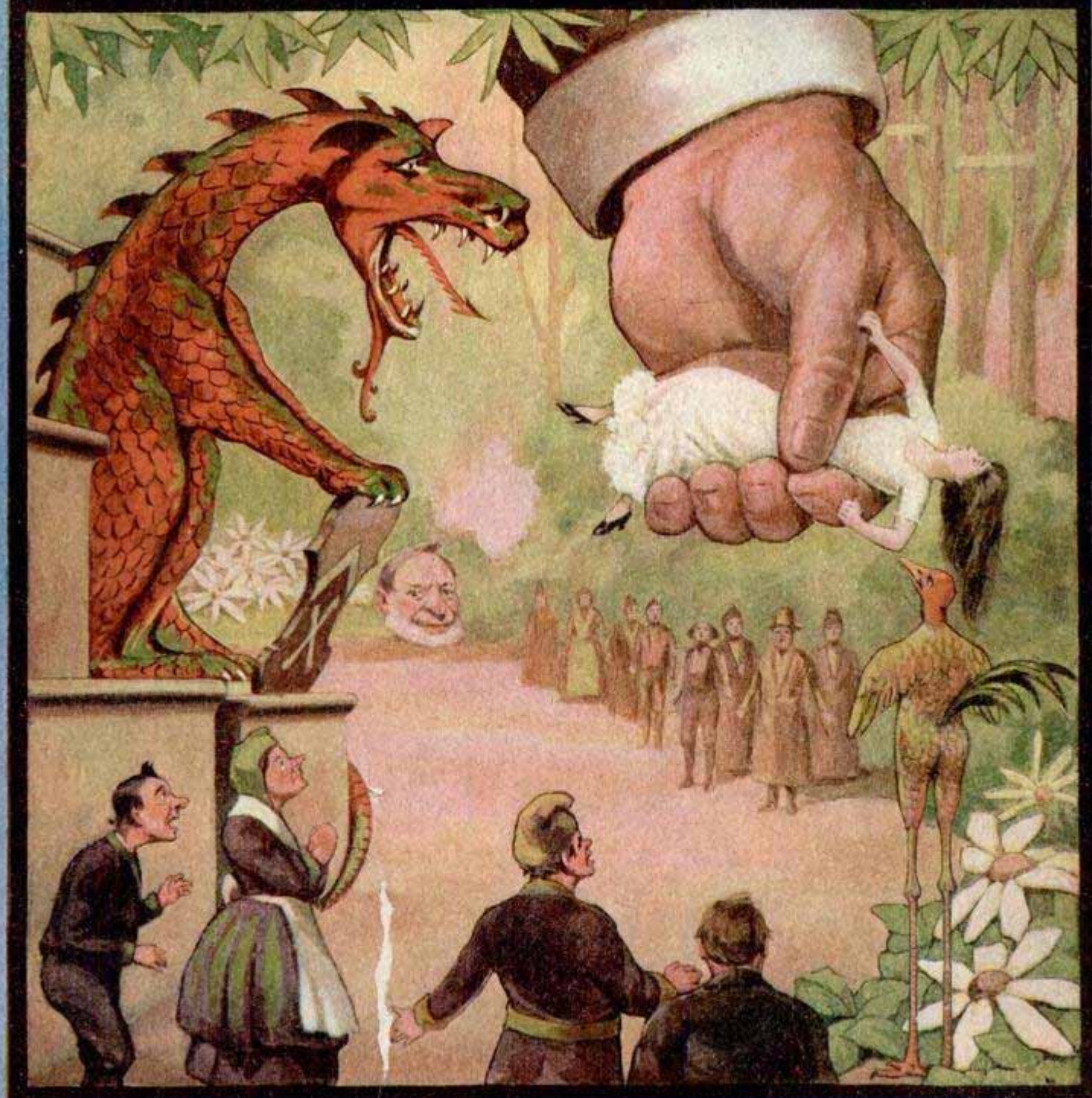


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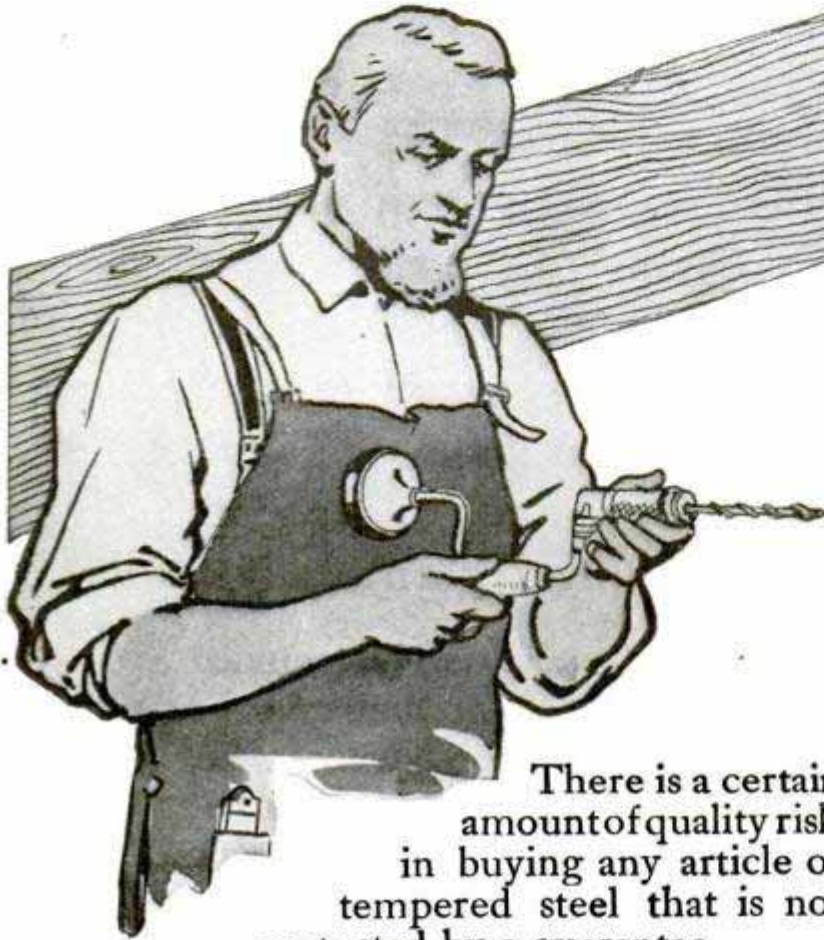
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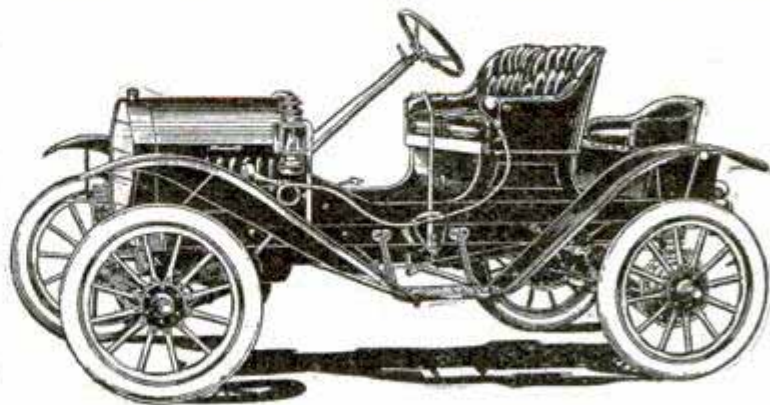
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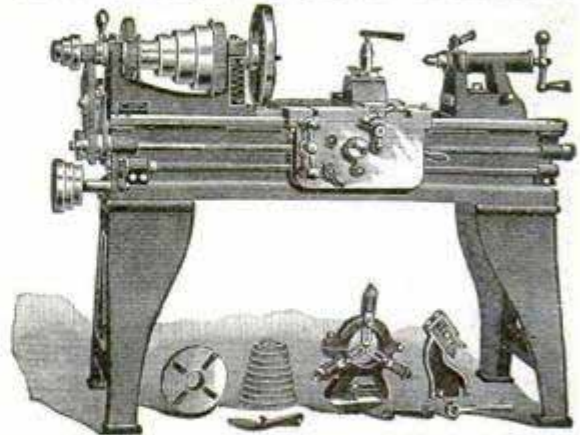
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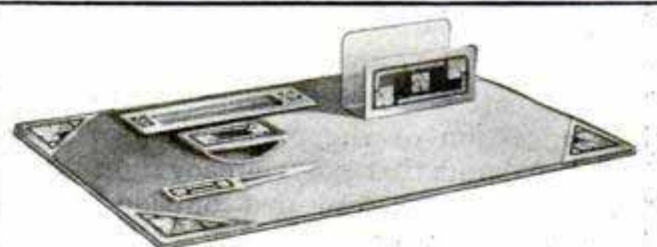
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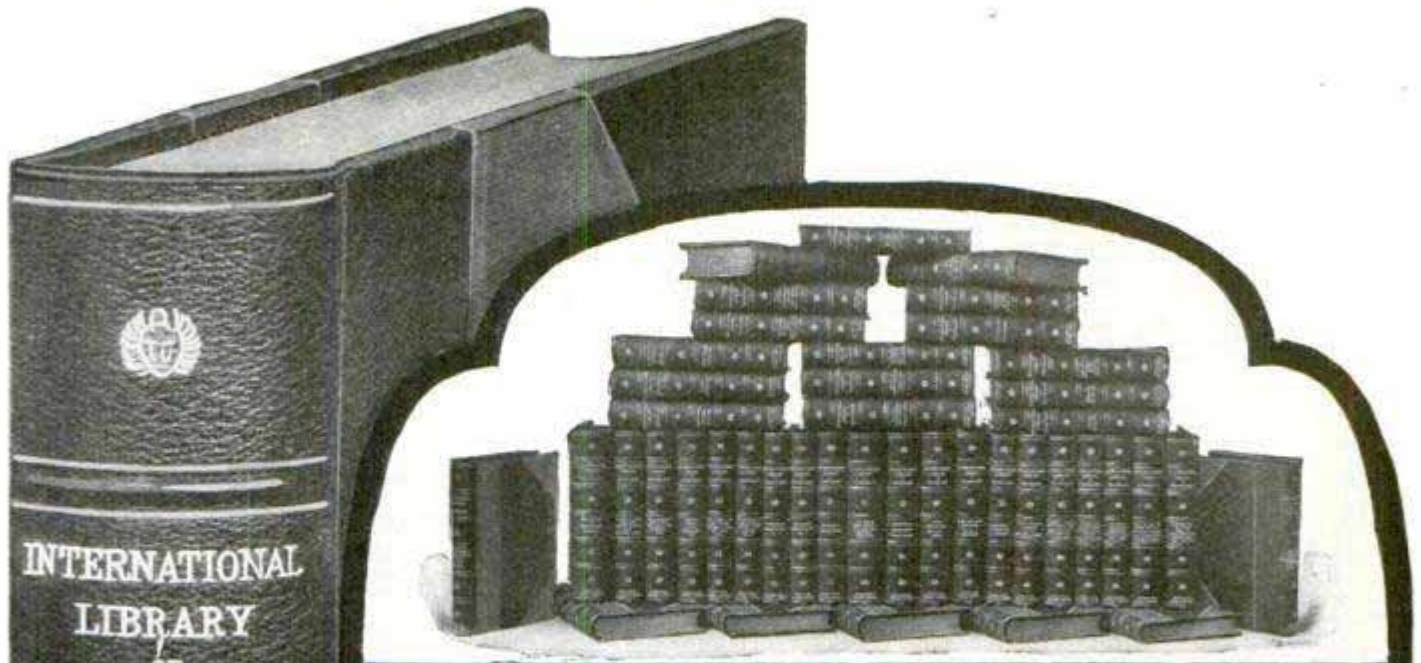
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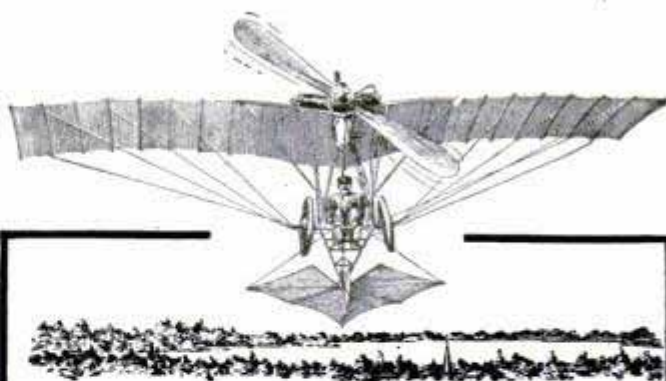
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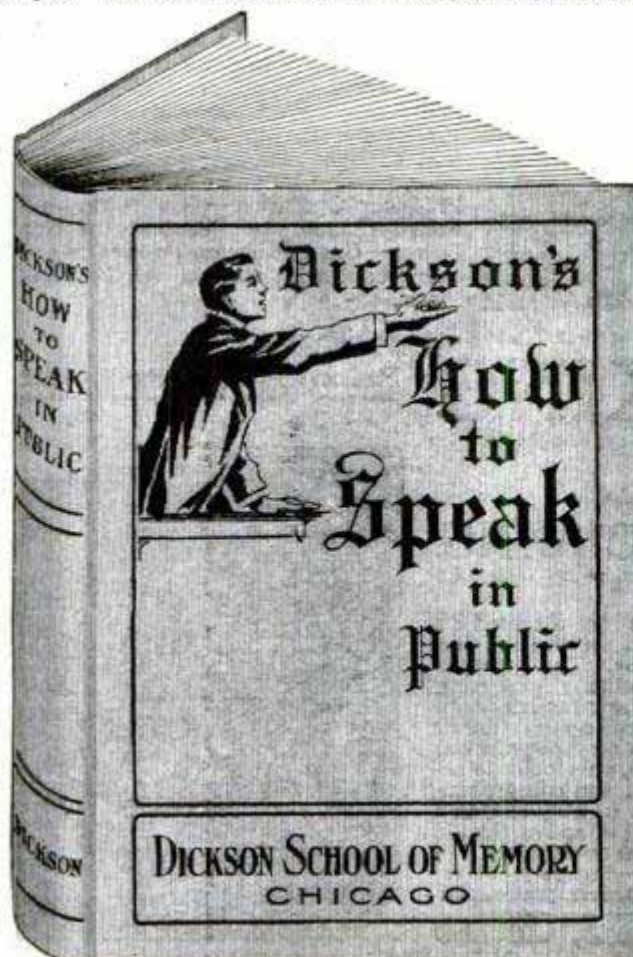
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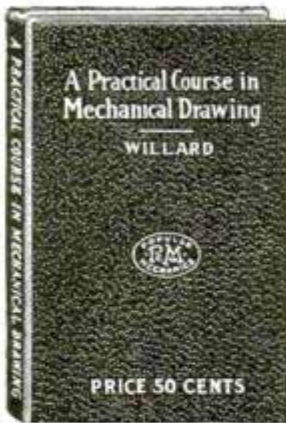
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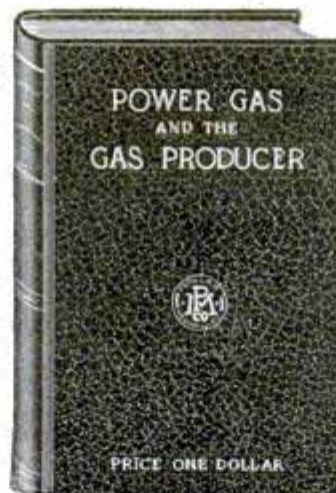
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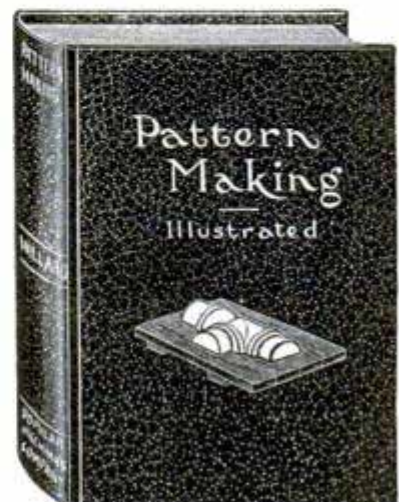
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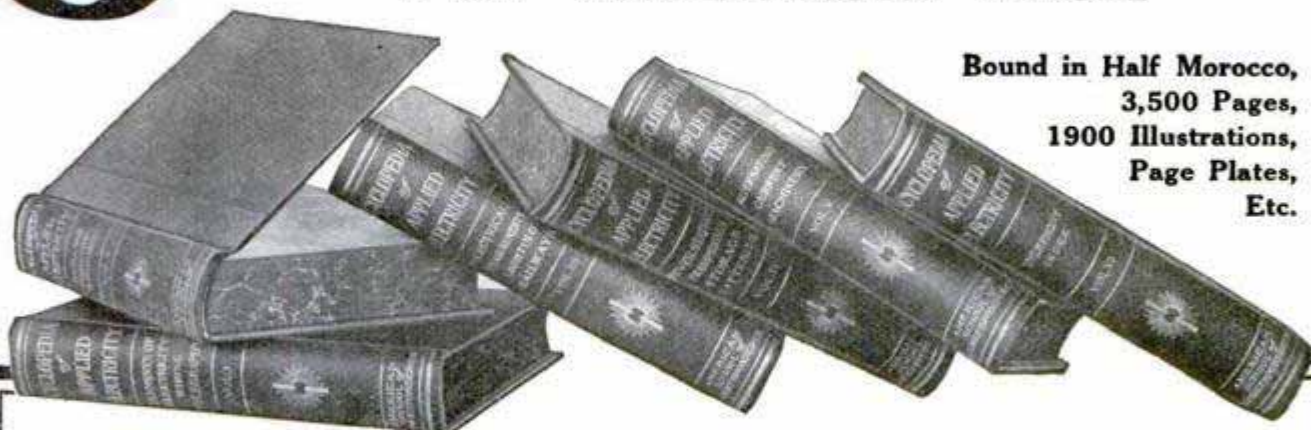
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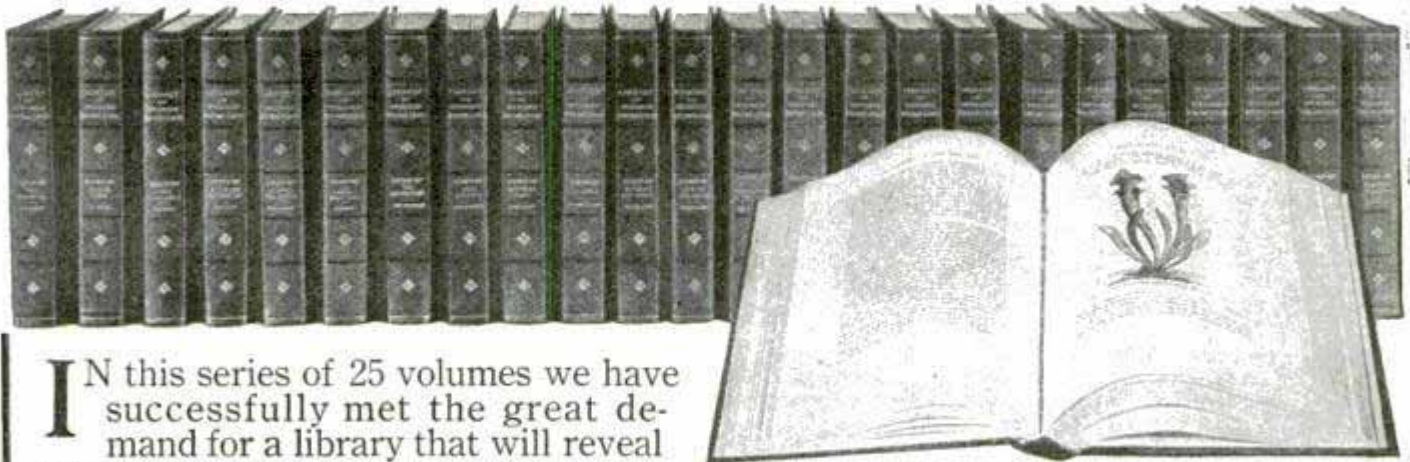
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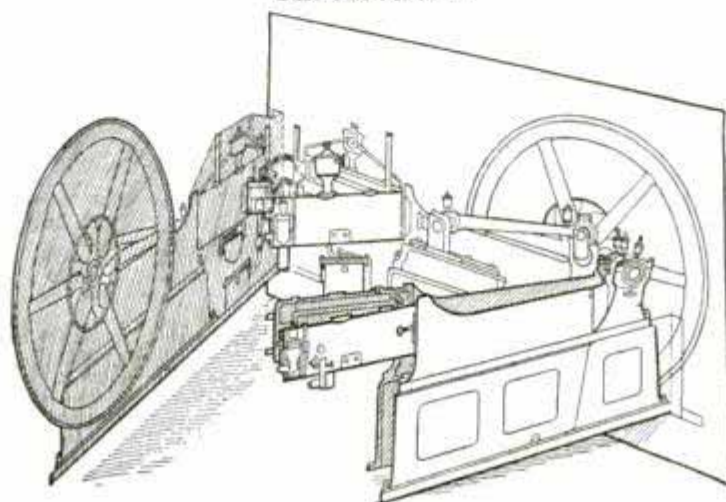
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SEND 10c FOR SAMPLE COPY of "The Circulating Journal," 200 M. O. names (all new) in book form free. Circulating Journal, 2441 Seventh Avenue, New York.

\$12 PER WEEK with spare-time Mail Order Business. \$1 starts you; particulars free. Jersey Supply House, Washington, N. J.

BE A HANDCUFF KING; make big money on the stage; all vaudeville circuits pay from \$50 per week up. I teach everything in this line. For particulars address, Box 902, Springfield, Mass.

INDEPENDENCE and fortune quickly attained in the Manufacturing Mail Order Business. I furnish formulas, manufacturing processes and trade secrets in all lines. Sold under a positive guarantee; 18 years' practical experience. Revision and improvement of formulas and processes; reduction of manufacturing cost; utilization of waste materials, etc., a specialty. Booklet, formula list and valuable information free. W. L. Cummings, Ph. D., 127 Standart St., Syracuse, N. Y.

BIG MONEY at amusement places with the device for testing batting strength. Send for catalogue. Wm. Sullivan, Richmond Hill, N. Y.

BE INDEPENDENT. Make "Dustless Dust Cloths" at home. Big profits. No special machinery. Formula and practical working instructions only 50c. Self-Help Bureau, Jackson, Michigan.

SEE advertisement under Agents Eagle Rubber Company.

BUILD A BUSINESS of your own and escape salaried drudgery for life. Learn the Collection Business. Limitless field; little competition. Few opportunities so profitable. Send for "Pointers" today. American Collection Service, 101 State St., Detroit, Mich.

I HAVE AN ARTICLE to manufacture at home that beats them all. 4c brings particulars. P. Benson, Stewartville, Minn.

START A MAIL ORDER BUSINESS of your own. Be your own boss. I made \$25,000 in two years with small capital to start. My booklet "Money Making Opportunities in the Mail Order Business" sent free. Address McKean, Dept. 356, No. 2232 Eighth Ave., New York.

PATENTS PROMPTLY OBTAINED. My free booklet will help you to fortune. Read pages 11 and 12 before applying for patent. Write today. Dean Swift, Washington, D. C.

LEARN THE TRUTH about Mail Order Business before buying "outfits." Important information and particulars for starting free. Mail Order Library, P. M. Tompkinsville, New York City.

WE START YOU in a permanent business with us and furnish everything. We have now easy selling plans and seasonable leaders in the Mail Order line to keep our factories busy. No canvassing. Small capital. You pay us out of the business. Large profits. Spare time only required. Personal assistance. Write today for plans, positive proof and sworn statements. J. M. Pease Mfg. Co., 1017 Pease Bldg., Buffalo, N. Y.

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

LIVE MEN: If you are making less than \$25 weekly, send your address quick. If you have a horse and buggy or bicycle you can use, all the better. We teach you. You can start right where you live. You owe it to yourself to investigate this opportunity and let us prove that we can better your condition. The Thomas Company, 962 Third St., Dayton, Ohio.

FORM A CORPORATION—Congress Law for D. C. and all States; cheap. Raise money easily; advice free. U. S. Legal Corporation, Washington, D. C. Representing \$1,225,000,000.

START A MIRROR FACTORY. We teach and trust you; 10c brings sample lesson; \$25 daily easily. Hullinger's Mirror School, 2, Francesville, Ind.

HOW TO JUDGE a patent. An "eye opener" for inventors. Sent free. Obed Billman, Cleveland, Ohio.

POSITIVELY BEST RIBBONS, three, \$1.10. See what I say under "Typewriters." Atchison.

WANTED

WANTED—Someone to manufacture Combined Penell Holder and Sharpener. Cut and description on application. J. H. Allen, 413 E. Broadway, Sedalia, Mo.

MANUFACTURERS—CALIFORNIA AGENCIES CO. want quick sellers. 635½ So. Hill St., Los Angeles.

SALE OR EXCHANGE

1908 INDIAN MOTORCYCLE for gasoline engine. English Motor Co., New Castle, Pa.

A 14 TO 16 H. P. Horizontal Steam Engine complete less boiler. E. F. Kuhn, Dunlap, Ill.

FOR SALE—Edison phonograph, double-barrel shotgun, coaster brake bicycle, kodak and outfit, also plating outfit. Want gasoline engine. Fred J. Kappler, 1146 22d St., Moline, Ill.

AGENTS WANTED

WEAR A STYLISH SUIT! Clothes Make the Man! The man who is admired is the well dressed man whose clothes are fashionable and are 1911 styles. You will be that man in your neighborhood! 1911 styles are just in. Get this suit—the swellest, classiest, snappiest style we ever created—and better your appearance! This is our idea: We want one man as our representative in your neighborhood. You've got a lot of friends. They wear clothes. It is the easiest thing in the world to get them to order their clothes from you. Prices, \$7.50 and up. Those orders mean a big business that more than doubles your salary, and the work is the easiest, cleanest, nicest occupation in the world. New representatives make \$5 to \$10 a day. You simply take the order and measurements and mail them to us. We make the clothes, ship them on approval to your friend and hand you the profit money. A regular cinch! That's the beauty of being in business for yourself. Sit right down now; write us a postal or a letter for the free outfit to representatives. And you get the swellest suit of fashionable, tailor-made, all-wool, 1911 clothes ever worn in your neighborhood. If your personal appearance and a big business is worth a postal or a 2-cent stamp to you, then act now—write us today. Address, American Woolen Mills Co., Dept. 468, Chicago.

MEN AND WOMEN—Particularly those employed in shops, factories, large office buildings, etc., wanted to introduce the best Hand Cleaner known among fellow workers; if you are earnest and honest we will trust you for the goods as needed; send names of two good people as references and 10c in stamps to help toward postage and show you mean business, and we will send you a pound can and letter of instructions, telling you how to commence taking orders at once; many are thus making upward of \$25 per month "on the side"; why not you? Quick-Klean Co., 505 Main St., Worcester, Mass.

I WANT A GOOD MAN to act as General Agent and District Manager, and appoint sub-agents for the sale of my Florida land. No experience necessary. I pay the general agent \$50 spot cash on every sale. My terms of \$5 a month for a 10-acre farm (no interest, no taxes) makes it possible to sell nearly everybody. \$200 in gold free every month to my best men. Also one grand prize of \$1,000 in gold coin. No capital required, but man must have a standing in his community and be willing to work. If you think you can fill the bill, send for my "Confidential Circular to General Agents," and "Selling Manual." Both free if you are the first to apply from your locality. E. C. Howe, 28 Hartford Building, Chicago, Ill.

SALESMAN AS LOCAL MANAGER to handle complete line of formaldehyde fumigators, liquid soap, floor oil, liquid wax, disinfectants and sanitary supplies. Goods used by U. S. government, New York Central and Pennsylvania R. R. The Formacone Co., 50 Church St., New York.

AGENTS—Biggest money-maker known. The new Canchester Incandescent Kerosene Lamp revolutionizes old lighting methods. Burns air, not money. Six times brighter than electricity, gas or acetylene at 1-10th cost. Burns with or without mantle. Burner fits any lamp. Saves 75% oil. No trimming wicks. Showing means selling. Territory going fast. Write today. Handsome outfit furnished. Canchester Light Co., Dept. P. M. 4, 26 State St., Chicago.

A PERMANENT CONNECTION with big pay awaits one responsible man in your section—following up leads and filling orders for fastest selling vacuum cleaner made. Send postal for special offer today. Hercules Mfg. Co., Rochester, N. Y.

ATTENTION—\$1,000 reward paid any one that fails to merge one pint of milk into one pound of butter in two minutes with our new patent machine, weighs six pounds, sells for \$3. Write for illustrated circulars, credit terms, 25 sworn testimonials and agents' prices. Family Butter Merger Co., Indianapolis, Ind.

KEROSENE MANTLE LAMPS. America's largest variety and lowest prices for guaranteed goods. Agents, who know, say our burners and mantles are the best on the market. Guilford Co., Seville, Ohio.

READ THIS. \$5 daily with only \$1 capital. Very new. Costs 10c or less. Sells for \$1. Week's supply carried in pocket. Sample, 2 cents. A. M. Hayes, Medford, Mass.

GERMAN SILVER KEY CHECKS—Steel letters for marking same, key rings, etc.; over 30 styles. Agents wanted. Sample marked with your name and address, and key ring, 15c. Pease, Die Maker, Winchester, N. H.

AGENTS—BOTH SEXES—We control a specialty never placed on market before. Not for sale in stores. Particulars free, sample, 15c. LeRoy Specialty Co., 76 Park place, room 52, New York.

GENERAL AGENTS WANTED to sell post cards through our original trust scheme method. No talking required. Big profits. Sample package, 10c. Holmes Novelty Co., Holmes Park, Mo.

WANTED—By New York manufacturer, several energetic sales agent to make market a proposition of merit. An exceptional opportunity for a few men of ability; give reference. Trow Mfg. Co., Dept. 29, 51 Leonard St., New York

KEENEDGE RAZOR hone; latest discovery; over-honing impossible; all shavers will buy; 100% profit. Sample, 25c. Particulars free. Ideal Mfg. Co., Toledo, O.

AGENTS—Ask what we have good to sell; if we don't demonstrate that we have "winners" we'll "shout." Hood Mfg. Co., Boston.

AGENTS 300% PROFIT; sell perfumes and toilet preparations direct from factory to consumer; catalogue and samples, 25c. G. Holly Manufacturing Company, 8 S. 13th St., St. Louis, Mo.

SELECTED OPPORTUNITIES. Send name and give reference. Reliable Sales Co., Box 768, Buffalo, N. Y.

AGENTS WANTED—\$5 to \$25 per day selling our automobile specialty; send for free particulars today. Mitchell Specialty Co., Houston, Texas.

SALESMEN—\$50 to \$100 a week selling our specialty; all classes of business buy large quantities, pocket sample; great side line. Wittl Volpianes, Chicago, Ill.

AGENTS make \$5 to \$25 per day easy selling our automobile specialty; particulars free; write today. F. J. Schoen & Co., Pocatontas, Mo.

\$100 MONTHLY and expenses to trustworthy men and women to travel and distribute samples; big manufacturer. Steady work. S. Scheffer, Treas., M. O. 125, Chicago.

400% PROFIT SELLING GORDON Photo Pillow Tops. High grade work. Samples and catalogue free. Luther Gordon Co., 171 Washington St., Chicago.

AGENTS in every city and town; best selling automobile specialty; large demand for goods; success assured; start at once. The Rich Jones Co., Georgetown, Del.

MEN and women agents to handle proposition which sells at sight; two to six in almost every home. Particulars free. C. F. Orbin, Kanona, Kan.

AGENTS—DUSTLESS DUST CLOTHS sell on sight. Every housewife wants one. 100% profit. Sample, 25c. Write for full information and free catalogue. Address, Floor Clean Co., 1443 W. 37th St., Chicago.

AGENTS; 100% profit. New patented awl. Sews harness, shoes, grain bags, anything. Sample free to workers. A. Mathews, 1262 Third St., Dayton, Ohio.

THE NOEL KEROSENE MANTLE LAMP beats electricity, gas or gasoline. The most economical light to burn. A whirlwind seller. Customers delighted. Agents write for territory. John S. Noel Co., 19th St., Grand Rapids, Mich.

YOU CAN MAKE BIG MONEY selling Portable Fence right. Every farmer needs it. Write B. Stambaugh, Woodboro, Md., for particulars.

WANTED—AGENTS everywhere to sell our Automobile Specialties; \$5 to \$25 daily; particulars free. Write today. The Warren Supply Co., Box 50A, Station N, New York.

AGENTS sell new patented rake attachment to lawn owners. Sample, 50c. Kummer, Box 25, Minneapolis, Minn.

AGENTS—LADIES, GIRLS, MEN, BOYS. Big profit. Sell and advertise toilet specialties. For particulars, Dr. Michaelis, Mariette, Wis.

SMALLEST ALARM CLOCK and Bible in world, 10c each, prepaid. W. H. Garner, A. 119 South Lafayette St., Evansville, Ind.

AGENTS, sell our electrocure; something new, great seller, good profit. Good for rheumatism, etc. The Edgar Mfg. Co., 104-E-2 Hanover St., Boston, Mass.

WANTED—AGENTS, advertisers, mail order dealers, salesmen, showmen, crowd workers, to send us their name and address and receive free particulars of over 50 different plans to make money. Address, Stark Co., Whiting, Ind.

ONE MILLION AGENTS WANTED; fast seller costing 5c, selling 50c. Every firm needs. Orders to \$50. Postal brings samples. Embossed Co., 2497 Milwaukee Ave., Chicago.

AGENTS WANTED—Rubber stamps and novelties. Send 4c for full particulars. A. S. Mankin & Co., Alexandria, Va.

SEND FOR AGENT'S OUTFIT and \$10 watch. No money required. Ogden Jewelry Co., Dept. 95, Chicago.

\$25 WEEKLY and expenses to men and women to collect names, distribute samples and advertise. Steady work. C. H. Emery, M. J. 25, Chicago, Ill.

AGENTS WANTED to sell our beautiful scripture wall mottoes. Frank Shilling Co., Navarre, Ohio.

SEND YOUR ADDRESS, and we will mail you our catalogue of 750 quick sellers. Over 3,500 guaranteed articles beautifully illustrated in our 4 free catalogues. \$500 prize contest this month. A. W. Holmes & Company, 151 Broad Street, Providence, Rhode Island.

GET WISE. REPRESENT the manufacturer direct. Modern self-heating irons, safety iron stands, etc. Sell on sight, 100% profit. Enclose 10c for sample lock. Write catalogue "P." Modern Specialties Mfg. Co., Milwaukee, Wis.

COLLECT NAMES, information, etc., for business concerns. Steady, profitable home business. Instructive booklet for stamp. Information System, 241, Marietta, Ohio.

AGENTS—Improved specialty for automobile owners; quick seller, big profits; illustrated booklets; write today. River Supply Co., Coldwater, Mich. Desk 1.

GET OUR AGENTS' PRICES; calling cards; flashlights; household necessities. Lartz, 1947 Orchard, Chicago.

AGENTS—To sell the "Gem" pocket rule holder in every shop; new invention; just out; sell on sight. New Invention Co., Box 1008, Wilmerding, Pa.

\$10 PER DAY—Legitimate substitute slot machine; sells like wildfire. \$1 sample free; secure territory now. Sidney Game Co., Sidney, N. Y.

AGENTS WANTED—New system bookkeeping. Sample, 40c postpaid. Order today. G. S. Taylor, Jamestown, N. J.

BE AGENT FOR US in your shop, factory or mill. Globe safety razor and 6 blades, retails 50c. Money back guarantee; profit 100%; sample, 30c. Big cutlery catalogue sent free to you with terms and special proposition. Write today. Millgot Sales Co., 800 National Union Bldg., Toledo, O.

AGENTS—You can make \$10 a day selling our new high grade original Air Brush Design Show Cards to storekeepers; 350 varieties. Catalogue free; sample, 10c. People's Show Card Concern, 711 W. Madison St., Chicago, Ill.

MORE MONEY! Lots of money! Agents! And general Agents! Quickest selling 25c article with beautiful premium. Unique selling plan which pulls orders. Send 10c for sample; handsome premium, circulars, prices, etc. Litholia Pm. Co., 1133 Broadway, N. Y.

GET A NOBBY EASTER SUIT. All of your friends wear clothing; why not make them buy their suits from you? You can save money for them and double your income. Don't say you can't. Send us an order for a suit for yourself. Wear the suit—that is all you have to do. You will be surprised how easy it is to take orders when you prove to your friends that you can furnish them with clothing "made to measure" for less money than they are now paying for ready made, out-of-date clothing. They must buy from you in order to get our exclusive styles, weaves and fabrics—the swellest, finest suits ever made. Take two or three orders and your profit will pay for your own suit. Easy to take measures with our instructions. We furnish a portfolio containing 60 handsome samples and show 30 different styles of coats, and all necessary stationery and information that will start you at once in a profitable, pleasant business. We guarantee to give you a perfect fit. You run no risk. We ship on approval, subject to 24 hours' examination. Your customers must be satisfied with style, fit and quality before paying. And don't forget—we pay the express on everything. Send us your application today if you want to represent us. Don't delay or someone else will take advantage of this great opportunity. Write today—a postal card will do. Paragon Tailoring Company, Dept. 11, Chicago.

ONE ALADDIN MANTLE LAMP AGENT made \$700 in 60 days. Another sold \$50 on money-back guarantee and not one was returned. Burns kerosene (coal oil). Brighter than electricity. Sell themselves on over-night trial. Improved 1911 line is finest in world for homes, offices, public places. Guaranteed. Ask nearest office for agency proposition. Mantle Lamp Co., Desk 367, Chicago, Portland, Ore., Waterbury, Conn., Montreal, Winnipeg, Can.

OUR STARTLING NEW INVENTIONS. Saxonia Spark Gas Lighter; cheaper than matches; Vacuum Cleaner, cheaper than brooms; Incandescent Kerosene Mantle Lamps, cheapest and best light known. Quick sales and large profits. U. S. A. Lighting Co., Box G, Springfield, Mass.

AN ADDING MACHINE costs \$300. Just think—we will mail a sample of our Lightning Multiplier, with special terms to agents for 10c. Simplicity Co., 420 Ashton, Grand Rapids, Mich.

SALESMEN—Making small towns—Just what you want for pocket side line. Consigned goods, new, snappy, catchy; good profits, prompt commissions and quick shipments; write for order book today. Canfield Mfg. Co., 208 Sigel St., Chicago.

SMALLEST BIBLE ON EARTH; illustrated; size of a postage stamp. Fast seller. Agents wanted; sample 10c. Ideal Book Co., 719 5th Ave., Grand Rapids, Mich.

AGENTS, BOTH SEX, TO SELL comfort shoes. Good profits. Ideal Shoe Co., Boston, Mass.

BOKARA DIAMONDS—Agents, everyone to wear and sell our famous Bokara diamonds. Write for sample offer and catalogue free. Northwestern Jewelry Co., 52 Northwestern Bldg., Chicago.

AGENTS easily make \$25 to \$100 per week with Greatest Labor Saving Invention. If you are out for the money, send time for three samples, wholesale prices, and unique selling plan which is a winner and money getter. Eagle Rubber Company, 213 East Tenth Street, New York.

WANTED—AGENTS—7 CENTS PROFIT EACH 10c sale; best little article ever offered; sample for 3c in stamps. Rawlings, Box 945, St. Louis.

DON'T ENVY THE MAN who earns big money. Here is your opportunity for all or spare time. Send 25c for sample and particulars. Leary & Munro, 1219 Fillmore, San Francisco, Calif.

AGENTS—Over 500% profit. Gold sign letters; sell everywhere; sample free. Johnston Co., Quincy, Ill.

AGENTS WANTED for "Sander" Vacuum Cleaner. Works like a carpet sweeper. Revolving of wheels does the pumping. Powerful. Catalogue free. Fred. Sander, Malden, Mass.

SIDE LINE SALESMEN to sell high class article to Banks and Merchants as advertising souvenirs. Good men make \$50 weekly in commission. Territory open. Sample free. C. Kopp & Sons, 557 Lakeside Building, Chicago, Ill.

BULLY! GREAT! IMMENSE! That's what all our agents say after selling our attractive 1911 combination packages of soap and toilet articles with valuable premiums. 100% to 300% profit. One Michigan agent made \$65 in 47 hours; another \$21 in 8 hours; another \$22.50 in 10 hours. Act now—not tomorrow. Davis Soap Works, 264 Davis Bldg., 1429 Carroll Ave., Chicago.

AGENTS make big money selling our new gold letters for office windows, store fronts and glass signs. Any one can put them on. Write today for free sample and full particulars. Metallic Sign Letter Co., 406 N. Clark St., Chicago.

DO BIG SPRING and summer business selling new and winning invention. Over 250,000 sold during 1910; 50,000 first two months 1911. Nationally advertised—a necessity in every home. Preston Hurmon writes: "Secured 110 orders first week." Quick sales, large profits, exclusive territory; attractive samples furnished; credit given. The Progress Company, 911, 210 Monroe St., Chicago.

PICTURE AGENTS—Portraits 25c, frames 14c, pillowtops 35c. Photographic china plates 65c. Our new "Negro Angel" and Jack Johnson pictures get the coin. Samples and catalogues free. Berlin Art Association, Dept. 76, Chicago.

AGENTS WANTED—To sell rich looking imported 36x68 rugs at \$1 each. R. H. Carter, Milan, Tenn., sold 115 in 4 days; his profit, \$51. You can do as well. Write for sample offer and unique selling plan; exclusive territory. A. Condon, Rug Importer, Stonington, Maine.

AGENTS—NEW INVENTION. Revolving rubber heels—Anyone can put on instantly. Heels never run over—never slip—half the price—three times the wear of any other. Sell for 25c pair; 200% profit. Sell like wildfire—every one wants them. Lambert Rubber Co., 1270 Washington Blvd., Chicago.

\$\$\$ SPARE TIME \$\$\$ Earn \$10.00 to \$15.00 a week during spare time. You can do it. Start a Mail Order Business right from your own home, city, town or rural district. We, as manufacturers, have new easy selling plans for you as our Mail Order Dealer to co-operate with us and keep our factories busy. We carry the stock, reasonable leaders, no canvassing. Small Capital. You pay us out of the business. Large profits. Experience not necessary. Do not work and slave for others, helping them to build fortunes but get wise, make it yourself. We show you how. Write me today for Free Plans, positive proof and sworn statement. J. M. Pease, Pres., J. M. Pease Mfg. Company, Dept. A, Pease Bldg., Buffalo, N. Y.

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

AGENTS—Improved specialty for automobile owners; quick seller; big profits; illustrated booklets free; write today. The Chaddock Specialty Co., Box 388, Polo, Ill.

AGENTS: Send for free booklet, inside information on the agency business. Filled with money making plans. Pointers and experience of thousands of successful agents. Address: J. M. Finch, 1162 3rd St., Dayton, Ohio.

AGENTS earn \$25 to \$50 weekly selling our latest styles beautiful braided waists, and dresses, Mexican drawn work, petticoats, various embroideries. Catalogue free. National Imp. Co., Desk 27, 699 Bway, N. Y.

FREE GOLD SAMPLE goes with first letter. Something entirely new. Every firm wants it. Orders \$1.00 to \$100.00. Nice pleasant business. Write today. Metallic Mfg. Co., 406 N. Clark, Chicago.

ACTIVE MEN OR WOMEN to work individually or organize and direct selling crews on patented gas cooking appliance. Saves fifty per cent. Exclusive territory and 100% profit. A. F. Decker, Sales Manager, 37 E. 28th St., N. Y.

AGENTS—\$1.00 hourly. One handed flour sifter. Just patented. Only one in the world. Sample free to workers. Ebright Mfg. Co., B 307, Columbus, Ohio.

AGENTS—Sell the Pinless Clothes Line. A labor-saving invention; sells on sight; write quick; exclusive territory; \$25 to \$75 weekly; freight prepaid; sample 25c. Pinless Clothes Line Co., 558 Lumber Exchange, Portland, Oregon.

BECOME A MANUFACTURER'S AGENT. We manufacture hosiery which outwears 3 of the ordinary kind, replaced free when hole appears. Easy sales; large profits. First reply obtains agency your city. Triplewear Mills, Dept. D, 724 Girard Ave., Philadelphia, Pa.

PATENTS PROMPTLY OBTAINED. My free booklet will help you to fortune. Read pages 11 and 12 before applying for patent. Write today. Dean Swift, Washington, D. C.

USEFULTES Sc. Stewart, San Jose, Cal.

AGENTS—\$50 weekly; we manufacture the best needle case made; a wonderful seller; 200 to 500 per cent profit; talking unnecessary; our copyrighted "Trust Scheme" Envelopes do the work; general agents can make over \$100 weekly; send 10c for a 25c sample containing 115 needles; particulars free; buy direct from the factory at wholesale. Paty Needle Co., 102 Union Sq., Somerville, Mass.

AGENTS—WE MANUFACTURE GLASS PAPER. Plain glass windows made to look like real stain glass; something new; easily applied; big money maker; two sample sheets of paper, with catalogue in colors and discount sheet, for 10c. S. H. Parrish & Co., 216 S. Clark St., Chicago.

AGENTS—100% profit. Combination monkey-wrench, plumber's pliers, 15 tools combined. Lightning seller. Sample free. Forshoe Company, Box 1335, Dayton, Ohio.

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

AGENTS—Portraits, 35c; frames, 15c; sheet pictures, 1c; stereoscopes, 25c; views, 1c. 30 days' credit. Samples and Catalog free. Consolidated Portrait, Dept. 1198, 1027 W. Adams St., Chicago.

AGENTS—HANDKERCHIEFS, DRESS GOODS, Carleton made \$8 one afternoon; Mrs. Bosworth made \$25 in 2 days. No experience needed. Free samples. Credit. Freeport Manufacturing Company, 59 Main St., Brooklyn, N. Y.

WIDOWS, Ladies, Men. New. Interesting. Profitable, easy work. Spare time or permanent. Sell our useful specialties. Our original selling plan will double your sales. Particulars and \$2.00 premium offer free. Fair Mfg. Co., HF51, Racine, Wis.

MEDALLIONS SELL AT SIGHT. 300 per cent to 500 per cent profit. Make up your own goods and be independent. "It's easy." Catalog free. Fred Resag Co., 1205 W. Randolph St., Chicago.

AGENTS—\$3 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 462 Third St., Dayton, Ohio.

AGENTS—Sell our Yankee Self-Wringing Mop and make \$4.00 to \$10.00 daily; we also manufacture 500 other fast sellers; particulars free. Scheff Co., 1637 Wells St., Chicago.

AGENTS—\$1.00 hourly. One handed flour sifter. Just patented. Only one in the world. Sample free. Forshoe Mfg. Co., B, 1535, Dayton, Ohio.

AGENTS—\$75 monthly. Combination Rolling Pin. Nine articles combined. Lightning seller. Sample free. Forshoe Mfg. Co., Box 535, Dayton, Ohio.

HELP WANTED

WANTED—One good man in each town to take orders for made-to-measure clothes. Up-to-date styles, very low prices; orders come easy. High-class permanent business; fine profits; \$5 a day and up. No money or experience needed. We ship on approval, express prepaid, and guarantee perfect fit. Write for free sample outfit and inside price on suit for yourself. Banner Tailoring Co., Dept. 685, Chicago.

IT PAYS TO GO "up in the air." No salary limit for aviators. We teach you to design, build and fly aeroplanes. Special course to out-of-town students. We need competent aviators in our exhibition department. Can place you with exhibitors and manufacturers. Write for booklet, Dept. G, Chicago School of Aviation, Chicago.

\$3,000 to \$10,000 YEARLY in the Real Estate business, without capital; we will teach you the business by mail, appoint you special representative in your locality, of leading real estate company, list with you readily salable properties, co-operate with and assist you to permanent success; a thorough commercial law course free to representatives. If you are honest and ambitious, our free 62-page book will surely interest you. Address, International Realty Corp., Dept. 1434, Chicago, Ill.

I WOULD LIKE TO hear from hustlers who want to turn their spare time into money. No canvassing, but a straightforward, legitimate mail-order proposition. Send stamp for particulars. J. Eakin, 881 W. Delavan Ave., Buffalo, N. Y.

WANTED—Salesmen, all or part time, selling hardware, paint, oil and mill trades; commission or salary. The Alcatraz Co., Richmond, Va.

MEN WANTED—Age 18-35, for firemen \$100 monthly; and brakemen, \$80, on all railroads. Experience unnecessary; no strike. Positions guaranteed competent men. Promotion. Railroad employing headquarters—over 400 men sent to positions monthly. State age; send stamp. Railway Association, Dept. 89, 227 Monroe St., Brooklyn, N. Y.

BOILER ROOM SPECIALTY. Leading manufacturer wants an exceptionally high grade salesman, capable of selling \$100 specialty to large power plants. Minimum commission \$25 on each sale. Ladd, 885 Niagara St., Buffalo, N. Y.

MEN MAKE MONEY after reading book containing thousand secrets. 25c. Write today. The Barstow Co., 514 23d St., Oakland, Cal.

WANTED—A man or woman to act as our information reporter. All or spare time. No experience necessary. \$50 to \$500 per month. Nothing to sell. Send stamp for particulars. Sales Association, 601 Association Bldg., Indianapolis, Ind.

WANTED—Reliable man or woman in every city to advertise, deliver and collect; steady position; \$20 weekly easily made; experience unnecessary. Dexter Co., 334 Dearborn St., Chicago.

PINLESS CLOTHESLINE AGENTS coin money. Sample prepaid. 25c. 503 Lumber Exchange, Portland, Oregon.

WANTED—COMMISSION SALESMAN calling on offices and factories to sell a line of filing cabinets and work benches. Henry Rowe Mfg. Co., Newaygo, Mich.

CASH FOR NAMES, formulas, information and ideas. Steady profitable home business. Big instructive booklet free. Information System, 242, Marietta, Ohio.

WANTED HIGH GRADE MECHANICAL ENGINEER as master mechanic of large manufacturing concern; must understand construction, mechanical and electrical engineering work and in general thoroughly understand and be capable of taking entire charge of this class of work. State fully experience, references, and age. Address, W. K., 223 Washington St., 6th floor, Chicago.

FREE! FREE!—A complete course in Show Card and Sign Writing to those purchasing small assortment of "Litholia," ready to use colors for show card writing and artists' use. Great opportunity to earn big salary, or establish money-making business. Information free. Litholia Pm. Color Co., 1133 Broadway, New York City.

WANTED—DISTRIBUTORS of advertising matter everywhere. Oliver P. Barkley, Mount Pleasant, Pennsylvania.

SEE ADVERTISEMENT under Agents Eagle Rubber Company.

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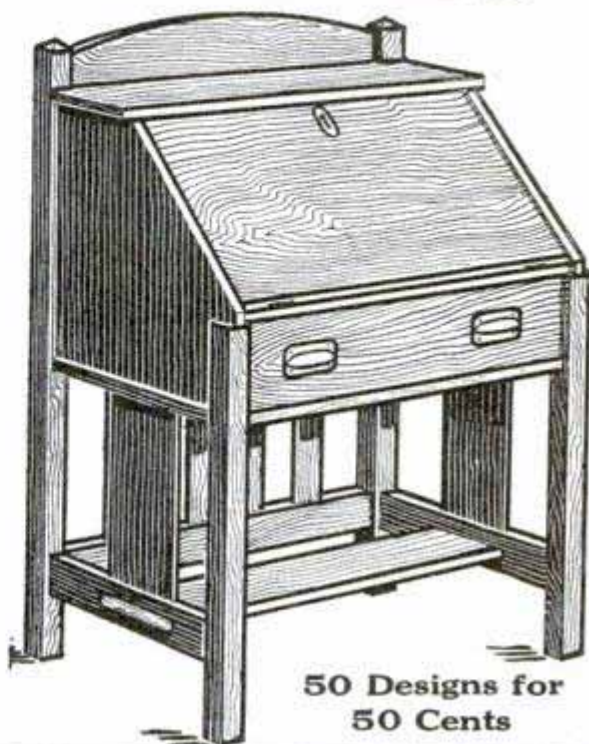
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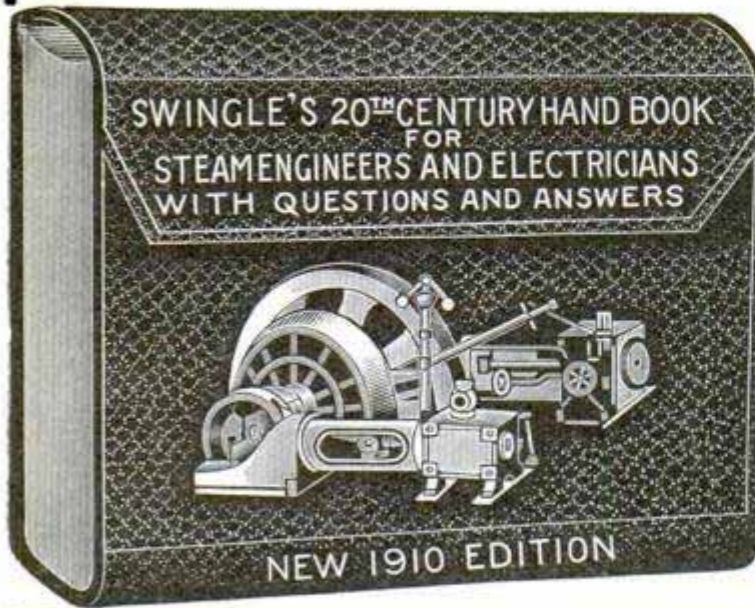
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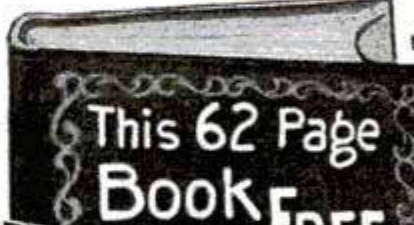


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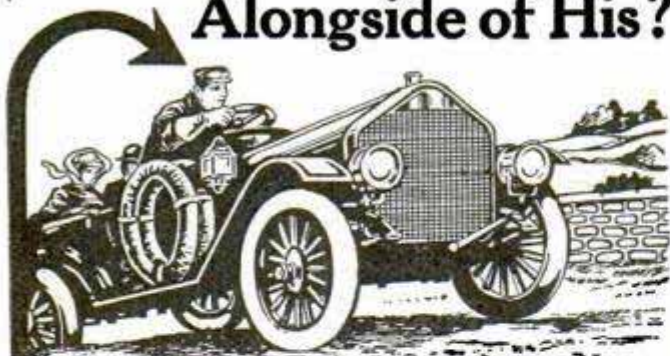
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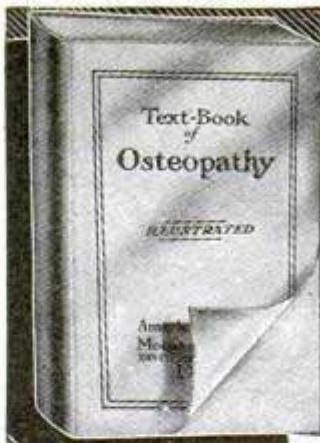
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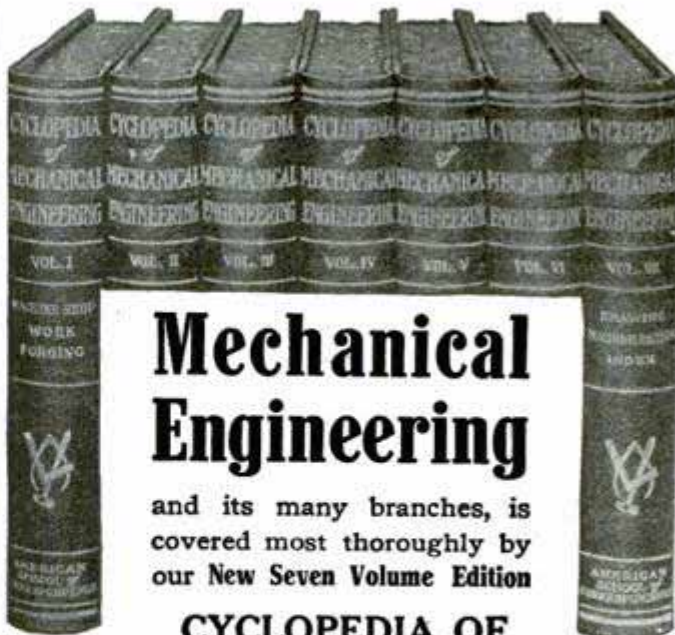
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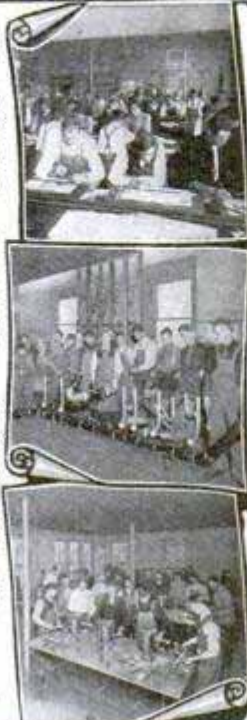
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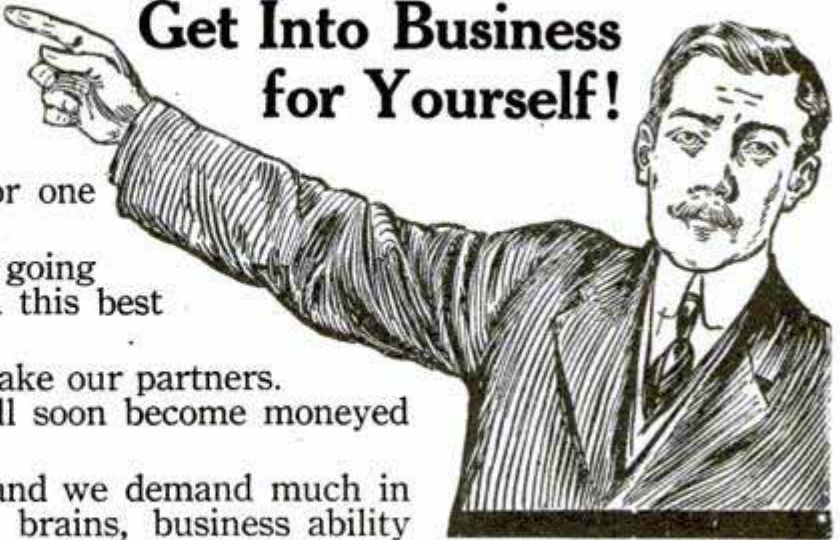
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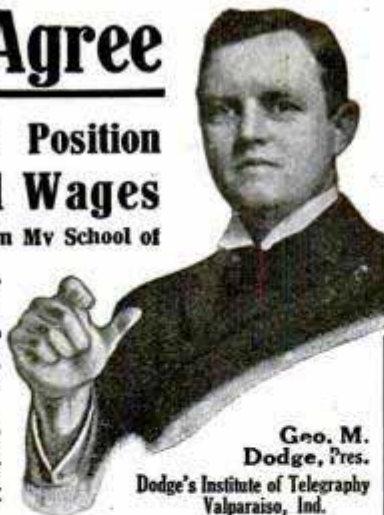
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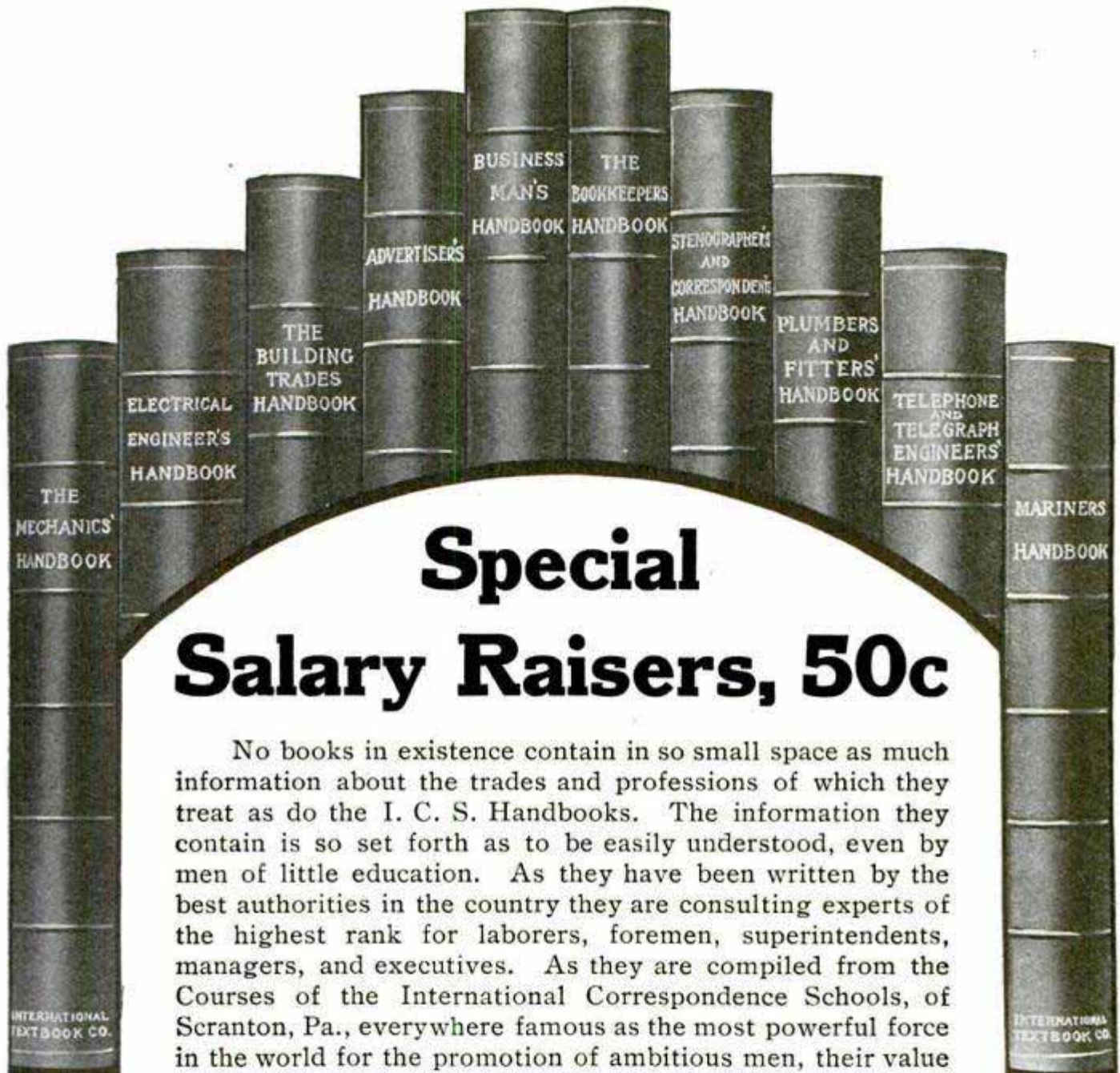
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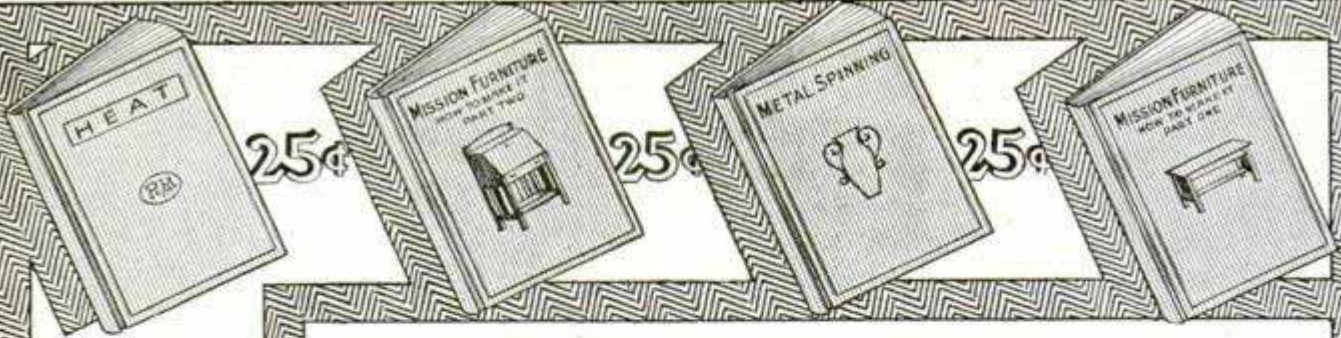
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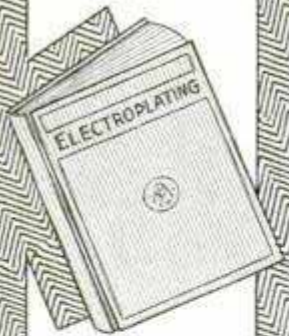
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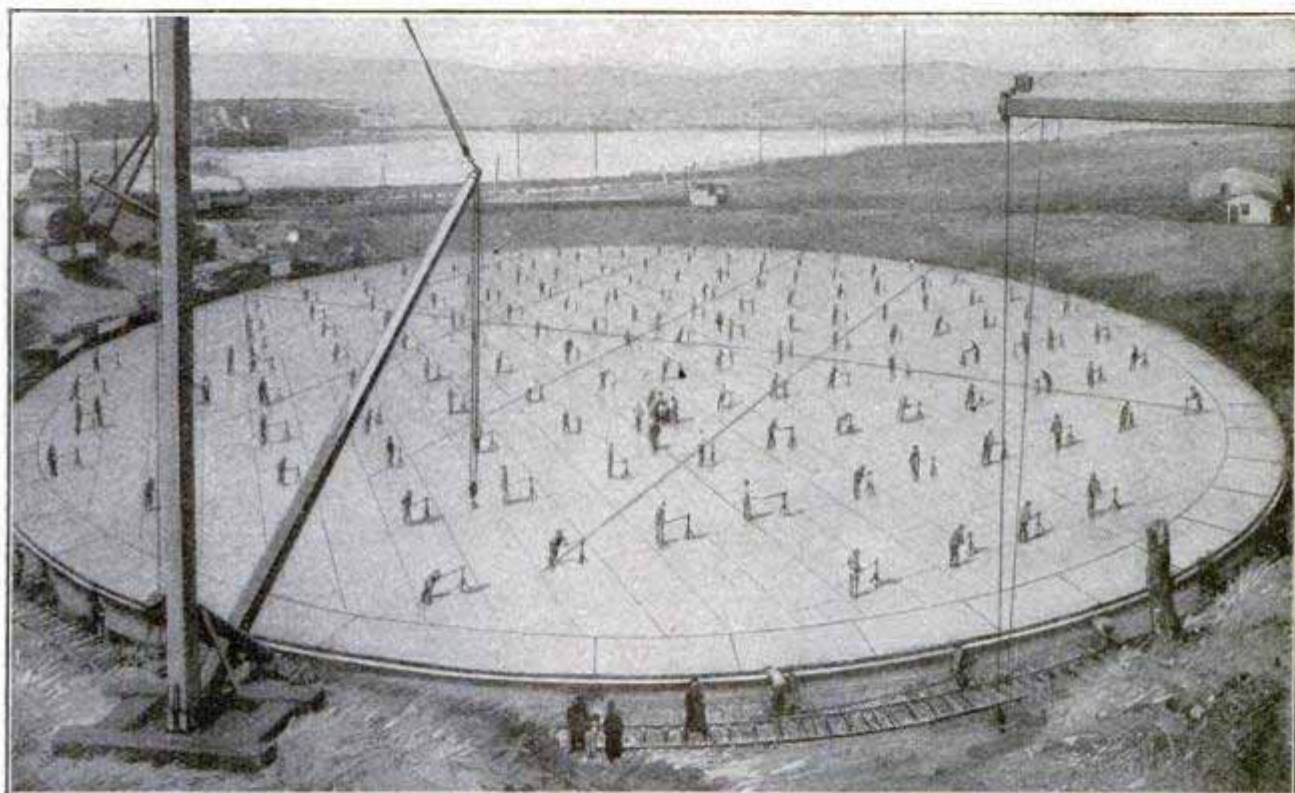
Vol. 15

APRIL, 1911

No. 4

LOWERING 300 TONS BY HAND

By E. F. STEARNS



How the Bottom of the Largest Gas Holder in the World, Weighing 600,000 Pounds, was Lowered into Position by 184 Men with Jacks

TO move by hand power alone a solid circle of metal 250 ft. in diameter and weighing about 600,000 lb. might reasonably be considered impossible; yet that is what was recently accomplished by lowering into its permanent position the bottom of the world's largest gas holder, which is being constructed at Kingsbridge for the Consolidated Gas Company of New York City.

The bottom was built of plates $\frac{3}{8}$ in. in thickness up to the outer course, where $\frac{5}{8}$ -in. plates were used; and since the riveting plainly could not

be done while resting upon the level concrete foundation which had been prepared for the bottom, it was assembled upon blocking at an elevation of 30 in. The construction of the enormous disk completed, the proposition was to lower it into place so evenly that no undue strain would come upon any one spot, and at the same time to use apparatus of such character that none of the machinery would be caught under the bottom at the end of the operation.

To this end 184 jackscrews of a type developed through years of experience

for this specific purpose were distributed around the rim and at 15 by 20 ft. intervals over the entire area. The screws were of 2-in. diameter and two



The Jack by Which the Man is Standing is the Type Used through the Holes in the Bottom of the Tank. The Jack at the Right is the Type Used at the Rim.

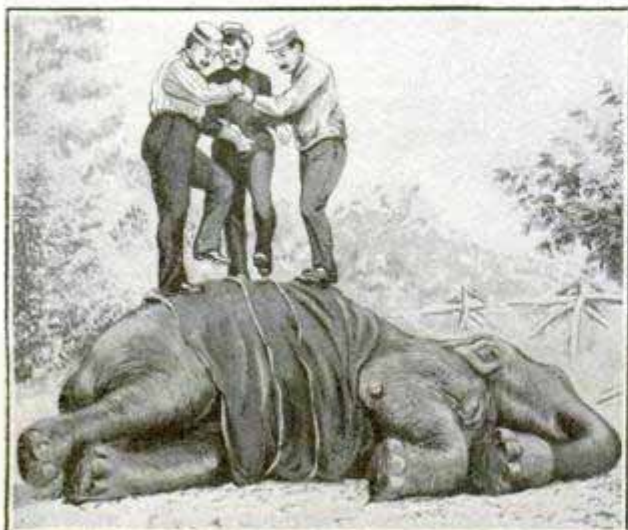
different styles were used. The type used over the surface passed through 7-in. round holes, cut in the bottom, and rested upon 6-in. circular plates on the concrete foundation. Around each screw was a threaded collar, from which were hung two steel straps, these being fastened to short pieces riveted in turn to the plate itself, so that the entire bottom was suspended from the jackscrews by the collars and the straps. In this type, the nut traveled downward as the lowering proceeded.

With the jack used at the rim, on the contrary, the screw itself moved

down, the elevation of the collar or nut remaining the same. These jacks each consisted of a frame standing clear of the rim, with a foot, attached to the lower end of the screw, projecting under the edge of the bottom plate and thus supporting it. The screw was lowered by turning a heavy nut on top of the frame.

The jacks having been set in position, the concrete bottom was thoroughly cleaned and spread with a layer of sand and Portland cement, dry, to furnish a bed into which the rivet heads of the bottom could sink. A few turns having been given to raise the bottom from the blocking, the latter was removed, and the hand levers of all jacks were set parallel and pointing in the same direction, with a man stationed at each jack. At the stroke of a bell, each screw was turned half a revolution, leaving all the bars again in the same line, but pointing in the opposite direction. Under the watchful eyes of half a dozen careful foremen, this simple performance was repeated again and again until the bottom was home.

The jackscrews and footplates were then removed, and water let in through the jackholes to hydrate the mixture of sand and cement; and covers having been bolted over the holes, the task was over—without a puff of steam or the turn of an engine.



A Mustard Plaster Has Been Applied to the Body of This Elephant as a Cure for Stomach Ache, and the Keepers Are "Rubbing It In."

MUSTARD PLASTER CURES ELEPHANTINE PAIN

A mustard plaster and a dose of gin and ginger comprise the cure for elephantine stomach aches in the New York Zoo. Elephants, especially those lately arrived from the tropics, are liable to stomach ache of a nature sufficiently extreme to cause them to roll on the ground in agony. The external application of mustard and internal application of gin and ginger soon bring relief.

In applying the mustard poultice, a blanket is wrapped around the body of the prostrate animal and upon this is

placed a thick layer of mustard. Then another blanket is thrown over the mustard and securely bound. As depicted in the illustration, the keepers are apparently working the mustard in by stamping upon the poultice.

HOMICIDE BY AEROPLANE THE NEWEST CRIME

Homicide by aeroplane is a new type of crime made possible by the extended use of the heavier-than-air machine. The technical definition of the crime is "homicide by imprudence" and two persons have already been convicted of it in France. One of them, M. van den Heuvel, was sentenced to pay a fine of \$10 to the state and to pay the widower of a woman killed by his machine \$1,000. The accident occurred at Issy-les-Moulineaux. The woman was walking along the public footpath and was knocked down by one of the wings of the airman's machine. M. Baillod, another airman, who ran his machine into a crowd of people, killing a young girl and injuring three other persons, was sentenced to pay \$40 fine and spend one month in jail.

WIRELESS OPERATOR TALKS THROUGH HIS HAT

The expression "talking through his hat" can no longer be used as indicating an erratic state of mind. A Philadelphian, Frank Chambers, talks through his hat as a means of communicating with his wife and friends and does it in all seriousness. He is a wireless enthusiast and in experimenting with various novel methods of enticing the winged words from the air he has hit upon the most simple of all plans, that of talking through his hat.

Chambers wears a $7\frac{1}{4}$ hat, and could work his new wireless plan through the medium of an ordinary Derby hat, but to make the experiment more interesting he tried it with a high silk hat.

The entire outfit consists of a small

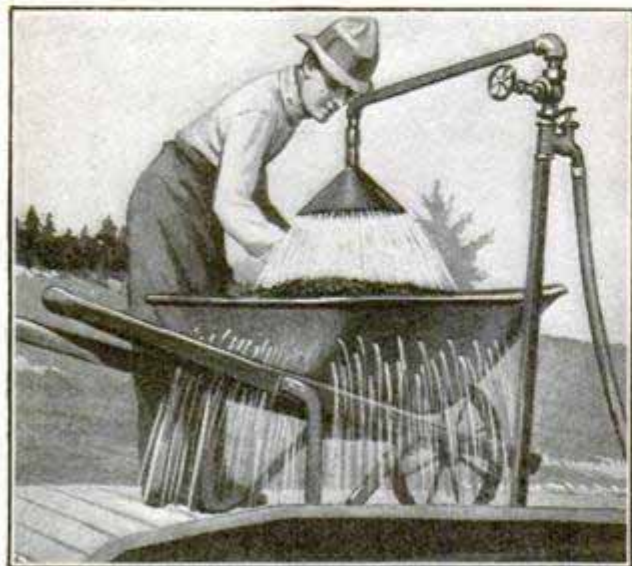


Receiving a Message while Standing on a Manhole

coil of wire, a pair of receivers for the ears, with the clamp that joins them, and a small electrical device that he suspends from the buttonhole of his coat. From this run wires, carried out of sight down the legs of his trousers and so to the ground to complete the circuit. The entire outfit fits easily in the crown of the high silk hat. The first experiment was made at a telegraph pole to which was attached one of the ordinary guy wires. Clipping his own wire to this guy wire Chambers fastened the trailing end of another to a fire plug and listened to messages sent by his wife from his home, from the Navy Yard and even from New York. The ticking of the various wireless messages that were darting back and forth overhead was distinctly audible through the receivers.

PERFORATED WHEELBARROWS AS GRAVEL WASHERS

Perforated wheelbarrows were utilized to wash the gravel used in concrete construction at Bangor, Maine.



Washing Gravel in Perforated Wheelbarrow

The gravel contained a certain amount of loam, which it was considered necessary to remove. Ordinary wheelbarrows were practically converted into sieves by punching holes in the sides and bottoms, and a water pipe was connected up between the storage piles and the concrete mixer. Each wheelbarrow of gravel was wheeled under the spray head and streams of water

discharged upon it, the water and loam passing out through the holes, leaving the clean gravel to be wheeled to the mixer. A spade was used to stir up the load so as to expose the bottom layers to the cleansing action of the water.

BRITISH FAVOR AMERICAN RAISED-CABIN CRUISER

The summing up of the series of contributions received by the British Motorboat magazine from its readers leads to the conclusion that the English motorboat enthusiast believes the American raised-cabin cruiser to be the ideal type.

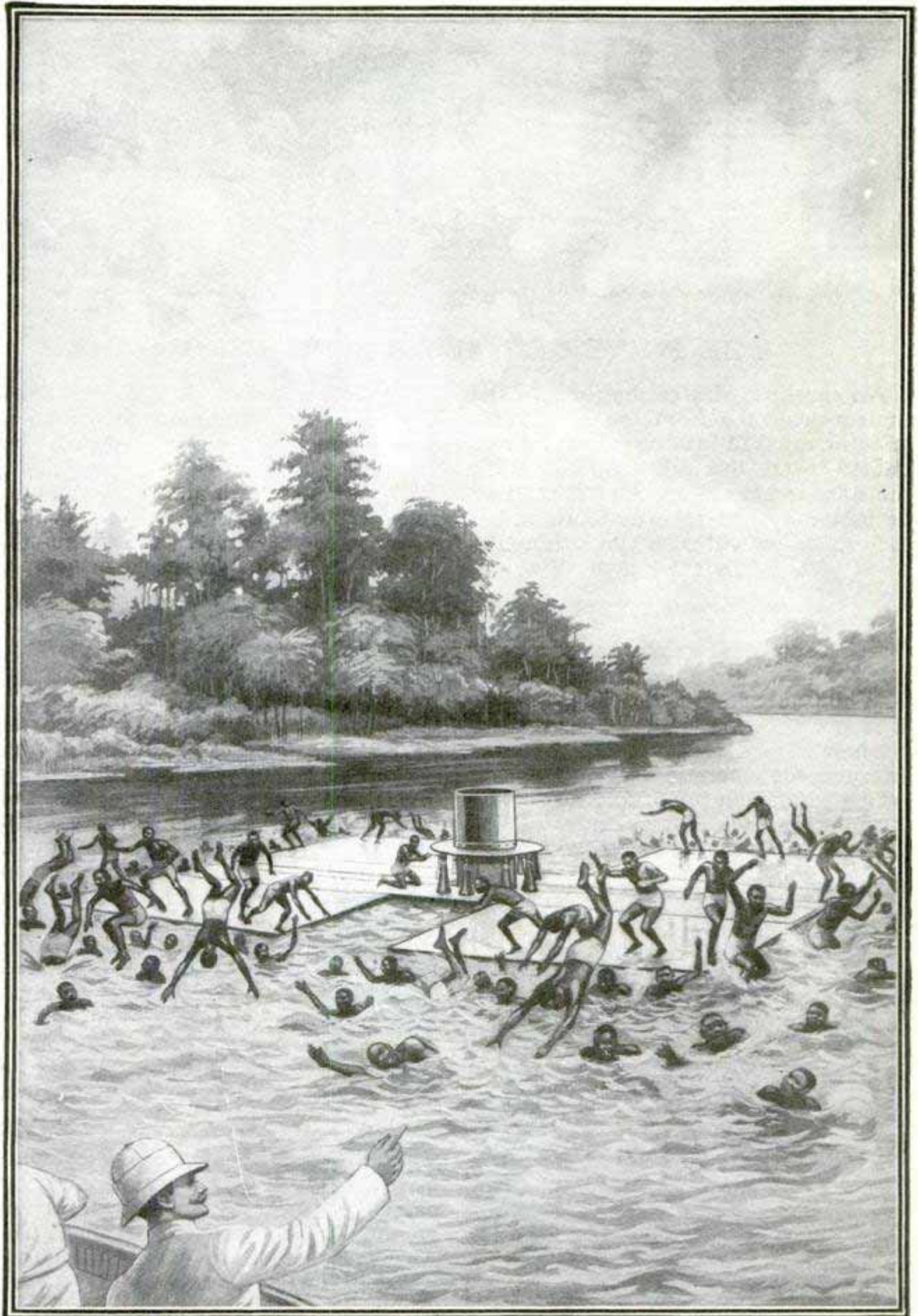
"Perhaps the most notable feature about the designs has been the preference shown by readers for the American type of cruiser," says the British magazine in an editorial. "America, it has always been acknowledged, has taken up the cabin cruiser as we in this country have favored the touring motorcar, and in consequence a great deal has been heard of American cruisers to the detriment of British boats. But we were scarcely prepared to find that the type of boat favored in the States had so impressed itself upon the minds of marine motorists in this country."

SWIM REQUIRED WITH EVERY FOOT OF BORE CASING RAISED

A method of raising bore casings by sinking a pontoon with man-weight, and then having the men jump overboard as the quickest means of removing the weight, was successfully adopted on the Aruwimi River in Africa.

The boring operations were being carried on from pontoons for the purpose of ascertaining the value of gold-bearing gravels in the bed of the river, and it was necessary for economy's sake to recover the casings on the completion of each bore. The ordinary method of hammering up the pipes

could not be employed because of the lack of certain mountings, and to screw them up with jacks was too slow. Consequently, a wide flanged collar was bolted round the casing and jacks were placed under the collar. Then some 80 natives were crowded on board the pontoon, which sank about a foot, the jacks meanwhile being screwed up tight. Before the deck was awash, all hands jumped overboard, and the pontoon rose, dragging the pipe with it. The process was repeated until the pipes were sufficiently loose to be pulled direct.



RAISING BORE CASING BY SINKING PONTON BY WEIGHT OF 80 NATIVES, WHO JUMP OVERBOARD ALL AT ONCE, THUS FORCING UP THE CASING



Courtesy The Graphic, London

Showing the Power of the Automatic Pistols Used by the Houndsditch Anarchists in London's Remarkable Battle

THE POWER OF AUTOMATIC PISTOLS

An excellent idea of the force of the bullets projected from the later types of automatic self-loading pistols may be gained from this illustration. With the muzzle held close, the bullets will perforate a steel plate a tenth of an inch thick, or will pass through a tree trunk 18 to 24 in. thick and kill a man

on the other side. At 250 yd. range a bullet will penetrate four pine boards, each $\frac{7}{8}$ in. thick, set as shown in the illustration.

The pistols weigh about $2\frac{1}{2}$ lb., and an experienced user can fire seven shots a second, or 80 aimed shots a minute, including the reloading of the magazine.

GEESE AND HORSES HAVE PARTS IN OPERA

While unfeeling critics might assert it is not the first, they all agree that the best trained flock of geese, that ever adorned the operatic stage, was that which formed an important part of the grand opera, "Die Königs-kinder" ("The King's Children"), produced this



Geraldine Farrar and the Flock of Trained Geese that Have an Important Part in the New Opera, "Die Königs-kinder."

season at the Metropolitan Opera House in New York. Miss Geraldine Farrar was the prima donna of the performance but she was forced to divide her honors with the geese, the latter being an exceptionally fine-looking and well-drilled collection of fowls. The creatures of the barnyard seem to have entered largely into at least two of the most important operatic productions of the season. In addition to the geese which make frequent appearances on the stage in "Die Königs-kinder," Signor Caruso and his fellow singers in "The Girl of the Golden West" were materially assisted by the trained horses used in the production.

☞ Wireless equipment is now compulsory on all Austrian ships carrying passengers from Austria to ports beyond Gibraltar and the Suez Canal. Austria is said to be the first country to adopt such a measure.

☞ The New York subway carried 270,321,490 passengers in 1910.

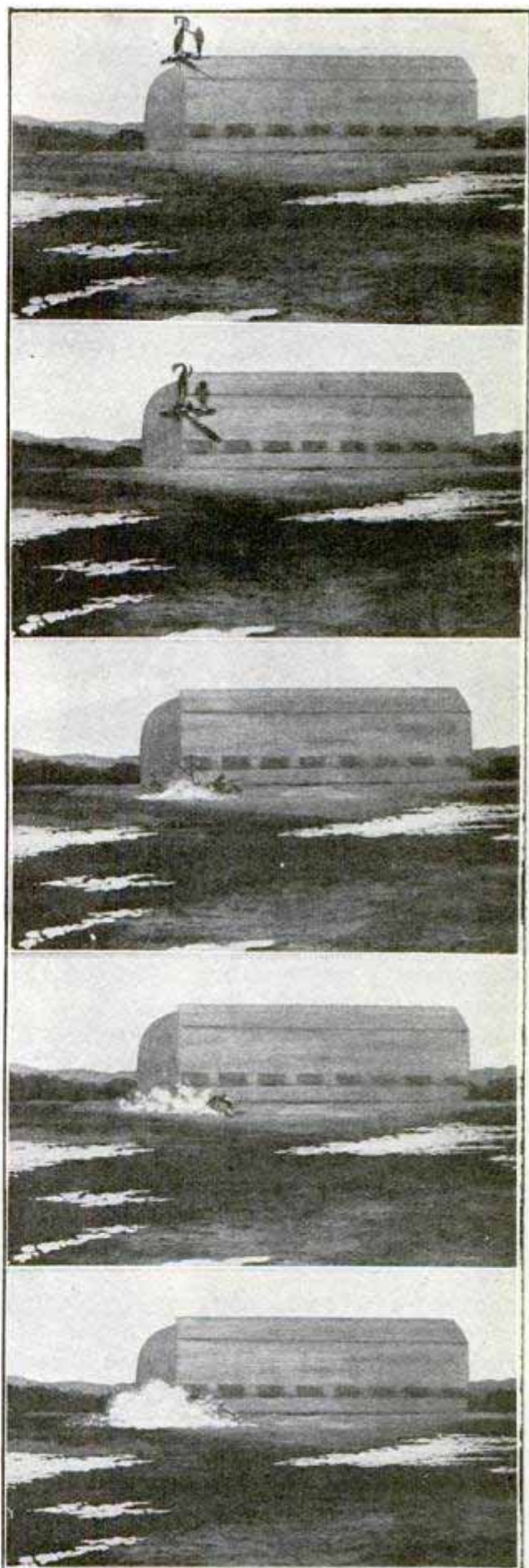
MOVING PICTURES SHOW AEROPLANE FATALITY

A moving-picture film of the aeroplane accident which cost two men their lives was made in France when M. Laffon and M. Paula were dashed to death on the aviation field at Issy-les-Moulineaux. The moving-picture camera had been set up on the field to make some aeroplane pictures of the flights and just happened to be in condition to make pictures when the accident to Laffon's machine occurred. Paula was a passenger with Laffon. The camera was quickly turned toward the falling machine and a series of pictures made which shows the exact condition of the machine as it fell and how it struck the earth. The first picture on the film showed the machine beginning to fall and the fall was followed and faithfully reproduced, the film ending with the broken, twisted machine lying on the ground.

REDUCTION-GEAR COUPLING FOR TURBO-GENERATOR

Designed originally for coupling a high-speed marine steam turbine to a slow-speed ship's propeller, in order to obtain the highest efficiency of both of these units, the Melville-Macalpine reduction gear has found its first important commercial application in driving a slow-speed direct-current electric generator by means of a high-speed turbine in the power house of an electric railway company at San Diego, California.

The steam turbine is adapted for directly driving an alternating-current machine, but not a direct-current dynamo, in the larger sizes, on account of the fact that the turbine is efficient only at high speeds, while the large direct-current generator is a comparatively slow-running machine; hence the necessity for "gearing down," a mechanical problem which was not commercially possible until the new efficient reduction gear was introduced a few months ago.



Part of the Series of Moving Pictures Showing Aero-
plane Accident Which Cost Two Men Their Lives

UPSET DOES NOT DAMAGE MODERN FIRE ENGINE

The principles on which modern fire fighting apparatus are constructed received a severe test in Coatesville, Pa., recently when an engine was thrown violently over on its side and against



Coatesville, Pa., Fire Engine Undamaged, Though Completely Upset

a fence without doing material damage to any of its parts. The gauge glasses were not even cracked, although one rod supporting the suction hose was bent as was also a small plate in the rear of the driver's seat. The engine was on its way to a fire when it "skidded" in making a turn and was toppled over into an unprotected culvert $3\frac{1}{2}$ ft. deep. The culvert saved the apparatus from going over a retaining wall and taking an 8-ft. drop, however. The foreman of the fire department, who was on the engine, and two other men escaped without a scratch. The engine was righted, cleaned and put into service almost immediately after the accident. A peculiar feature of the affair was that the horses drawing the engine were not even thrown down.

☞The demand for brass beds is steadily declining, owing to a steadily increasing call for three-piece bedroom suites.

PRESERVING LIVE BUGS BY COLD STORAGE

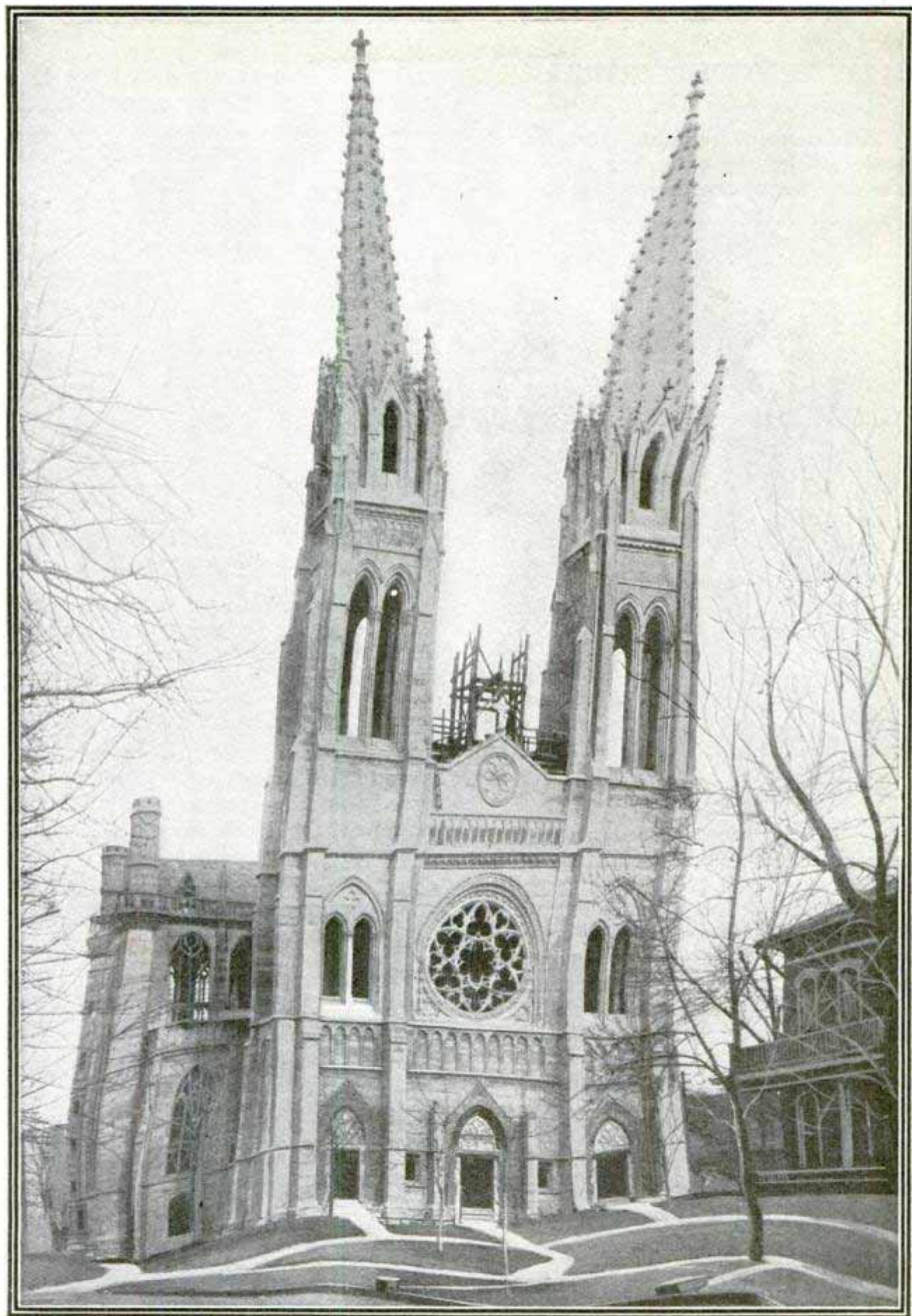
The immense number of ladybugs used every year by the California State Commission of Horticulture to destroy the aphid, which does such deadly mischief to the fruit trees and vines, are kept alive in cold storage until required.

The ladybugs, which congregate in great colonies in the high mountains, are located in the early fall, and sometimes in December and January. Four or five ton of them are collected and taken to the insectary. Packed in wood and screen boxes, 60,000 to a box, they are placed in specially built storage rooms, where the temperature is continuously kept around 40 deg. F. In this manner the ladybug colonies can be kept in perfect condition for six

months without food. The action of the cold storage is to arrest development and induce a condition similar to the natural hibernation.

FORTY YEARS WITHOUT A SINGLE HOLIDAY

The Washington pension office clerk who was promoted a few years ago because he had not taken a vacation in 14 years, was a loafer compared with five members of the Tokyo, Japan, fire department, who were recently decorated by the head of their department. These men were called before the entire fire-fighting organization at a review held in the Japanese capital and publicly thanked as men who "had distinguished themselves by diligence during their service of 40 years without taking a day's holiday." The thanks of the government was supplemented with substantial gifts of money.



EVILS OF ALCOHOL EXTEND TO PHOTOGRAPHY

The addition of a small quantity of alcohol to photographic developing fluid gave a Colorado photographer some startling results in the finishing of a negative made of a large church building. While most of the original lines of the picture were preserved, they were given a tipsy appearance.

MASKED MOUNTAINEERS WHO ARE NOT OUTLAWS

Experienced mountain climbers who scale glaciers or extensive snow fields usually wear masks or else blacken



Surveyors of U. S. Geological Survey Masked to Prevent Sunburn on Mountain Tops

their faces to prevent sunburn or scald caused by the intense reflection of the sun's rays from the dazzling white. Last season, in the government survey of the Mount Baker quadrangle in Oregon, United States geological surveyors scaled Mt. Baker, one of the great extinct volcanoes of the Cascade range. As shown in the picture, taken on the summit of the mountain, the men wore black masks. Others, impatient of such covering, suffered severely from sun scald.

PREVENTS METAL RUSTING BY ELECTRICITY

The phrase "a hair of the dog that bit me" has its scientific counterpart in a new electrical process, which, if successful on a commercial scale, will save untold millions of money by preventing rusting and corrosion of metals.

A great deal of the pitting and cor-

rosion of metals is caused by local electrical currents generated by the action of acidular water on dissimilar metals (often impurities in the metals themselves) at the points affected.

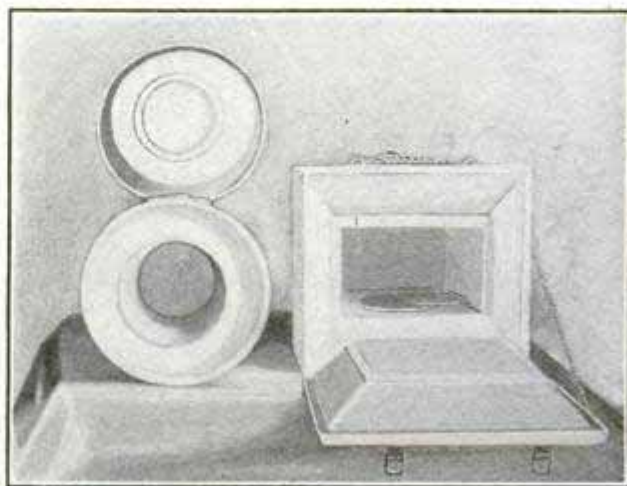
An Australian inventor has discovered that a weak electrical current, generated by a dynamo, and passed through the metals to be protected, will counteract the local electrical currents and effectually prevent corrosion. The amount of electricity required is very small and its regulation is said to be easy. The process is being tried out commercially on the locomotive boilers of the Canadian Pacific Railway.

REPAIR OLD BRIDGE WITH CEMENT FILLINGS

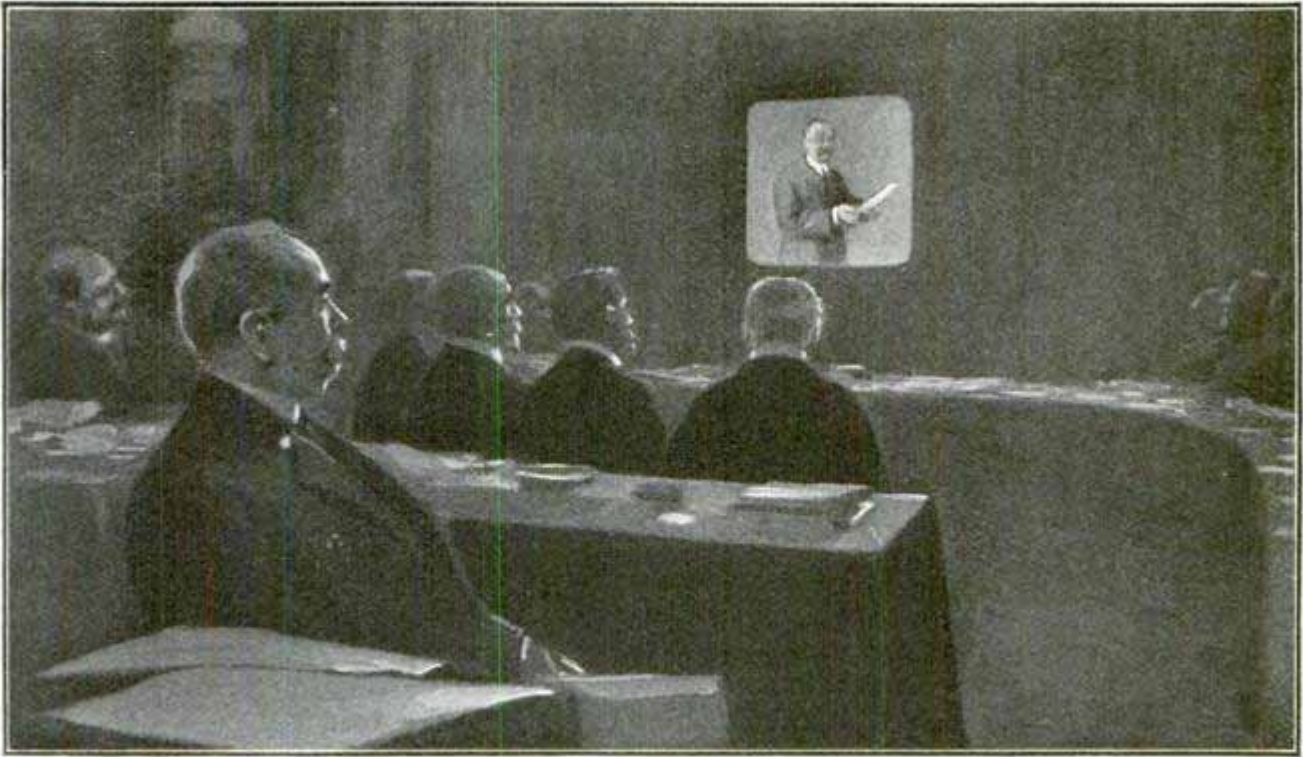
Two stone railroad bridges crumbling to pieces with age, in Hamburg, Germany, have been made strong and serviceable again by a novel application of cement mortar. Small holes were bored partly through the masonry at the sides of the cracks, which spread in all directions, and the cement forced into the apertures. When this hardened, the stone was found to be thoroughly consolidated.

ELECTRIC FIRELESS-TYPE COOKERS

The successful experiment of cooking a pot of beans by the heat from an ordinary 16-cp. electric lamp, led a



Interior View of Two Types of Economical Electric Cookers



M. Gaumont Watching and Hearing Himself Make a Speech

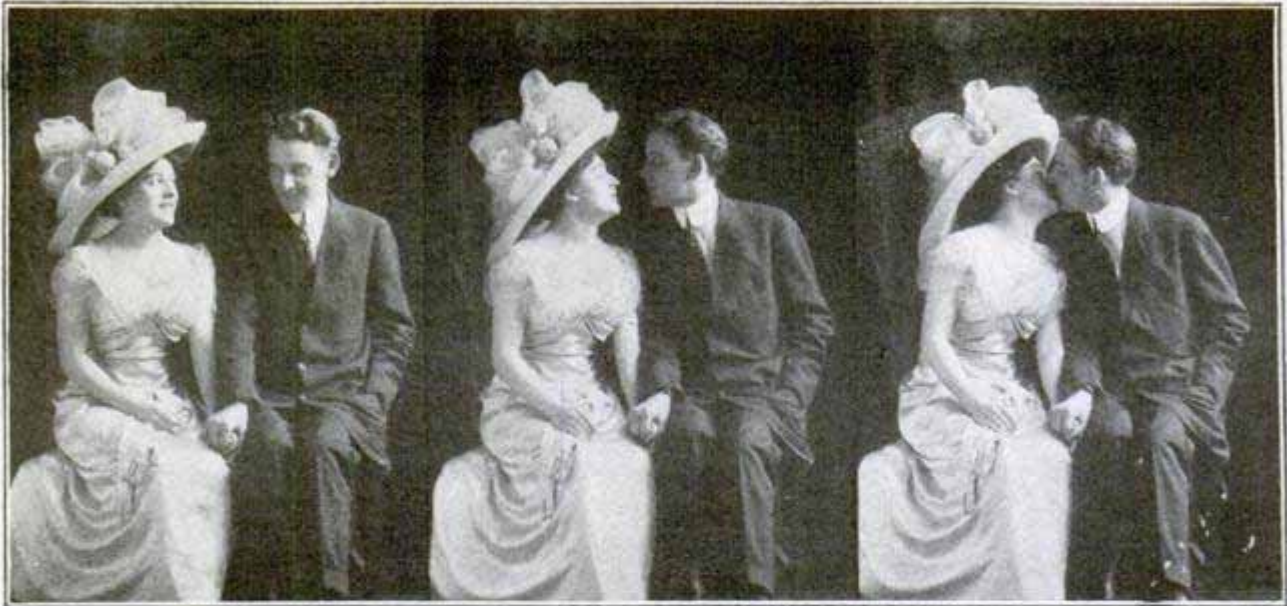
Connecticut electric company to evolve two types of electric fireless cookers which take so little electricity that they may be connected directly to an ordinary electric-lamp socket without violating the electrical ordinances of any city or town in the country.

The cylindrical cooker has an outside diameter of 14 in., and an oven depth of 9 in. It takes the same amount of current as an ordinary 16-cp. carbon-filament lamp, and is designed mainly for stewing, boiling and long-hour service. The box-shaped cooker takes twice the current as the other, and is designed for short-time service, such as baking and roasting. It is said to meet the total cooking requirements of a family of from 3 to 5 persons. The outside box is of fiber. The two disk-heating elements, $6\frac{1}{2}$ in. in diameter, are located at the top and bottom of an interior oven, $12\frac{1}{2}$ by $10\frac{1}{2}$ in. by 8 in. high, lined with glazed white fireclay and surrounded by asbestos packing. The large oven maintains a constant temperature of 380 deg. F.

An ordinary electric chafing dish takes 10 times the current required by the small cooker, and five times the current taken by the large cooker.

MOTION PICTURES MADE TO TALK

To sit at the rear of a hall and watch himself make a speech on the platform to a group of fellow scientists is the unique experience enjoyed by M. Gaumont, a French savant, at a recent meeting of the Academy of Sciences in Paris. M. Gaumont is the inventor of a synchronized motion picture-phonograph machine which he calls a "chronograph." It is the result of many experiments with motion pictures and talking machines and is said to be a perfect co-ordination of the two. In presenting the result of his labors to his associates, M. Gaumont adopted a method entirely out of the ordinary, but one which showed the capacity of the machine in a manner the reading of a long paper could never have done. He simply prepared his address and then caused pictures and phonographic records to be made of it with his machine. When it came time to present it to his audience, he darkened the room and let the machine speak for itself, projecting the pictures of himself on the screen while the talking machine gave simultaneously the details of the invention.



Three Successively Posed Photographs from Which the Single Moving-Picture Slide is Made

MOTION PICTURES WITH AN ORDINARY MAGIC LANTERN

Any magic lantern can be used to produce moving-picture illusions by adopting a special form of compound slide which was recently demonstrated in Chicago theaters. The principle is simple.

Suppose three equal-sized pictures (A, B and C) be cut up into a series of parallel equal strips. Take the first strip of each of the pictures and paste them next to each other, in order, on a piece of paper. Now take the second strip of each of the pictures and paste them in order next to the others, and so on until all of the strips are used up. It is evident that strips 1, 4, 7, 10, etc., on this compound picture belong to

picture A; strips 2, 5, 8, 11, etc., to B; and 3, 6, 9, 12, etc., to C.

Now take a piece of glass ruled in parallel lines a distance apart equal to the width of one of the picture strips. Leave the space between the first two lines transparent and blacken the next two spaces; leave the next (fourth) space transparent and blacken the next two; and so on.

If this glass be laid on the built-up picture, the transparent spaces will expose strips belonging to one picture (say A), while the black lines will cover the strips of the other two pictures (B and C). Now move the glass sideways to the left a distance



Left—The Screen; Middle—The Magic-Lantern Slide Made from the Three Pictures Seen Above; Right—The Slide with Screen Superposed to Cover Two of the Pictures.
The screen is actually much finer than appears in the cuts, which had to be "faked" for reproduction purposes. The general idea, however, is well conveyed by these pictures.

equal to the width of a strip. Strips belonging to pictures A and B will now be covered, and those of C will be exposed through the transparent strips of the glass. A similar further movement of the glass will expose B and cover C and A.

Of course the built-up picture will be three times the length of each of the component pictures. Suppose, now, that only every third strip of each picture had been selected, and the others thrown away. The resulting picture, built up in the same way as before, would be of the proper width. And when the glass screen were used as stated, the complete picture, A, B or C (according to the position of the black lines) would be exposed to view, the distance of the observer from the picture causing the separate strips to blend into one harmonious whole.

This, in brief, is the principle of the compound lantern slide. The transparency is made in the same way as the ordinary slide, except that, instead of one picture, three pictures of the same subject but of slightly different poses are used. The negative, from which the transparent slide is made, is exposed successively to the three pic-

tures, and instead of these being cut up into strips and rearranged, the same effect is produced by interposing a glass screen, ruled with black lines twice the thickness of the transparent spaces, between the picture and the negative plate. The screen is moved sideways through the width of a transparent space, between the first and second exposures, and again between the second and third. The result will be exactly the same as that of the cutting-up process previously described.

With this slide is used a ruled screen of the same size to cover up the strips of two of the pictures and expose those of the third. The slide and screen lie flat against each other, and the required movement is obtained by a small eccentric device, operated by a lever. This is secured at the end of an ordinary lantern-slide carrier.

When projected on the sheet, the effect of operating the lever is to cause one picture to dissolve almost instantaneously into the others, in turn. An illusion of motion is thus produced, which can be made very amusing. Pen-and-ink sketches may be substituted for posed photographs in making the slides.

FIGUREHEAD OF "IDAHO" ADORNS BANDSTAND

The bronze figurehead of the battleship "Idaho," which was ordered removed from the ship, has been sent to Boise, the capital of the state after which the ship was named, and it now surmounts a novel bandstand and speakers' platform built in the state capitol grounds.

The rostrum is built in the shape of the bow of a ship, and is constructed of concrete. The flagstaff which rises from the rear adds to the impression of a ship. A stone stairway leads to the top of the rostrum, and the inner edge of what would be the gunwale of the ship is equipped with cement benches.



Not a Ship, but a Bandstand

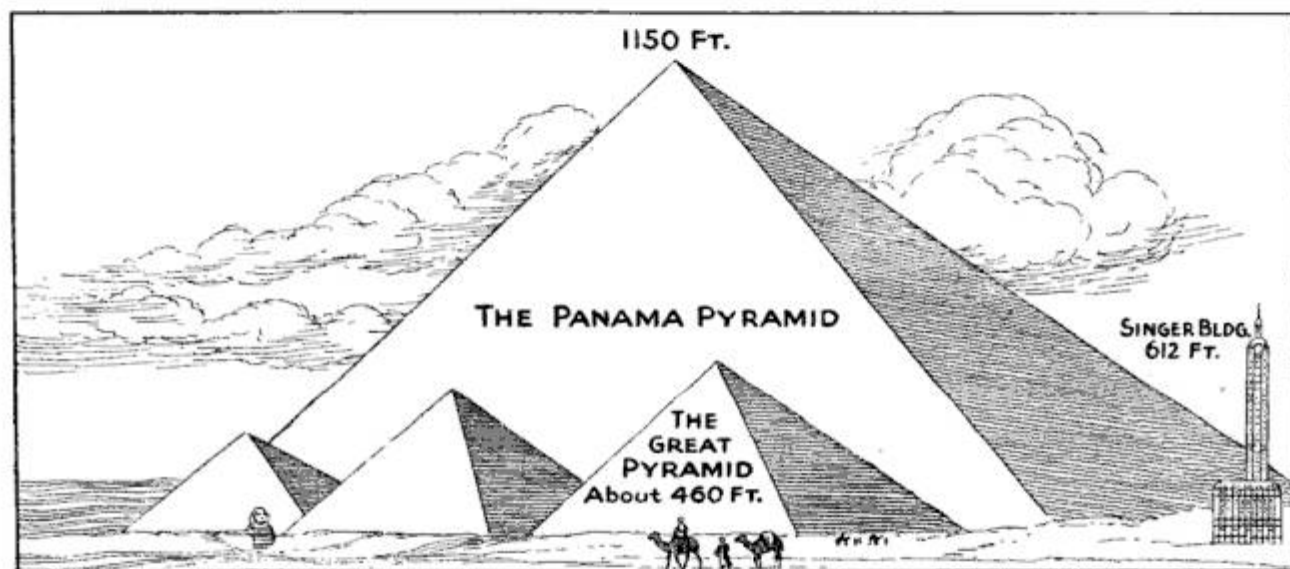
THE EXCAVATION OF THE PANAMA CANAL

The total amount of earth excavated and yet to be taken out in building the Panama Canal under the projected plans, amounts to 214,666,594 cu. yd. Such figures have no real meaning to the ordinary mind, unless they are compared to some existing objects the size of which can be comprehended by the eye.

Those persons fortunate enough to have taken the trip up the Nile, in Egypt, have marveled greatly at the immensity of the great pyramids.

city block. Assuming its base to be perfectly square, the "Panama Pyramid" would be three city blocks long, three blocks wide, and its height nearly twice that of the tower of the Singer Building in New York City.

If these figures are not startling enough, let it be supposed that the rock and earth excavated from the Panama Canal be loaded into 600-ft. steamers. About 30,000 such vessels would be required, and if stretched in line, end to end, they would form a



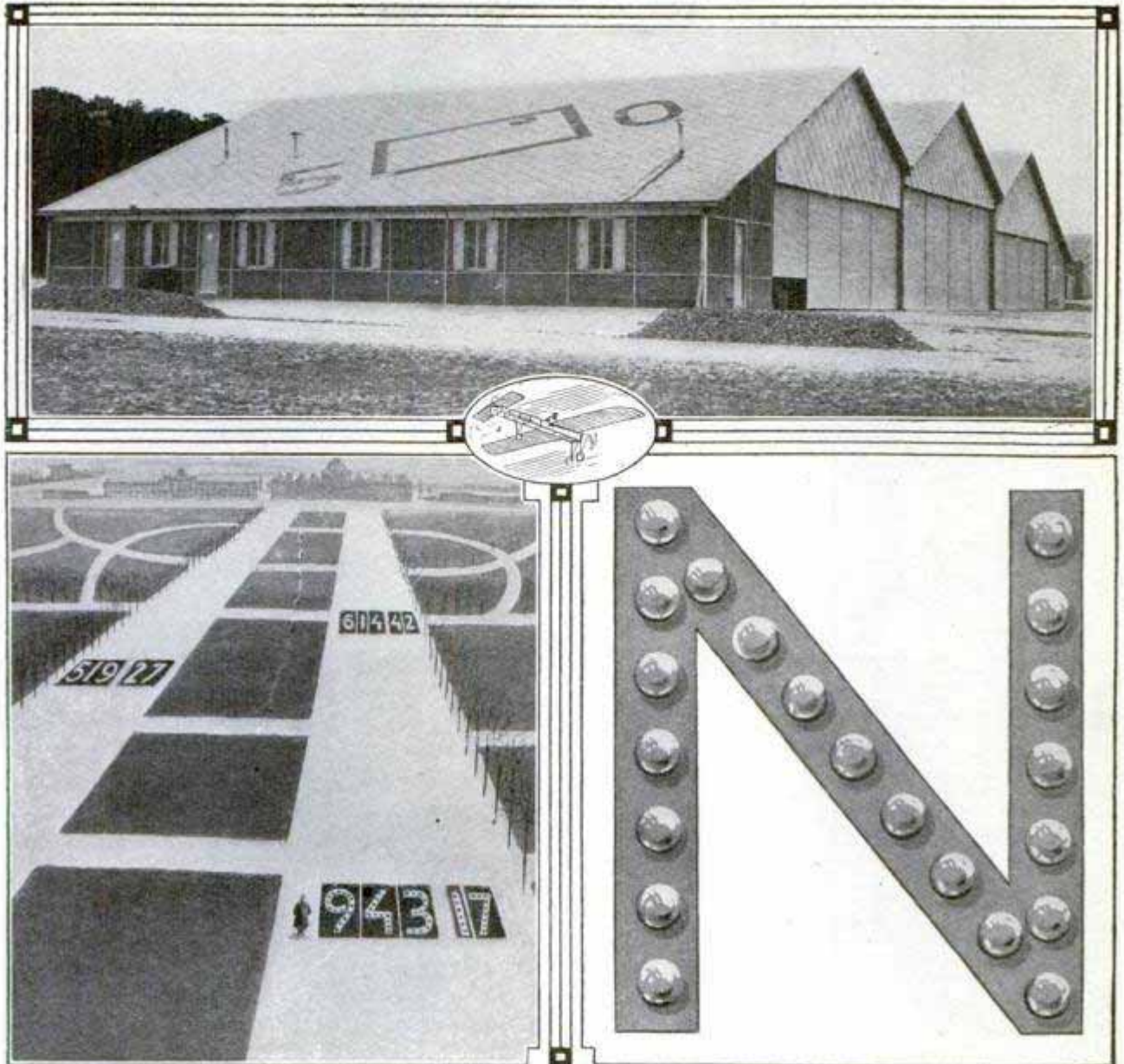
The Material Excavated in Building the Panama Canal, If It Were Consolidated in the Form of a Solid Pyramid, Would Make the Great Pyramids of Egypt Seem as Pygmies by Comparison, and the Largest Buildings of the Earth Look Like Dolls' Houses

And yet, if the rock and earth dug out in making the Panama Canal were to be built up in a solid pyramid, the proportions of the Great Pyramid, or Pyramid of Cheops, would seem insignificant in comparison. The "Panama Pyramid," as it may be called, would tower nearly $2\frac{1}{2}$ times as high as Cheops, and would contain about 14 times as much material, by volume. In height, it would extend up into the sky nearly 1,150 ft. The area covered by Cheops is slightly more than 13 acres. The "Panama Pyramid" would extend over nearly 75 acres. Taking the length of an average city block as 600 ft. and its width at the same figure, the "Panama Pyramid" would cover an area about 9 times that of a

bridge of boats extending clear across the Atlantic from New York to Liverpool.

Suppose again, that common dump carts such as used by contractors, were employed to carry away the dirt. Over one billion carts would be needed, and if they were strung out in line, they would extend no less than 160 times around the earth at the equator.

⌈The journey from Paris to Tokyo will be shortened from 15 days to 11 days 10 hours by the opening of the new connecting line of the trans-siberian railroad from Mukden to Wiju, on the Corean coast, cutting out the trip to Vladivostok.



Silvered-Glass Balls Forming Figures

Military Markings on Building Roof

Letter "N" Formed of Glass Balls

DIRECTION SIGNS FOR AIRMEN

Much has been done recently in France in devising signs that can be seen by airmen and used as a means of direction or other information. Experiments carried on in Paris prove that silvered glass balls, set on a black background so as to form letters and figures, can easily be seen from a great height. One of the illustrations shows the figures 943 17 as photographed from a position 325 ft. above them on the Eiffel Tower.

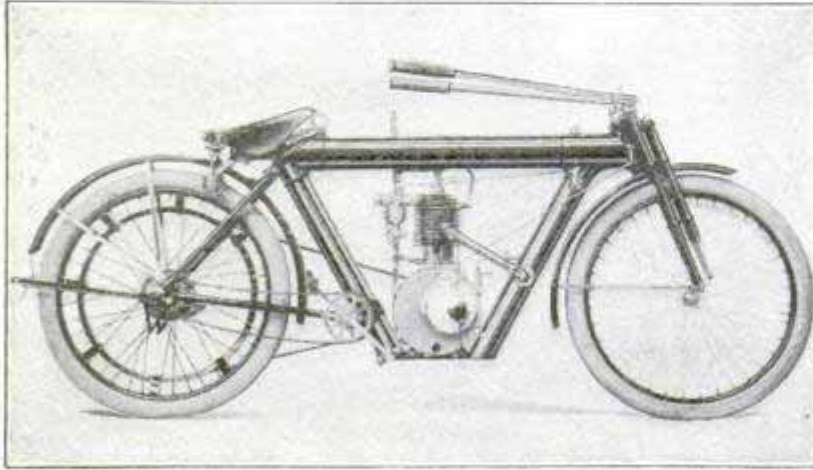
A system of markings on the roofs of military hangars is being tested by the French Army with the idea of placing such markings on the roofs

of buildings in all parts of France. The roof marking shown in the illustration would be unintelligible to the ordinary airman, but to the airmen of the French army, it would, through the medium of the military chart books provided them, show just what section of France they were over. In these chart books, France is divided into rectangular sections, each section bearing a number.

☞Telephoning from London to St. Petersburg, a distance of 850 miles, is to be made possible by means of the new cable across the English Channel, and suitable land lines.

MOTORCYCLE TUBING AS STORAGE SPACE

While motorcycles in general have the gasoline and lubricating oil tanks, ignition equipment, muffler and tool bags fastened onto the frame promis-



Ignition Equipment, Gasoline and Oil Tanks, Muffler and Tool Kit, All within the Frame Tubing

ciously, wherever a convenient place be found, this motorcycle has all these important parts stowed away within the greatly enlarged tubing of the

main frame. The tool kit is located under the saddle within the crossbar, the remainder of the space within this tubing containing the gasoline tank.

An emergency supply of gasoline is contained in a tubular tank in the upper part of the rear upright section of the frame, from which it can be pulled out by lifting the saddle, while the lower part of the rear upright section provides space for the batteries and coil. The lubricating oil tank is carried in the upper part of the front upright frame section, and the muffler is directly underneath. The oil tank was

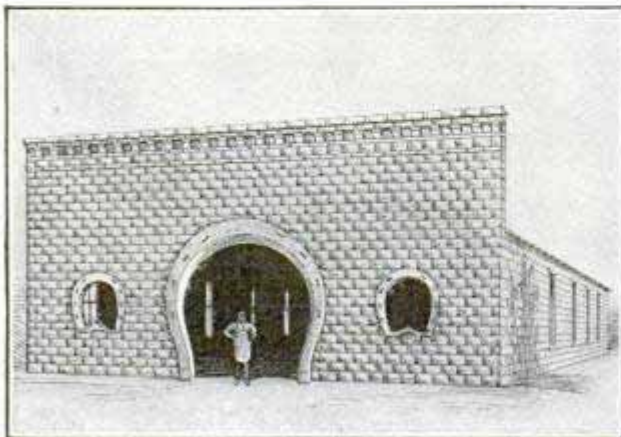
placed within the same tubing as the muffler so that the heat could be utilized to make the oil flow easily in cold weather.

DECLARATIVE ARCHITECTURE

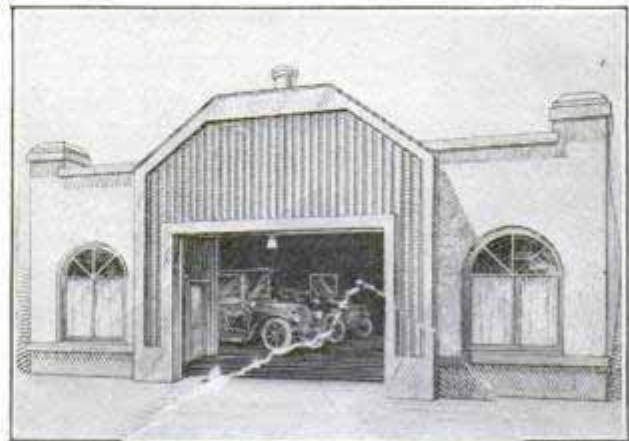
Two examples of architecture which suggest or declare the nature of the business they were constructed for are shown in the accompanying illustrations. One is a blacksmith shop at Glendive, Mont., and the other an automobile garage in San Jose, Cal. The doorway and windows of the former are horseshoe shaped, and the central

portion of the front of the latter is shaped to represent an automobile radiator.

A 150-ft. bridge spanning the Rio Michol River in Mexico is built entirely of solid mahogany, which at the present market price would bring nearly \$2,000,000.



The Architecture of This Building Explains Its Purpose



Shaped Like the Front of an Automobile



Capt. Brodie Walking Along a Road While Clothed in "Death Costume" and Preaching as "A Voice from the Dead"

WEARS SKULL WHEN PREACHING OF DEATH

Assuming that people forget what they hear, but remember what they see, Captain Brodie of the Salvation Army in London, wears a skull and shroud when preaching of death. His aim is to impress people into thinking about death and what follows it.

SHOOTS SELF RATHER THAN BURN

John Whitelaw, an express messenger on a Grand Trunk passenger train, caught in a recent wreck near Paris, Ont., chose death by bullet as preferable to being roasted alive. Pinned under one of the cars in such position that the rescuers were unable to free him, he watched the approach of the fire in the debris until all hope of its being extinguished was past, then shot himself through the breast with his revolver.

GYROSCOPE FOR MOTION-PICTURE CAMERAS

A French inventor has designed a gyroscope attachment for motion-picture cameras, the purpose of which is to neutralize the short and rapid shocks the apparatus is subjected to when not steadily supported. The slower shocks caused by turning the crank by hand are done away with by substituting a small compressed-air motor for this purpose.

The ordinary motion-picture camera must be mounted on a steady tripod, if the negatives are to be sharply defined. This takes time and is a handicap, if the scene to be photographed happens to be something which develops suddenly, such as the fall of an aeroplane. By use of the gyroscope and compressed-air motor, it is claimed to be possible to make clear, distinct motion pictures by simply holding the apparatus in the hands, as in making snap-shots with an ordinary camera.

HIDDEN PUFF-BOXES

A new fad for women is a secret puff-box in an umbrella handle, hat-pin head or pendant and watch brace-



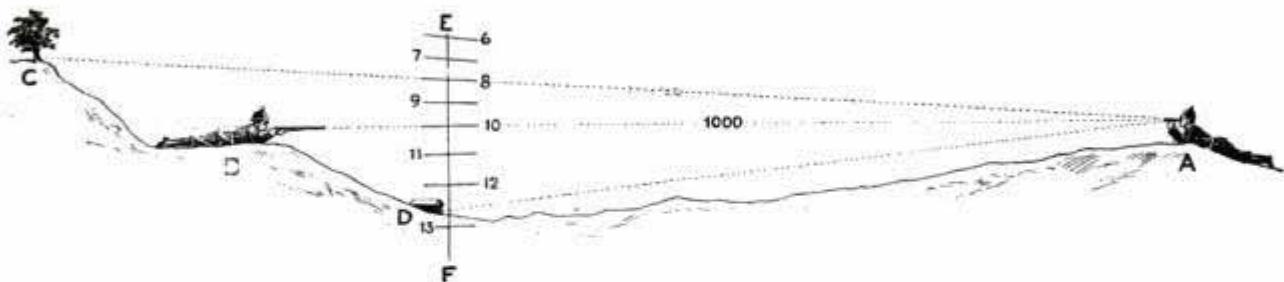
Puff-Box in an Umbrella Handle

lets. Many of the umbrella handles have a compartment into which a tube of lip salve may also be slipped, while tiny jeweled enamel puff-boxes, costing as high as \$50, are now often attached to snap-spring bracelets in place of the usual locket or padlock. On the watch bracelet the puff-box is hidden under the watch.

in command to give his men the range at which they should set the rear sight of their rifles in order to effectively fire on an enemy, which, for some reason or other, cannot be seen with the naked eye.

It consists simply of a glass plate, on which is a scale graduated to correspond with the scale on the rear sight of the rifles. This plate forms part of the left ocular in the field glass, and the scale, the lines and numerals of which indicate the distance, appears enlarged in the field of vision when the field glass is used.

An excellent idea of how the device operates may be gained by referring to the accompanying drawing. The officer using the field glass is represented as A, and B is the enemy's firing line. The distance between the two firing lines is known to be, say, 1,000 yd., but, because of faint light, mist or some such reason, the men cannot see the enemy. The officer, using the field glass, sees the enemy, however, and levels the glass until the line marked 10, the enlarged image of which is represented in the drawing by E F, is in line with B. Although, as before stated, the enemy cannot be seen by the men, some larger object in the line of fire, either in front of and below the enemy's line, as D, or back of and above it, as C, is probably clearly visible. When the field glass is leveled



Aiming at One Object and Striking Another

FINDING FIRING RANGE WITH BINOCULAR DEVICE

While not a range-finder in the usual meaning of the word, the little device for binoculars, invented by an officer in the German army, may be properly called so, because it enables the officer

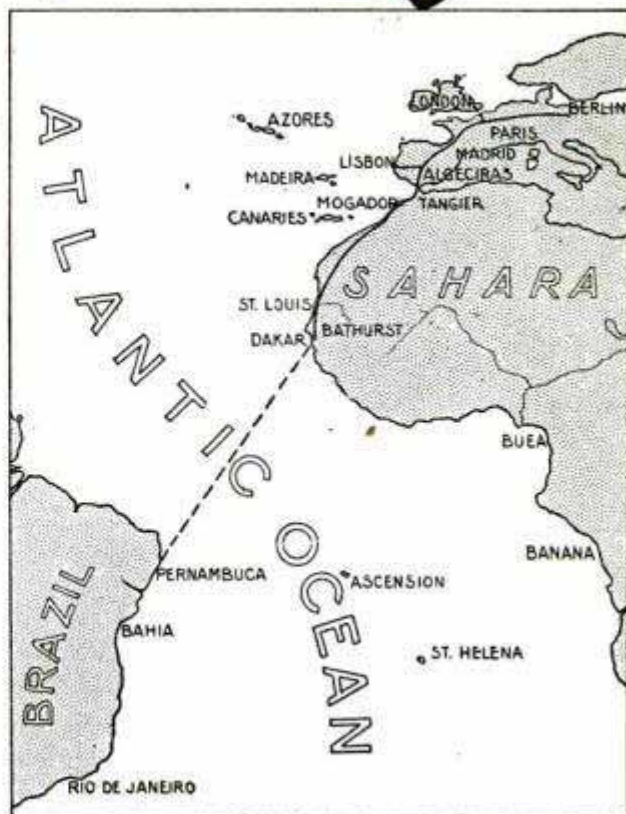
so that the line 10 in the field of vision is in direct line with the enemy, the object C, which in this instance is back of and above the enemy, coincides with the line of the scale marked 8. Consequently, the officer orders his men to adjust the sights to 800 yd. and aim at the object C. Similarly, if D is

determined on as the object to be aimed at, the officer orders the sights adjusted to 1,250 yd., as the object D is midway between the lines numbered 12 and 13 on the scale. In either case, although not aiming directly at the enemy, the fire would be effective at 1,000 yd.

EUROPE TO SOUTH AMERICA SHORT ROUTE

European capitalists are projecting a rail and water line between Europe and South America that will mean a reduction of seven days in time from Mediterranean ports, and more in proportion from northern ports.

The plan is for a railroad to be known as the "Ibero-Afro-American Railway," crossing Spain and down the African west coast from Tangier to Bathurst, Gambia, the point in Africa nearest to South America. Huge ferryboats will transport the trains from Gibraltar to the African coast in half an hour, and the run from Tangier to Bathurst or Dakar will take but two days. The voyage across the Atlantic from Africa to Pernambuco, Brazil, by fast steamers would take but three



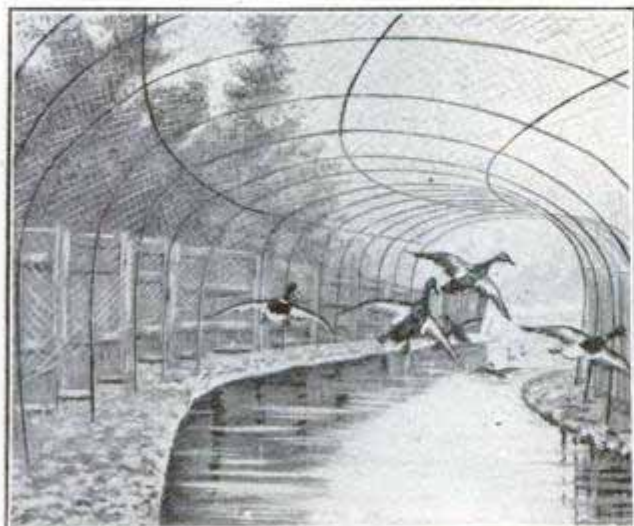
Proposed Rail and Water Route from Europe to South America

days, which would bring Europe within five days of South America. The distance across is a little more than 1,600 miles. It is estimated that the project will require a capital of \$140,000,000.

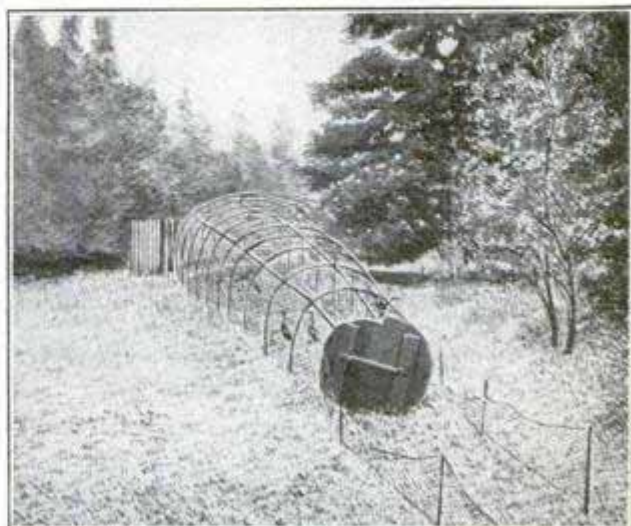
ENGLISH DUCK TRAP

A remarkable trap and decoy is used at Hornsby castle, on the Duke of Leeds' estate, England, to capture wild

duck. Tame ducks are kept in the small lake on the estate to entice the wild ducks when the frosty weather



Courtesy Black and White, London
The Wired-Over Outlet



Narrow End Where Ducks Are Captured

arrives, and these, incited by a trained dog, lead the wild visitors into a net-covered outlet from which there is no escape.

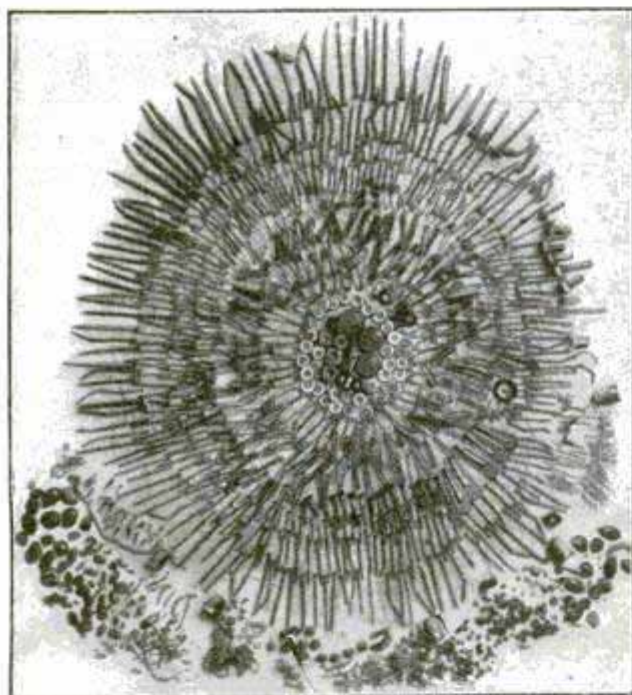
The trap, composed of wire netting stretched over an arch-shaped metal skeleton, covers the outlet completely over, and then narrows down to the end in which the ducks are finally caught.

The part played by the dog, which

the ducks mistake for a fox, consists of jumping back and forth over specially-constructed screens at the side of the arch. This action infuriates the ducks, which collect together and endeavor to quack him off their preserve. As the ducks advance the dog retreats, luring them farther and farther into the net, until finally a screen is lowered behind the birds. They are then driven into the narrow end.

WOMAN SWALLOWS FIVE POUNDS OF HARDWARE

Examination of the stomach of an insane woman who died in the state hospital at St. Joseph, Mo., recently,



Nearly 1,500 Articles and Fragments of Hardware Found in Stomach of Insane Woman

divulged the fact that during the several years of her detention she had swallowed 1,446 articles and fragments of hardware. Instances of insane persons swallowing foreign substances are common, but this case is remarkable, because of the number and variety of the articles, and the fact that there had never been any symptoms suggesting trouble with the stomach.

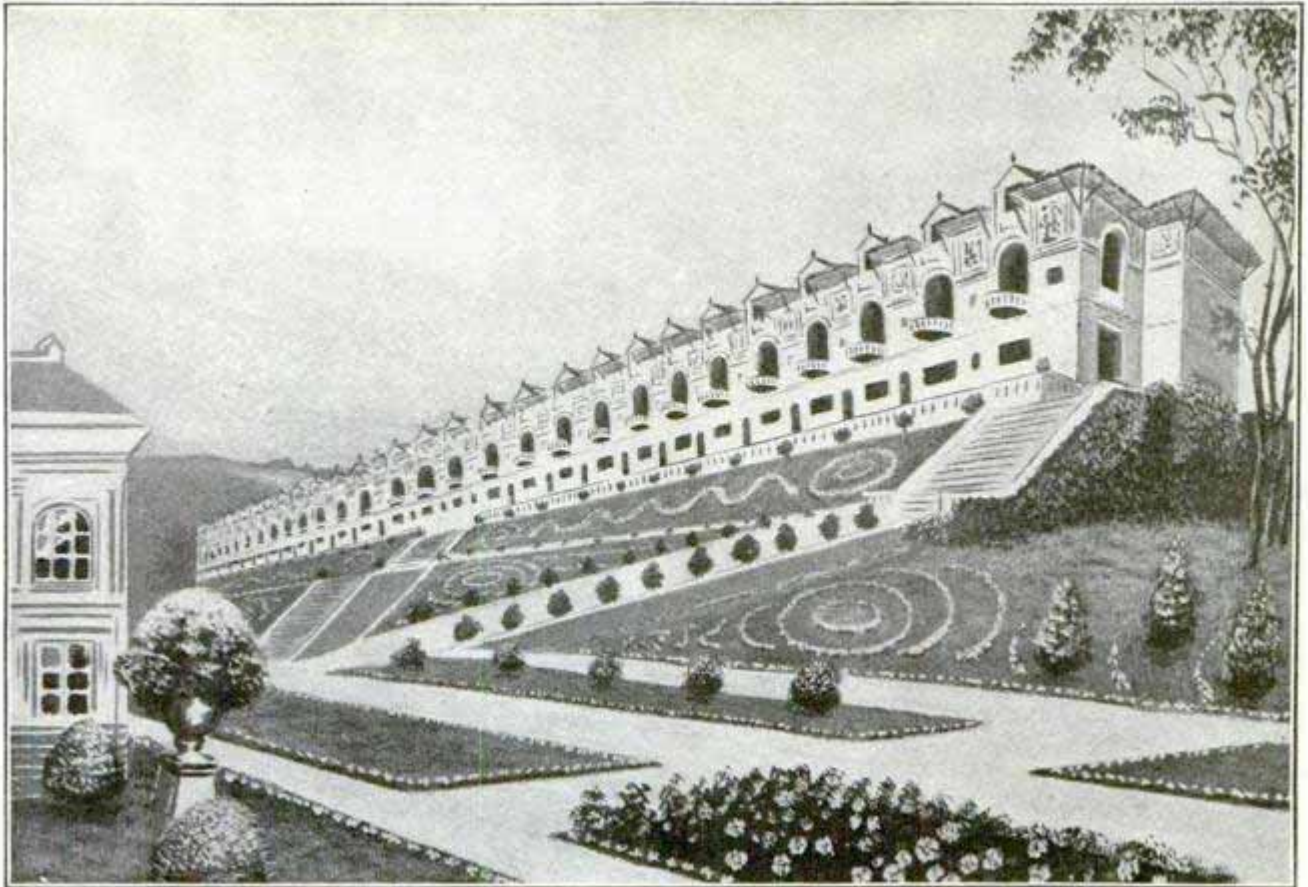
The list of articles found includes 453 nails, ranging in size from 3-penny to 20-penny; 42 screws, 9 bolts, 5

teaspoon handles, a nail file $3\frac{1}{2}$ in. long, 5 thimbles, 3 salt-shaker tops, 115 safety pins, 52 hairpins, 136 common pins, 7 broken coat-rack hooks, a string of beads 4 ft. long, 85 large beads, and 742 miscellaneous objects.

NEW PROPULSION SCHEME FOR SHIPS

Two Brooklyn inventors have been issued patents on a scheme for vessel propulsion which they claim will make possible the control of the engines from the bridge and automatic mechanical steering. The system of pilot-house control of the propelling apparatus is secured through the combining of electric motors with kerosene engines, and the automatic mechanical steering by means of an electrically connected compass.

The inventors claim that all the operator in the pilot-house will have to do will be to map out and start the vessel on a course, after which the machinery will do the rest. As soon as wind or wave throws the vessel from her course, the compass box, turned around the north-pointing needle by the falling away of the ship, makes an electrical connection which starts the propeller on one side revolving faster than the one on the other. This, so the inventors presume, will drive the ship back to her course in a few seconds, after the accomplishing of which, both the port and starboard propellers will be revolved at the same speed again.



Some 200 Persons Will Have All the Comfort and Luxury of a Fine Estate in This French Communistic Dwelling at a Nominal Cost

COMMUNISTIC DWELLINGS ON LUXURIOUS SCALE

Plans have been made for the erection near Paris of a luxurious communistic or cooperative dwelling in which a large number of people of the same class may live in common without infringing upon each other's individual liberty, and with a degree of comfort and luxury that could not be realized for the same amount of money if they lived separately.

The historical old estate, "Chateau des Mesnuls," near Paris, with its century-old parks and gardens, fish ponds and rolling meadows, comprising in all some 170 acres, has been acquired by the association. The old mansion will be left undisturbed for the accommodation of visitors and tourists, and the communistic dwelling will be erected facing it on a sloping green of about 12½ acres in extent. It will be built in villa style, and will consist of two wings, composed of 100 two-story residences, which are joined by a pergola-like gallery in 15th-century Florentine style. Each residence has

a private garden. The communistic features include dining rooms with common or private tables, large and small drawing rooms, smoking and billiard rooms, a lecture hall and library, Roman baths, and a winter garden.

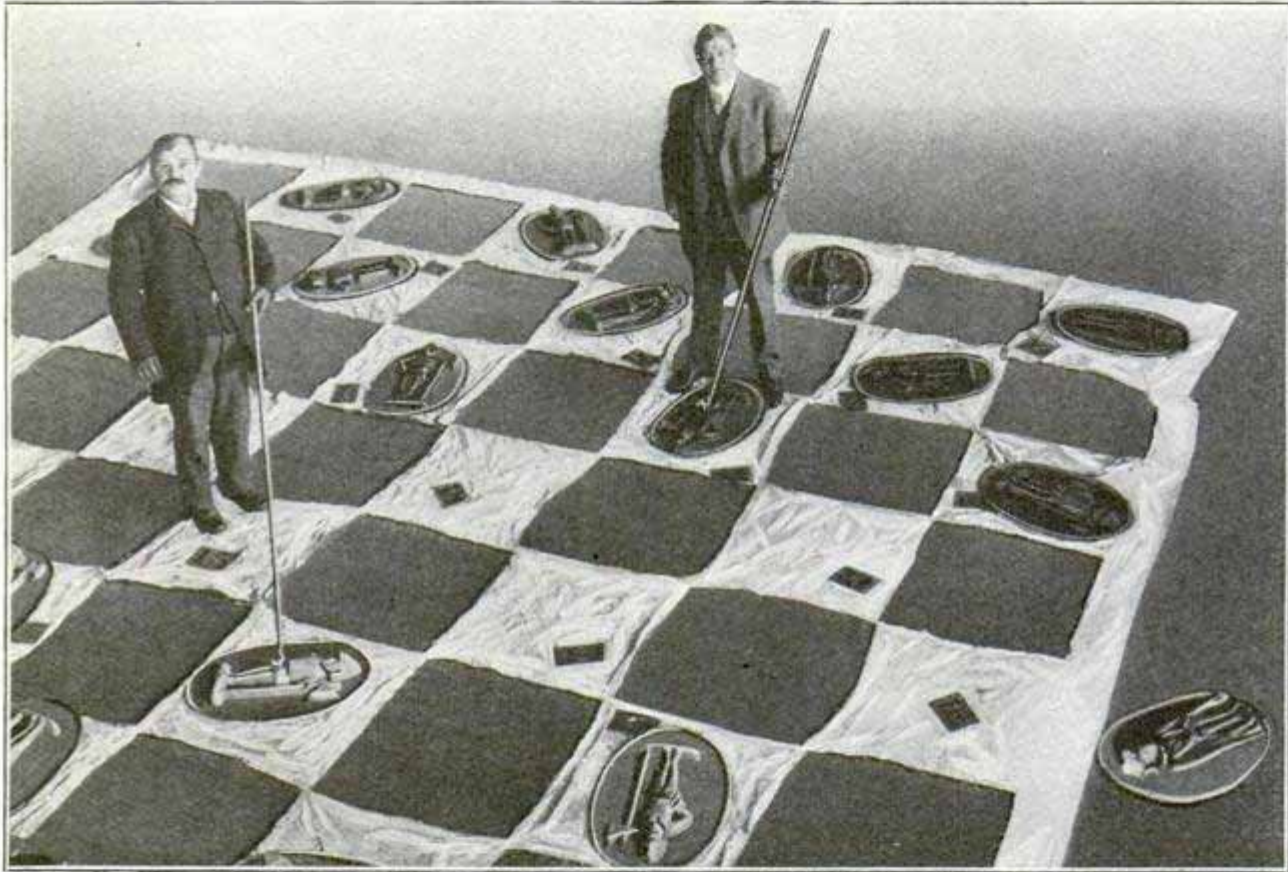
Each residence is intended for only two persons, without restriction as to age, or for a family consisting of husband and wife and one child. Provision is made in each residence, however, for a man servant or maid, or both, a small additional monthly fee being exacted for each of them.

The grounds are, of course, at the disposal of all, with what hunting and fishing there is, as well as gardening. An automobile service, and medical attendance are also provided, all of which a single tenant may enjoy, along with his private residence, telephone, meals at a common or private table, light, heat, laundry, etc., for the modest sum of about \$1,200 a year. For two persons the cost would be about \$1,800.

PLAYING CHECKERS ON A 24-FOOT BOARD

Lawn checkers is the newest game to be introduced in public playgrounds and recreation centers. Old-fashioned checkers has long been a popular game in the settlement houses and the social centers and lawn checkers is played in exactly the same manner, so far as the moves and general characteristics are

with a hook in the end. The game does not drag like an ordinary game of checkers, as the player is allowed only 30 sec. for each move. Several of the large hotels at fashionable summer resorts have ordered lawn checker boards, and will have them installed in the early spring.



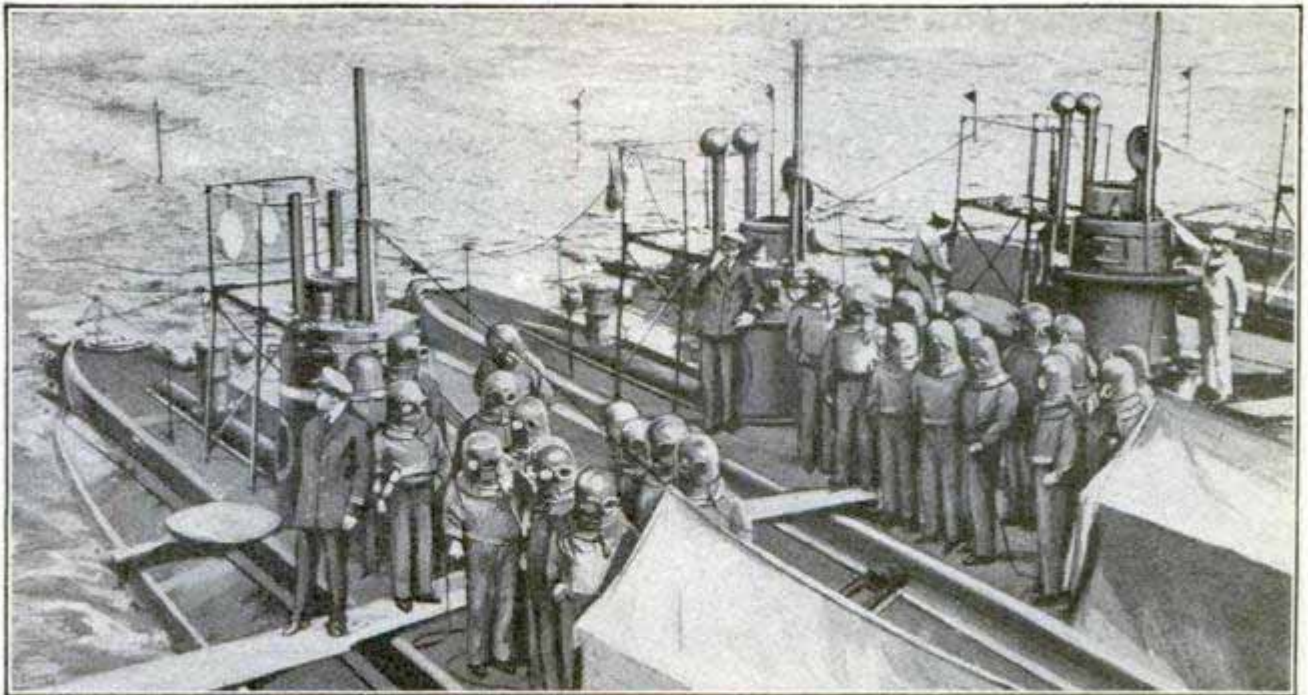
Playing "Lawn" Checkers in New York. Christy Matthewson, Baseball Star, at Right

concerned. Instead of a small board that can be held in the lap of the players, however, the lawn game is played on a marked-off space, 24 ft. square, the "board" being made of white canvas, on which squares are cut out to represent the black or red squares on the regulation board.

The feature of the game that has appealed most strongly is that it can be transferred out-of-doors as the days grow a little warmer, and will have the additional advantage of keeping the boys in the open air. The players walk in the blank or cutout squares, moving their men, which are made of papier maché, by means of a long cue,

SHIPPING SNOW SOUTH

To ship snow to the south as a means of ridding a city of part of an unwelcome surplus seems an extraordinary procedure, yet this was done in Chicago following a February blizzard. The Illinois Central Railroad, whose tracks run along the lake front, was badly snowed under. A large number of empty coal cars about to start for Kentucky coal mines being on hand, the snow was shoveled into them. The snow was nearly all melted by the time the trains reached the Kentucky coal fields, and the cars were loaded with coal and hauled back to Chicago.



Crews of British Submarines in Safety Drill

SAFETY HELMET DRILL ON BRITISH SUBMARINES

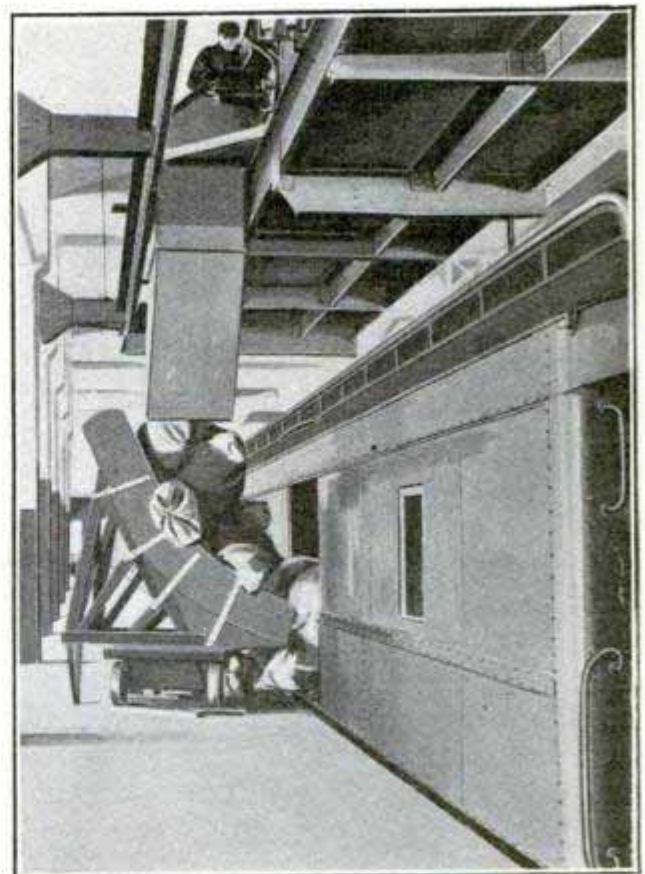
The crews of the British submarines are as steadily drilled in preparation to save themselves should accident occur as are life-saving crews in preparation for the saving of others. The illustration shows the ending of a competition between the crews of two submarines. The men were at work at their respective posts when the lights were put out and the order "on helmets" was given. Only 3 min. 5 sec. elapsed before the crew of the winning boat was on deck.

ELECTRICAL HANDLING OF MAIL

The handling of mails between the sub-postoffice and the trains in the new Pennsylvania Railroad Station, New York, is by a unique electrically-operated plant, capable of receiving and delivering 300 tons of mail a day. Overhead and underground belt conveyors, chutes, slides and elevators of the plunger, platform and bucket types, are employed for transporting the pouches between the different floors of the sub-postoffice building and to the mail trains standing on the sunken

tracks, some of the conveyors delivering directly into the mail cars.

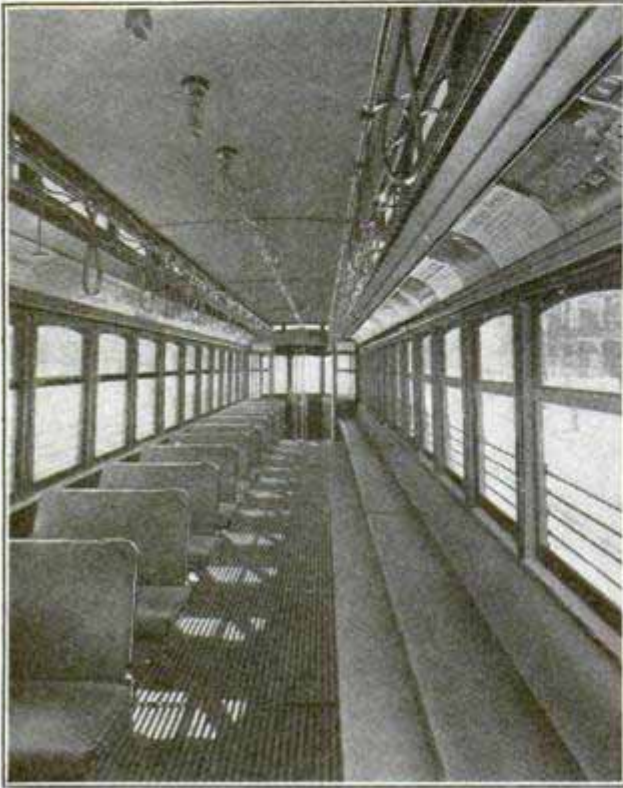
The illustration shows one of the continuously moving belt conveyors delivering pouches through chutes into the very door of a car.



Electric Overhead Carrier Delivering Mail into Car in Pennsylvania Station, New York

INTERESTING STREET-CAR SEATING ARRANGEMENT

Up to the present there have been two distinct arrangements of seats in inclosed street cars, one consisting of



Ingenious Seating Arrangement of Pittsburg Street Car

two continuous bench seats on each side of the car, and the other of cross seats with side seats at the ends, the latter varying in length according to the number of cross seats. In this steel street car built in Pittsburg, there is a continuous bench seat on one side and cross seats on the other, which provides an exceptionally wide aisle.

NEW SOURCE OF RUBBER

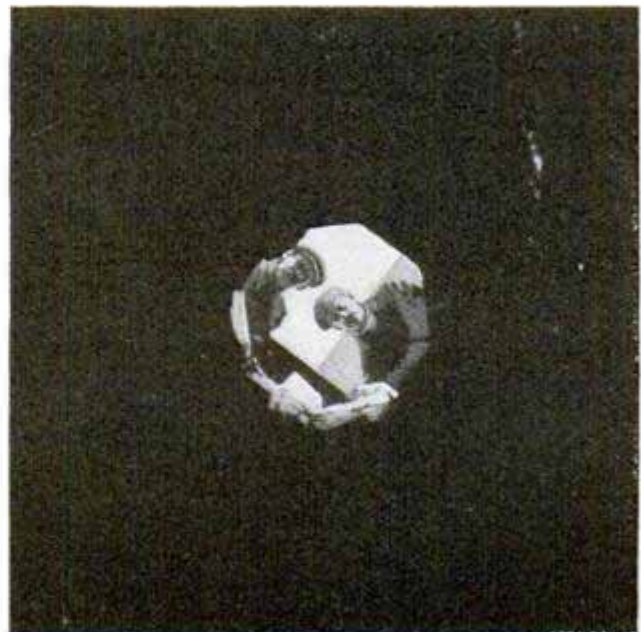
A new source of rubber supply was announced at a recent session of the French Academy of Sciences, the scientist responsible for the announcement demonstrating that rubber can be extracted in commercial quantities from a gum found in abundance on the Malay Peninsula and the islands of the Malay Archipelago. The gum, which can be easily gathered, contains from 10 to 20 per cent of pure rubber.

SAFETY SIGNAL FOR LOCOMOTIVE CABS

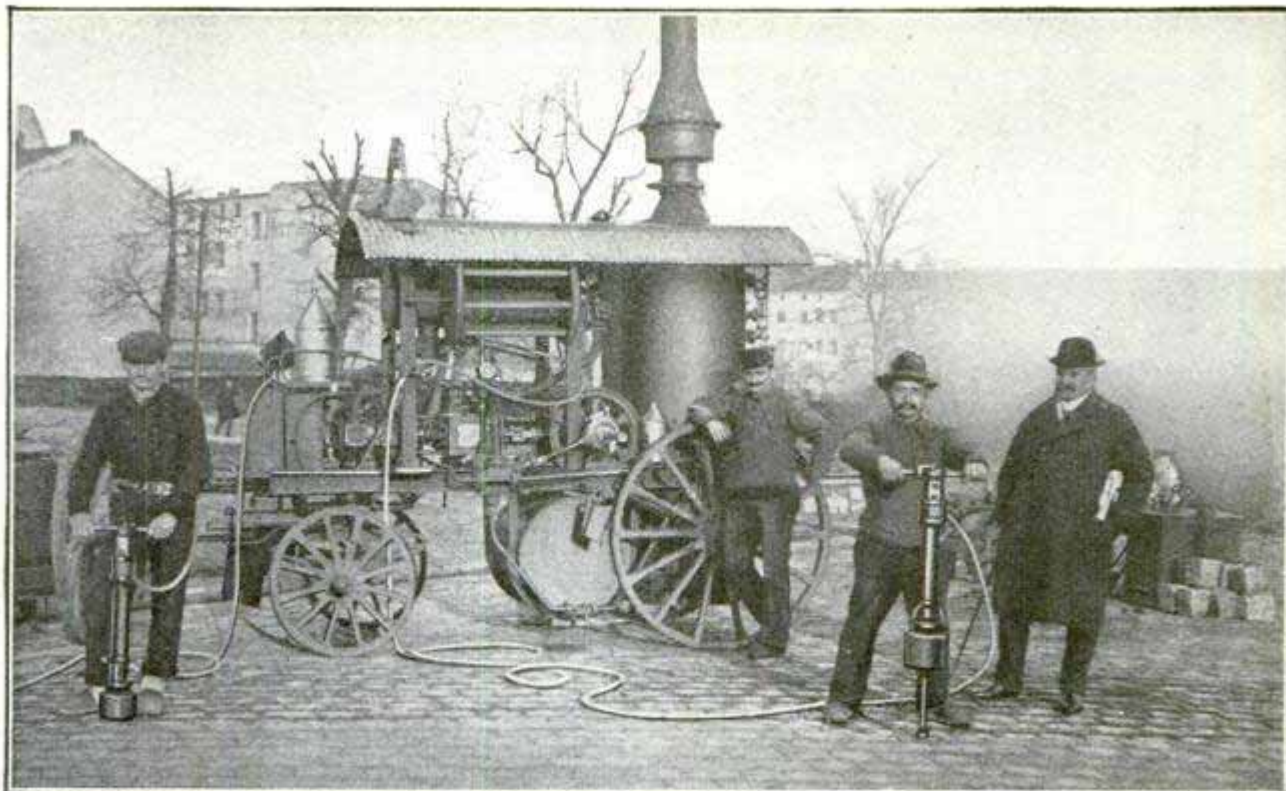
Of several systems of automatic safety signals designed to prevent accidents through the disregard of stop signals by locomotive engineers, the best results in recent German Railway tests were obtained by a recording alarm. By means of electric contact, a bell in the locomotive cab is rung, if a stop signal is overrun. This notifies the engineer that he is disregarding the signal, and also gives evidence against him, as the bell cannot be stopped without recording the overrunning.

WORM'S-EYE-VIEW OF A LONDON STEEPLE

The bird's-eye-view of a thing is quite a common form of illustrating, but few people have given thought to what a worm's-eye-view would be like. A London photographer evidently had this in mind when he made a picture of a couple of steeplejacks at work on the top of a tall church spire in the English capital. He pointed his camera straight up the center of the tower or steeple, calling on the workmen he could plainly see through a round aperture in the peak, to look down.



Courtesy the Sphere, London
Looking Up through a Church Steeple



Ingenious Pneumatic Plant Used in Germany for the Mechanical Tamping of Paving Blocks

PNEUMATIC PAVING-BLOCK TAMPER

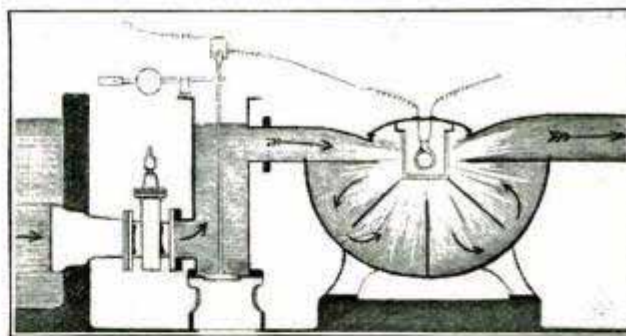
Pneumatic tampers of ingenious design are being used in laying block pavements in Germany. The compressed air is supplied by a portable plant, and several leads of hose and tampers may be used at once. Running centrally through the tamper is a rod or standard, which is rested on the block being tamped, and on which the tamping head and pneumatic mechanism work up and down in delivering the blows.

WATER STERILIZATION BY ULTRA-VIOLET RAYS

An apparatus in which ultra-violet rays are utilized for sterilizing water is in operation in France. The lamp is placed in a watertight rectangular box, the three submerged sides of which are composed of quartz plates. In one of the tests, one lamp was used steadily day and night for 12 days, sterilizing 6,600 gal. of water per hour.

The location of the lamp is shown in the accompanying drawing, as well

as an automatic safety valve which causes the water to flow out through a drain pipe, instead of passing through the apparatus, should the lamp go out. Bacteriological examinations show that



Purifying Water by Light Rays

the filtered water sterilized by the apparatus contains from 500 to 13,000 germs per cubic inch before treated by the ultra-violet rays, as compared to an average of about 17 per cubic inch after treatment.

ⒸThe first war vessel to be built in Venezuela was launched recently in the government navy yard, the ship being a gunboat of 61½ tons which has been christened "29 de Enero" ("29 of January") because that is the day the vessel's keel was laid.

TRICYCLE-CARTS FOR STREET CLEANERS

A new street-cleaning service has been inaugurated in Paris for the pur-



Keeping Paris Streets Free of Waste Paper

pose of keeping the boulevards and streets free from the litter of handbills and torn paper which has long given them the reputation of being the Parisians' waste-paper basket. The waste-paper gatherers will ride the streets on tricycles of the type used for the delivery of packages. The scraps of paper are picked up on spiked sticks and dropped into ordinary waste-paper baskets carried by the gatherers. When the basket becomes full, its contents are deposited in the box carried by the tricycle.

U. S. HAS TIMBER TO HOUSE A BILLION PEOPLE

The United States has enough standing timber to build frame houses for about a billion people, or two-thirds of the entire population of the world.

This fact is immediately deducible from figures given in the recent report of Herbert Knox Smith, commissioner

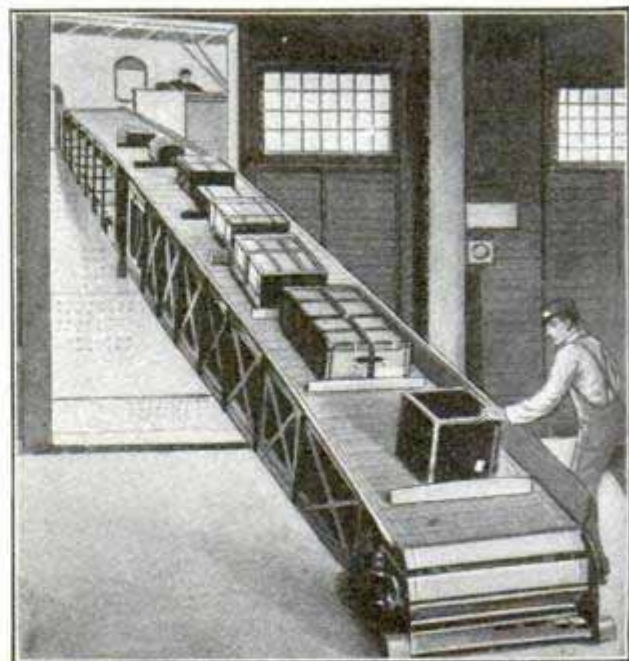
of corporations, on the lumber industry of this country.

There are, in the forests of the United States, about 2,800 billions of board-feet of timber, a board-foot being equal to a slab 1 sq. ft. in area and 1 in. thick. Sawed into lumber and placed in freight cars, it would load a train nearly a million miles long. Cut into blocks 4 in. thick and used as a paving material, it would provide wood paving for three million miles of roadway having a width of 50 ft., or it would make a road over a mile wide around the earth at the equator.

CONVEYOR USED IN LOADING "MAURETANIA"

This automatic, electrically driven conveyor is used in loading and unloading the "Mauretania" and "Lusitania." The motors are located inside the steel frame, and the wiring extends from end to end, which makes possible the placing of push buttons at various distances, so that the motors may be started or stopped at any point.

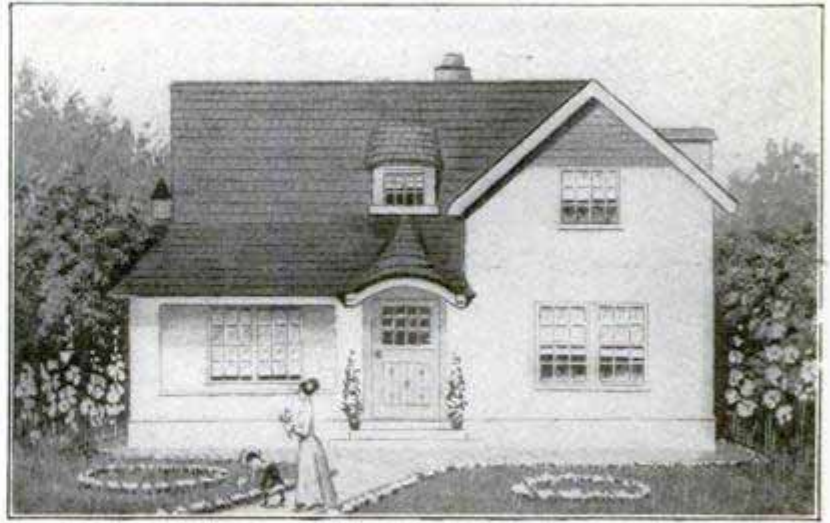
The endless carrier moves at a speed of from 75 to 100 ft. per minute, can handle 3,000 pieces of freight per hour, and is operated easily at any angle up to 45 deg.



Electric Endless Carrier for Loading Ships

PRIZE-WINNING DESIGN FOR SMALL HOUSE

SIMPLICITY is the keynote in this plan for a 4-room tile-block house to cost not more than \$2,500. The outside is to be finished with a coat of cement. The floor beams are to be wood and there is to be shingle or slate roof. The exterior trim on the window frames is to be stained dark brown. This design won a prize at the recent contest for small house designs conducted by the Building Trades Employers' Association of New York.



Front Elevation Showing Excellent Lines and Economy of Material



First Floor Plan



Second Floor Plan

Designed by Robert L. Stevenson, Architect

WIRELESS ANTENNA USED IN AEROPLANES

Two methods of disposing of the antenna have been adopted by the military and aviation experts in working out the wireless problem with the aeroplane. The military officers who recently completed successful tests on the Pacific coast are credited with the most simple device. The great problem has been to provide a proper antenna for the aeroplane end of the circuit and the army officers do this with a strand of copper wire 200 ft. long. A coil of

fine copper wire is taken aloft and is allowed to dangle toward the ground. The experiments that have been made with this system have all been at an altitude that permitted a length of wire of 200 ft. When the experiments were completed, the wire was simply cut and allowed to fall. This class of wire is cheap and is used for a variety of purposes in military operations so that a plentiful stock of it is always at hand.

The second method, which has been



Two of the Types of Aeroplane Wireless Apparatus with Copper Wire Antenna, Used by Army Officers

successfully tested by wireless and aviation experts, consists of connecting all the wire stays of the aeroplane in series to form the antenna. On one machine that was fitted in this manner, the aggregate length of the antenna thus obtained was 800 ft. and so well did it work that messages from shore stations around the city and even from ships at sea were received on the aeroplane instrument while the latter was in a shop on the first floor of the building of the United States Aeronautic Reserve in New York, although the

wires were not connected with other antennas on the roof of the building.

There have been several types of equipment devised for aeroplane use. Photographs of the experiments made in San Francisco show two army officers each using a different type. The one which was installed in the machine that has been set up by the New York reservists has a total weight of 65 lb. This has a 6-in. spark coil which is fed by a 12-volt storage battery having a capacity of 50 ampere-hours and weighing only 40 lb.

FRANCE INTERESTED IN WRIGHTS' SUIT

The proceedings in the suit brought by the Wrights against French aeroplane constructors for alleged infringement of patent rights have been followed with considerable interest in France. The basis of the suit is the contention that the Wright patents cover the simultaneous action of warping the wings and changing the angle of the vertical rudder to establish equilibrium, the construction details for which, more or less modified, are used in all flying machines. Conse-

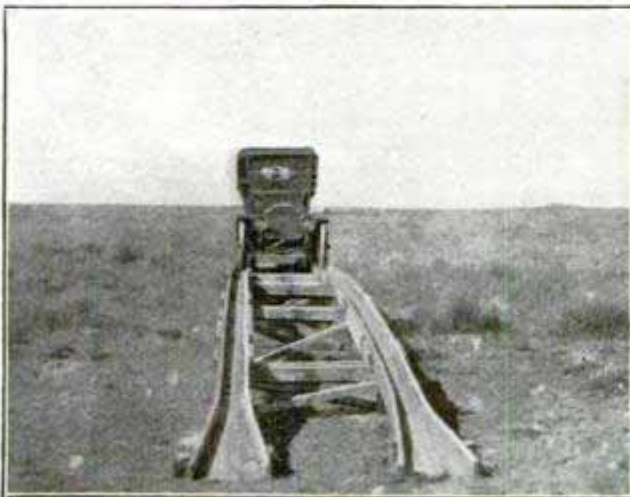
quently the Wrights claim the right to issue licenses, which means that the Wright patents may become in aviation what the Selden patents were in the development of the automobile.

The attorneys for the defense reviewed the development of the aeroplane at the first hearing and argued that the warping of the planes had been utilized in earlier machines, and that the selfsame word, "warping," was used in the Adler patents of 1900 relative to the flying machine "L'Avion."

It was also argued that the vertical rudder could not be patented, having been in use in aerial navigation long before the Wrights appeared, not to speak of its use on ships. The combination of the two in simultaneous action is performed by the airman as he sees fit and as circumstances require. Therefore the defense maintains that the combined action of the two is not patentable.

MAIL CARRIERS USE AUTOS IN THE WEST

The automobile is putting the old stage lines in New Mexico and Arizona out of business for the carriage of mail to points inaccessible to the railroads. The motorists on the "star" and the rural-free-delivery routes have troubles out of the ken of the ordinary automobile drivers, however. The cars cannot be driven along some of the trails that are easily covered by a horse and wagon, and in some places bridges with troughs for the wheels of the machine instead of a full width of flooring are built over old creek beds and depressions. At other points, where fence lines must be low, bridges that are really cattle guards are laid a distance of a few feet on either side of the fence line where a section has been removed. These are made of boards set on edge and are provided with narrow strips on which the automobile can run, but over which cattle cannot pass.



Bridge over a Creek Bed in New Mexico with Troughs for Wheels of Automobile Mail Carrier

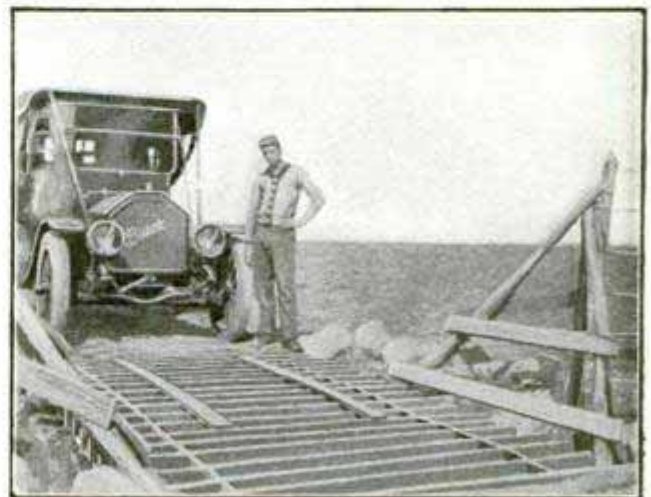
PLAGUE-PROOF GARMENTS

The illustration shows the means adopted by physicians to prevent infection of the plague which has been devastating Manchuria and parts of China. The helmet, coat and gloves are of rubber, and the helmet is soaked with iodoform.



☐The first evidence of the aeroplane interrupting the course of true love was recorded in the English newspapers when a nouncement of the dissolving of her engagement to marry Robert Lorraine, the actor-airman, was published by Marie Lohr, an actress, the determination of her fiancé to continue flying being given as the cause.

☐Lieutenant Stein of the German military aviation corps, was instantly killed when the aeroplane he was testing at Doeberitz, Feb. 6, fell 65 ft.



Fence Crossing and Cattle Guard Used in New Mexico for Automobiles in Use on Mail Routes

TROUSERS SKIRT DEVISED FOR OUTDOOR WEAR



The American Interpretation of the French
Trousers Skirt

The trousers skirt that has created such a sensation within this country and abroad was designed primarily for out-of-door use. The basic idea, which came from one of the most famous of the Paris dress-making establishments, was to give woman a garment in which she could be comfortable while in the open. It was meant for touring, for walking expeditions, for hunting and other such purposes, and was not at first intended to be used in the drawing room or on the streets for morning or afternoon wear, as the so-called harem skirt has come to be used. American dressmakers have remodeled the garment into more practical form than the original Paris design and have so made it that it can even be equipped with hip pockets, if the fair wearer so desires.

ⒸThe capacity of the aeroplane as a means of taking the family for an outing was tested with success by Charles F. Walsh of San Diego, California, who made a flight at Los Angeles with his wife and two children as passengers.

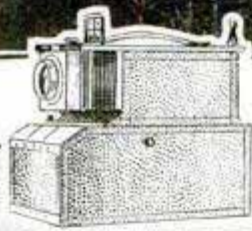
LONG-DISTANCE CAMERA

For the photography of inaccessible objects, such as mountain views, details of architecture, and scenes which must necessarily be a considerable distance from the operator, such as movements in modern warfare, ordinary photographic apparatus is inefficient. An ordinary camera provided with a lens of 48-in. focus would give a sufficiently large image under such conditions, but weight, volume and excessive length make such an apparatus impracticable.

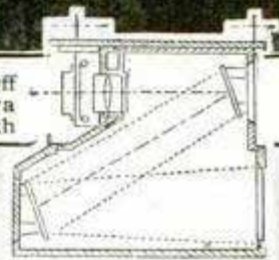
A long-distance camera has been designed, however, which provides a focal length of 48 in. with a length of but 16 in. of apparatus. This is accomplished by breaking the focal length

into thirds with the aid of two mirrors, as shown in the diagram. When the camera is not in use, the upper part telescopes into the lower.

The accompanying illustrations of a mountain scene in Switzerland, one photograph taken with an ordinary camera, and the other with the long-distance apparatus, from exactly the same spot, provide an excellent comparison. The photograph taken with the ordinary camera has a section marked off at the right, the buildings in this section being about 1,400 ft. distant. The second illustration shows the section marked off in the first as brought out by the long-distance camera.



Taken with the Ordinary Camera, the Section Marked Off Being 1,400 Ft. Away. Exterior Appearance of Camera and Diagram Showing Method of Breaking Focal Length



Details within Marked Section of Photograph Reproduced Above as Brought Out by Long-Distance Camera from the Same Point



1—Cavendish Morton before Starting to Make Up for the Part of Falstaff 2—The Start—Wig and Bulging Forehead with Eyebrows in Place 3—The Silk Bag in Place, Ready for Inflation

A SILK BAG FOR FACIAL MAKE-UP

By WENDELL PHILLIPS DODGE

Cavendish Morton, a young actor, is the inventor of a unique appliance for making up for rôles calling for a "big head." It consists principally of an ingeniously made silk bag having a drawstring for controlling the amount of inflation.

In pondering over how he could "get into" the part of Falstaff, physically as well as histrionically, he hit upon this scheme of ballooning his own face and head to the full-moon size of that of Shakespeare's elephantine, yet withal witty creation.

The six accompanying illustrations make clear how the trick of "getting the big head" is done. Figure 1 shows Mr. Morton, who weighs 180 lb., before entering his dressing room, where he proceeds to build himself into the proportions of the 400-lb. Falstaff.

In Fig. 2 is seen the wig in place which is to be used with the "big head." This consists of a sort of silk bag inflated before it is put on. Usually, a padded wig is worn, but poor old Falstaff easily gets hot-headed, so Mr. Morton devised his silk bag, inflated with cooled air, to take the place of a cake of ice on the head for that "morn-

ing after" feeling that Falstaff experiences after his ineffectual flirtation with the Mistresses Ford and Page.

Figure 3 shows the silk face bag joined to the wig and "big head," on which the full-moon cheeks and double chin are to be formed. The edges of the silk bag are joined around the eyes, mouth and nose with spirit gum. Next the cheeks and chin are padded by carefully pulling the drawstring. The silk make-up bag then takes the appearance shown in Fig. 4.

Pouches of nose paste are now placed beneath the eyes, and these are blended with the false cheeks, effectually covering the joints. Then a groundwork of No. 3 grease paint, made deeper with yellow, carmine and a little lake, is applied evenly all over the face. Blotches of carmine mixed with a little yellow are dabbed on the nose and cheeks, and the high lights of white, mixed with a little yellow, are placed on the forehead, on the pouches under the eyes, and on the cheeks. These are then carefully blended with the groundwork. (See Fig. 5). All is now ready for the beard and mustache of the jovial and rotund knight. These are so placed on



4—Bag Tightened at Bottom and Inflated

5—The Nose of Toupee-Paste in Place. Now for the Complexion

6—Sir John Falstaff—One of the Most Difficult Make-Ups Ever Devised

the balloon-mask that the actual outlines of the cheeks are lost. The beard is then blended into the cheeks with fine pieces of crêpe hair stuck on with spirit gum. Finally, the eyelashes are colored with a reddish yellow, making

the eyes seem smaller, and, consequently, giving an added appearance of great breadth, or rather circumference, to the face of the character. The complete head and face appear in the play as in Fig. 6.

ANOTHER SLIDE IN PANAMA CANAL

One of the worst slides the Panama Canal engineers have had to contend with occurred in February, when 500,000 cu. yd. of earth slid into the cut just opposite the town of Culebra. It has always been held that the slides were caused by heavy rainfalls, which make the soil soggy and the sloping rock underneath slippery. Under this condition it is believed that when the weight overcame adhesion and when the concussion of dynamite blasts gave sufficient impetus, the slides took place. It is said that no such explanation is possible for this slide, because there had been no heavy rains in the section for six weeks and no blasting in the vicinity.

☞ Maurice Tabuteau has been awarded the Michelin trophy for 1910, his record showing a continuous flight of 7 hr. 45 min. covering a distance of 362.7 miles.

LIGHT FLASH COMBINED WITH WHISTLE BLAST

Several vessels on the Great Lakes are being equipped with an electric whistle-blowing apparatus that will cause a light to flash at the same time, and for the same duration, as the whistle blast. The light, of course, is only brought into play at night, and its purpose is to make it possible for one ship to signal another by visual means as well as by making a noise.

Vessels are continually passing each other at close range on the Great Lakes, especially in the channels connecting them, and when steaming into the face of a high wind, there is a possibility that the sound of the whistle will not reach an approaching vessel. Such a contingency is provided for in the daytime by locating the whistles at least 4 ft. higher than the top of the pilot house, so that the escaping steam will show that the whistle has been blown and tell whether it was a long or a short blast.

ELECTRICITY PRODUCED BY OIL-GAS POWER

The Holton Power Company of El Centro, Cal., is to generate electricity by means of gas power derived from crude oil, the success of which, it is believed, will greatly affect the means employed for producing power in sections of the country where fuel oils are available and where water cannot be obtained in sufficient quantity for use in steam plants.

The new plant consists of three oil-gas producers, which burn a small amount of the oil and convert the rest into a power gas suitable as fuel for a gas engine. On leaving the producer, the gas goes direct to a 1,000-hp. twin-tandem gas engine, which is direct-connected to a 3-phase, 60-cycle, 2,400-volt alternator.

RECORD AEROPLANE FLIGHT WITH PASSENGER

The French airman, M. Busson, recently broke the world's speed record for flight with a passenger by flying $29\frac{3}{4}$ miles in 30 min. 36 sec. at Rheims, which corresponds to a speed of 58.4 miles an hour. The flight was made in a Deperdussin military monoplane, and the course was a circuit only $1\frac{1}{2}$ miles in length, which necessitated much skill and care in maneuvering.

CA special train carrying Charles G. Gates from Yuma, Arizona, to New York for medical attention, covered the last lap of the journey between Chicago and New York, a distance of 974 miles, in exactly 987 minutes, the fastest time of record for the distance.

SAFETY APPLIANCE TO STOP DERAILED TRAINS AUTOMATICALLY

By C. S. PARTRIDGE

By driving a train over broken rails on a leased track near Washington, D. C., every afternoon, J. T. Andrew, an Alabama railroad man is endeavoring to convince government officials that his safety appliance will prevent the derailment of railway locomotives and cars from any other cause than the deliberately wicked machinations of man.

The invention is simple. It consists of two extra wheels, two rollers, a valve operating the emergency brakes, and a tie-beam to prevent the falling of the brake-beam, should it happen to break. The extra wheels are of smaller diameter than the regular wheels and are attached to the axle by a case bolted to the axle; the extra wheels, with heavy double flanges and faces of 12 in., fitting just inside the regular wheels. The rollers, also of 12-in. face, are immovable, being attached to the journals just outside the regular wheels. The case strengthens the axle

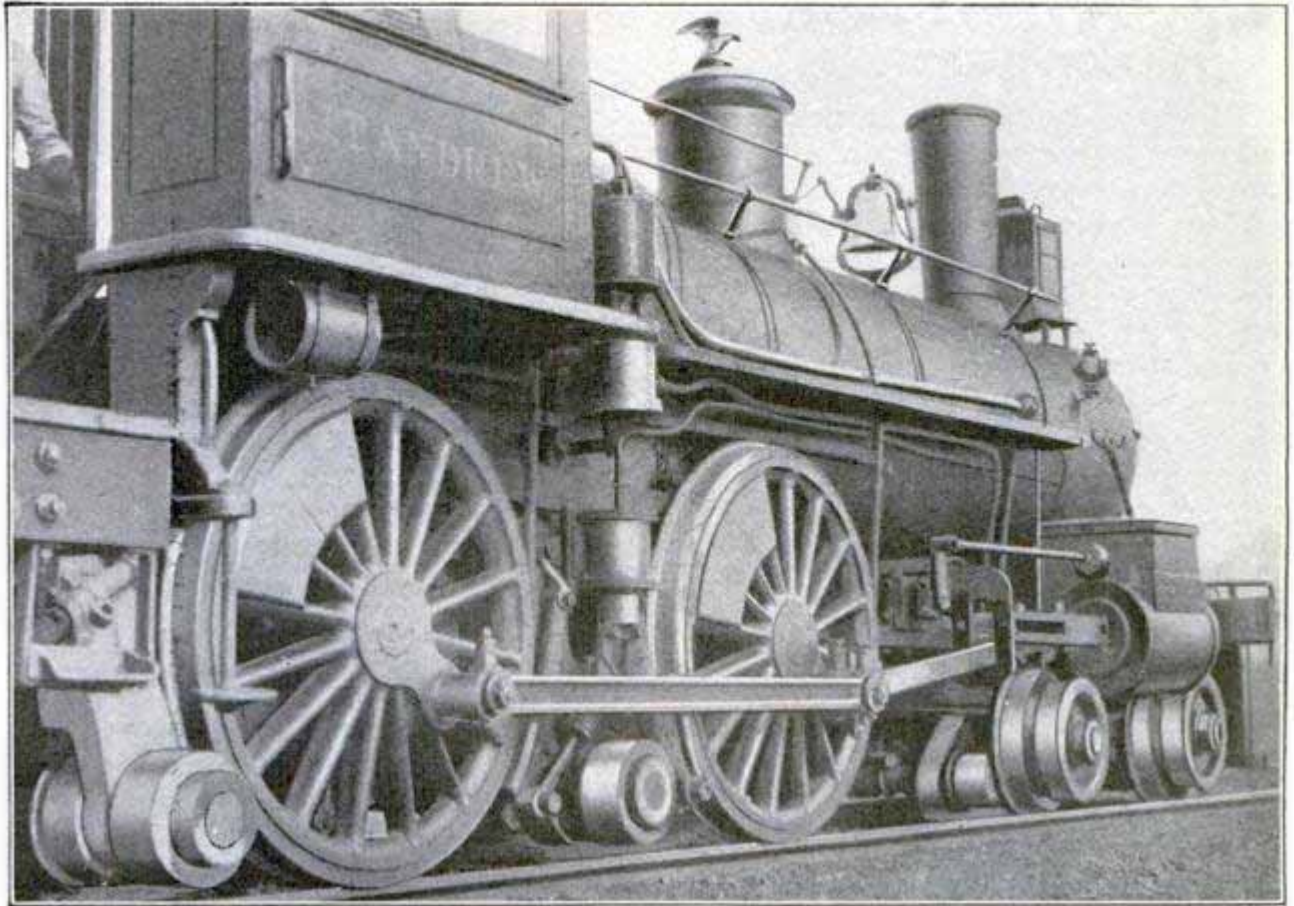
and prevents damage if it should break. The rollers, when in use, distribute the weight of the car on the trucks.

The tie-beam, besides affording a protection against a broken brake-beam, binds the trucks together more firmly.

The valve operating the emergency air brakes and signaling the engine-man is worked by a rod which is moved upward by the roller when it takes the rail.

The principle on which it works is that when one regular wheel or several regular wheels leave the rails, the rollers on one side and the extra wheels on the other take the rails and stop the train by automatically applying the brakes.

The most severe test in derailments from "natural causes" is that of causing a break in the track by the removal of a portion of rail. Into and over such a gap the locomotive and car equipped



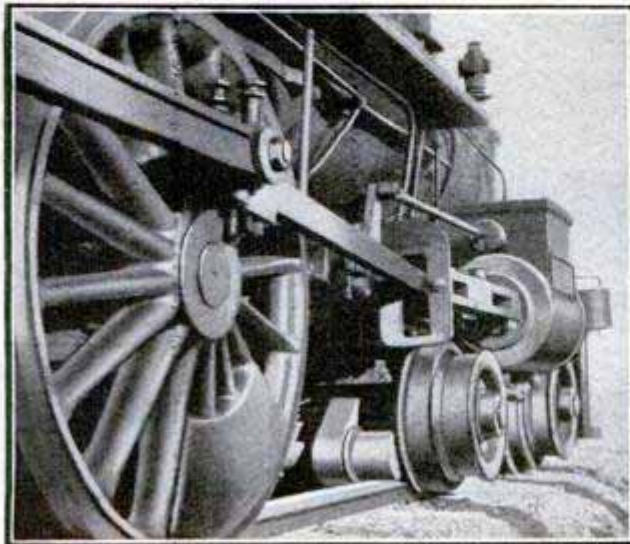
Locomotive Fitted with Safety Appliance

with the appliance have been driven at a speed exceeding 40 miles an hour. In all the tests made in Washington and in the South—more than 150—no person has been injured and no property damaged, the cars being unhurt.

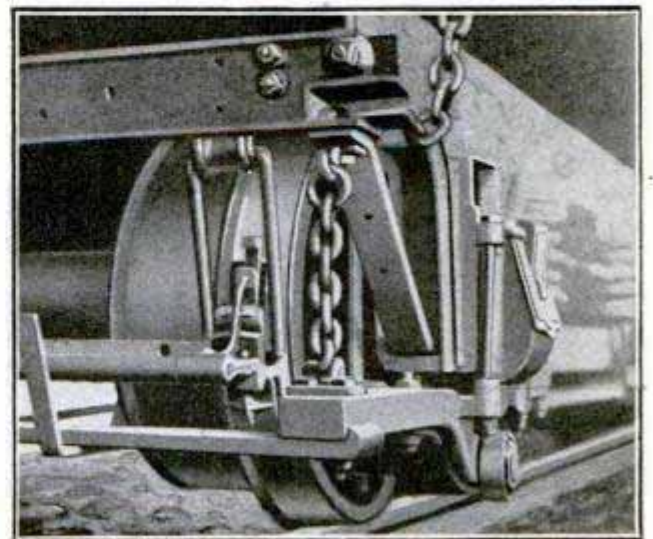
In the tests, the emergency brakes were automatically and instantaneously applied and the train was stopped within 175 ft. Rerailers were

placed, another locomotive hooked on, and within a minute the train was humming along under its own power.

ⒸAn American shipbuilding firm has been awarded the contract for the construction of a second-class cruiser for the Chinese navy, at a cost of \$1,000,000. This is the first Chinese warship to be constructed in America.



Engine After Wheels Have Left Rails, Showing How Appliance Holds Locomotive on the Other Side



Appliance Attached to Trucks of Car. The Tie Beam is Parallel and Below the Brake-Beam

PLIERS AVERT DANGERS OF LONG HATPINS

While pliers are not usually rated among the weapons of defense there is every prospect that the useful tool will be so set down in the future be-



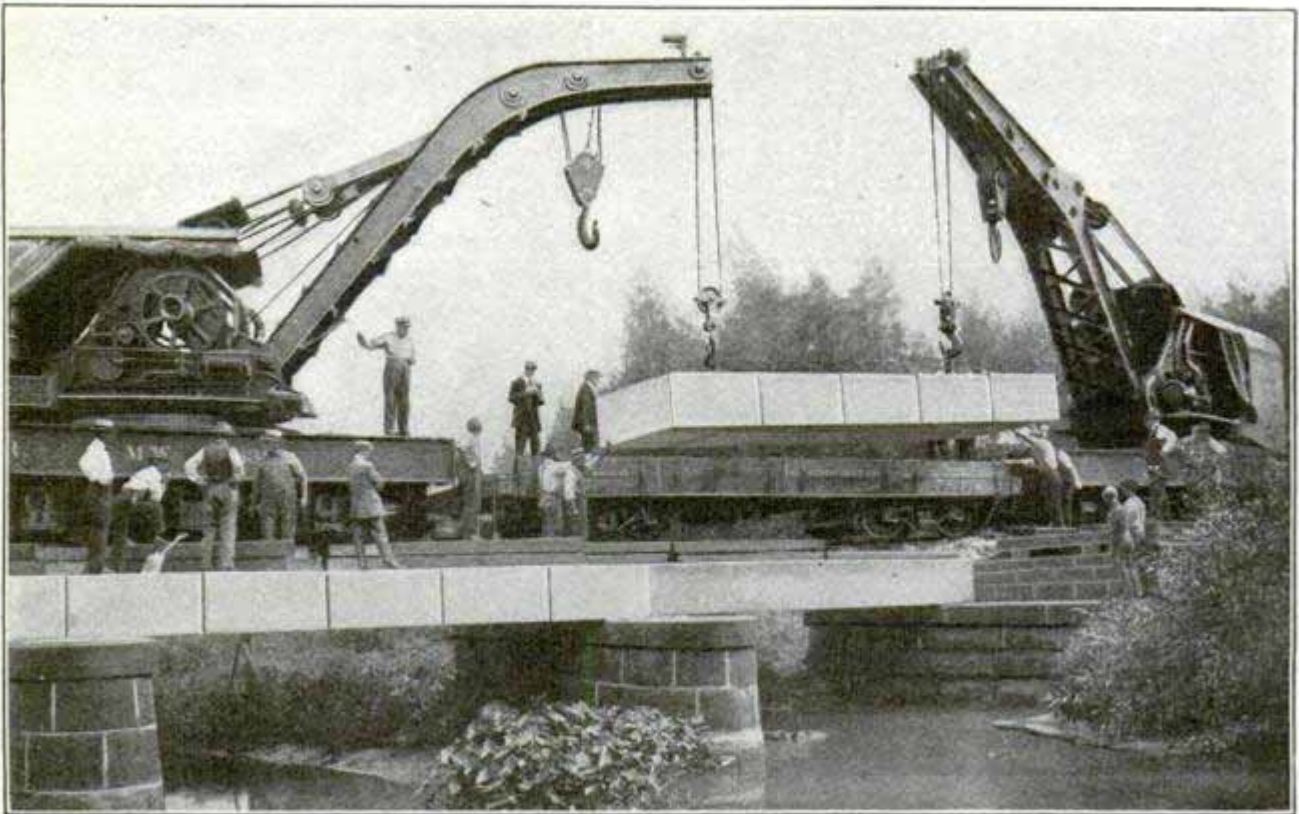
Pliers Effective Protection Against Hatpins

cause of the effective use to which they have been put to guard against damage from hatpins in crowded street cars. A Chicago architect is credited with having first made use of a pair of pliers

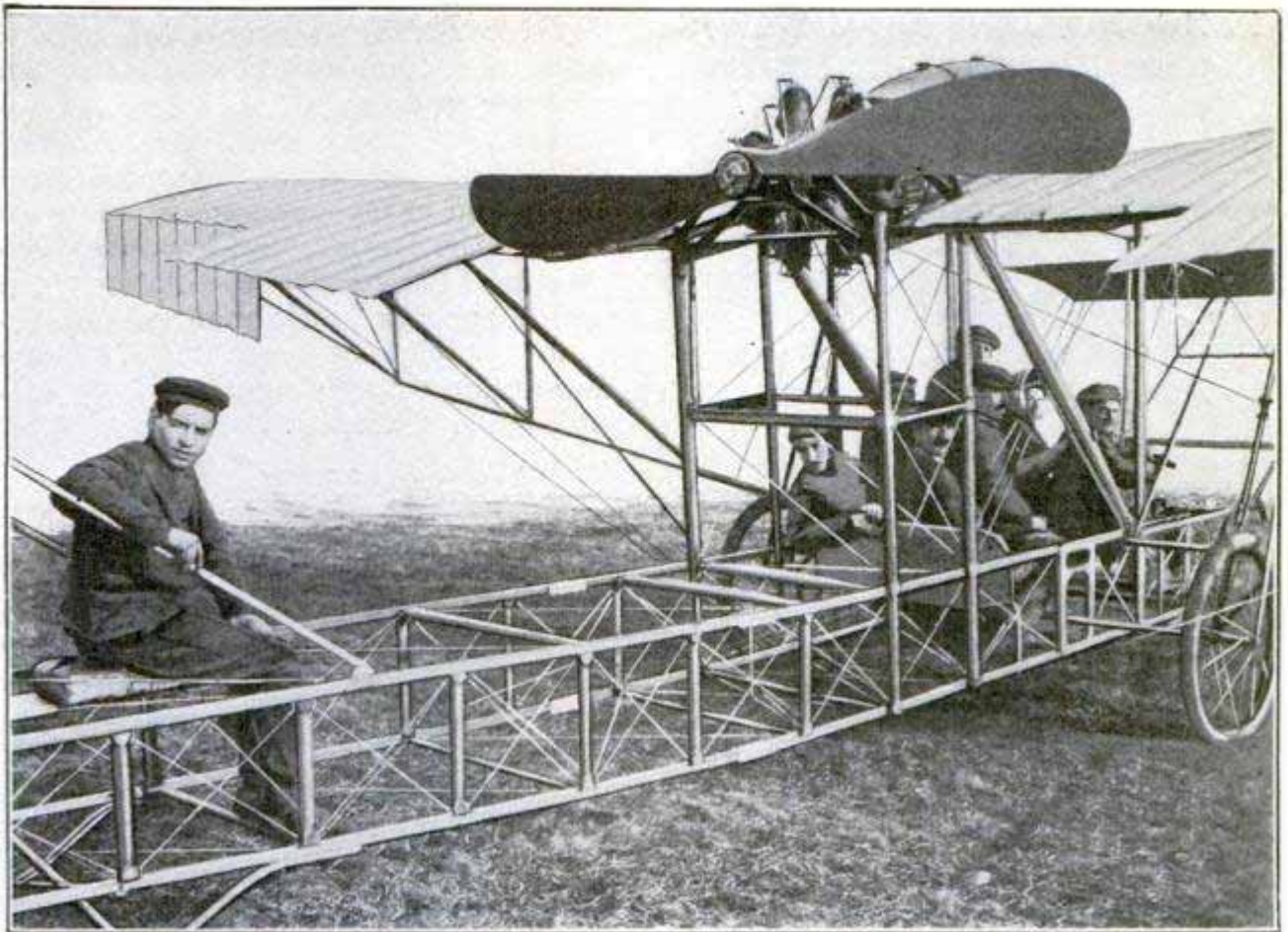
for this purpose. The protruding point of an exceptionally long hatpin, worn by a young woman standing next to him in an elevated train, not only annoyed him but did him physical harm by scratching his face. Polite requests for the withdrawal of the pin having met with no response, the injured man drew a pair of pliers from his pocket and catching the offending point in their jaws, dexterously bent it upward, thus eliminating all danger to other persons in its vicinity.

BRIDGE RECONSTRUCTED IN LESS THAN TWO HOURS

A record in small bridge reconstruction was made recently on one of the divisions of the Pennsylvania Railroad. The reinforced concrete slabs which were to form the new spans were placed in accessible positions along the tracks, and when all was in readiness, two powerful wrecking cranes tore up one side of the bridge, tracks, spans, and all. Within 30 minutes the concrete slabs were placed on this side and tracks laid, after which



Old Span Torn Away and Replaced by Reinforced Concrete Slabs without Interrupting the Train Schedule



Bleriot Monoplane Just Before the Flight with M. Lemartin and Seven Passengers

the other side was treated in the same manner. Not a single train was delayed or thrown off schedule, notwithstanding the fact that the bridge is on the main line between Washington and Buffalo.

Reinforced concrete slab spans for small railroad bridges of this nature are said to form a road bed so solid that the fastest passenger trains and heaviest freights do not produce the slightest tremor.

AEROPLANE CARRIES EIGHT PERSONS

The remarkable flight of the French airman, M. Lemartin, with seven passengers, one of which was a woman, was made with a 100-hp. Bleriot monoplane having a supporting surface of 430 sq. ft. The combined weight of Lemartin and his passengers was 1,041 lb.; the fuel and lubricating oil, 66 lb., and the machine, 1,320 lb., making a total of 2,427 lb. to be supported by

430 sq. ft. of surface, which is 5.63 lb. per square foot.

Although the flight only lasted five minutes, it demonstrated the possibilities of flights without passengers of a duration and distance that would far eclipse anything heretofore accomplished. The combined weight of the airman, the seven passengers, and the fuel and lubricating oil carried in the 5-minute flight was 1,107 lb. Allowing a weight of 165 lb. for the aviator, and the balance, 942 lb., for fuel and lubricating oil, the machine should be able to keep in the air for over 12 hours, and, at a speed of 61 miles an hour, cover a distance of about 800 miles.

ⒸThe aeroplane has been put to practical use by the United States army along the Mexican border, having been several times utilized to convey messages and orders between detachments at various stations and from headquarters to outposts.

OREGON PLANS NEW LEWIS AND CLARK MONUMENT

On the extreme western point of Oregon, where the first salt to be



Lewis and Clark Monument Being Erected in Oregon

made west of the Mississippi river was taken from the Pacific Ocean by the process of evaporation, there will be erected a tall shaft of native stone in memory of the leaders of the Lewis and Clark expedition. The members of this expedition were the first white men to reach the far northwestern shore and the monument will stand among the still existent remains of the cairns in which they made their salt. Six hundred tons of native cobblestone and cement are to be used in the construction of the shaft, which will stand on a 22-ft. base, 63 ft. above the ground.

THE KAISER "PURIFIES" THE GERMAN LANGUAGE

The efforts of our only living ex-president toward the establishment of a reformed spelling have been totally eclipsed by Kaiser Wilhelm. The German monarch aims at nothing less than the elimination of all Latin phraseology from scientific nomenclature and the substitution thereof of purely German words.

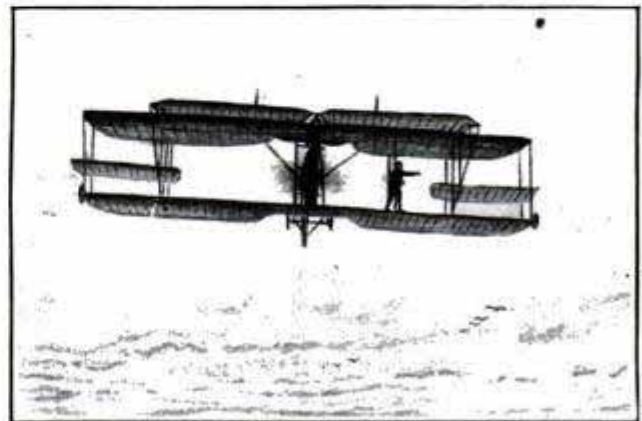
If the Kaiser is successful, it will mean the complete rewriting of all scientific works in the German language. But this is not all. The present Latin forms are comparatively simple and easily understood. For instance, the term "fraktionierte Distillation" (fractional distillation), as it now appears in German, would become "bruchstückweise flüssige Verdampfungsstoffaufsägung zu verschiedenen Wärmestärken."

ASK SALVAGE FOR BALLOON UNDER MARITIME LAW

Navigation of the air brings before the French tribunals all sorts of new questions of law. Some months ago two French aeronauts were carried out to sea in a storm and were compelled to descend on the water about 1,000 ft. from the shore. After anchoring the balloon, they saved themselves by swimming, reaching the shore in an exhausted condition. While several fishermen were attending them, others towed the balloon ashore. Claiming the balloon should be considered as ordinary wreckage, these fishermen recently sued for one-third its value as salvage money.

CODY CARRIES PASSENGER ON AERO'S WING

One of the most spectacular aeroplane passenger carrying feats of recent record is that credited to S. F. Cody when he made an ascent in Eng-



Airman Cody Carrying a Passenger Standing on the Wing of His Aeroplane



Roofs in a New York Factory District During Fire Drill

land with a passenger standing between the planes of his biplane about midway the length of one wing. This flight was regarded as particularly perilous because of the uneven distribution of the weight. A perfect balance of the machine was maintained by expert maneuvering.

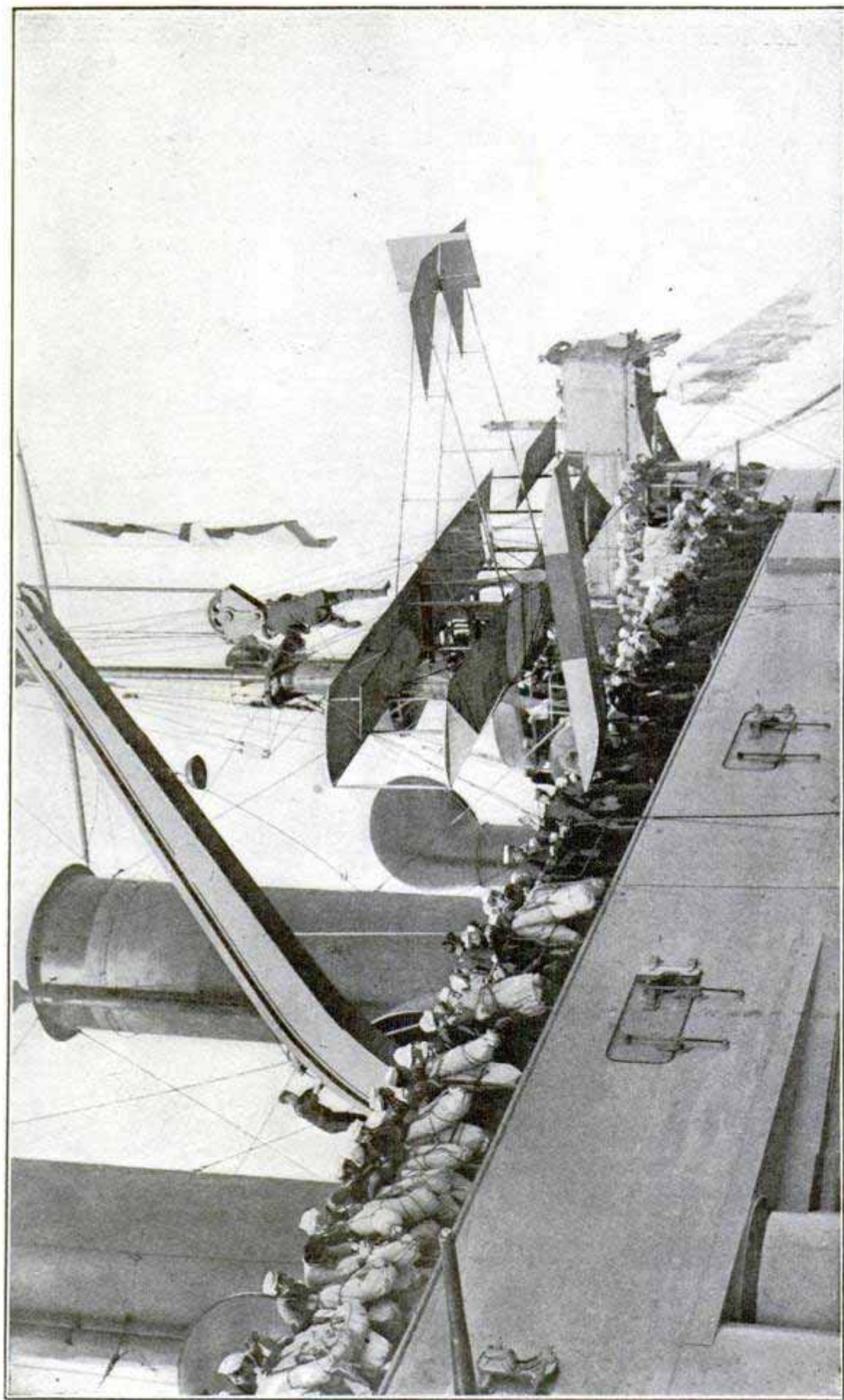
TRAIN FACTORY HANDS TO AVOID FIRE PANIC

How well employers of labor in New York and vicinity have taken home the lessons taught by the recent disastrous factory fire in Newark, N. J., is shown by the recent institution of fire drill among the employes of many factories, by means of which the buildings may be quickly emptied in case of accident of any sort. The roofs of their own and adjoining structures are used in practicing the exit of the employes, who are now taught to walk quietly and without undue haste to the various exits provided for them. Each group of employes is given a certain door to use and route to follow, in

case of fire, and there are frequent tests of the plans. A fire alarm is sounded and the employes are marched out of the building in accordance with the plan, the alarms being given at unexpected times. The success of these maneuvers is manifested by the fact that buildings are emptied in an exceptionally short time without confusion or congestion at the exits. The same system is applicable to tenement houses.

☞The Zeppelin expedition to consider the feasibility of reaching the north pole by dirigible, of which Prince Henry of Prussia was a member, has returned from Spitzbergen with the report that dirigible ballooning has not reached a stage sufficiently advanced to warrant such an undertaking.

☞Onyx of colors varying from a rich chocolate to a high amber, unlike any variety previously known, has been discovered in immense deposits in the mountain of El Talan, 12 miles from the city of Oaxaca, Mexico.



THE CURTISS MACHINE BEING HOISTED ABOARD THE CRUISER "PENNSYLVANIA" AFTER A WATER FLIGHT AT SAN DIEGO, CAL. THE MACHINE WAS LOWERED INTO THE WATER AGAIN AND FLEW BACK TO ITS HANGAR ON SHORE

COMMENT AND REVIEW

WHILE a number of gentlemen engaged in export trade were relating their experiences recently, an incident was mentioned which should be suggestive to any concern contemplating foreign trade. A certain large manufacturer of laundry machinery is located in Spain. He needed an extra lathe, the price of which in this country was \$3,600. Being in a hurry, he cabled his order and was answered that on account of orders already in hand shipment could not possibly be made under four months, to which must be added another month in transit. Notwithstanding he could have bought in Germany for less money and had the machine laid down in his shop in three weeks, he preferred to wait and get the American-built machine.

*Why the
American
Machine
Won*

To an American friend the purchaser explained the reason. He said the German machine could not be put to work on arrival but would have to be fixed. Bolts would not fit holes, parts would not assemble as they should, and from a few days to two weeks must be spent in getting the machine in condition to start up. Then for a longer time there would be constant stops and delays until finally no more alterations were needed.

"On the other hand," said he, "I know when I uncrate the American machine, all I have to do is to bolt it down and throw on the belt, for it is in perfect running order and ready for the heaviest job it is capable of, right from the start." This man had bought from German and American builders before, and spoke from experience.



ANOTHER case was that of an English manufacturer of cotton cloth, who had enjoyed a large trade for many years with a rich Chinese importer at Hong Kong. One day he received a letter stating the last shipment was unsalable and was therefore refused. The goods were identical in quality, size, weight and design to former orders, and what the trouble might be no one could imagine. However, as the shipment involved thousands of dollars and the customer's future trade very much more, a competent man was dispatched from England. This is what he found. To satisfy the local trade, there had been printed on each piece of cloth a good luck sign, or what with us corresponds to a trademark. This sign consisted of the figure of a dragon, about the size of a silver half dollar.

*What a
Modern
Dragon
Did*

Continued use had so worn the printing plate as to necessitate the engraving of a new one. This was apparently identical with its original, but on actual measurement proved to possess wings one-eighth of an inch longer in the new than the old one, which was sufficient to queer the goods with the retail buyers who insisted they were no longer being served with the Simon-pure article. Evidently the Chinaman has the "just as good" idea developed to a much higher degree than we Americans.

The morals are obvious: In the first, build your machines yourself, and do not leave part of the work for the purchaser; in the second, one cannot know the little details of foreign trade too well.

NOT so long ago to have crossed the ocean in a bed instead of the then stuffy, uncomfortable berths, was considered the event of a foreign trip, and something to relate to the neighbors. Today every first-class Atlantic passenger steamer has a large number of staterooms so equipped, not only in the cabins de luxe, but on other decks as well. An eastern railroad has recently put in operation on a one-night run, apartment car sleepers with real beds and dressing-room accessories. One or two interurban trolley lines have also provided bedrooms on a smaller scale. Now that the demonstration has been made, it is hoped that the idea may be extended over other roads, and that the uncomfortable cages misnamed drawing rooms may soon become things of the past.

*Comfortable
Beds for
Trains*

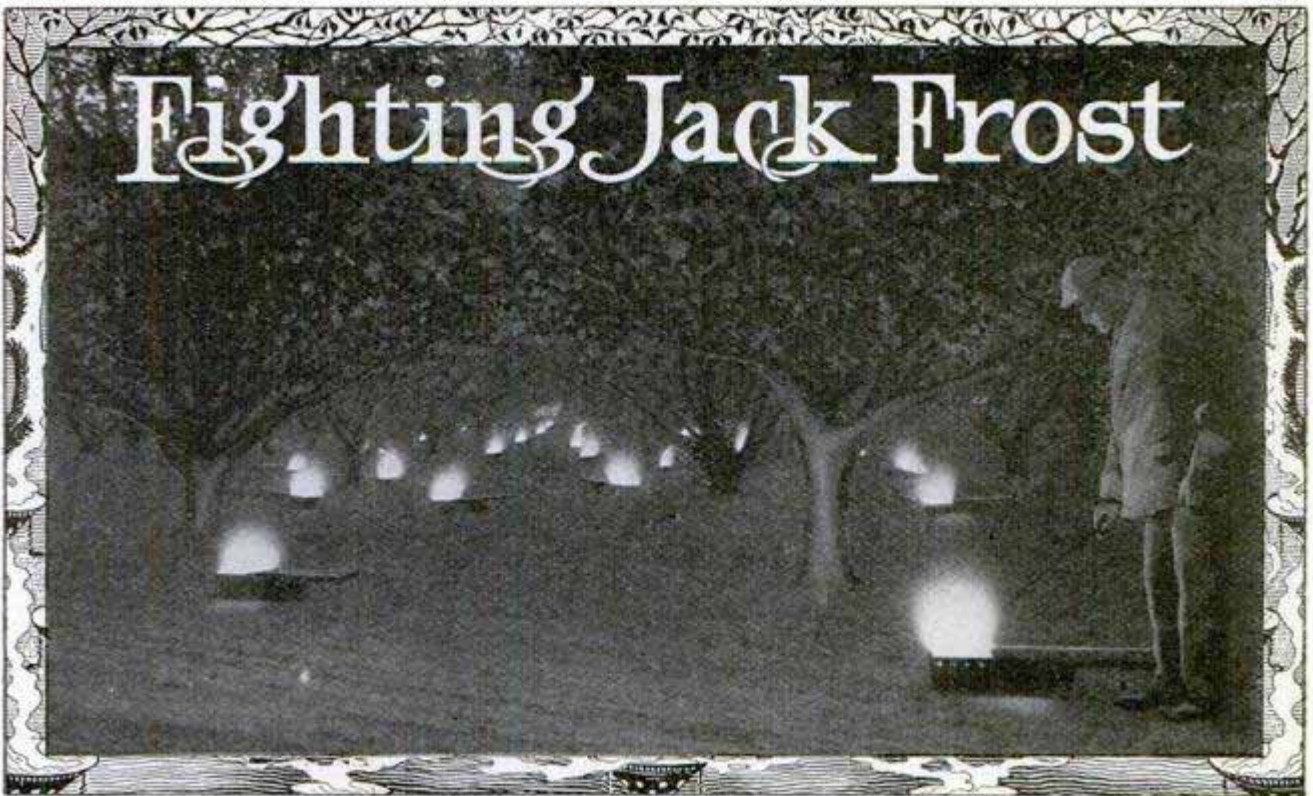


ENGLAND and the United States are the two large powers where compulsory service in the army in times of peace is not required. From time to time, and more frequently of late, we are told that before many years have passed, it will be necessary to enforce one to three years military service here from every able-bodied young man. The idea is extremely repugnant, for while the physical and disciplinary value is admitted, it would mean the taking of the very years in which the average young man really fits himself for his life work. To return to this preparatory work after three years of military life is by no means easy, as anyone who has dropped his studies for two years, well knows. The training to obey without dispute, to be punctual and respectful, are things in which the American

*Compulsory
Military
Service*

boy is lacking, but could not all this be reasonably accomplished with drill of one hour, or less, a day, compulsory if necessary, for all boys in upper-grade public schools and students in high schools and colleges? Moreover, it should not be forgotten that the average American boy is a very fair shot and with a minimum of training would quickly become an excellent sharpshooter. With a fair knowledge of tactics acquired at an age when he learns easily and rapidly, he would develop into an excellent soldier ten years later, if necessity required his services, in a very short time. There are many things in our modern school curriculum for which military training might be substituted with very great advantage. In cities of sufficient size, the instruction could be by a regular army man; in the small towns and country districts, the training would be less efficient both through inferior instruction and lack of that enthusiasm which comes only from massed forces, yet much could be accomplished even there.

H. H. WINDSOR



Oil Smudge-Pots in Operation in Grand Valley, Colorado

Western Orchardists Will Heat All Outdoors with Smudge-Pots to Prevent Recurrence of Damage Caused by Cold Wave a Year Ago When Crops Were Lost

By LOUIS MEYER

MILLIONS and millions of dollars are spent annually as insurance protection against fires—against heat. Now comes the proposal to equip the nation to fight cold by starting fire, and the organization of a system along the line of volunteer fire departments to save the crops of the nation from the millions of dollars of loss suffered annually by frost and freezing.

At the outset, of course, the proposition to heat all outdoors sounds absurd, but it has been demonstrated by science that this very result can be obtained. When a cold wave swept the entire nation in April, last, the total loss caused to the fruits and other crops of the United States in one night was estimated at from \$75,000,000 to \$100,000,000. But there was one section of the country immune,—the Grand Valley of Colorado where a

\$3,000,000 crop of fruit was saved by the use of smudge-pots, or more properly, orchard heaters. In some parts of Europe this method of preventing crop losses has been known for years.

Orchard heaters were used for the first time in the Grand Valley three years ago. Last year was the first time that their practicability was effectively demonstrated. Before that period an effort had been made to induce the orange growers of California to experiment with orchard heating, using ordinary lard pails and crude oil, which was obtainable in the refineries nearby at a trifling expense. The orange growers were not only skeptical but also were reluctant to admit that there was any danger from frost. Finding no market for the pails which he had manufactured for the purpose, a California grower thought he might work



Refilling Coal Smudge-Pots with Fuel

them off on the orchardists of the Grand Valley. The manager of a fruit growers' association agreed to help him when he arrived in the valley, but the growers were not at all enthusiastic. However, rather than ship them back, the pots were offered for little more than the freight, and as the Weather Bureau happened to send out a frost warning at that auspicious moment, some of the more progressive growers agreed to experiment with the pots. The result was that they saved almost their entire crop, while others in the valley lost everything.

The success of these ranchers with the pots, started the inventive minds of the valley citizens to work. While these first pots burned oil, the proximity of coal mines turned their thoughts to coal. One man patented a cone-shaped pot, with holes for under-draft to hold about half a bushel of coal. Another originated a similar pot. A third devised a pot which holds twice the amount of coal. All were provided with covers to keep the fuel dry during the period not in use.

In addition to these, there are scores of pots not patented. One of the most inexpensive is a wire-basket made of

poultry netting, which costs about six cents each. Others used a stove-pipe section, cutting a draft near the bottom and providing a grate to keep the coal from the ground.

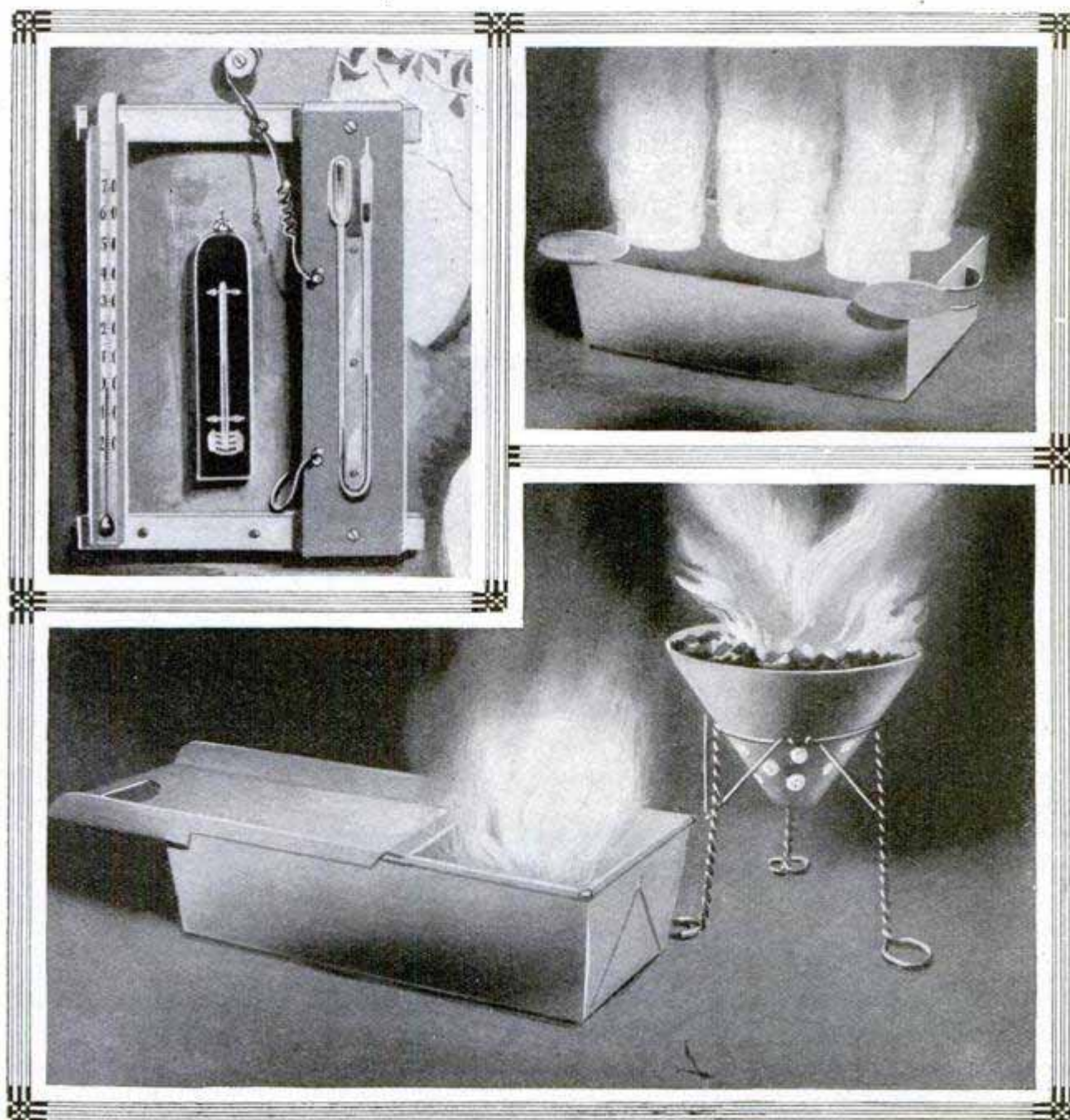
Oil, of course, is easier to handle than coal, and for this reason many believed that this variety of pot would be more popular. The ordinary lard pail formed the basic principle of the first pots and the inventors tried to improve upon that idea. A Cañon City man designed a heater similar to this bucket in shape, but with an underneath draft and features to conserve the oil and distribute the heat.

Last season the new theory of saving crops from frost was effectively proved. The ranchers who smudged their crops saved them—the men who did not lost them. On the morning of April 16th the mercury in some sections of the valley dropped 15 degrees below the freezing point, at the same time a cold wave swept the country, causing a loss of millions of dollars. It was demonstrated then that temperature could be maintained at 32 degrees in an orchard while it was as low as 17 degrees outside, and for long periods of time. For possibly six hours the mercury was

below the point where the peach, pear and apple buds were in danger. This is agreed by experts to be from 28 to 30 degrees in the condition the trees were at that time—in full blossom.

Not all of the orchardists who "smudged" saved their crops, but practically every man who did not mourned his lack of foresight in not providing the little heaters for his orchards. The men who used the pots intelligently, as a general rule, were successful. But it was also shown that proper equipment must be provided and that it must be

used with all proper care and system. Some of the ranchers are arranging now to fire their smudging pots on the same general plan that is used for fire protection in the larger cities—namely a fire department. One of the largest ranchers in the valley, with over 200 acres, will man his heating apparatus with a volunteer department of a dozen men, trained in advance for the duty of lighting the pots in his orchard. While of course it appears somewhat useless to train a volunteer corps for service only one or two nights in a season, and



Upper Views Show Alarm Thermometer which Warns Fruit Growers of Lowering Temperature through Electrical Connection, and Oil Smudge-Pot with Fire Openings, Invented by a Colorado Fruit Grower. Lower View Shows Types of Reservoir Oil Heater and Cone-Shaped Coal Heater

possibly not that, yet the cost of this insurance is amply repaid.

The pots are placed from 50 to 100 to an acre, and some of the orchardists are figuring on providing a reserve set of pots for an emergency occasioned by a long freeze such as occurred in April, 1910. These pots must be arranged on some systematic plan in the orchard with the lighters or kindling all on one side. Haste in lighting the pots is one of the essentials, and many ranchers lost thousands of dollars last year because they had placed the pots in haphazard fashion about the orchard, and could not find them in the darkness when the alarm sounded.

Especially in the use of coal is a large force of men needed, for during a long continued freeze the pots must be refilled during the night. To meet this difficulty, the men in the cities are called upon for assistance. The secretary of the Grand Junction chamber of commerce has taken charge of this part of the frost fight, and by marshaling a force of volunteers and providing automobiles for their transportation, aid is available at the critical stage of the night. The telephone com-

pany and weather bureau cooperate by sending out repeated warnings of danger to the ranchers during the danger period, and when the mercury drops, whistles blow and the bells ring, sounding a general alarm. The experience of two years has demonstrated that the old system of smudging—"making a smoke,"—is not a success, and that heat as well as smoke must be provided to save the fruit. Some of these heaters will raise the temperature in an orchard more than 15 degrees, or rather maintain the heat that much above the temperature on the outside.

While there is much difference of opinion as to the respective merits of coal and oil pots, last season's experience has demonstrated the success of the smudge-pot as an economic necessity. The heaters can be successfully used not only for fruit where the returns are hundreds of dollars an acre, but for strawberries and low-growing crops. The only objection to its general use for all purposes is the cost, for unless a return of \$50 an acre can be depended upon, the expense of operating the pots, coupled with first cost, would outweigh the profits.

REVOLVER CIGARETTE CASE

One of the newest Parisian novelties is a cigarette case of a shape very similar to the latest types of automatic revolvers, although, of course, much smaller. The person at whom it is suddenly pointed is taken sufficiently unaware to believe it a real revolver,

until disillusioned by the appearance of a cigarette when the trigger is pulled.

☞Candles set against ice in a refrigerator for a half hour will not burn fast or make ugly drippings.



Held Up with Apparently Deadly Weapon



Which in Reality is Only a Cigarette Case

ATLANTIC COAST CANAL OPENED

The formal opening of the Beaufort canal, which is the first link of the proposed inland waterways from Maine to Florida, was celebrated at Beaufort, N. C., in January. The canal, which is 20 miles long, from 90 to 250 ft. wide, and 10 ft. in depth at mean low water, has been under construction since 1907. Some five miles were cut through dry land, the remainder being made by dredging and straightening two creeks. It cuts off about 90 miles of distance, and enables ships in the coastwise trade to avoid treacherous Hatteras and Cape Lookout.

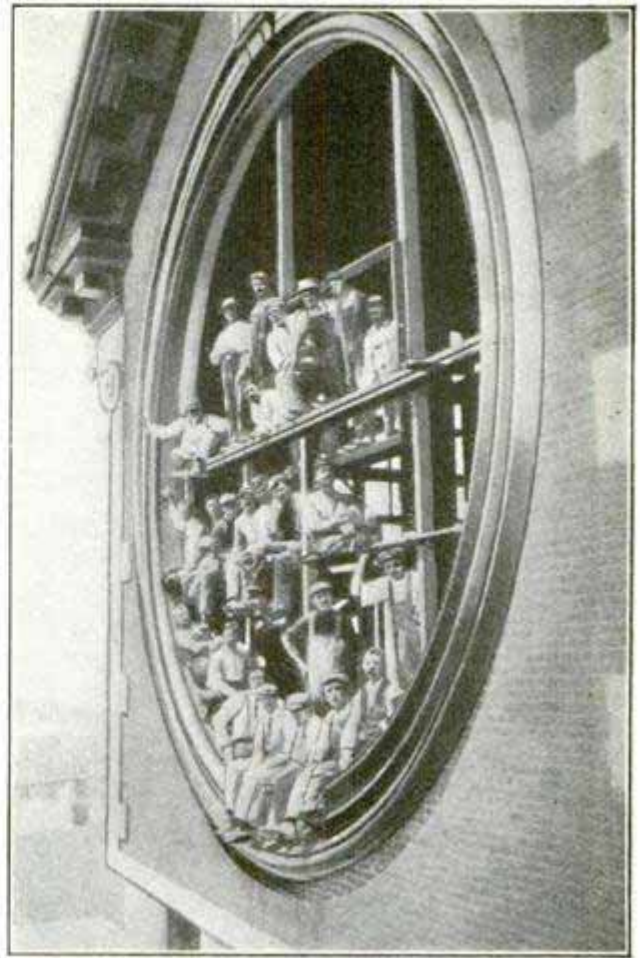
INVERTED PIPES

A Scotchman has invented an inverted pipe from which the lighted tobacco will not fall out. It consists of a tapered bowl, the lower part being very small. The bowl is filled from above by removing a cap, but the tobacco is lighted from below so that it will burn upwards, which is claimed to be the natural way for smoking. The stem being at the top, prevents any noxious substances entering the mouth, and gives the pipe a clear draught.

LARGE STRIKING CLOCK FOR MASSACHUSETTS MILL

At the Ayer Woolen Mills in Lawrence, Mass., there is being installed a large striking clock, one of the largest of its kind, the dials of which are 22 ft. in diameter. The machinery and other parts of this clock weigh 40,000 lb., or 20 short tons. The hands are about 14 ft. in length. The faces are of ground glass, in cast-iron frames, and will be illuminated at night. The clock has a gravity escapement, and is wound up every eight days. The pendulum rod is about 15 ft. long, and weighs, together with its bob, 270 lb.

The materials in the dials are: cast iron, 27,500 lb.; lead, 1,140 lb.; bolts and screws, 450 lb.; glass, 5,500 lb.;



Opening for Dial of Monster Clock

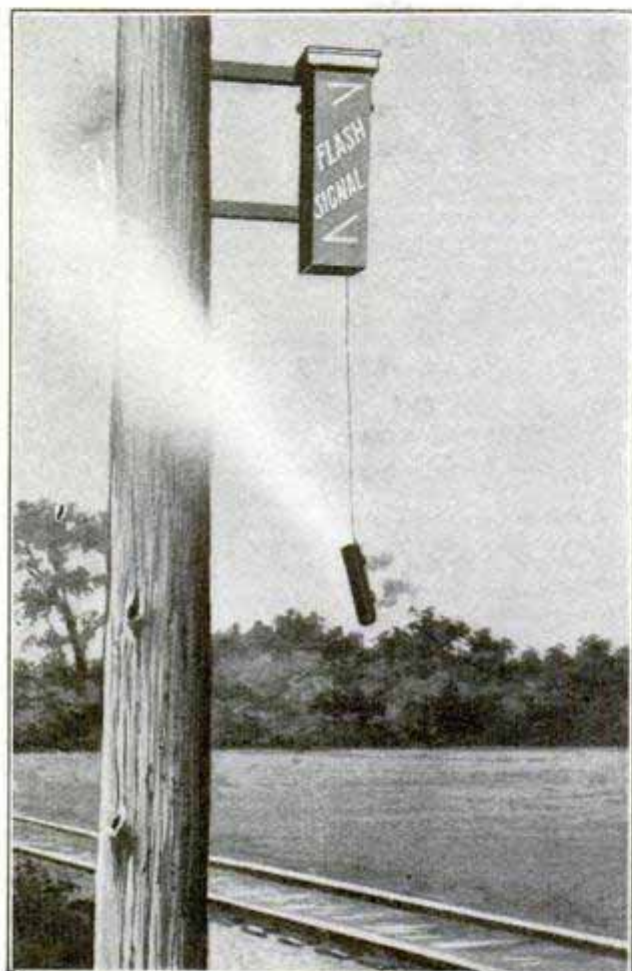
putty, 1,000 lb.; a total of about 36,000 lb. The dials are securely braced with heavy adjustable bolts to great I-beams which also support the dial works, gears and shafts on which the hands are mounted. The hands are made of pine wood, cut from single boards, 18 in. wide and 14 ft. long, and fastened at the center with heavy cast-bronze bearing plates.

The striking mechanism of the clock is connected to the time part electrically, so that at the hour only, and exactly on time, the clock will strike the correct number of blows on the great 5,000-lb. bell that is in the room below. The blows are struck by a cast-iron hammer weighing 120 lb.

The clock works are 9 ft. long, 5 ft. wide, 8 ft. in height, and weigh about 4,500 lb. The clock is fitted with electrical connections to control any number of secondary clocks that may be placed in the building. The big time-piece is guaranteed not to vary more than 15 seconds a month.

EMERGENCY TORCHES TO PREVENT COLLISIONS

This system of emergency torches, to be ignited when a dispatcher has made a mistake that is sending trains



This Emergency Torch, Controlled by an Electric Circuit, is Dropped and Ignited to Prevent an Impending Collision

together on the same track, was devised by a dispatcher who was held responsible for a fatal collision on a Canadian railroad. Such a system cannot be compared in any way with

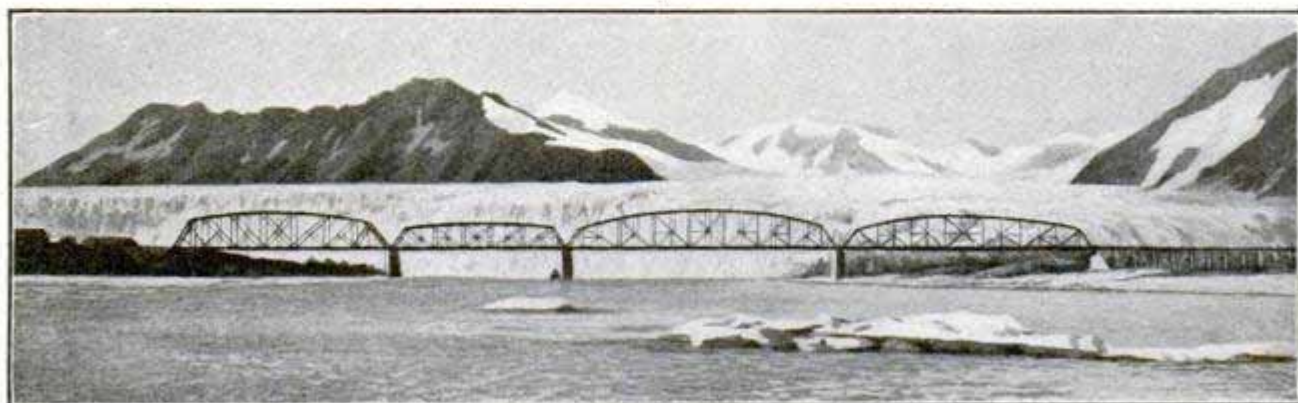
the block system, but it is very inexpensive as compared to the latter, and is designed for pioneer roads.

The idea is to place the torch containers, four to the mile, on the telegraph poles skirting single-track railroads. The torch, filled with a combustible which burns slowly with an intensely brilliant flame, is held in an inverted position in the retainer by a holder controlled by a small electromagnet. At the lower end of the torch, as it hangs in the retainer, is a wooden plug carrying a small vial of sulphuric acid, which causes the torch to ignite when the latter drops.

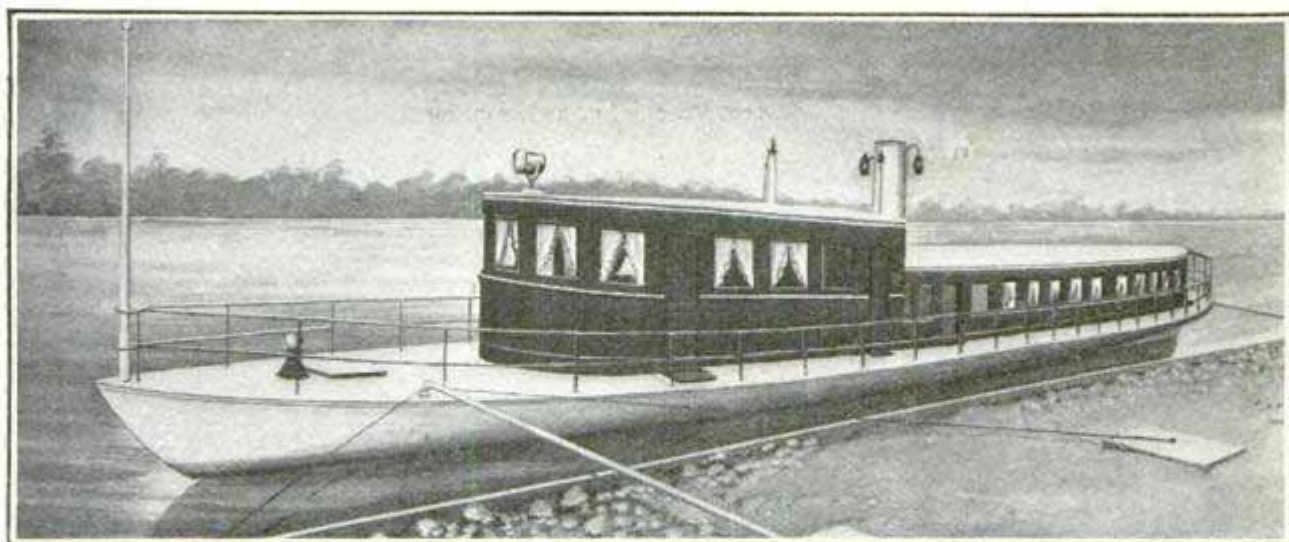
The operation of the torch system is by an electric circuit. Should the dispatcher inadvertently send a train on to a section of line being traversed by another train, he closes the electric circuit by pressing a button. This has the effect of energizing the magnet of every torch retainer along the section where disaster is threatening, and the torches fall to the extent of the retaining wires with which they are provided. In dropping, the wooden plug carrying the sulphuric acid vial of each torch is knocked over, causing the torches to burst into flame.

RAILROAD BRIDGE FRINGES GREAT WALL OF ICE

One of the most remarkable bridges ever built, so far as location is concerned, is the Miles Glacier railroad bridge in Alaska, a description of which has been printed in this magazine.



Miles Glacier Railroad Bridge in Alaska



86-Foot Shallow-Draft Motorboat

The accompanying illustration shows the bridge as it appeared, apparently holding back a great wall of ice. At times the movement of the glacier was so great that two shifts of men had to be kept at work continuously, clearing the ice away from the upstream side with long ice chisels.

CANAL MAY CONNECT LAKES ONTARIO AND HURON

The construction of a ship canal from Hamilton to Goderich, Ont., has been proposed. Such a canal would connect Lake Ontario directly with Lake Huron and thus obviate the necessity for traversing Lake Erie. This would save 1,700 miles of marine transportation in lake traffic from the west, and would enable the establishment of through steamers from Duluth and Chicago to Liverpool by way of the lakes and the St. Lawrence River.

Hamilton is at the western extremity of Lake Ontario. Goderich is on Lake Huron. The commercial men of Toronto are interested in the project because it is believed that its realization would make the Ontario capital a great commercial center.

☞The "Lusitania" established a new eastward passage record Jan. 24 when she docked at Liverpool 4 days, 18 hours and 40 minutes out from New York.

LARGE MOTORBOAT WITH SHALLOW DRAFT

A motorboat, 86 ft. long, yet drawing only 2 ft. of water, has been built at an engineering works in Charleston, W. Va., for cruising in shallow rivers. The hull, which has an overall length of 86 ft., with an 11-ft. beam on waterline, and a 15-ft. deck beam, is constructed of steel. A tunnel stern is provided for the propeller, so that the greatest draft is 2 ft. The power plant develops 125 hp. and drives the boat at a speed of 15 miles an hour.

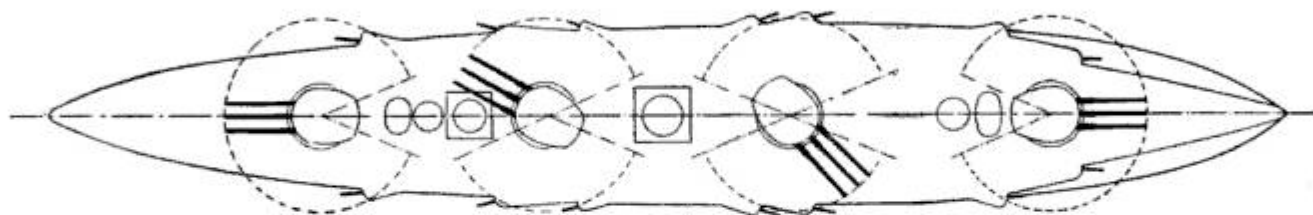
THIS FORK IS EASY TO CLEAN

Ordinary flat-tined forks are difficult to clean, and it is a common thing to find portions of the polishing paste still clinging to the edges of the tines after carefully rubbing with the polishing cloth. In order to do away with this objectionable feature, an English inventor has devised a fork the tines of which are diamond-shaped in section. The old and new styles of forks are contrasted in the accompanying illustrations. One of the prongs of the new fork is cut away to show the section.

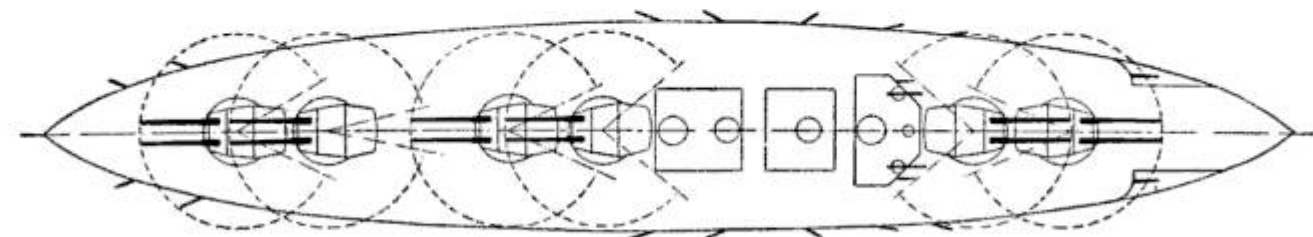


BATTERY ARRANGEMENTS ON DREADNOUGHTS

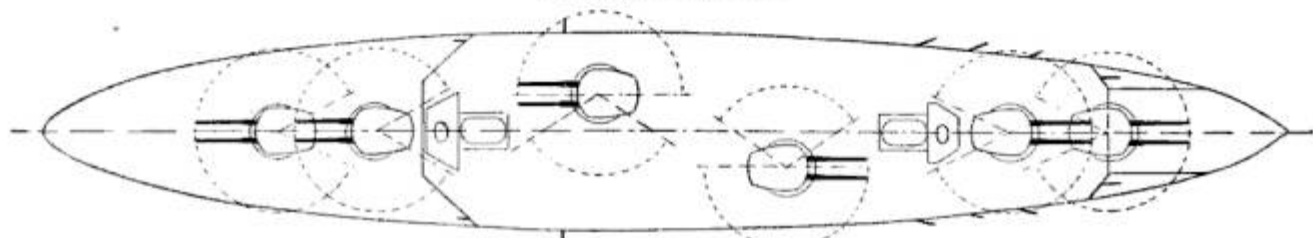
It is interesting to note the different arrangement of the main batteries of four recent types of dreadnoughts, the guns can fire fore and aft within 15 deg. of the keel line. The arrangement of turrets on the French ship sacrifices



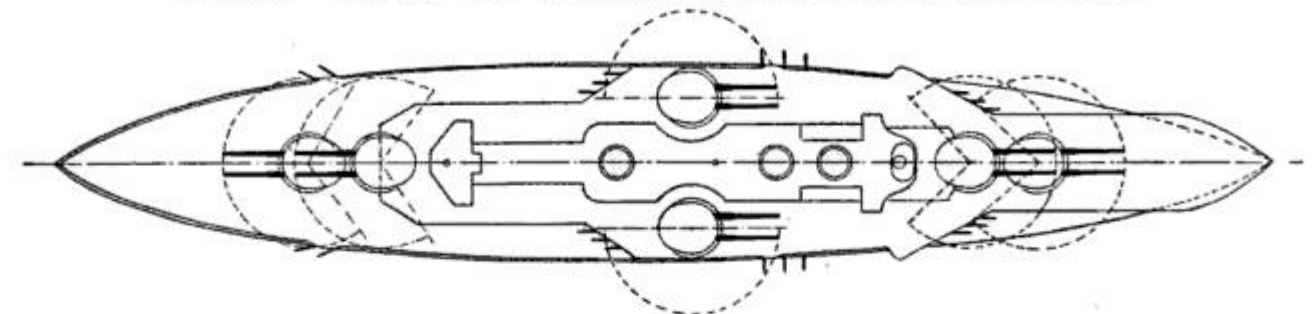
Russian "Sebastopol" Dreadnought—As the Four Turrets are All on the Same Level, Only Three Guns Can Fire Direct Ahead or Astern



Gun Arrangement of U. S. S. "Wyoming"—Four Guns Can Fire Direct Astern and Ahead and All Twelve on Either Broadside



"Rivadavia" of the Argentine Republic—Although the Guns of This Ship are Not All on the Center Line as on the "Wyoming" and "Sebastopol," All May Be Fired on Either Broadside



"Jean Bart" of the French Navy—The Arrangement of the French Guns is Considered Poor, One-Sixth of the Gun Power in Broadside Attack Being Sacrificed to Reinforce the Bow and Stern Fire

ships dealt with being the U. S. S. "Wyoming," the Russian "Sebastopol," the "Rivadavia" of the Argentine Republic, and the French "Jean Bart."

The twelve 12-in. guns of the Russian ship are mounted, three guns to a turret, on the longitudinal center line, giving a broadside fire of all 12 guns throughout an arc of 130 deg., but only three guns can be fired, end on, within 25 deg. of the keel line. The American ship has a broadside fire of all 12 guns through an arc of 95 deg., and four

one-sixth of the gun power in broadside attack merely to reinforce the bow and stern fire.

☐ According to the annual report of the Anglo-Indian government, India has more than 4,000,000 beggars, of whom 2,433,115 are "fakirs" or impostors.

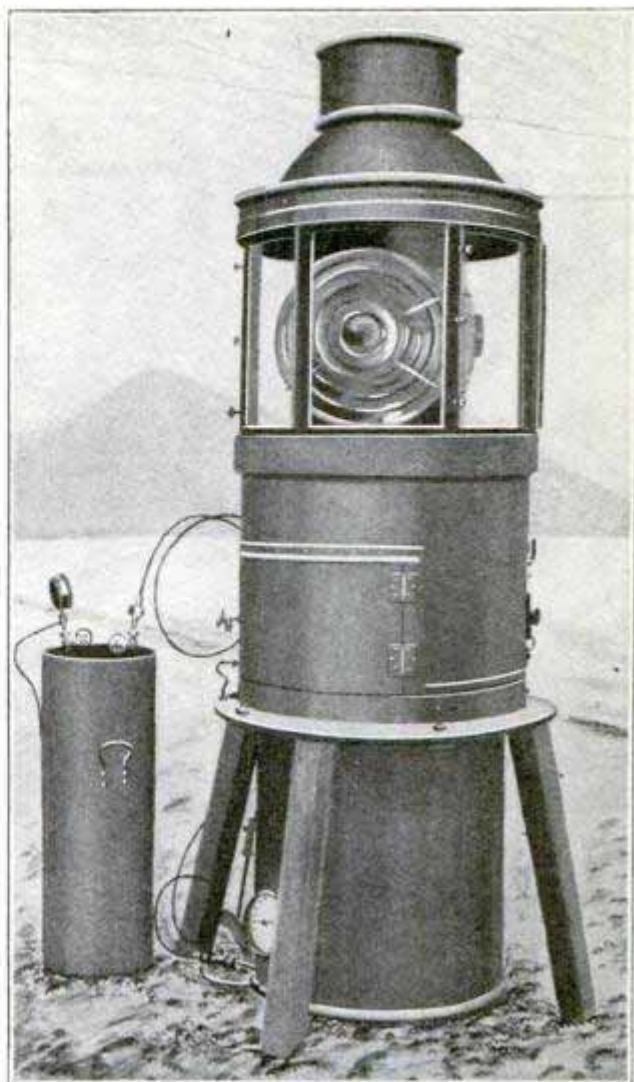
☐ Even Andrew Carnegie, who recently gave \$10,000,000 to promote the peace movement, believes that the Panama Canal should be fortified.

NEW AUTOMATIC FLASHING LIGHT

Since the introduction of the unattended flashing buoy, Trinity House, the organization which controls the safeguarding of the British coasts, has evolved a single apparatus which will turn the gas off and on at the proper times, give a flashing light, and only require attention at protracted intervals.

The first automatic flashing light had automatically revolved lenses, but the light was always burning. Another step was the introduction of a timing mechanism by means of which the gas could be turned on and off at varying times of the day and night, according to the period of the year.

The new apparatus is very simple and has met with a remarkable degree of success in the tests. The clock which regulates the turning off and on of the gas is wound by the mechanism which revolves the lens, consequently the apparatus is entirely automatic. The clock is of special form, being provided with two dials, one of which is divided into 24 divisions, representing the hours of the day, and the other into 12 divisions, representing the months of the year. A fixed pointer is provided, and if the dials are set to the day of the month and time of day, the mechanism will light up and extinguish the lamp at the correct time each day, making the necessary variations for the time of year. The power which revolves the lenses and winds the clock is, of course, provided by the pressure of the gas, and the whole mechanism, as well as the lighting of the lamp, depends



Automatic Flashing Light Showing Clock and Driving Mechanism

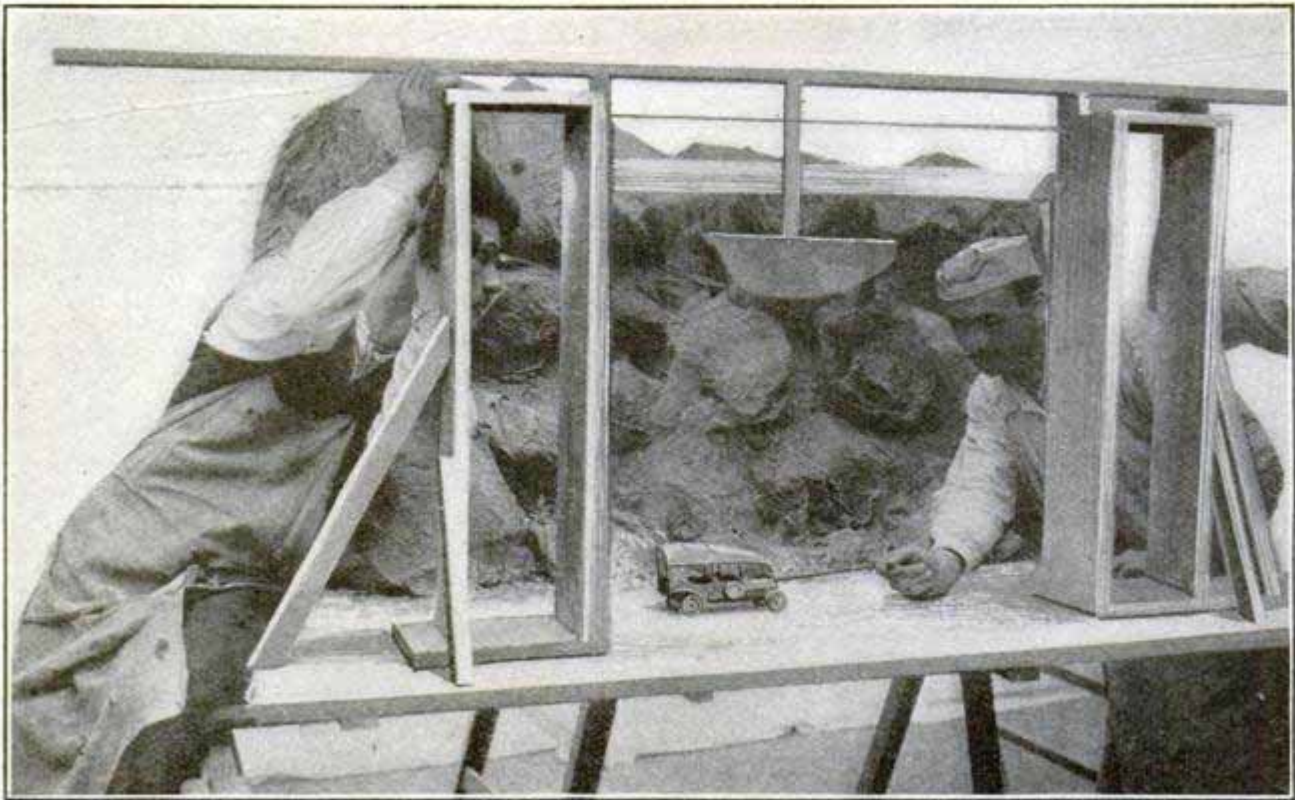
on the turning on of the gas by the clock.

The quantity of gas contained in the reservoir, which will be located in the base of the apparatus instead of in a tank at the side, as shown in the illustration, will be sufficient to keep the light at work for four months. The flash of the light has an intensity of 8,500 cp.

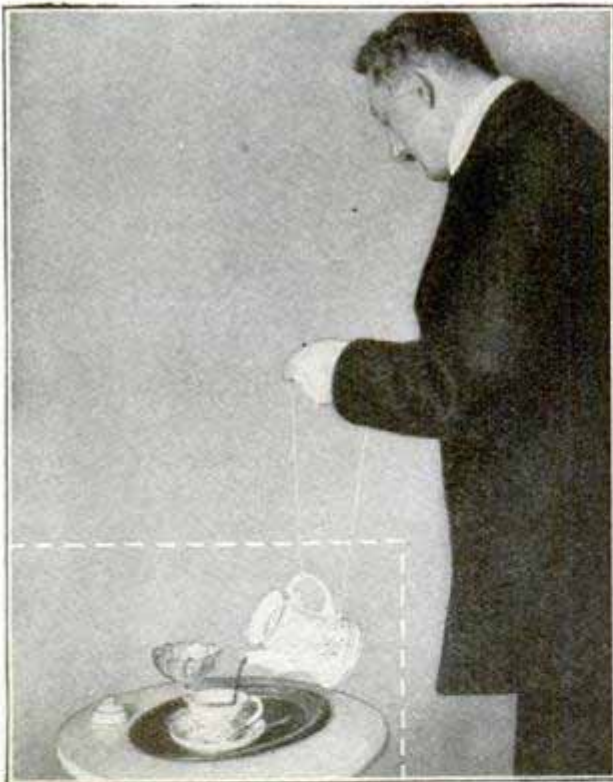
MAKING "FAKE" MOVING PICTURES

Many stirring events, such as the remarkable battle between three presumed Russian anarchists and soldiers, police and firemen in London, are actually caught by the moving-picture men, but many realistic scenes are "faked."

The methods of faking have developed into a highly specialized art. The engagement in battle of an aeroplane with warships, for instance, is produced in a large, shallow tank. Two miniature battleships are in the chan-



Preparing to Show an Automobile Falling Over a Precipice



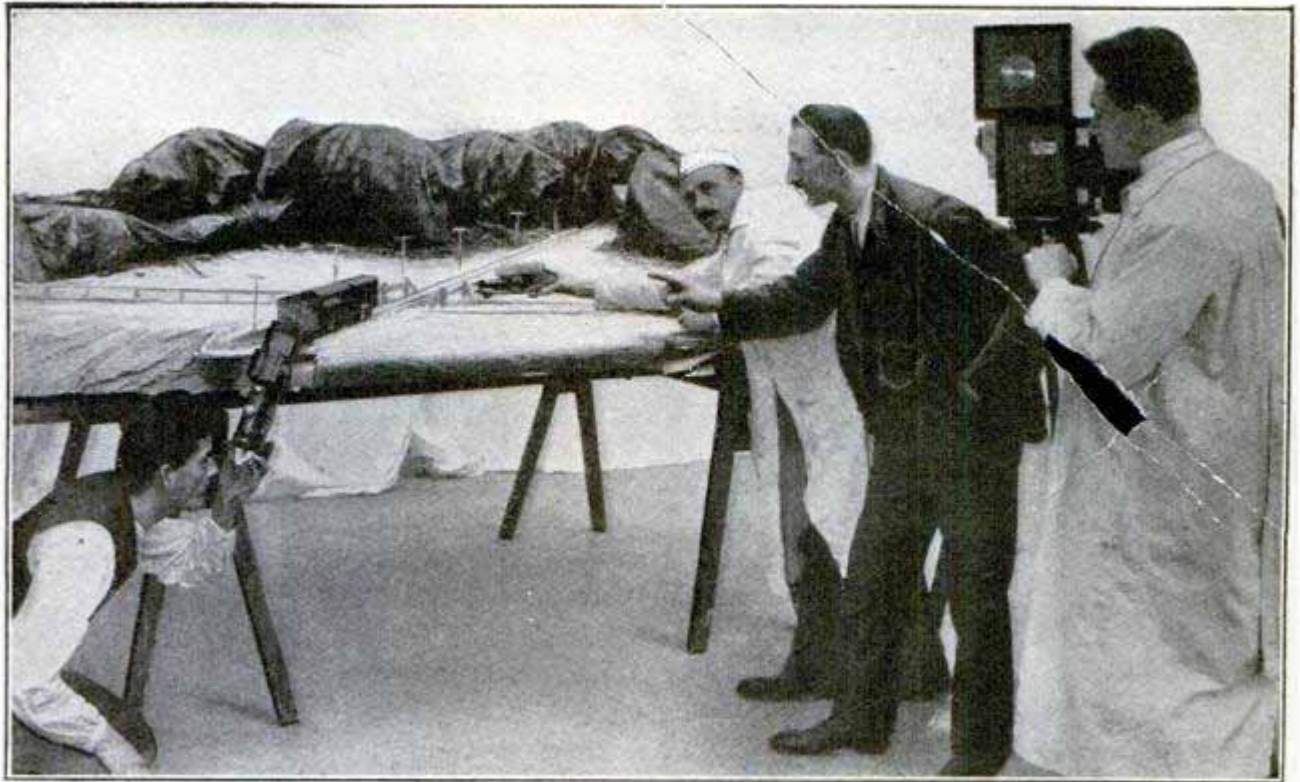
How Chocolate Pot Pours Out Its Contents without Aid—Section of Picture Which Shows on Screen is Indicated by Dotted Lines

nel and above them is a miniature monoplane suspended by cords. At one corner is a motor-driven fan, the function of which is to make waves on the water. The moving-picture camera is operated from above.

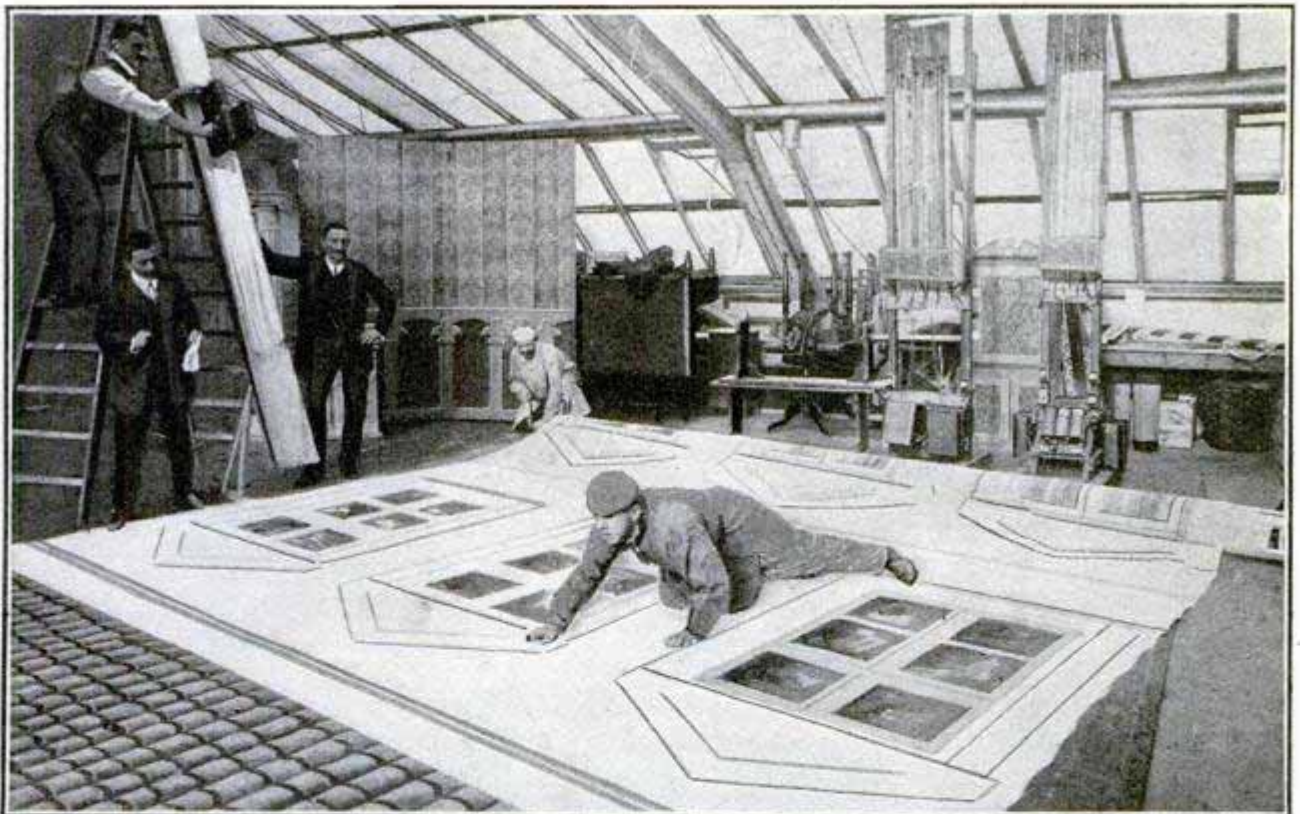


"Faking" a Battle between Aerial Craft and Battleships. Fan is Used to Cause "Waves" and Camera is Pointed Downward

How automobile accidents are worked out with miniature settings, which appear real on the screen, is also shown in the illustrations. In one, an automobile falls over a cliff, and is photographed from the top as it drops.



How a Collision between a Train and an Automobile is Staged for the Moving-Picture Camera



Climbing Up the Face of a Building—How an Obviously Impossible Feat is Made to Appear Real

In the other, an automobile and railroad train collide.

There are, of course, many kinds of moving pictures which the audiences know are illusions, such as a pot or pitcher pouring of itself, or a burglar

climbing as nimbly as a fly up the face of a building. The face of the building in this instance is painted on canvas spread out on the moving picture studio floor, and the "burglar" crawls on hands and knees over it.

HELMET FOR MOTORISTS NO THING OF BEAUTY

Bosco, of childhood's memory, whose principal task, in addition to looking



Not the Missing Link, but a Harmless Motorist Wearing the Newest Thing in Winter Auto Headgear

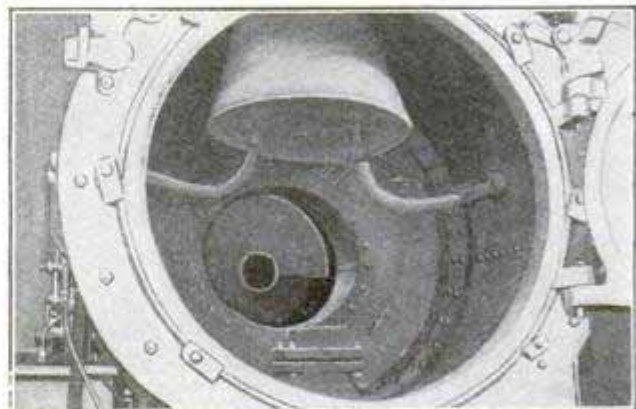
ferocious, was to "eat 'em alive," looked as gentle and benign as Santa Claus when compared with the up-to-date auto driver equipped with the latest thing in cold-weather masks. "Zip, the What-is-it" is the name the racing men have given the new device which was designed by one of their number in Indianapolis and has found favor with the professionals wherever it has been shown. The mask is really a hood made of fur with apertures for the eyes, nose and mouth. It resembles the well-known bearskin shako worn by drum majors, except that it fits over the head instead of on top of it. Goggles are fitted over the eyeholes and a celluloid covering is provided for the nose. The mask makes a most terrifying spectacle of the motorist, but it keeps him comfortable even in zero weather, and as

that is its chief reason for existence, it can be considered a great success.

CENTRIFUGAL SPARK ARRESTER

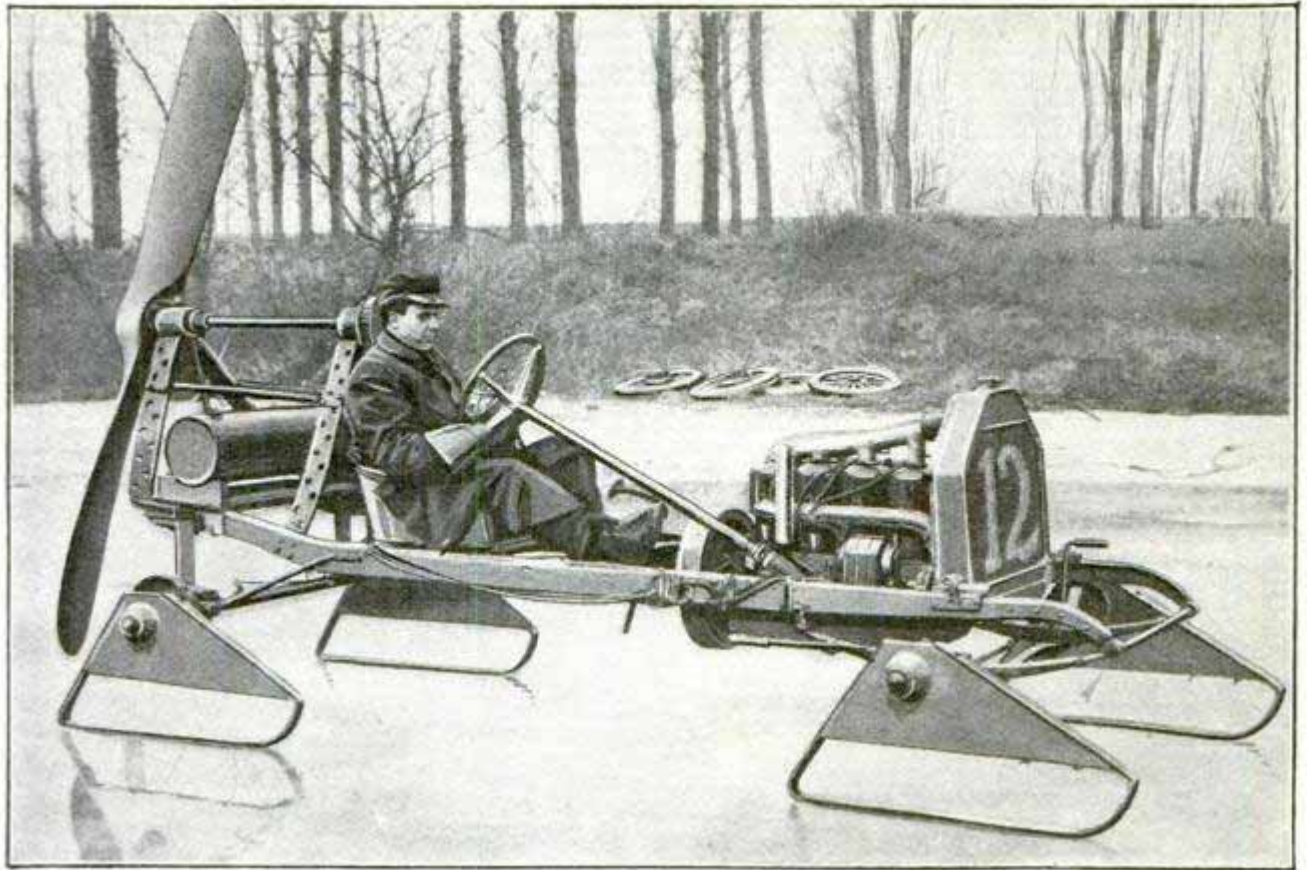
This centrifugal spark arrester for railroad locomotives, favorably tested out on the Chicago & Northwestern Railroad, requires an extended smoke-box, the whole consisting of three chambers, in the center of the foremost of which is located the stack, as shown in the illustration. The exhaust nozzle is located directly under the stack, the exhaust steam being carried to it from under the saddle.

Separating the foremost chamber from the second chamber is a large circular plate in the center of which is an opening 22 in. in diameter provided with a collar 10 in. long. At the back of the second chamber is a spiral diaphragm of one revolution separating the second from the third chamber. The claim made for this arrangement is that the gases are diverted by means of the spiral diaphragm, the periphery of which follows the inside wall of the smokebox and advances a distance of 30 in. during one revolution, into the second chamber, where they are given a rotary motion around the walls of the smokebox. This motion throws all heavy particles, such as cinders, to the outside wall and carries them forward over a hopper at the bottom of the second chamber, in which they are de-



Interior of Smokebox Extended for Centrifugal Spark Arrester

posited. The gases then pass through the opening in the collar to the foremost chamber and thence to the stack.



Ice Boat Made from Automobile Wind-Wagon

WIND WAGON-BOAT IS NOW A POWER ICE SLED

The Indianapolis motorist who exhausted the sensations of ordinary locomotion with his automobile and put an aeroplane propeller on it and used it as a wind wagon on land, or supported by a pontoon on water, has now put his machine on runners and negotiates the ice and snow as easily as he did the road and water. There are four runners used to replace the wheels on the axles. The runners consist simply of triangular-shaped wooden forms over which steel rims are fitted. The machine is driven by a revolving 8-ft. air propeller. The use of the machine as a sled on roads is limited, because there is a clearance of but 6 in. between the propeller blades and the ground. On ice, however, the machine makes excellent time.

CA long series of experiments at an asylum for the insane in Vienna, Austria, have culminated in the announcement that a cure for progressive paralysis has been found.

NEW OXYGEN PROCESS MAY CHEAPEN SMELTING COST

A new process of separating oxygen from the air by means of cold, announced by President James Swinburne at a recent meeting of the Faraday Society in London, produces the vitalizing gas at so cheap a cost as to suggest its use for blast-furnace work.

According to Mr. Swinburne, a ton of oxygen should be produced on a large scale at a cost of \$1.00, with electric energy at the same price as is paid by the electric street railways of Chicago.

IF YEAR'S SUITINGS WERE MADE INTO ONE

If all the cloth used in the United States for one year in making clothing for youths and men were to be made into a single suit of clothes, this suit would be big enough for a giant over six miles high. Such a man would weigh about 16 billion tons, if built in proportion to his height.

MICROPHOTOGRAPHIC LIBRARIES

A Belgian scientist has constructed a microphotographic apparatus by means of which rare books, valuable documents, magazine articles and newspapers may be reproduced on minute photographic plates in which form they will require infinitely less space for storage than would be necessary for the originals.

The apparatus could reproduce 50 octavo pages (each 6 by 9½ in.) on one 3½ by 4¾ in. plate. As an example, the 154 pages of reading matter in this

ductions will have projecting lanterns of simple mechanical construction by which the tiny plates will be magnified for the use of the public. Rare manuscripts and books would no longer be accessible to the public, only photographic reproductions thereof, and all the larger libraries could, at a comparatively small cost, obtain reproductions of all rare and important documents.

The Bibliographic Institute of Brussels has adopted the idea for the reproduction of part of its collection.



How Octavo Pages of Popular Mechanics Magazine Would Appear Reproduced Photographically on Small Scale for Bibliographic Institute of Brussels, to be Transferred onto Screens by Projecting Lanterns

magazine, each of which is 6¾ by 9¾ in., or only a little larger than an ordinary octavo page, could be reproduced on plates the aggregate size of which would be about three-fourths of a single page.

Reduced to the size of the pages shown in the illustration, it would require a page 18¼ by 12¾ in. to reproduce the 154 pages of the magazine, but the microphotographic apparatus can reduce each page to less than one-fourth the size of one of these pages.

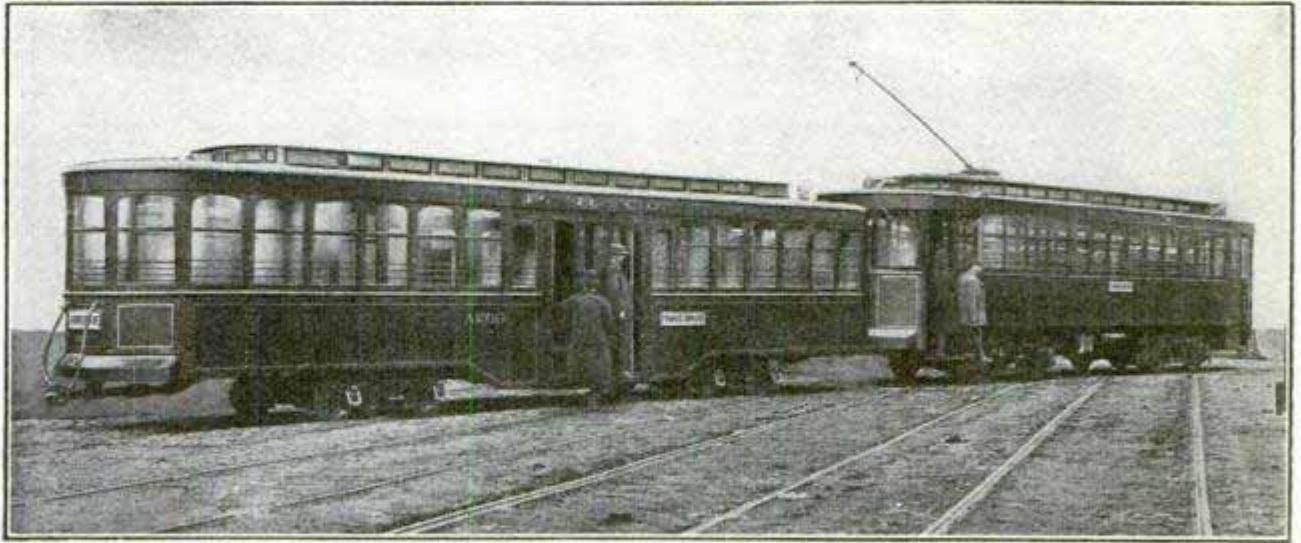
According to the plans, each library having the microphotographic repro-

A \$750,000 OZONE PLANT

A \$750,000 ozone installation, the largest of its kind in the world, has recently been installed at St. Petersburg by a German firm. The plant receives water from the Neva, filters it and thoroughly sterilizes it for human consumption by the application of ozone made on the spot in large quantities by electrical apparatus.

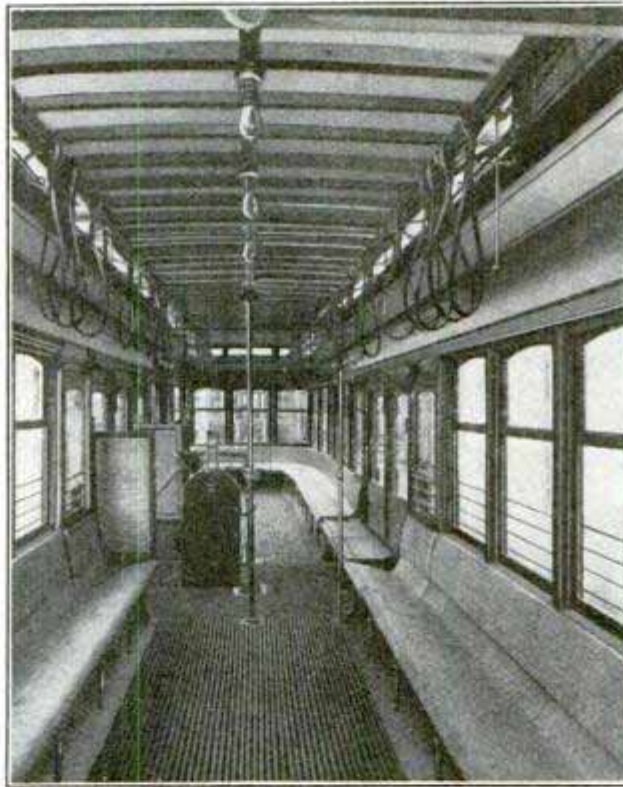
Electrification of the Russian Northwestern Railroad within the environs of St. Petersburg is being considered.

STEEL TRAILERS WITH SIDE ENTRANCE AND EXIT



Steel Side-Entrance, Pay-at-Entrance Trailer

The new steel trailers for the Pittsburg street railways are pay-at-entrance cars of unique design. Both the entrance and exit are at the center of the car, and the side seats extend all the way around the interior, except across the door. On entering the car, each passenger deposits his nickel in a glass fare box mounted on a metal base. The conductor presses a device with his



Interior View of Trailer, Which is Operated on Pittsburg Street Railways

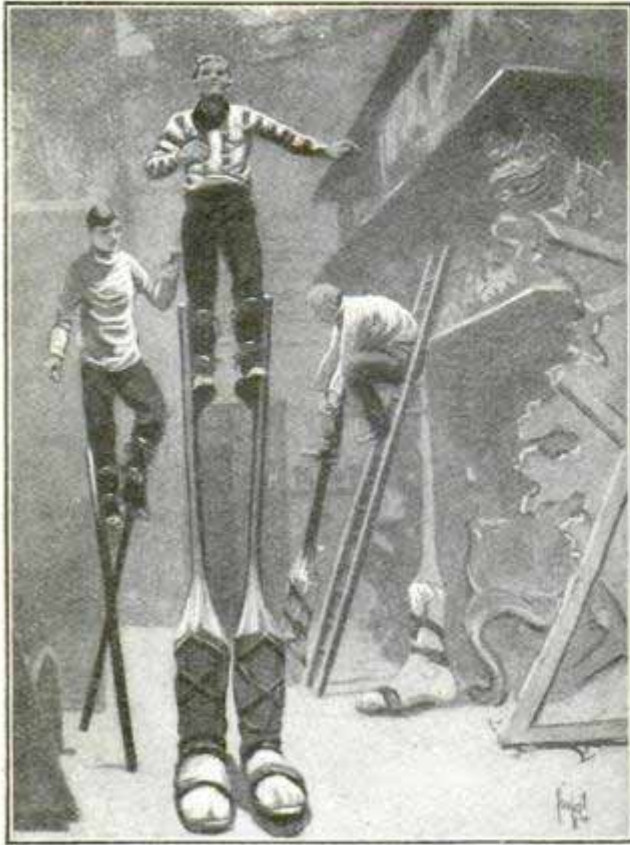
foot to drop the nickels from the glass box into the metal one. The car seats 62 passengers.

Recent tests of ball-bearing wheels on German railroad cars are said to have been entirely successful. Two concentric rings with three grooves for different-sized balls were used, one ring being affixed to the journal, and the other fitted into the hub of the wheel.

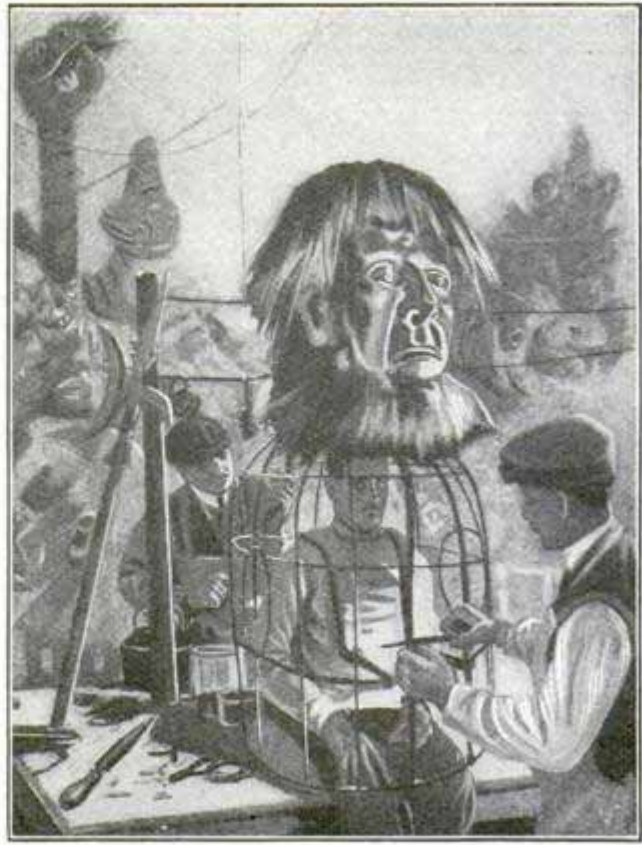
TENDER LARGER THAN
VESSEL IT TENDS

Morton F. Plant, who is having an 86-ft. racing schooner built, recently ordered a motor yacht to act as a tender for the sailing vessel. The motor yacht will be 138 ft. long, which is 52

ft. longer than the vessel she is to tend, and will have a speed of 20 miles an hour, driven by two six-cylinder air-starting and reversing engines of 300 hp. each. The tenders of the tender will be a 21-ft., 16-hp. motorboat, and two row boats, the largest of which will be 24 ft. long.



The Limbs of the Giants



Assembling a Giant

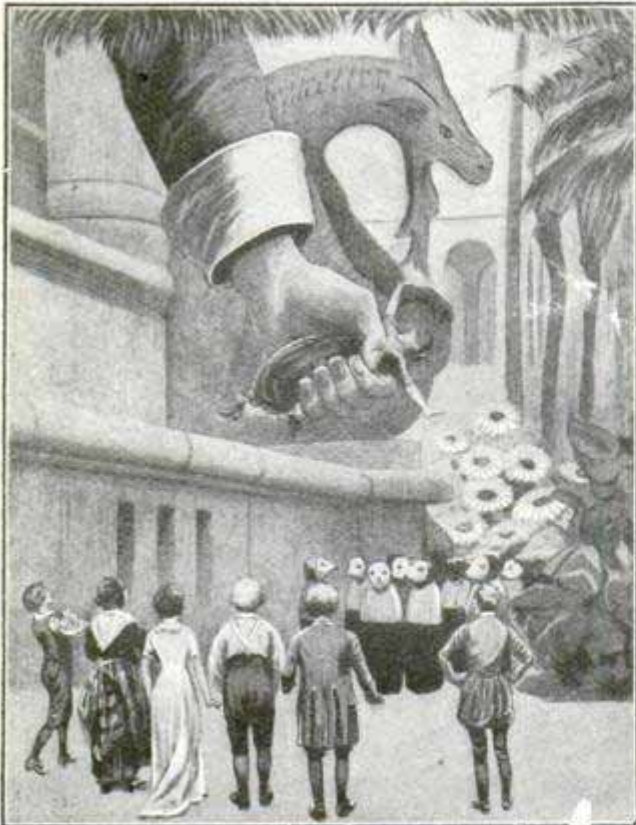
THE GIANTS IN "JACK AND THE BEANSTALK"

Nearly every thing else in theatrical productions gives way to pantomime

for several weeks during the holidays in England, and the spectacular performances are greeted with as much delight by adults, as by the younger generation.

The most prominent feature of the last "Jack and the Beanstalk" productions in London was the huge size of the largest of the giants. This chief giant was so huge that it was impossible for him to be seen as a whole, for the stage would not have been large enough to contain him were the whole of him there. The presence of this giant was first made evident by the appearance of his legs, which could be seen only up to the knees. Later, he swooped one arm down, clutched the princess and carried her off.

One of the several minor giants Jack saw after climbing the beanstalk is shown being assembled in another illustration.



Courtesy Illus. London News

Huge Hand and Arm of the Chief Giant in British Pantomime Production

Canadian railroads built 1,698 miles of line in 1910, and have 3,200 miles in progress of construction.

The Kingdom of Dust

By J. Gordon Ogden, Ph. D.

THIS is the second of a series of articles by Dr. Ogden, who is professor of physics at the Fifth Avenue High School, Pittsburg, Pa. In every home, in every office, in every shop or factory, the fight against Dust is never-ending. Dr. Ogden illuminates this subject in a manner which brings a realization of its infinite importance.

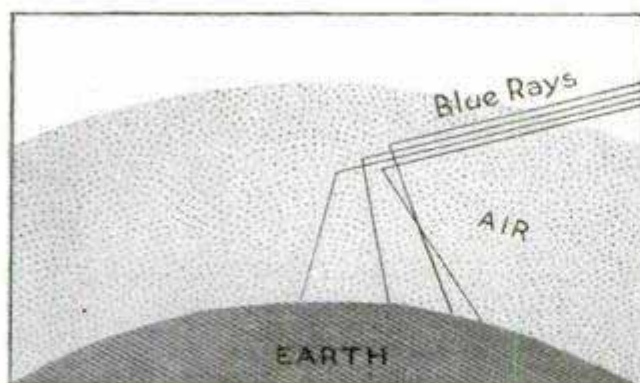
II—Physical Phenomena Produced by Dust

HOW strange it would seem were one to look up at the sky at noon-day, and with the exception of the sun's disk, see just what one sees at midnight; to recognize the various planets and constellations glittering afar in the blackness of night, and the disk of the sun, sharply defined, shining with almost infinite whiteness against the background of impenetrable darkness!

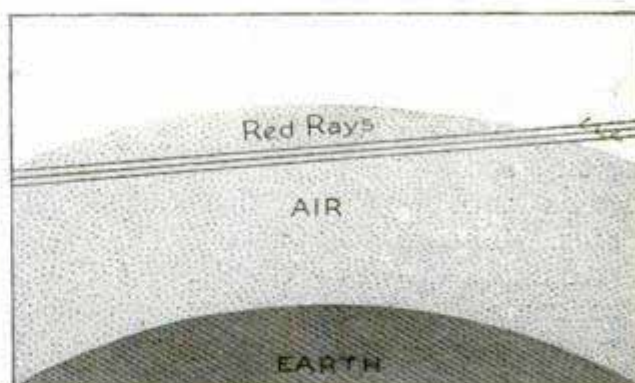
Yet that is just the condition that would prevail were it not for dust. Gone forever would be the beautiful azures of the day sky; and at eventide and dawn, all the wondrous combinations of ruby and gold, rich lavenders and delicate pinks that attend as heralds the setting and rising of the sun, would exist only in the memories of

ible only when looked at directly. The rest of the sky would be black. We would not have the soft diffused light that bathes land and sea in its pure, mellow flood, and constitutes what is ordinarily known as daylight.

The explanation of this strange state of affairs is not difficult to understand. The radiations that emanate from the sun are simply quiverings and pulsations of a mysterious, infinitely rare substance known as the luminiferous ether. The shortest of these "light" radiations when they enter our eyes produce the effect of blue light upon our consciousness. The longest quiverings or waves cause us to perceive red light. The waves that produce these results are neither blue nor red.



Waves Which Produce Blue Rays Are Interrupted by Dust Motes, Reflecting Them in All Directions. This Causes the Blue Color of the Sky



Light Waves Producing Red and Yellow Rays Are Strong Enough to Pierce Dust and Continue on Their Way

those beings fortunate enough to have lived at one time in the Kingdom of Dust.

Were one to look at a dustless atmosphere at midday, the sun would be vis-

Color exists only in the mind. The same thing is true about sound waves. A bell does not give forth anything other than quiverings, called sound waves. These waves are interpreted

by the brain as sound. Were there no eyes nor ears there would be no light and no sound. Were there no operator who understood and could interpret the clickings of the Morse alphabet, there would be no message—only a series of impulses. The trained Egyptologist reads history where the unskilled layman sees only a strange jumble of odd-looking hieroglyphics. In other words, sound waves have no sound, heat waves are not hot, and light waves are invisible, as we understand each of these different phenomena. They simply affect us so that we feel these different sensations.

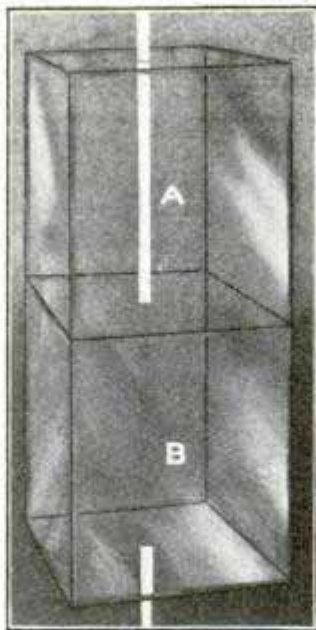
It would seem to the ordinary observer who has often seen a beam of light athwart a darkened room from a hole in the shutter on a sunny day, that light is really visible. As a matter of fact it is dust motes that render the light visible. These tiny particles of matter intercept the radiant energy known as light and reflect it directly to the eye. A representation of an experiment that proves the truth of this statement is shown in one of the illustrations. A box divided into two compartments by a glass partition, and having glass windows at both sides and ends, allows a beam of sunlight to pass through its entire length. One of the compartments, A, contains dust-laden air. The other compartment, B, has its sides smeared with glycerine, which soon catches and retains most of the dust motes. The light passing through A is visible. The same beam continuing through B is practically invisible, but becomes visible again after passing through the window out into the dusty air. On a moonlight night only the illuminated part of the surface of the moon is visible. The rays from the sun, from which this illumination is produced, are invisible.

Light waves, as we shall continue to call them, travel at the rate of 186,000 miles per second, the ether being the transmitting medium. Although these waves travel so rapidly, they are exceedingly small so far as wave length is concerned. Those that produce dark red, for example, have a wave-length of only $1/33,000$ of an inch, while the violet-producing waves are only about one-half this length.

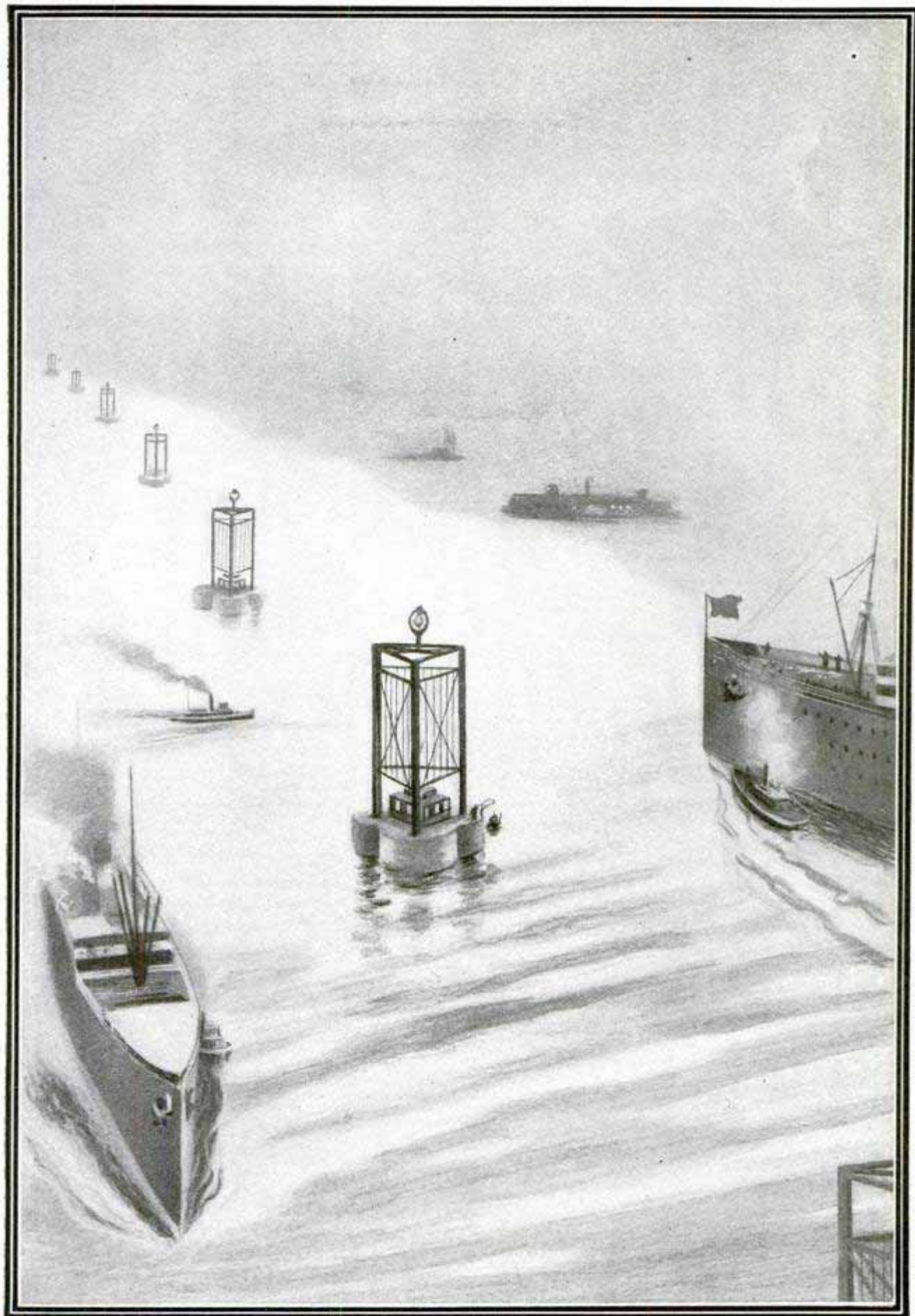
Light is made up of billions of wave lengths, each of which is responsible for a different color. While Newton thought that there were only seven colors,—violet, indigo, blue, green, yellow, orange and red,—in reality there are as many colors as there are wave lengths—billions.

The brotherhood of light waves, undulating through the practically empty ether, travels without let or hindrance with equal velocity for all lengths of waves, until the earth's atmosphere is reached. Then the tiny dust particles begin their work of breaking up the brotherhood, and sifting out the short waves from the longer ones. Those that produce the reds and yellows are strong enough to brush aside the motes, and go on their way through the air. To the shorter and feebler quiverings that cause the sensations of blue and violet, these small dust particles are insuperable barriers, causing these latter waves to be reflected in all directions. Some of these violet and blue-producing vibrations enter the eye. As we see an object in the light that comes from it, these innumerable decillions of motes give us the effect of a blue sky.

At sunrise and sunset the reds and yellows are also reflected, as they must pass through a relatively large quantity of air, which, on account of its being so much nearer to the earth's surface, contains the larger and heavier particles of dust.



A Ray of Light Passing Through Two Compartments, in One of Which All the Dust Has Been Removed. The Ray of Light is Visible Only in the Compartment of Dust-Laden Air



"The Time Will Come When Fog Dispellers Will be Put into Operation in New York Harbor"—How the Harbor Would Look During a Fog, if Electrical Fog Dispellers Were Used to Clear a Channel for Ocean-Going Steamships

This dust is capable of stopping and reflecting the outward flight of these stronger waves. Hence the preponderance of reds and yellows in the evening and morning skies.

In 1869, Tyndall demonstrated the cause of the blueness of the sky in his laboratory, by filling a glass tube about a yard long with air at one-tenth the ordinary density, mixed with the vapor of a substance known as nitrate of butyl, which is quite volatile. On passing a beam of light from a powerful arc lamp through this combination, the mixture appeared as a beautiful blue cloud.

Lord Rayleigh investigated Tyndall's experiments by profound mathematical research extending over a long number of years, and satisfied himself that Tyndall's explanation is correct. He estimated that the size of the particles that produce the reflection of blue light are less than one-thousandth of an inch in diameter. Some of these particles are motes of dust, others are water, but most of them are composed of particles of oxygen and nitrogen. Professor See, noting that the blue sky continues for about an hour and fifteen minutes after sunset, has made this the basis of a trigonometrical calculation by which he avers that the height of the atmosphere is in the neighborhood of one hundred miles.

Dust is responsible, to a large extent, for the formation of fog. Fog is defined as "the aggregation of a vast number of minute globules of water in the air near the earth's surface, usually produced by the cooling of the air below the dew point, whereby a portion of its vapor is condensed."

This is true, of course, but in order to produce the condensation, there must be small nuclei, or particles of dust, around which as centers the water may condense. In large manufacturing cities like London and Pittsburg, fog is an important factor in industrial life. Many efforts have been made to devise some simple, inexpensive means by which fog may be dispelled. As yet, the use of electrical discharges of high-tension currents seems to be the most

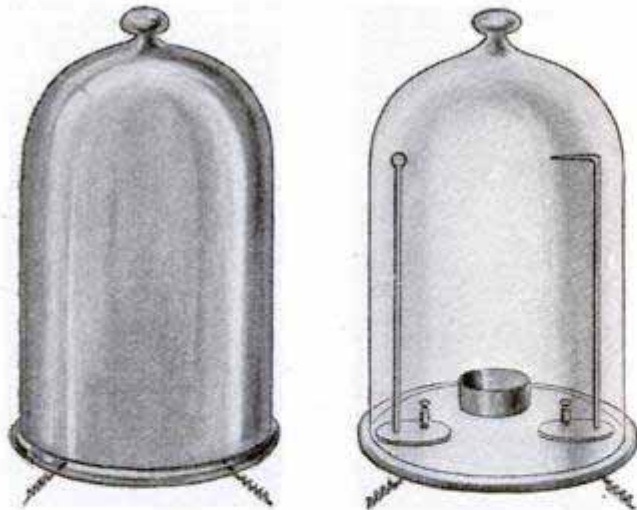
practical solution of the problem. Tyndall was the first investigator who sought to disperse this foe of commerce. In 1870, he discovered that heat applied to dust-laden air would free it from particles. This fact may readily be demonstrated by holding a red-hot poker under a beam of sunlight filled with glancing dust motes. Immediately, like magic, a space is cleared of the dust. Some scientists explain this phenomenon by stating that the dust particles were really water, and hence dissipated into invisible vapor by the heat. This would not account, however, for the disappearance of the motes, which were not water, nor could it be accounted for by convection currents of hot air, as Lord Rayleigh in 1880 showed that a lump of ice held under the dust beam would produce exactly the same effects as the hot poker.

There is no doubt that a molecular bombardment of the dust particles was caused in some manner or other, but no one knew the precise nature of the bombardment. Finally, in 1883, Professors Lodge and Clarke determined to try the effect of an electrical discharge. A bell jar was fitted with wire rods between the terminals of which an electrical brush discharge could be produced. The jar was filled with an artificial fog made from all kinds of substances, such as tobacco, paper, ammonium chloride and lead fumes. The discharge was permitted to take place between the points, and almost immediately the bell jar became free of fog. A practical test of this method of dispelling fog was made by Lodge a few years ago on a fairly large scale in the quadrangle of the University of Liverpool. On a foggy day, when the fog was so dense that one could not see a foot into it, the trial was made. The wire network of the apparatus was connected up to a source of high-tension electrical current. Instantly the fog was dispelled for a considerable space in the vicinity of the wire, thus demonstrating the practicability of Lodge's method of fog dispersion.

The time will come when such fog

dispellers will be put into operation in places where their economic value would be highest, such as in the entrance to New York Harbor, along the Chicago River, the Thames, and other places where their use is clearly indicated. Possibly in the far-distant future, all of our large cities may have their Bureaus of Mists and Fogs, enabling us to disperse at will the occasional fog and the perennial smoke which envelops us.

Dust is frequently the cause of explosions, as the terrible accidents in coal mines have so often admonished us. The small particles of dust thrown into the air by the blow of the miner's pick, wander up and down through the various rooms and entries and shafts, and become under certain conditions as dry as powder, and likewise as explosive as gunpowder. How many thousands of lives have been lost in this way the statistics of mine casualties of this country and elsewhere will plainly show. Government experts are studying this serious problem with the greatest care, and they have already proposed plans, which are apparently giving relief.

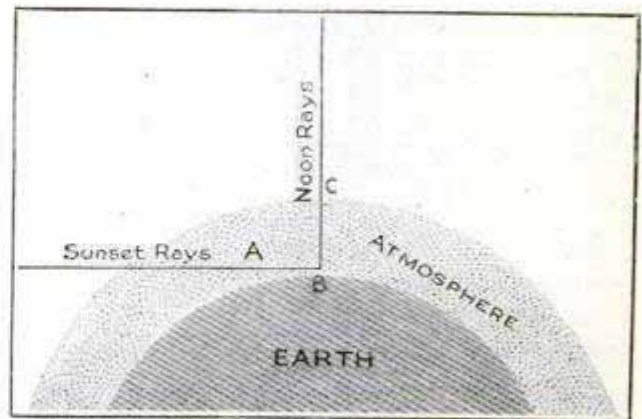


Test of the Effect of Electrical Discharge on Fog. First Jar Filled with Artificial Fog. Second Jar Shows Clarifying Effect of Electrical Discharge

Accurate statistics compiled by the United States Geological Survey show that from 1890 to 1906, 22,840 men were killed in the coal mines of the United States. Of this number it has been estimated that at least 11 per cent were due to explosions caused by dust

or gas. Many so-called gas explosions are really due to dust, as recent research has revealed.

Dust explosions occur quite fre-



Red and Yellow Rays are Reflected at Sunrise and Sunset Because at Those Times These Light Waves Travel Through Enough Dust to Reflect Them—Line A-B is Longer Than B-C

quently in flour mills and in other factories where fine dust is generated. The greatest care must be taken to prevent the smallest spark of fire in the room where the dust is flying.

In at least one respect, dust is a public benefactor. It is an exceedingly important agent in the transfer of vegetable organisms, seeds and spores, to the waste and barren places of the earth. "Perhaps," says M. Barral, a distinguished French scientist, "it would be correct to say that the air remaining in a condition of purity equal to that which is sometimes obtained in our laboratories would strike the earth with barrenness. Perhaps, too, it is necessary for the maintenance of life on our planet that a host of impurities should be incessantly carried hither and thither by the winds and storms from the places where they are produced to regions where germs are waiting to be fructified."

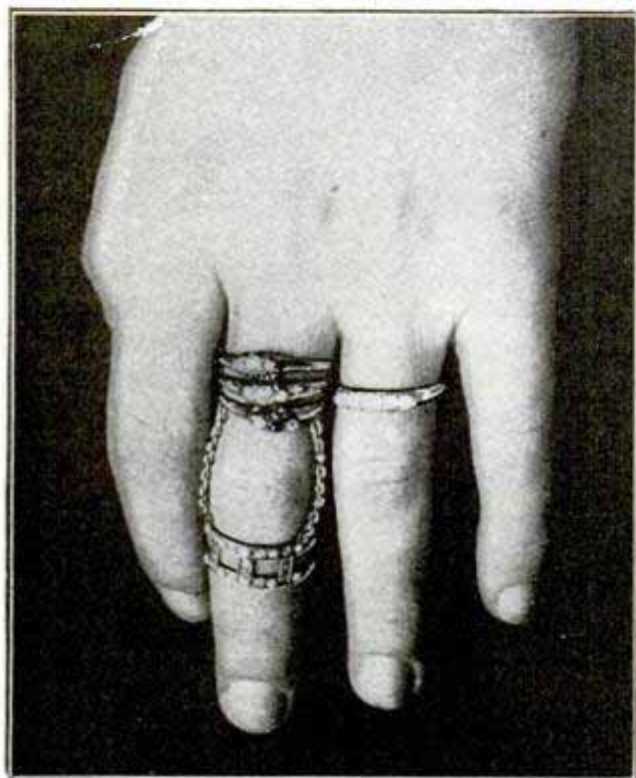
Dust is undoubtedly a fertilizer. Particles of phosphoric matter are often detected in the atmosphere, transported from regions where phosphate of lime is abundant. As each crop of grain draws on an average of $17\frac{1}{2}$ lb. of phosphorus per acre from the soil, we may readily perceive the importance of a new supply of this invaluable element.

We can understand also why it is that races like the Arabs, who never attempt to fertilize their lands, are necessarily nomads. They live in one place long enough to exhaust the soil, using up the chemical elements essential to

the production of grain and other food-stuffs, and then move on to pastures new. In this manner they allow the soil, through dust and other natural agencies, to recover itself for future tillage.

JEWELED RING GUARD

A ring guard that is ornamental as well as useful is shown in this illustration. By its use, valuable rings are



Prevents Loss of Valuable Rings

linked up with each other by fine chains thus lessening the risk of their being lost or stolen from the hand.

WHAT AN 8.3-IN. SNOWFALL MEANS

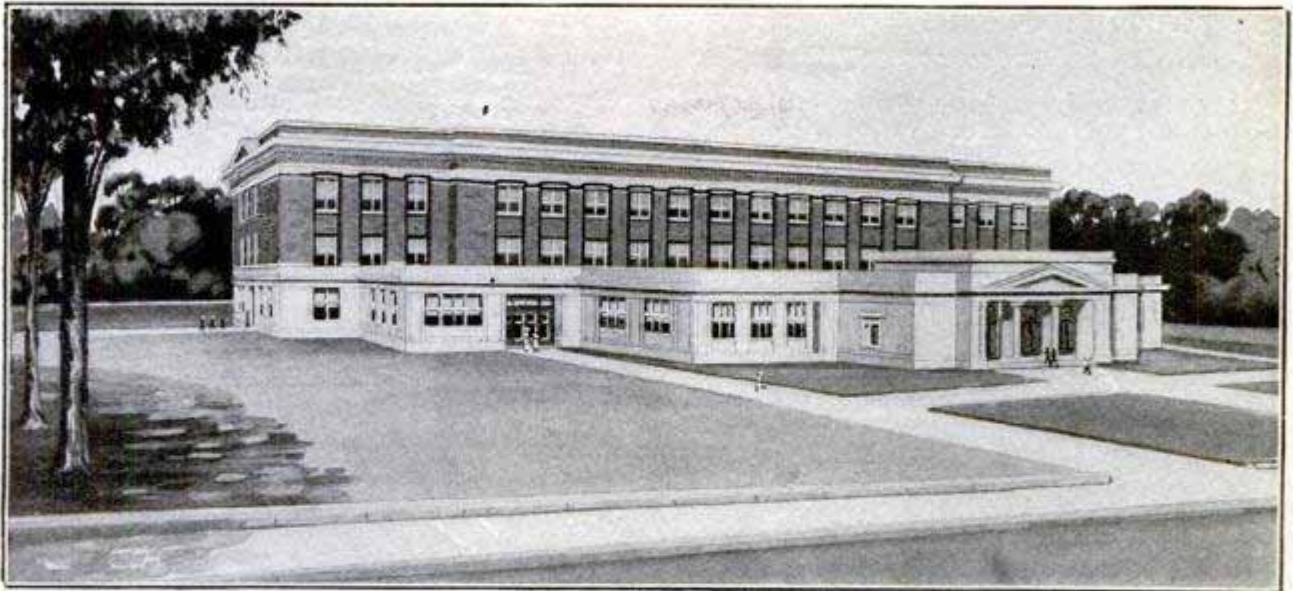
In February last, Chicago experienced the most severe snowfall since 1907. Snow fell all over the city to a depth of 8.3 in. The magnitude of this fall may be appreciated when it is stated that the total weight of the snow that fell within the area of Chicago was about 15,000,000 tons. If this snow were melted into water, it would fill an immense reservoir $2\frac{1}{4}$

miles long, $\frac{1}{4}$ mile wide, and 30 ft. deep. If the energy of the snow, falling from the sky over Chicago, could be harnessed and made to do useful work, it would equal in amount the energy supplied by a 5,000-hp. engine working day and night for a whole year.

SAVING BOYS FROM "BLIND ALLEY OCCUPATIONS"

The education authorities of Liverpool, Eng., have established a scholars' employment bureau for the purpose of finding adequate positions for both the boys and girls when they leave school. The most important feature of the idea is to do away with what is called "blind-alley occupations," that is, occupations which do not admit of advancement, such as telegraph messengers, errand boys, van boys, etc. After two or three years of this work, the places are filled with younger boys, the older ones being dropped, little, if any, better off than they were at the time of entering upon such duties.

In the bureau scheme, the schoolmasters, who, in conjunction with the education committee, have to do with the boys and girls until they are at least 14 years of age, continue what may be called a post-graduate interest, finding them positions and watching out for their welfare. Careful discrimination is made between employments which have a future and those which do not. Great care is also taken to see that the natural tendencies and abilities fit the child for the position into which he goes. Thus a boy with a mechanical turn of mind would not be recommended for an office position, and vice versa.



The New Type of Chicago Elementary School with Large Assembly Hall and Gymnasium on Ground Floor

CHICAGO'S SOCIAL-CENTER ECONOMICAL SCHOOLS

Chicago's new elementary school buildings, evolved after much study, are called social-center schools because the design is such that the assembly hall and gymnasium may be opened for neighborhood social gatherings in the evening without throwing open any other part of the building. They are called economical school buildings because, through simplicity in construction, without loss in architectural beauty, they are costing about \$50,000 less than the old expensive structures, which have no more accommodations.

The Trumbull school, for instance, the contract for which was let in 1908, has 20 class rooms, with a capacity of 1,000 pupils, and cost \$218,525. The social-center, economical school shown in the illustration has 24 class rooms, seats 1,200 pupils, and will cost not more than \$165,000. The saving is \$53,525.

The change in style of building, according to the architect of the Chicago Board of Education, is along lines of simplicity and strength of construction, keeping in mind beauty of outline, harmony in color, etc. The rooms have ample light, the most modern heating and ventilating apparatus that can be procured, and a thorough school equipment, nothing being eliminated that would decrease the safety, limit the

comfort of the pupils, or impair the educational efficiency of the school plant.

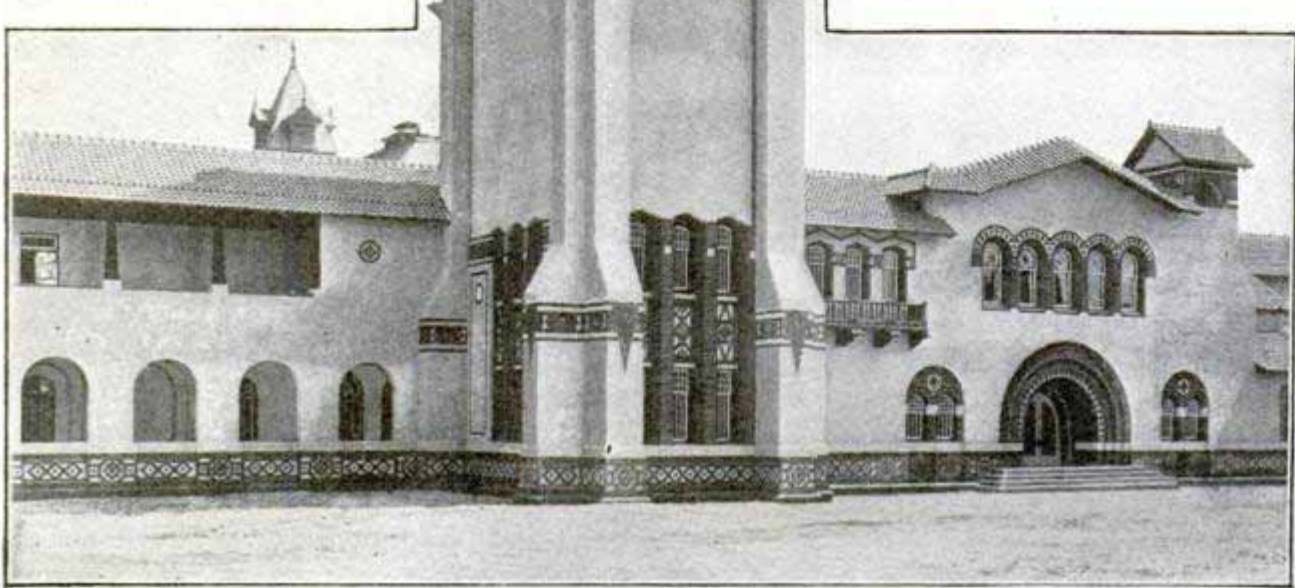
The architectural feature of the new schools, six of which are now under construction, is the combined assembly hall and gymnasium, occupying the one-story stone extension. This feature was evolved in carrying out the social-center idea. There are four entrances by which the pupils may be admitted to the gymnasium and assembly room during the day, but at night the main school structure is completely shut off, admittance being through the main entrance of the extension. Ordinarily the gymnasium is separated from the assembly hall by sliding doors, but, when these are pushed back, the whole becomes one large hall with a capacity of 1,000 persons.

The new buildings have no basements. Behind the assembly hall and gymnasium, in what may be called the school building proper, is a long wide corridor, and back of this are lavatories, coat room, etc. The heating plant is contained in a separate building at the back. The only study or work rooms on the main floor are the manual-training room, the kindergarten, and two class rooms. The second and third floors have 10 class rooms each. A wide, well-lighted corridor

runs through the center of each of the upper floors, with five class rooms on each side.

The social-center school idea is new in Chicago. Its purpose is not only to provide entertainment one or two evenings each week for the pupils, thus keeping in touch

with them out of school hours and influencing them towards a higher standard of amusement, but also to bring the parents and adult friends of the children into closer touch with the school influences. The entertainments will include illustrated lectures, musical evenings, etc.



NEW CALIFORNIA STATE NORMAL SCHOOL

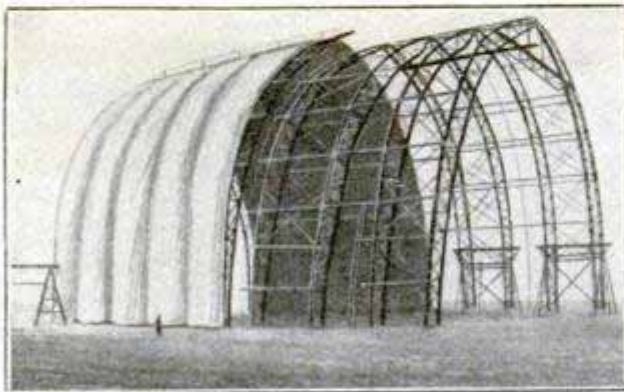
In contrast to the simple architectural treatment of the Chicago schools is the new state normal school at San Jose, California, designed by the state engineering department. Brick and faience tile are used as an exterior decoration for the concrete building. The school is built in the shape of a rectangle, broken up slightly with pavilions and buttresses. The exterior color scheme is gray, red and green, red tile being used for roofing. The tile and red brick used as inlay make a pretty contrast to the dull gray cement finish.

PORTABLE AIRSHIP HANGAR

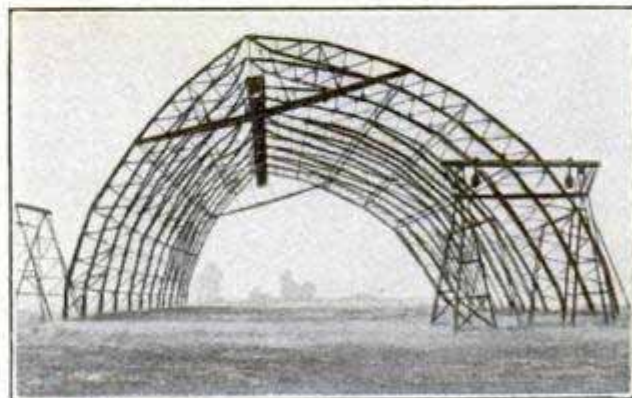
The new portable German airship hangar shown in these illustrations is unique in that it may be quickly erected or taken down in sections without the

falsework or other auxiliaries usually required for such work.

The great steel-arch trusses are made in sections or panels about 20



Remarkable Airship Hangar with Framework Complete and One End Canvas Covered



The Steel Frame is Erected a Step at a Time, Therefore the Lop-Sided Appearance

ft. long. The top sections alone make a small arch, and the next lower sections added to them make a somewhat larger and higher arch, the adding of sections continuing until the full height and span are reached. By setting up the crown sections with the tie rod holding them, then raising one side of the frame high enough to permit inserting the next lower section, and then tipping the structure in the opposite direction to insert the second section on the other side, and so on progressively, the whole is at last erected without staging. Special gantry frames, 25 ft. high, provided with chain blocks, are used for the lifting.

The completed structure has a span of 108 ft., a height of 98 ft., and a diameter of inscribed circle of 65 ft. The covering is canvas.

THE "KISS OF DEATH" IN COTTON MANUFACTURE

A custom in cotton factories necessitated by the old-fashioned weaver-room shuttles is grimly called the "kiss of death," because of its transmission of infectious diseases. The so-called "kiss of death" is the sucking of the thread through a hole in the shuttle, and, according to the Journal of the American Medical Association, it has doubtless been responsible for the carrying of tuberculosis and other infections throughout all the generations in which it has been used.

A bill has been introduced in the Massachusetts legislature to compel all mill owners to abandon the old shuttle in favor of a new one which does not require this lip contact.

CURE DRUNKENNESS BY EYE TREATMENT

A craving for stimulants may frequently be cured by a visit to an eye specialist, says a well-known oculist. The theory is that unsuspected strain on the eyes leads to nervous disorders which result in an overindulgence in intoxicating liquor.

TELEPHONE SAVES LIFE OF WESTERN LINEMAN

Presence of mind in tapping a telephone line recently saved the life of a



How a Snowbound-Lineman Secured Assistance with a Portable Telephone Outfit

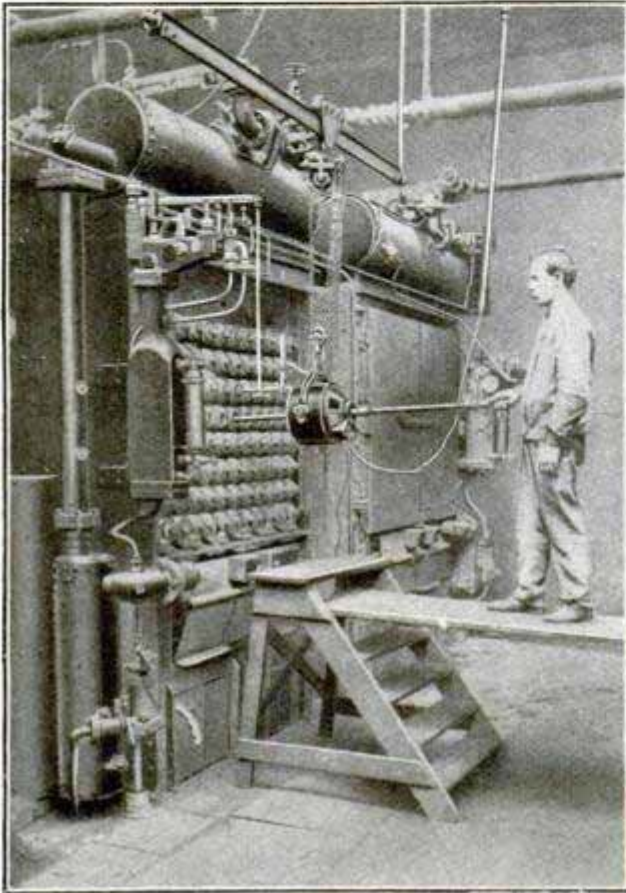
lineman in an out-of-the-way place during the snowy season.

After finishing his work on a pole line near "The Hump," a precipitous mountain in the state of Washington, a telephone lineman essayed to make a short cut home by climbing up the mountain side to the track of the Northern Pacific Railway. His climbing started a snowslide, and but for the fact that he happened to strike a telephone pole, he would have been dashed to his death over the cliffs below. Struggling out of the snow, he bethought himself to climb up the pole and tap the wire with his pocket telephone set. A freight train was dispatched to his assistance, and he was finally rescued by a party of linemen who worked their way hand over hand along the pole line by means of a lineman's swinging seat suspended on the telephone cable.

☐The gates for the locks of the Panama Canal will require 58,000 tons of steel.

FRENCH MOTOR-DRIVEN FLUE CLEANER

An electrically driven rotary cleaner for boiler flues, invented by an employe of the Post and Telegraph De-



Electrically-Driven Flue-Cleaner in Operation and the Rotary Cleaning Head

partment, Paris, has been successfully tested out on various boilers belonging to the French government. The cleaning head, mounted on the end of a shaft, has four rotary cutters so arranged as to always be parallel with the tube. The electric motor is mounted on the other end of the shaft as shown in the larger illustration.

Chinese carry on 75 per cent of the business done in the Philippine Islands, there being more than 8,000 Chinese merchants in the archipelago whose business capital amounts to more than \$25,000,000.

VALUELESS PEBBLES ARE TRADED FOR GEMS

One of the many curious trades that depend upon successful imposition is that of the seaside lapidary or gem cutter who secretly trades inexpensive gems for absolutely worthless pebbles. Such a transaction proves profitable at some of the English seaside resorts. The victim or victims are shown gems which are claimed to have been picked up on the shore and polished by the gem cutter. Then they start out in search of gems and carry to the cutter pebbles which he convinces them are gems. They leave the pebbles to be cut and the gem cutter sends back, in return for the valueless pebbles, topazes, aquamarines and such inexpensive gems, charging a price for cutting which gives a handsome profit on the transaction.

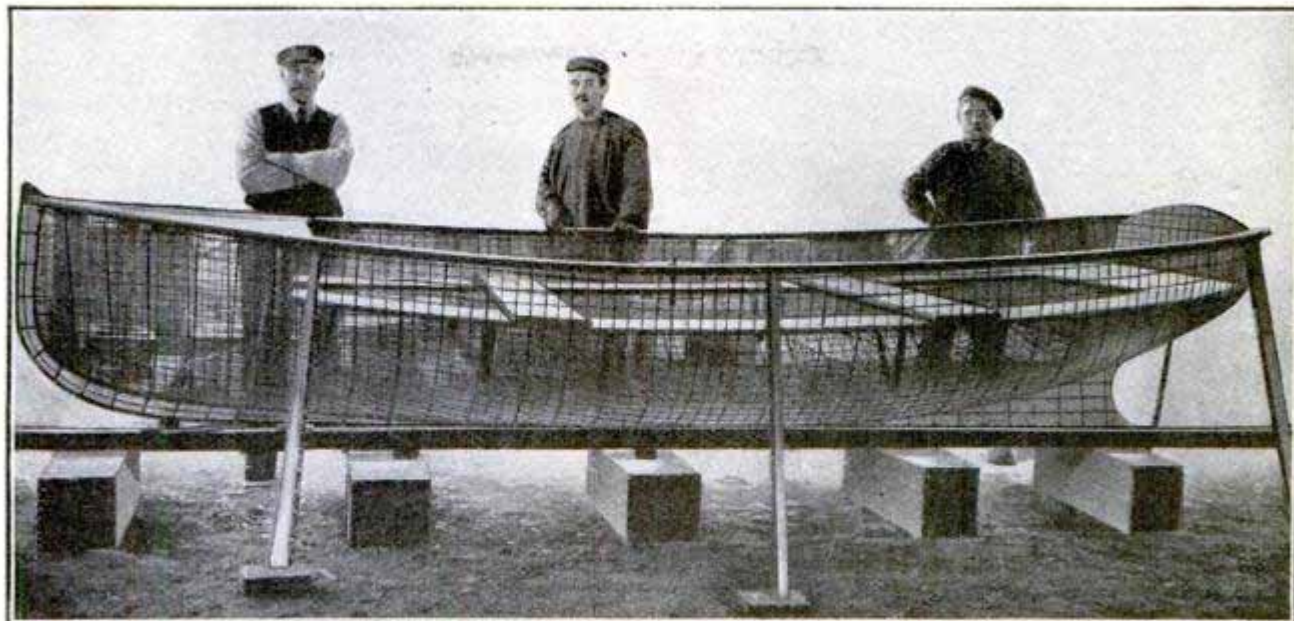
KENTUCKIAN MAKES SLEIGH OF DRYGOODS BOX

Probably the strangest sleigh ever seen on a city street was that belonging to an old Kentucky mountaineer who drove into Cincinnati recently. The sleigh was made from an old dry-goods box with runners made of hickory. A window sash served as a wind break. With the bottom of the box filled with straw and hot stones, the old mountaineer was able to withstand the wintry blasts and enjoy his city trip in comfort.



Kentucky Mountaineer Riding in His Home-Made Sleigh

DUTCH CONCRETE MOTORBOAT



Ready for the Application of Concrete

The novel concrete motorboat shown in these illustrations is one of many made by a concern in Holland. This boat is about 15 ft. long and 5 ft. wide, and, driven by an American 3-hp. engine, has a speed of 7 miles an hour.

The reinforcing is wire network, the concrete being



Concrete Motorboat Built in Holland

applied on both sides. The deck and seats are the only wooden parts used in its construction.

Concrete boats, such as canal boats and barges, were first made in Italy, but are now being constructed to some extent in the United States, as well as in many European countries.

UNCERTAINTY OF RADIUM

Although radium has been acclaimed as a renewer of life because of the experiments of Professor Petit, in France, in which an old horse apparently received a new lease of life after injections of radium, other scientists draw attention to the uncertainty of its behavior.

The experiment has been frequently tried both on animals and human beings, according to Sir William Ramsey, the famous English scientist. He tested the possibilities on cats, all of whom became emaciated after a short

time and eventually died. Of eight persons suffering from cancer who received injections, only one recovered, so that it is difficult to say what the effects of the radium were, if any.

On the other hand, external applications of radium undoubtedly effect a cure of certain kinds of cancer.

☞ A new form of electric motor is prevented from overheating by blowing through its coils a current of cold air which is passed through a water-cooling apparatus in the base of the motor.

A DIRECT MEASURER OF ILLUMINATION

A boon to amateur photographers is the handy portable photometer de-



Portable Electric Photometer in Use

signed by an English inventor and shown in use in the illustration. This simple instrument, which measures 7 by 3½ by 2 in. and weighs less than a pound, does away with the spoiling of plate or films by underexposure or overexposure, for it enables a direct measurement to be made of the illumination in any direction at any place, and the time of exposure and the stop aperture for the lens may be chosen accordingly.

This photometer contains a tiny electric lamp which throws a beam of light on to an inclined screen, the angle of which may be adjusted by a small milled head. A mirror, from the central portion of which the silvering has been removed, reflects an image of the screen into the eyepiece of the instrument. Through the desilvered part of the mirror is viewed the object whose illumination is to be determined. When the milled head has been turned until the illuminations from the lamp

and the object are equal, the illumination of the object may be read directly on a small scale.

BOHEMIANS MAKE BUTTER FROM COCOANUT OIL

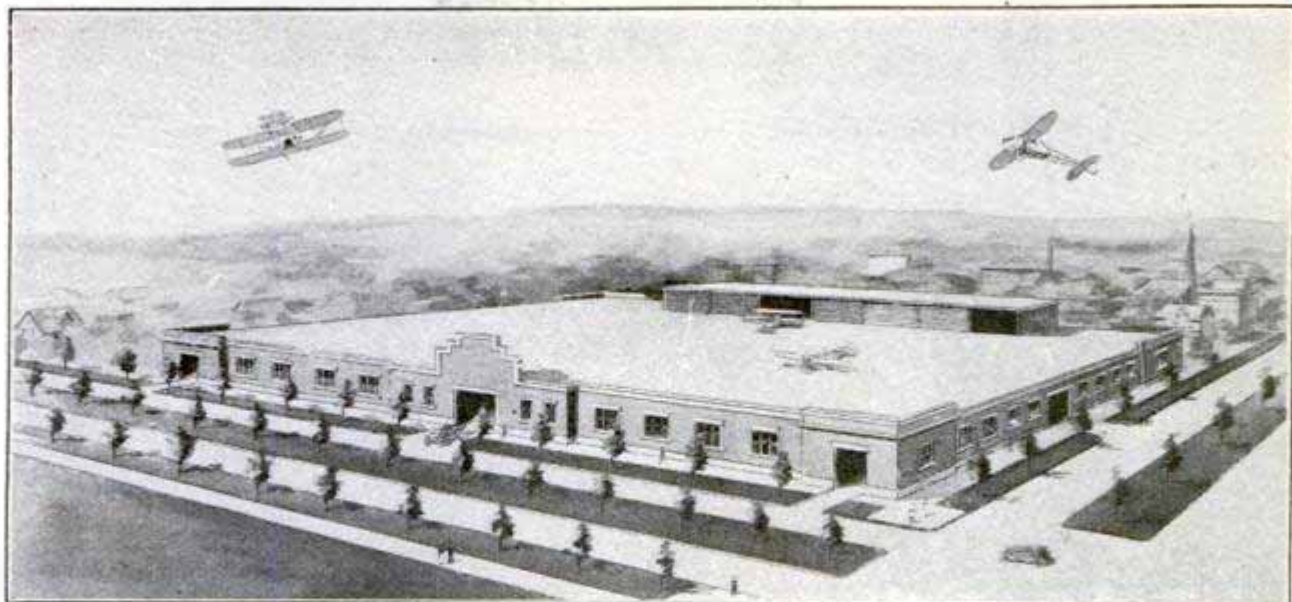
"Vegetable" butter, made from coconut oil, eggs and a small percentage of cream, is being manufactured in Bohemia where it sells for less than half the price of creamery butter. The claim is made that this butter has an agreeable flavor, that it is not injurious to health, and is excellent for cooking purposes. It is prepared in two forms, soft, and in firm cakes. The principal ingredients are coconut oil and the yolks of eggs. It sells at 14 cents a pound. Creamery butter sells, in Bohemia, for 35 to 38 cents a pound, and farm butter from 31 to 33 cents a pound.

ACROBATIC FREIGHT CAR

While the train was running at a moderate speed, the steel sheet bars with which this car was loaded shifted so seriously as to cause it to jump the track. The car tumbled down a bank 20 ft. high, made a complete turn in which it emptied itself of its load, and when it landed right side up in the bed of the stream, one of the trucks was found resting on the floor as shown in the illustration.



This Freight Car Emptied Itself by Turning a Somersault and Then Picked Up One of Its Own Trucks



Roof of Combined Aerial and Automobile Garage as Ascending and Alighting Surface for Aeroplanes

COMBINED AERIAL AND AUTOMOBILE GARAGE

If present plans are carried out, a combined aerial and automobile garage, one of the finest structures of its kind in the world, will be erected on the Parkway, Cambridge, Mass., at a cost of \$200,000. The roof, which will be perfectly flat, will provide a surface from which to ascend and alight.

Hangars on the roof are to be connected with the machine shop and garage below by stairways. The necessary skylights will be flush with the roof, and sufficiently strong to bear any weight required.

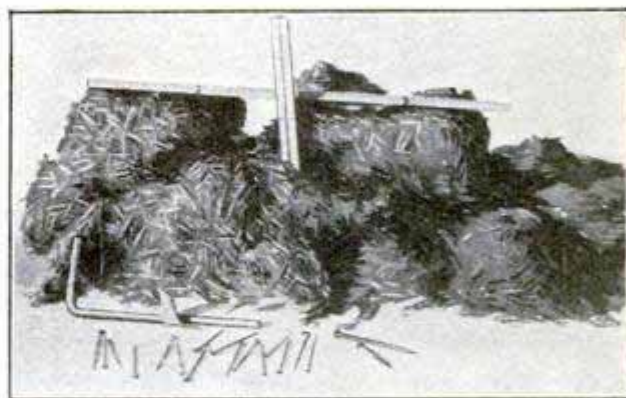
REINFORCED TELEPHONE APPARATUS

Users of desk telephones have to be careful not to knock off the apparatus on to the floor, as the ordinary receivers and transmitters are very brittle and break easily.

A new form of reinforced construction for these parts has recently been introduced to overcome this objection. The mouthpiece and earpiece are made of a metal-ribbed frame, around which the rubber insulation is forced under high pressure. It is almost impossible to break apparatus made in this way, and rough usage results only in very slight chipping around the edges.

JUNK IN CYLINDER STOPS PUMPING ENGINE

The miscellaneous collection of iron borings, rods, nails and other junk shown in the illustration was found in the low-pressure cylinder of a large pumping engine at Atlanta, Ga., when the engine was overhauled recently on account of valve trouble. No less than 59 lb. of scrap was taken out of the cylinder, which measures 90 in. in diameter. The engine had been doing half-time duty for about six months, and it is remarkable that serious damage did not result sooner. As it was, one of the valves jammed and the stem was badly bent. It is supposed



59 Pounds of Junk Taken from Engine Cylinder

that the ports of the intermediate cylinder had not been cleaned out properly when the engine was erected, and that the junk came from this source.

HEAT DOES NOT AFFECT THIS SKIN

Benzine, poured over the hand of an ordinary human being and set on fire, would have a very painful, if not dis-



This German Performer Saturates His Hand with Benzine and Sets It on Fire

astrous, effect, yet a German vaudeville performer does this trick at every performance. He also piles gunpowder on the palms of his hands and sets it on fire. It is claimed that he does not prepare his skin in any way for these tricks, but has practiced until his skin is practically insensible to heat.

OIL-BURNING ENGINES IN NATIONAL FORESTS

At the recent meeting of the Western Forestry and Conservation Association announcement was made that recommendations were to be presented to the Forestry Bureau that oil-burning locomotives be specified in all future grants of franchises to railroads crossing national forests.

In the summer of 1910, according to W. B. Greeley, district forester, nearly 950 fires started within 200 ft. of the rights of way of the Great

Northern and Northern Pacific railroads in the national forests. Both roads burn coal, and Mr. Greeley is convinced that 90 per cent of these fires were caused by engine sparks.

On the Milwaukee line, which uses oil-burning engines to pull its regular trains through the forest districts, not a fire was discovered that was not traceable directly to coal-burning engines used on wreck trains or steam cranes.

DOG A VALUABLE AID TO LONDON CHARITY

"Brum," the handsome Newfoundland dog that is a familiar figure to all travelers through the Euston station, in London, has just been given a medal for faithful service because he has collected the sum of \$1,000 in small amounts for the Long and North-Western Railway Servants' Benevolent Fund. "Brum" made friends with everybody that came his way and this quality of his was what first suggested his being used as a collector for the railway employes' relief fund. A crescent-shaped box was made to fit on his back with straps. A slot was made in the top of the box, large



"Brum," the Newfoundland Dog Decorated for Service as a Collector for Charity Contributions

enough to receive coins and bills, and the dog took his stand in the station where the crowds were thickest.



Ruins of the Giant Scenic Railway Wrecked by Wind at Denver. Fell Like so Many Dominoes

WIND WRECKS AMUSEMENT-PARK STRUCTURE

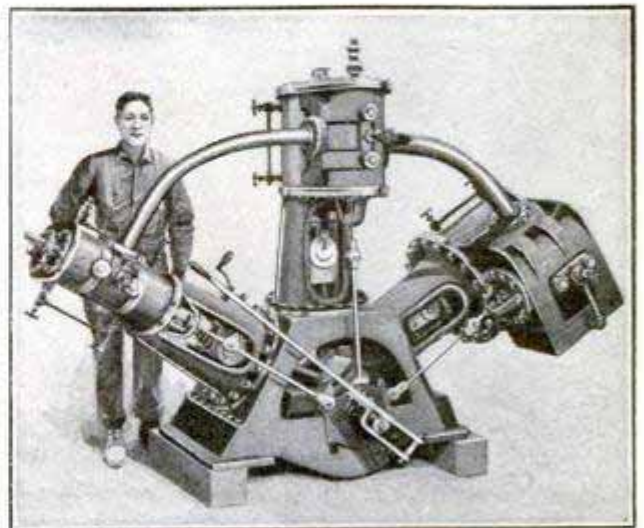
During a severe windstorm in Colorado recently, the big new \$20,000 scenic railway being constructed at a large amusement resort near Denver, collapsed, and was completely destroyed. The fall was most spectacular. As the first section collapsed, it fell against the next bearing, and so on from one end to the other like a long string of huge dominoes. The falling timbers severed the telephone and feed wires of the interurban railway, blocking traffic and communication for several hours.

SIMPLIFIED MARINE ENGINE

A southern engineering plant is building a line of remarkably simple triple-expansion marine engines, ranging from 150 to 700 hp., especially adapted for tugs and small single-screw steamers. The simplicity is such that two cranks, four main bearings, three links, five eccentrics, five straps and three eccentric rods are eliminated, the

result being that maintenance is reduced to a minimum, while efficiency is increased by a reduction of friction.

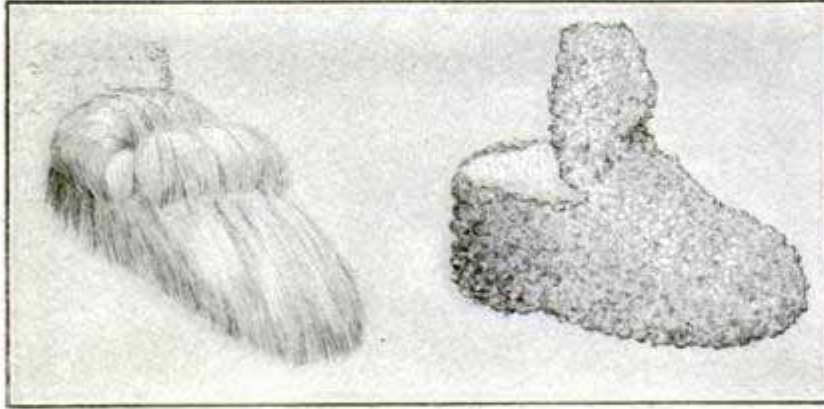
The engine shown in the illustration has cylinders 9 in., 14½ in., and 25⅝ in. in diameter by 14-in. stroke. It is designed for a working steam pressure of 250 lb., and 300 revolutions per minute. Piston valves on all cylinders are easily operated and reversed by a single eccentric valve gear.



Two Cranks, Four Main Bearings, Three Links, Five Eccentrics, Five Straps and Three Eccentric Rods Eliminated in This Engine

COMFORTABLE FOOT MUFFS FOR MOTORISTS

Muffs are ordinarily associated with hands, but English clothiers are now featuring foot muffs as part of their

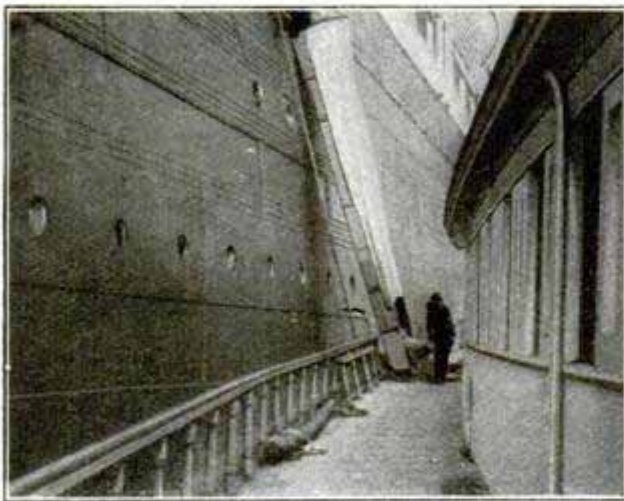


Two Types of Muffs for Motorists' Feet

regular stock. These muffs are designed especially for motorists, and are made of astrakhan, and seal, brown bear and many of the other furs used in the making of ordinary muffs. Many of them are lined with thick white wool.

TRANSFERRING MAILS FROM LINER TO MAILBOAT

The discharge of mails is one of the first things to be rushed through when one of the great transatlantic liners draws into the harbor at New York. The accompanying illustration shows a mailboat that has just drawn along-



Mailboat Receiving Mails from Ocean Liner by Means of Chute

side, and the chute by means of which the transfer of mail is accomplished.

WHISTLING CLAIMED TO STOP SNORING

Whistling, according to an article by an English physician, in the Daily Mirror, London, is a preventive of many ills, and also a sure means of stopping snoring. If a person sleeping in the same room with you commences to snore, whistle softly, and, if the London physician is right, the snoring will stop.

The London physician claims that it has been proven that persons having a tendency to bronchitis and pneumonia should be encouraged to

whistle, as children who whistle are least troubled with these diseases. Whistling strengthens the lungs and throat, develops the lips, teaches breath control and strengthens the face muscles. Persons who are apt to lose their "wind" when climbing hills are advised to whistle loudly at every second step, the assertion being that it will soon cure them of breathlessness.

NATIONAL TOURING OFFICE

An organization for assisting tourists has just been inaugurated in Paris, under the title of the French National Touring Offices. The committee consists of high government officials, members of chambers of commerce and railroad managers, with the minister of public works at its head. The object is to centralize and place at the disposal of the public all necessary information for traveling in France. It is hoped that many attractive parts of the country, which at present are not well known to foreign visitors, will be thus advertised.

Can ingenious accessory for automobilists is an air-exhausted bulb which glows when the high-tension current from the spark coil or magneto passes through its metal electrodes. It is used for testing the sparking.

THE MAKING OF ARTS-CRAFTS LAMPS

By JOHN D. ADAMS

PART IX—SHADE FOR DROP LIGHT

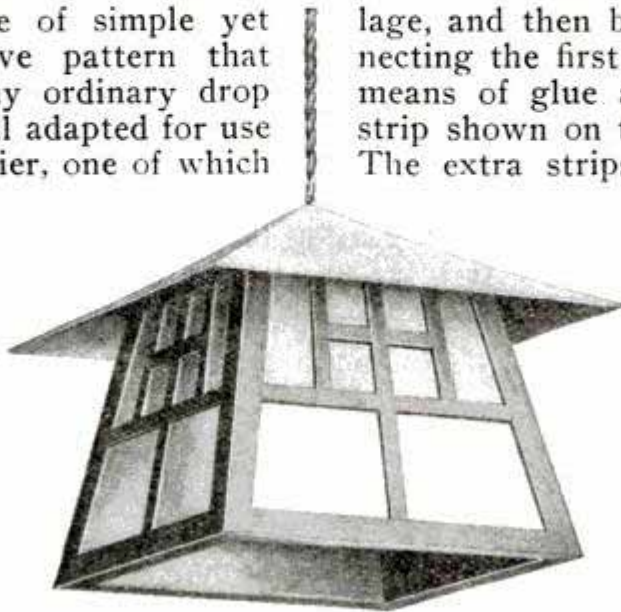
THIS is a shade of simple yet rather attractive pattern that may be used on any ordinary drop light, and is also well adapted for use in a mission chandelier, one of which will be next described. The same outside and general dimensions may be retained, while any desired design may be substituted for the simple cross-bars shown. A monogram, college initial, or some heraldic device may often be worked up in an artistic manner.

Accurately lay out the design decided upon on a sheet of rather heavy flat paper, and after cutting it out with a sharp knife mark it off four times on the sheet of cardboard, which will have to measure at least 12 by 28 in. Proceed rather slowly at first with the cutting out of the cardboard, so there will be no danger of the knife slipping.

Any frayed or torn edges should be smeared with glue and sandpapered smooth when dry. All the bends are indicated by dotted lines, which should be scored with the knife on the outside, but for no greater depth than will allow a good sharp bend. Attach the colored paper with mucilage,

and then bend into shape, connecting the first and last sections by means of glue applied to the extra strip shown on the left-hand section.

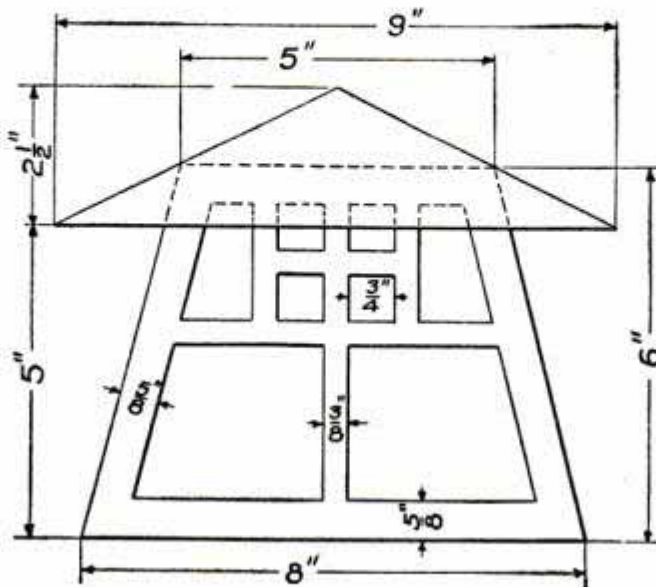
The extra strips on the four lower edges should all be bent inward and connected at the overlapping corners with paper fasteners. The pattern for the top, which is next in order, should now be marked off and cut. Bend into shape and fasten the first and last sections with



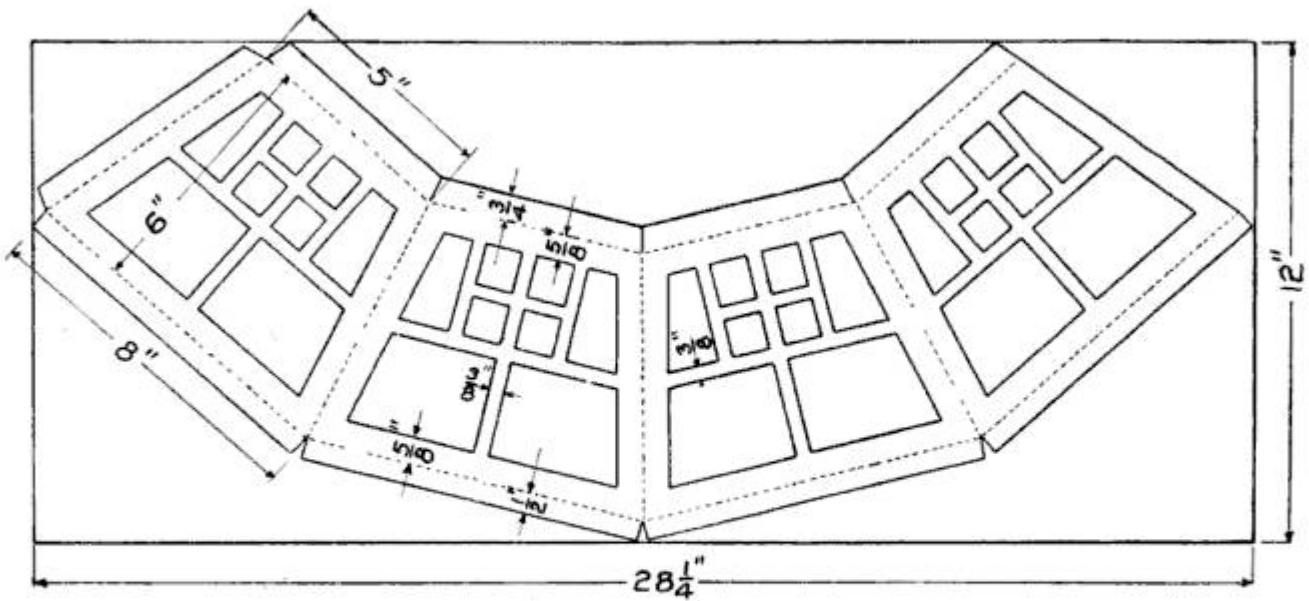
Shade Complete

glue applied to the extra strip shown. All bends should finally be bound with passe-partout tape. Bend the extra strips at the tops of the four sides inward to an angle corresponding to the slope of the top, and then fasten on the top by means of paper fasteners and glue. Paint the entire framework and top a dull black. If the light is not controlled by a wall switch and

only an ordinary socket is available, a 1½-in. hole will have to be cut in the top of the shade in order that the socket may protrude from the operating key upward. Four small strips of tin should be provided and one end of each clinched through the top of the shade and the

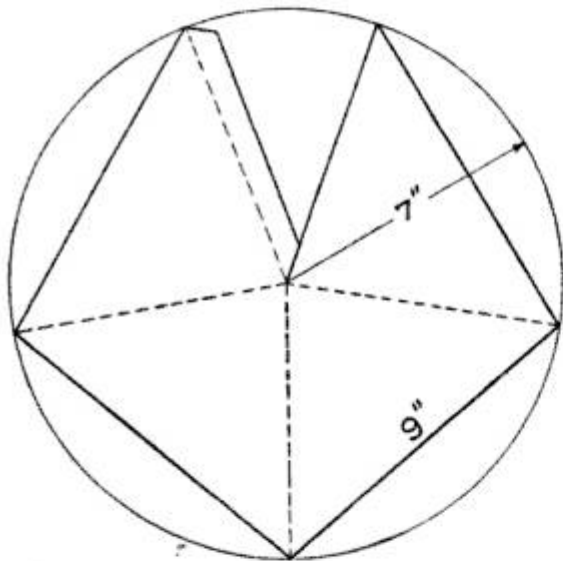


General Dimensions of Shade



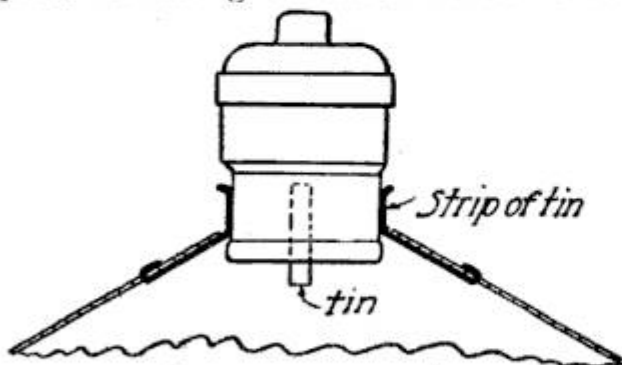
PATTERN FOR THE SHADE

other end bent upward so as to fit along the socket. The shade is then attached by binding the four upward



Pattern for the Top

projecting ends to the socket with a piece of string or wire. If some in-



One Method of Attaching Shade to Socket

ulating tape is at hand, it can be used instead of the string or wire.

THE HOMESTEADING OF ENGLAND

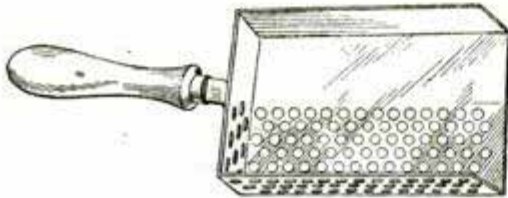
An organization called the Land Union has launched a scheme in England the purpose of which is to practically colonize that country with small homesteads, which are to be paid for on the installment plan. Only 50 or 60 cottages will be built the first year, but if the plan works as expected, the number will be increased year by year.

The first 12 homesteads to be provided were awarded to men picked from the great number of old army and navy men, policemen, and ex-civil service men who filed applications, all of whom have small pensions. Plans were made out showing the selected sites and neighborhoods, and the designs of the cottages and buildings, along with statements of the exact amount of costs and the annual payments which will purchase the homesteads over a course of years. This information was then placed before the selected men, who were permitted to modify them as would best suit the size of their families, the amount of the installments they could pay, and the nature of the agricultural or horticultural work they wished to practice. The monthly or quarterly sums the families thus provided with homesteads will have to pay, will scarcely exceed the amounts ordinarily paid

out in rent. The majority of the homesteads will not have more than three acres of land, the idea not being to provide a complete livelihood to the men, but to increase the income and provide a good home in the country.

ASH-SIFTING HAND-SHOVEL

This hand ash-sifter is used in France, where the open fireplace is still the chief means of heat. It is for use before removing the ashes from the room in which the fireplace is located, which allows of the unburned pieces of coal being immediately replaced in the fire basket. Only one half of the shovel is perforated, the



Saves the Unburned Coal

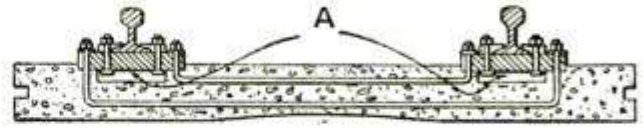
unperforated half serving to hold the ashes after the unburned coal is recovered.

CONCRETE TIE WITH WOODEN RAIL-CUSHIONS

Elasticity of the bed for the rails is the important feature of a concrete tie invented by an engineer of Pulaski, Ill., now being tested by the Illinois Central Railroad.

Over a groove at each end of the concrete tie, is placed a wooden block, varying from 3 to 6 in. in thickness, and held in place by the reinforcing rods which run through the tie. These reinforcing rods, after being bent to project from the top of the tie, are threaded to receive a nut, and, in order that this may not work off, the end of the rod is slotted, which causes it to spread. The grooving of the concrete ties leaves an open space under the blocks at the point of attachment of the rails, and this, according to the inventor, gives the blocks a yielding bed, which will prevent undue shocks.

The rails are fastened to the blocks by means of clips, which extend over



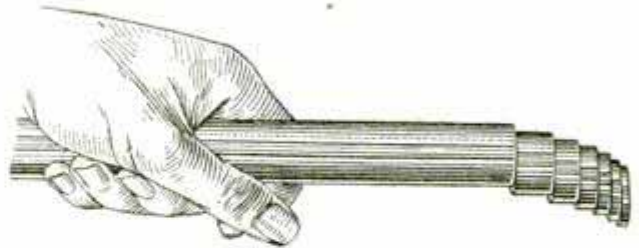
Manner of Constructing New Concrete Tie—
A, Wooden Blocks

the flanges and are secured by bolts passing through the blocks. The ties weigh 600 lb. each.

CORRECT TO THE HUNDRED-THOUSANDTH OF AN INCH

It passes human comprehension what the one hundred-thousandth of an inch really means. One can perceive with difficulty the one hundredth of an inch on a mechanic's steel rule; but the one thousandth of this small division is beyond human ken. Yet mechanics can work to this degree of accuracy.

The illustration shows the holder and distance pieces of a high-grade gauge set adhering to each other, not mechanically or from the effect of magnetism, but from simple atmospheric pressure. They are made correct to the one hundred-thousandth of an inch and fit against each other so closely that the absence of an air film between them permits the atmospheric pressure



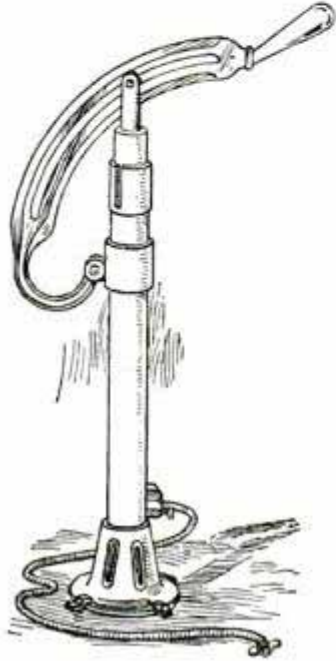
Pieces of Metal Held Together by Air Pressure

of 14.7 lb. per square inch to hold up their weight and prevent them from falling.

CA life buoy carrying four electric lights, two above and two below the water, and having sufficient buoyancy to support three men, has been successfully tested in England. It weighs 25 lb., and the batteries will light the lamps continuously for four hours.

FRENCH AIR PUMP FOR AUTOMOBILE

With the ordinary air pump the effort required increases as the piston is forced to the bottom of the cylinder, but in this new French pump the force required to complete a stroke is the same from beginning to end. The hinged and grooved arm which pushes the piston down gives a steadily increasing leverage as the piston approaches

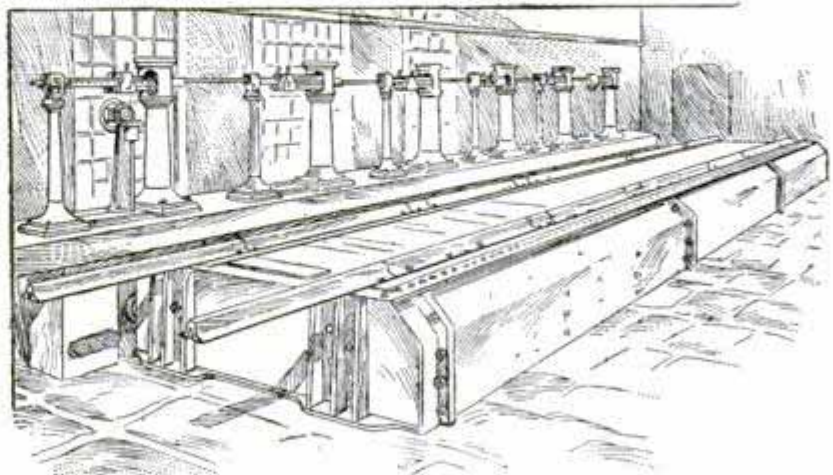


the bottom of the cylinder.

LOCKING WEIGHING TABLES FOR LOCOMOTIVES

Weighing machines are used in all the great locomotive works to determine the weight on each wheel, thus making possible such distribution of the total weight as will result in an easy-running machine which will not be unduly hard upon the rails. The majority of these machines consist of separate weighing tables for ascertaining the load on each individual wheel.

The weighing machine here illustrated consists of 12 such tables provided with a special locking gear, which firmly locks them in position while a locomotive is being moved over them, thus preventing oscillation and shocks during the operation. The locking and un-locking is effected by means of a hand wheel.



Twelve-Table Weighing Device for Locomotives

SECRET VAULTS IN HOMES AGAIN POPULAR

The latest fad in home construction is the building of secret safety boxes or vaults in the walls or floors. This is not a new idea, however, but the re-adoption of a feature from the days before the development of banks and trust companies. In some houses the boxes are placed under the floor and are hidden by a cover which is moved by a secret spring, while in other instances, the safe is sunk in a window ledge, under a stair, in the fireplace, or in the walls.

DRIVES TUNNELS BY HEAT AND COLD

Driving tunnels by alternately applying heat and cold is the method proposed by an inventor who has applied for a patent on a new style of tunneler based on this principle.

Almost any method of generating heat may be used, as by burning gasoline, crude oil, natural gas or the like, or by applying electricity. When gasoline is used, air under pressure is forced through a burner and the heated products of combustion strike against the face of the rock which is softened or cracked by the intense heat. Disintegration is completed by shutting off the supply of fuel and forcing cold

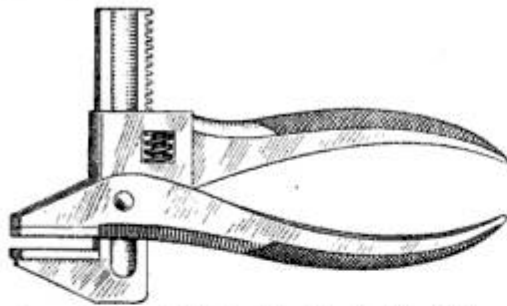
air against the heated face of the rock, which can then be mined by hand or

with a pneumatic tool. Shoveling is practically eliminated by digging the waste rock right into a specially constructed car or hopper.

The chief objection which might be raised against the new method is that the products of combustion would probably have a deleterious action on the workers in the confined space of a tunnel heading. This would be obviated, however, by the use of electric heaters.

EXPANSION PLIERS

The curious-looking tool shown in the engraving combines in a pair of pliers the expansion principle of the monkey wrench. The handles are pivoted together so that they are always the same distance apart, while the lower jaw may be moved in and out by the knurled worm in the same way as a monkey wrench is adjusted. As the pivot is quite near the jaws, the leverage is much greater than in the ordinary variety of pliers. Thus a greater gripping power is possible, and this



Screw-Wrench Principle Applied to Pliers

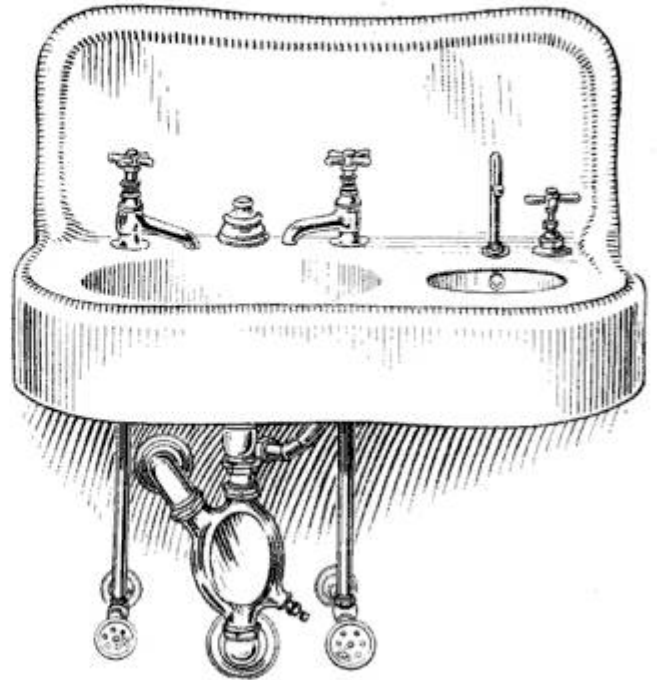
effect is also increased by the fact that the jaws are nearly parallel when the tool is in use.

COMBINATION WASH BOWL AND DENTAL BASIN

The practice of using the wash bowl as a dental basin is obnoxious when considered from a sanitary and hygienic standpoint. Of course it is almost necessary to do so when separate facilities are not provided.

The fixture shown is a combination lavatory and dental basin, with back, slab and apron cast all in one piece and

artistically enameled. It is furnished with special fittings for both bowl and



Obviates Necessity for Using Wash Bowl as Dental Basin

basin and with separate flushing arrangements for each.

SINKING PILES BY MAN-WEIGHT

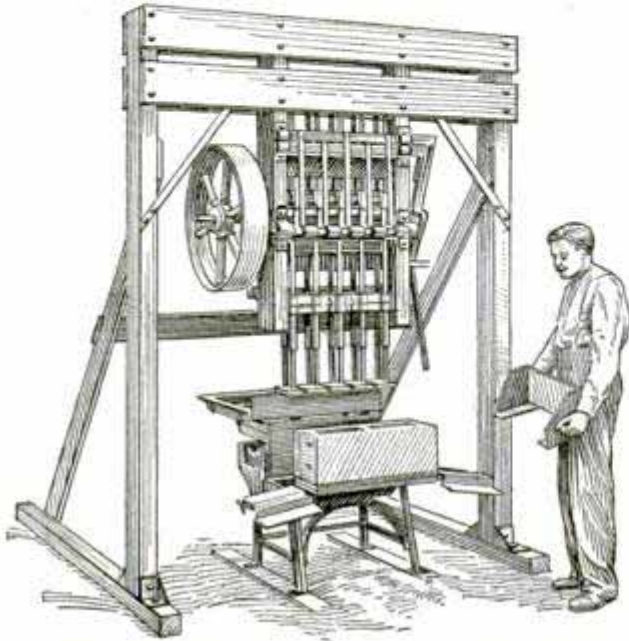
This story of unique utilization of a heavy workman in the sinking of piles comes from the south. The piles were being sunk in soft ground by means of the water-jet method, but some kind of weight was required to make them sink faster. One of the men in the working gang weighed nearly 300 lb., and, because of this weight, along with the fact that this man was not a very hearty worker, he was selected to serve as sinker. A board was nailed to a pile, the heavy man was boosted to this improvised seat, the water jet was applied and the men see-sawed on the ropes, the pile sinking easily.

The process was then repeated with the next pile, all of them being successfully sunk by this method.

¶The United States mints sent out \$141,500,000 in coin during the year 1910, of which \$105,000,000 was gold and \$3,000,000 in pennies and five-cent pieces.

AUTOMATIC POWER TAMPER FOR CONCRETE BLOCKS

The latest model of one of the well-known concrete-block-making machines is provided with an automatic



Tamps Disengaged and Mold Open for Removal of Finished Block

power tamper, and a scraper and finisher attachment, thus eliminating practically all hand labor from the time the material is placed in the machine until the finished block is removed.

The power tamper is said to deliver a harder and more uniform blow than is possible by hand, and the product is correspondingly better. When the tamping is completed, the operator by pressing a foot lever throws forward a knife which scrapes off the surplus material and deposits a finishing plate directly over the block. The tamps are then thrown again into operation, and, with three or four blows, the block is given a finished back.

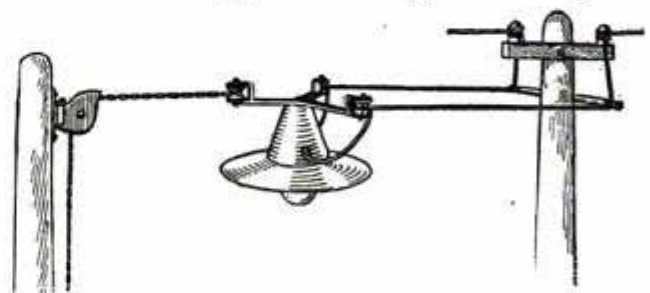
TORONTO HAS NEW TYPE OF CONVERTIBLE CAR

A trolley car that can be used either as an open summer car, or closed completely for winter use, and that contains many new constructional features, has been put in service in Toronto. When used in summer, it is provided

with side openings and benches that run the width of the floor, with a side step its entire length, as is the case with all summer cars. In winter, however, its character is completely changed. Instead of the cross seats it has longitudinal benches, one on either side and its sides are completely closed. The front door between the car and vestibule has been dispensed with, the motorman having a railed-off section of the platform for his use. The car is 44 ft. 9 in. long over all and seats 38 people as a closed car, or 70 when used open. It is of semi-steel construction. The cars are all of the pay-as-you-enter type and so far have been highly satisfactory, both in convenience and comfort, and in economy of operation.

STREET HOOD FOR TUNGSTEN LAMPS

The use of large tungsten lamps for outdoor lighting is comparatively recent, owing to the fragility of this type of incandescent lamp and the difficulty of suspending it so that it would be safe from breakage by the wind. Improvement in the manufacture of these high-efficiency lamps has removed the first objection, and the introduction of special types of street hoods has solved the suspension problem. One of these special suspensions and hoods for a 400-candlepower tungsten lamp is shown in the illustration. The two current-carrying wires form one side of the support, and the third arm of the three-arm rigger is supported by a



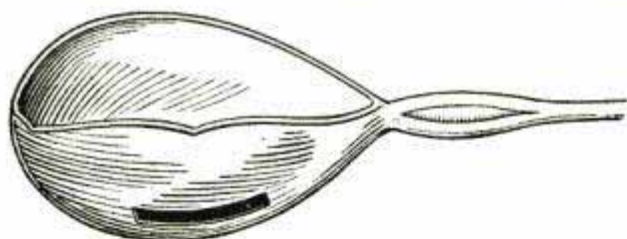
Tungsten Street Hood Suspended

chain or rope which passes over a pole pulley on the opposite side of the street. When the chain or rope is tightened, the street hood is held firmly

in position. It cannot sway or turn over in a windstorm, but remains perfectly level, a matter of the utmost importance when tungsten lamps are used.

SPOON THAT IS PROVIDED WITH A MUFFLER

A spoon that permits the most careless person to eat soup without noise has been invented by a St. Louis man. The inventor claims that a person using this spoon cannot make a noise, even if he feels inclined to do so. The "muffler" which has been applied to the spoon is simply a "lid" that covers one half the surface of the bowl, a slit being provided at the edge through which the liquid enters the mouth of the user. The device is somewhat like the old-fashioned "mustache cups" in the results obtained, and is recommended to men with heavy mustaches for use with all manner of liquids



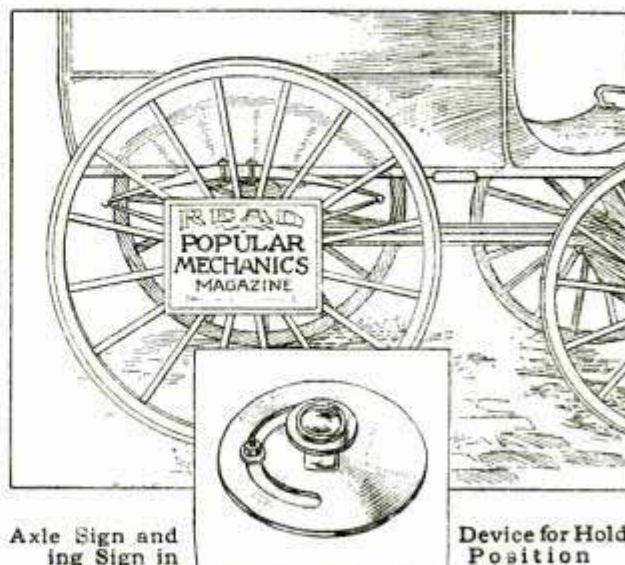
Spoon from Which Soup Can Be Eaten without Noise

taken with a spoon. A spoon with a wider slit or aperture is to be made for use with soups other than the "clear" or "strained" varieties.

AXLE-NUT ADVERTISING

The axle-nut sign is a new idea in advertising especially adapted to spring wagons and all light vehicles used as delivery wagons. The sign plate, made of metal, is held in position by a specially devised nut, which has a ring or plate cast to the free end. This nut is of the shape of the ordinary axle nut, with the exception of the plate, which has a slot one-half of its circumference, in order to allow of the adjustment of the sign plate. The ring on the nut is concaved on the side that

comes in contact with the sign plate, this allowing perfect contact at all points around the ring, which is ex-



Axle Sign and
ing Sign in

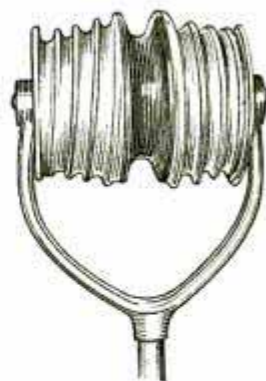
Device for Hold-
Position

pected to keep the sign from rattling when the vehicle is running over rough streets.

The signs are fastened only to the rear spindle, as the driver usually uses the front hub as a step.

TROLLEY REPLACING DEVICE

A new device for the automatic retrieving of a trolley when it leaves the wire, has been invented by an electrical engineer of Brooklyn, N. Y. It consists of two spirals or worms, four threads wide, one placed on each side of the trolley wheel and turning on the same axis.

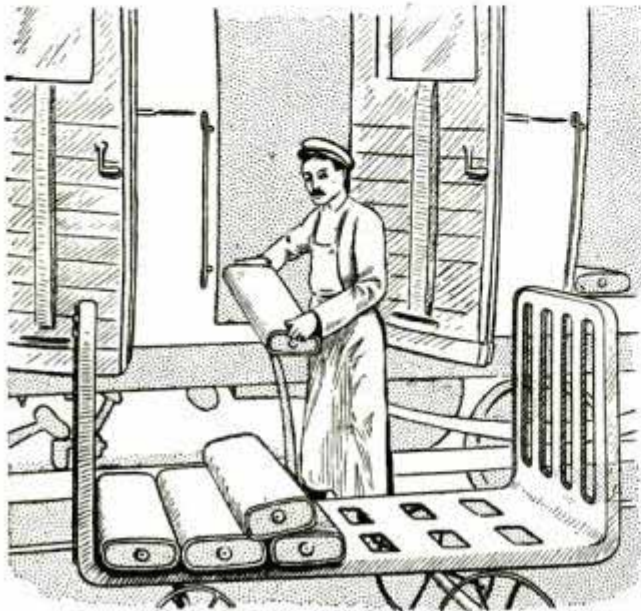


The threads run inward, so that, when the trolley wheel slips from the wire and the wire engages with the spiral, the forward movement of the car brings the trolley wheel back into place again.

“Consumeter” and “Petrolometer” are two new words proposed to designate a device for measuring gasoline for automobiles, etc.

LARGE HOT-WATER BOTTLES HEAT FRENCH COACHES

Although the limited trains on the branch railways are provided with up-to-date equipment, the local trains,



Hot-Water Bottles That Warm French Local Trains

made up for the most part of the oldest cars, are almost entirely lacking in comfort. Especially is this so as regards heating, the primitive hot-water bottles being still in use.

These bottles are so hot when first placed in the compartments that it is impossible to keep the feet upon them, but they soon grow cold and are worse than useless before a station is reached where an exchange of bottles may be made.

AIR IN GARAGES MENACE TO LIFE

Lack of efficient ventilation in a private garage recently caused the death of a physician in Chicago. The doctor had been in the habit of leaving his automobile engine running while the machine was standing in the garage. Owing to imperfect combustion of the explosive charge in the cylinders, the exhaust gases contained considerable quantities of carbon monoxide gas. This poisonous gas has a peculiar action on the blood, preventing the red corpuscles from properly performing their function of transfer-

ring oxygen from the lungs to the muscular tissues. The effect is not always sudden, and may be due to several successive visits at frequent intervals to an inclosure containing the gas in appreciable quantities.

In this particular instance, the physician was not aware that he was being poisoned until one day he became afflicted with nausea and dizziness when starting up the engine in the garage. These symptoms disappeared when he went out in the open air, but the mischief was done and he died the next day of carbon-monoxide poisoning.

METAL COATING BY A SPRAY APPARATUS

The spraying of perfumery or disinfectants by means of a pneumatic vaporizer has inspired a Swiss inventor to devise a method of applying a metal plating or coating to all kinds of substances, including plaster castings, wooden moldings and stone, as well as metals.

The apparatus is a huge vaporizer. The metal intended for coating purposes is reduced to a molten state in a crucible, which has an opening at the bottom controlled by a valve or tap. Nitrogen or hydrogen, supplied from tanks, is introduced into the apparatus through a tube, which passes over a small furnace heated by illuminating gas, raising the temperature of the gas to 200 deg. F. The tube then divides into two branches, one entering the crucible containing the molten metal, and the other passing under the apparatus to the tap from which the metal is forced by the gas from the first branch. The effect is to convert the molten metal into a cloud of particles and to sprinkle it upon the object to be coated.

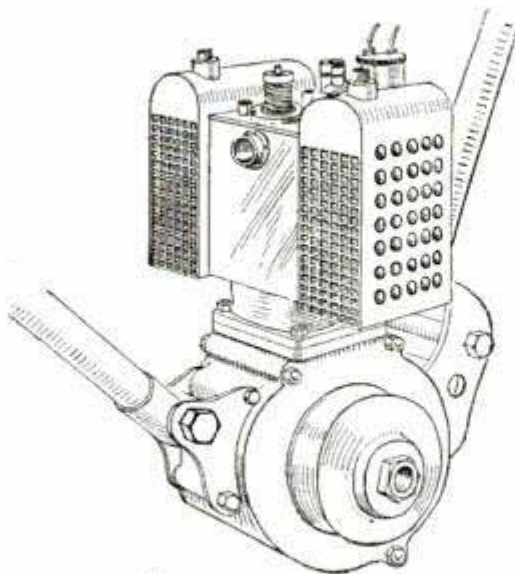
Aviation has reached such importance that one newspaper has begun to print news of it in short paragraphs under a general caption of "SKY VESSEL MOVEMENTS."

VACUUM MACHINE EMPTIES CESSPOOLS

Vacuum cesspool exhausters, some horse-drawn and others motor-driven, are now extensively used in parts of England where such pools are still utilized. The vacuum is created in a cylindrical tank, a suction pipe is connected between the tank and cesspool, and on opening the valve, the sewage is drawn into the tank. The fact that the tank and connection must be airtight if a vacuum is to be created assures an entire absence of the nuisance associated with old methods of cesspool emptying. The capacity of the tanks ranges from 150 to 900 gal.

A UNIQUE RADIATOR FOR MOTORCYCLE ENGINES

A British firm is introducing a motorcycle having a unique type and arrangement of radiator for its water-cooled engine. In this engine the water jackets and side radiators are made of copper and form one piece. The flow of the water from the tank in front, to the rear radiator, around the cylinder to the other radiator, and back again to the tank, is maintained by thermosiphonic action. A water-

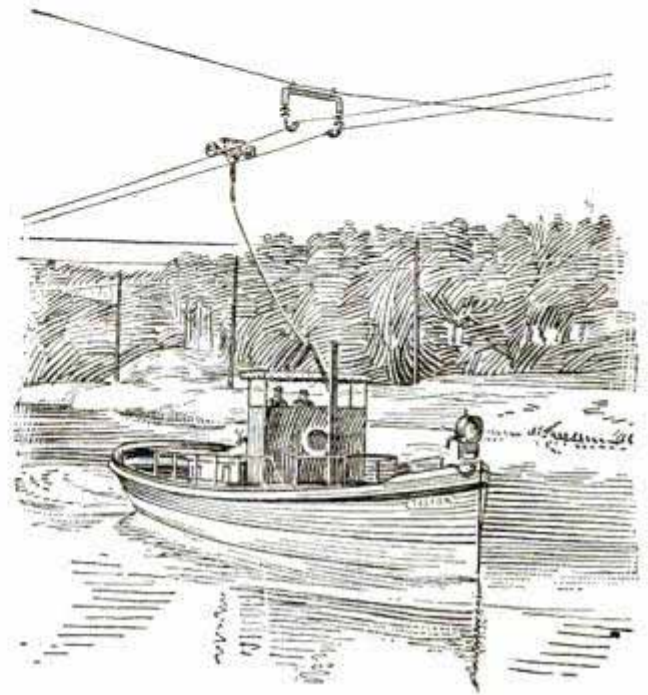


Water-Cooled Motorcycle Engine with Unique Type of Radiator

tight joint between the bottom of the cylinder and the water jacket is made by means of a rubber ring.

TROLLEY TUG-BOAT USED ON GERMAN CANAL

Trolley wires stretched above a waterway in the same manner as they are ordinarily stretched over a city



Ingenious System for Tug-Boat Propulsion

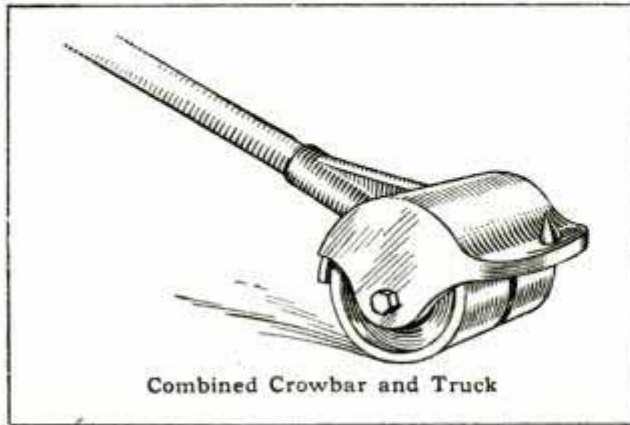
street, and a tug instead of a street car deriving its propulsion power from these wires are the novel sights which greet the visitor to the Teltow Canal in Germany. The electricity is taken from the overhead wires by means of a little wheeled truck, which the tug pulls along as it goes, instead of by a trolley pole.

VEGETABLE GROWTH OF NILE AS FUEL

The dense vegetable growth of the Nile, which is a continual nuisance to river navigators, may become an Egyptian asset, if the tests made of it as fuel in the form of briquets are as satisfactory as claimed. The vegetable growth, known as "sudd," is to be dried, disintegrated and compressed into briquets by machinery. The resulting fuel is claimed to be suitable for use in steam boilers, in which it is expected to give an evaporation of about $4\frac{3}{4}$ lb. of water per pound of briquet.

A COMBINED CROWBAR AND TRUCK

The device shown in the accompanying illustration is used in sets of three for handling heavy pieces, up to three



Combined Crowbar and Truck

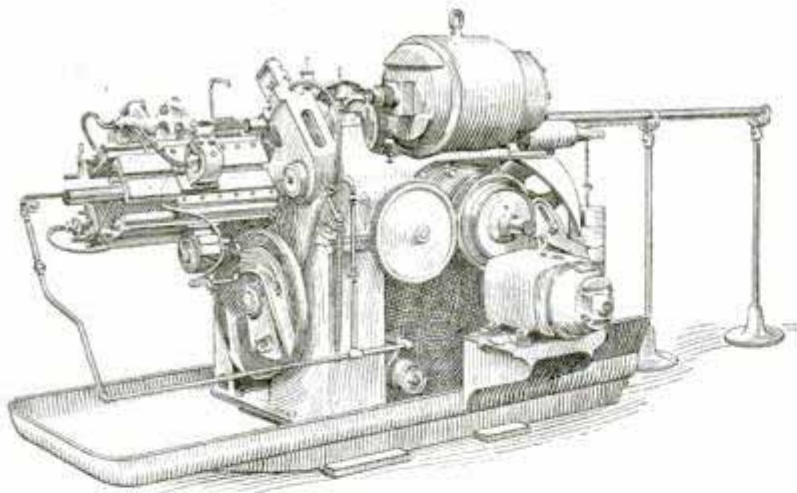
or four tons in weight, on the floors of workshops, factories, etc. The three

truck-crowbars are inserted with their conical points under as many different points of the load, and by bearing down on the handles the load is lifted clear of the floor and can be pushed to any desired place. The conical points prevent slipping. The bar trucks are easily manipulated by ordinary laborers, and are said to be very convenient, even in shops which are equipped with traveling cranes.

A HUMAN STORAGE BATTERY

A miner of Sullivan, Ind., is reported to be so full of electricity that he cannot carry a watch in his pocket for fear of it becoming magnetized and stopping. He has been warned to keep far enough away from the town clock when he wants to know the time.

MOTOR-DRIVEN AUTOMATIC LATHE OF BRITISH DESIGN

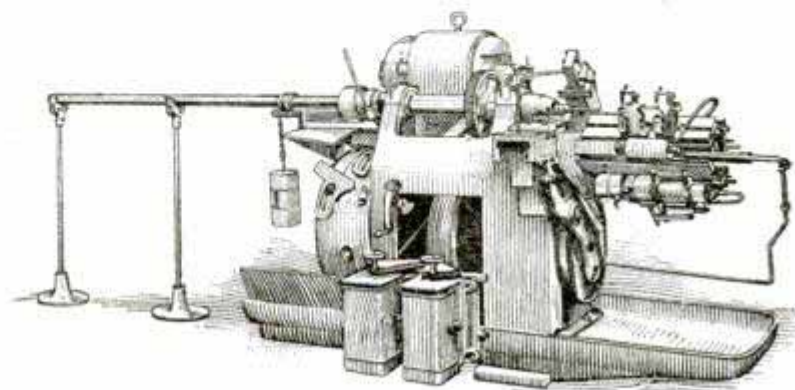


Front View of Motor-Driven Automatic Lathe

The motor-driven automatic lathe built in Manchester, Eng., has one feature at least that differs from the ordinary automatic lathe. In general practice the turret revolves axially on the bed of the lathe, but in this machine its only movement is rotative, which brings the four tool slides, on which the tools are mounted, into position. The turret revolves on

bearings placed in both ends of the headstock, and is actuated by an intermittent revolving worm running in a worm wheel attached to the turret.

The lathe has two motors, one driving the spindle, and the other the feed mechanism. The former is reversible for withdrawing a tap or die. The two motors, having independent controllers, which are automatically



Rear View of the Same Machine

actuated by cams on the operating drum, work independently of each other, and the entire range of spindle speeds can be obtained on any operation.

SECTION OF SHIN BRIDGES GAP IN SKULL

There is only one person in the world, so far as medical science is aware, a section of whose shin might be kicked and his skull fractured in the same place. The medical world is very proud of this person, who has a portion of his shin on the top of his head in the shape of a 3-in. patch over a place where there was no skull. The subject of this remarkable transposition of bone is a four-year-old English boy whose head was successfully operated on at the East London Hospital for Children, early in December, 1910. As the result of a fall when he was 18 months old, the bone over the whole right side of the skull failed to develop, and a large soft tumor, bulging the scalp, formed in its place. The child was brought to the hospital to be treated for another fall and the surgeons found it necessary to remove the tumor, which proved to be a sac filled with the cerebro-spinal fluid usually found in the ventricles of the brain and the spinal cord. The excess fluid was removed and it was then decided to transplant bone from the shin to bridge the space left vacant by the missing parts of the skull. The operation was successful.

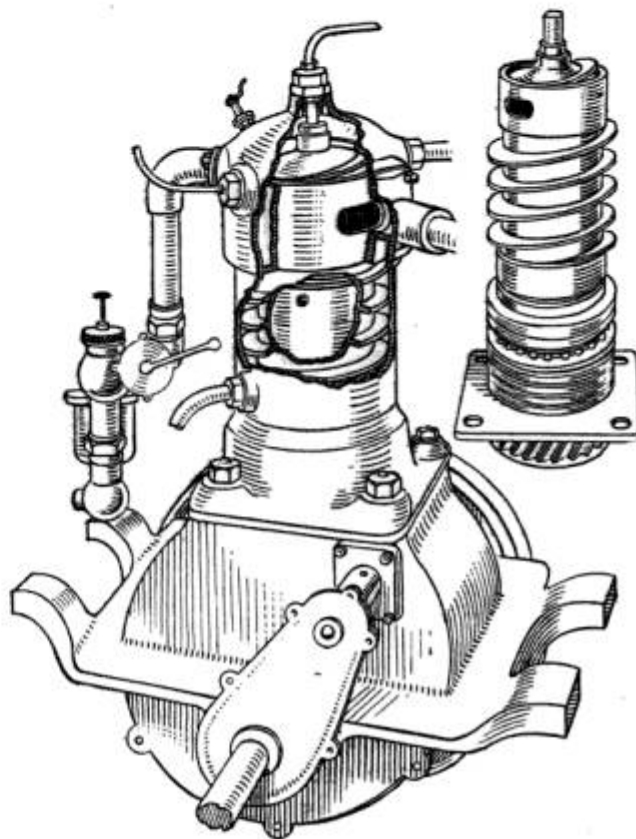
NOVEL TYPE OF INTERNAL COMBUSTION ENGINE

An explosion engine with an axially revolving cylinder that constitutes among other things its own inlet and exhaust valves, reversing gear and water pump, is the remarkable invention of an English engineer.

The two views given herewith show the main features of the engine. The larger drawing in the accompanying illustration is an external view with part of the water-jacket casing and cylinder

broken away to show the interior parts. The smaller drawing shows the revolving cylinder.

The cylinder is rotated at one quarter of the engine speed by worm gear-



Explosion Engine with Revolving Cylinder That Operates Inlet and Exhaust and Circulates the Cooling Water.

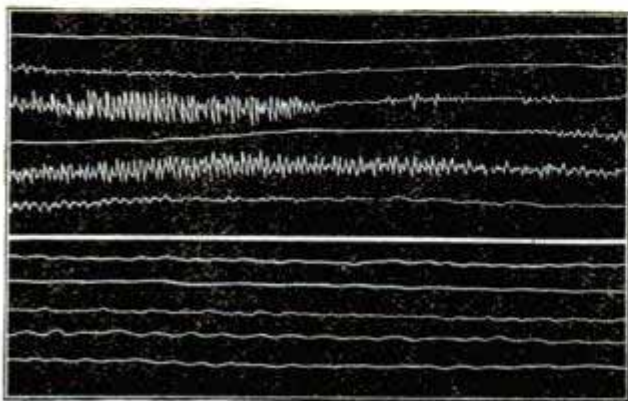
ing. Inside the head of the external casing are four ports, arranged opposite each other in pairs. The ports work with a pair of diametrically opposite ports in the cylinder head, one of which is shown in both illustrations. These ports comprise the valves when working against each other, both for inlet and exhaust.

The revolution of the cylinder, besides causing inlet and exhaust and circulating the cooling water, also automatically laps the piston rings and grinds the "valves," thus keeping the bearing parts perfectly true. Reversing can be accomplished by casting in extra ports and fitting a valve to allow either set of port openings to be used, for forward or backward running respectively.

This engine has been called a "cylinder-valve" engine to distinguish it from other types.

PARIS HAS MUSEUM OF PHONETICS

Paris has a museum of phonetics, established through the efforts of Professor Ponge, where records of spoken words and vocal waves, in the form of diagrams, will be made and preserved to reveal the pronunciation of this



Examples of Diagrams of Words and Vocal Waves Being Preserved in French Museum of Phonetics

century to the people of the centuries to come.

From one century to another pronunciation changes, rhymes cease to rhyme, and vowels and consonants change value. Phonographic records are no doubt becoming more and more perfect in reproducing the human voice, but the ear cannot perceive the infinitesimal fluctuations of sound. The diagrams, however, representing enlarged micro-acoustic waves of only one or two hundredths of a second's duration, will reveal to the eye the difference between records of the same word from different periods, if one diagram be superimposed on another.

The upper part of the illustration shows tracings of words enlarged 576 times in height and 15 times in length, while the lower part shows the curves of the vowels a, e, i, o, and ou in French, enlarged 60 times in height and length.

☞The latest estimate of the yearly coffee consumption per person in the six leading coffee-drinking nations is as follows: Netherlands, 17.06 lb.; Belgium, 13.09 lb.; Sweden, 12 lb.; United States, 10.98 lb.; Germany, 7 lb.

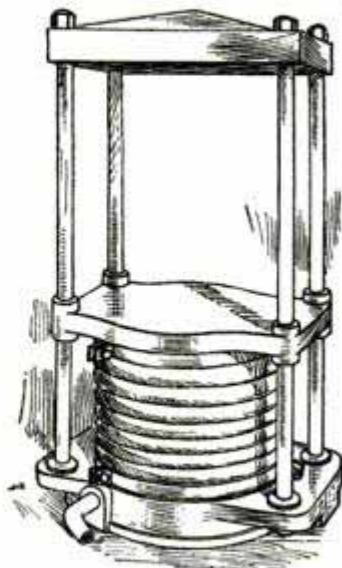
MAY SHOW MOTION FILMS IN RAILWAY STATIONS

The tedium of waiting for trains in the railroad stations of several large cities is to be relieved by the enterprising purveyor of moving pictures. Such, at least, is the proposal of an organization of motion-picture men, who discussed the subject at a recent meeting in Columbus, Ohio, and authorized steps to be taken to secure the co-operation of the railroad authorities.

It was pointed out that there would be a good financial return for the men who would place at the disposal of the people who fill railway-station waiting rooms, some method of spending the time while waiting for trains. It was proposed to give a regular motion-picture show and at the same time to safeguard the travelers with announcements as to the impending arrival or departure of trains. Nothing has yet been heard of the railroad officials' view of the matter.

HYDRAULIC PRESS WITHOUT A PISTON

A new pistonless hydraulic press that uses a collapsible cylinder instead of a ram has been tested in England with highly satisfactory results. The press is the invention of a Russian. There is a steel tension frame provided with a strong head and bed plate and a cylinder carrying a table or platen. The cylinder is made of stout fabric and vulcanized rubber, armored with steel rings and is capable of withstanding a working pressure of 100 lb. per square inch. There are internal and external guides to pre-



vent buckling and the table is guided by side rods. No auxiliary apparatus is required and the town water supply of from 40 to 100 lb. per square inch is used. The whole area of the cylinder being acted upon by the water, pressures of from three to 80 tons are readily obtained. Owing to the elasticity of the walls of the cylinder, the pressure is applied with easy graduation and can be maintained for any length of time without further expenditure of water. There is no leakage, no pump, no cup leather, and no foundations are necessary. A 12-in. cylinder, with 60 lb. water pressure, will give a pressure of three tons, while a 3-ft. cylinder with the same water pressure will give 27 tons. The press has the further advantage of being portable and can be worked with compressed air. It is regarded as a valuable adjunct for electrical workshops where it can be used for numerous purposes, such as making commutators, forcing wheels on shafts, removing street car wheels or tires and molding insulating material.

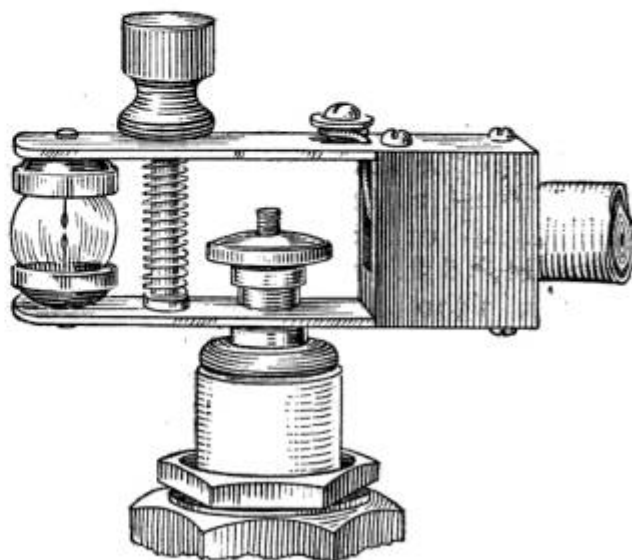
AIRMEN NOT HELD RESPONSIBLE FOR ACCIDENTS

Suits instigated against M. la Gatienerie and M. Blanck in the French courts, following accidents in which their machines seriously injured persons who were watching the flights, were dismissed on the grounds that aviation is still in its infancy, and that airmen have to contend with forces unknown and uncontrollable.

The court held that it was in no way able to establish when an airman should be considered incompetent, and that lack of proper precautions could not be proven, because the court was not sufficiently informed to say decisively what precautions should be taken. The decision in one of the cases ended with the statement that the public certainly should be protected against such accidents, but that in the absence of laws and regulations responsibility could not be fixed.

SPARK-PLUG TESTER

A handy tester for spark plugs was exhibited at the recent motorboat show in London. It is called a spark lamp, and consists of a small glass bulb held by a terminal fitting, which can be



Spark Lamp Tests Spark Plugs

fitted to any plug having a screw terminal. The bulb contains two electrodes, which are connected direct to the magneto distributor by turning a thumbscrew, causing the bulb to light up. The bulb also contains a vapor, which produces a luminous discharge and offers very little resistance to the high-tension current.

OLD ENGINE STILL WORKS WITH POWER TRIPLED

Built in 1854 to work on a steam pressure of 30 lb., an engine of the walking-beam type is still in service in an English ironworks, and, what is still more remarkable, is doing much heavier work than it did 56 years ago. In 1898 it was converted into a compound engine by the addition of a second cylinder, and the pressure increased to 120 lb. In 1910 it was converted into a triple-expansion engine by adding yet another cylinder, and is now working with steam at 200-lb. pressure. In this manner the ancient engine has been keyed up to meet the increasing demands of the plant instead of finding a place in a museum.

TELEPHONE STATION FAR ABOVE THE CLOUDS

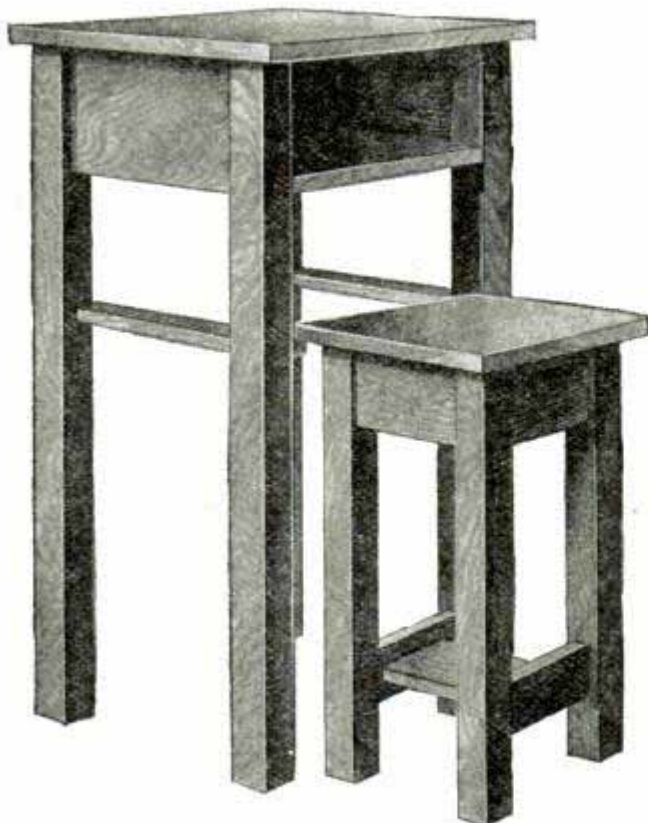
Although stringing telephone wires under the sea or along the lower levels of the surface of the earth has been regarded as presenting many difficulties to linemen, there is at least one place in the world where greater trouble was experienced running the wires high above the earth. This was at the loftiest telephone station in the world—at the highest meteorological station, on the summit of Mont Rosa in the Italian Alps, 14,960 ft. above the sea level. The mountain top is covered with perpetual snow and the installation of the telephone system that connects it with two other stations on lower peaks and with the world at large was regarded as a wonderful feat. Poles could not be used

on the extreme heights, and the wire was laid along the ground, on top of the snow, which is so dry that it is almost a nonconductor. In fact, the line would not operate properly until the director of the observatory had himself lowered with ropes into the deep crevice of a glacier, the only place he could obtain a good ground for the wire.

The meteorological observatory is a wooden building built with double walls 4 in. apart and covered with an outside shell of copper. Sound sleep is impossible at Mont Rosa, owing to the low barometric pressure and the constant vibration of the copper shell of the building by the winds which are always blowing. The observatory is named in honor of Queen Marguerite, the widow of the late King Humbert of Italy.

MISSION TELEPHONE STAND AND STOOL

The stand shown in the accompanying illustration is for use with a desk telephone. The stool, when not in use, slides on two runners under the stand.



Telephone Stand and Stool Complete

A shelf is provided for the telephone directory, paper, pencil, etc.

The joints may be made with dowels, or the mortise and tenon may be used, as desired. If the latter is decided upon, allowance must be made on the length of the rails for the tenons. The list given is for the dowel-made joints. The following stock list gives the amount of material needed which should be ordered planed and sanded. This work can be done by hand if the builder has the time and desires to have an entire home-made article. However, the list is given for the mill-planed material.

STAND

- 4 posts, $1\frac{1}{2}$ in. square by 29 in.
- 2 rails, $\frac{7}{8}$ by 5 by 11 in.
- 1 rail, $\frac{7}{8}$ by $1\frac{1}{2}$ by 13 in.
- 1 rail, $\frac{7}{8}$ by 5 by 13 in.
- 2 runners, $\frac{7}{8}$ by $1\frac{1}{2}$ by 14 in.
- 1 top, $\frac{7}{8}$ by 18 by 20 in.
- 1 shelf, $\frac{7}{8}$ by $12\frac{3}{4}$ by $13\frac{3}{4}$ in.

STOOL

- 4 posts, $1\frac{1}{2}$ in. square by 17 in.
- 4 rails, $\frac{7}{8}$ by 4 by $6\frac{1}{2}$ in.
- 4 rails, $\frac{7}{8}$ by 2 by $6\frac{1}{2}$ in.
- 1 stretcher, $\frac{7}{8}$ by 4 by $7\frac{1}{4}$ in.
- 1 top, $\frac{7}{8}$ by $12\frac{1}{2}$ in. square.

The exact lengths for the posts are given in the list. Should the builder

desire to square them up, allowance must be made for this when ordering the stock.

Arrange all the pieces in the position they are to occupy in the finished stand and stool and number all the joints. Locate the centers and bore holes for all the dowels. Assemble the two sides of the table first. Notch the runners and fasten them to the posts with flathead screws. Use hot glue on the dowel joints if possible.

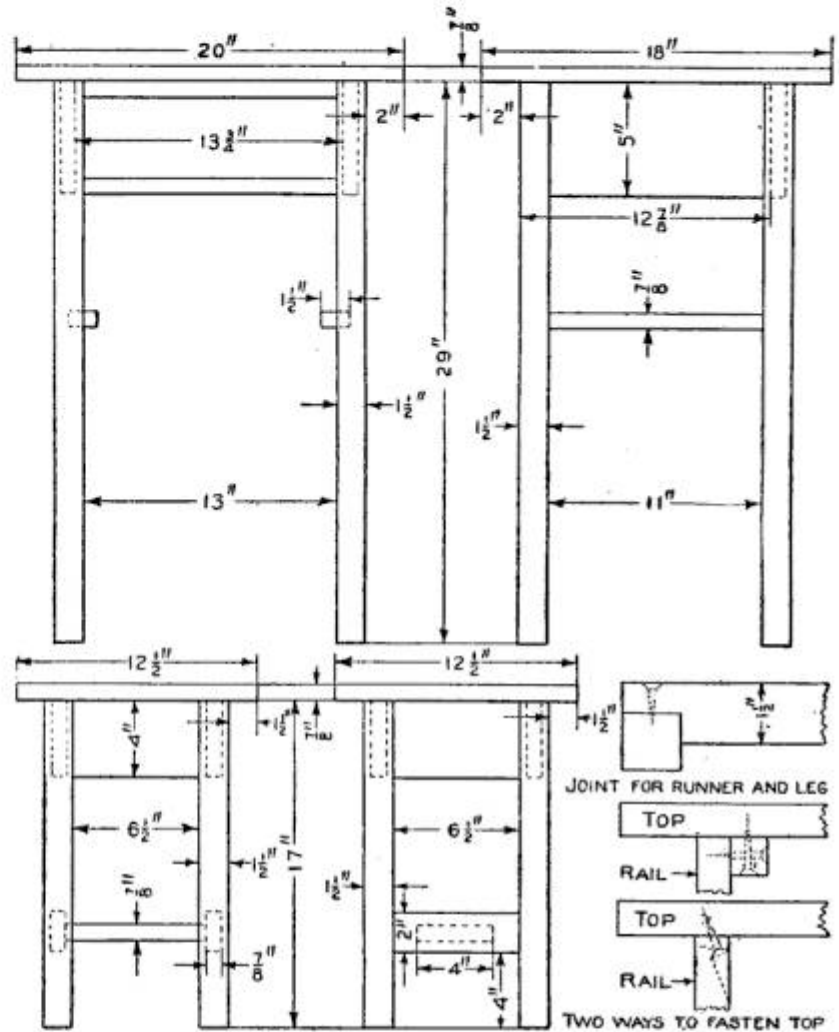
Cut the corners out of the shelf to fit the legs and assemble the frame of the table. Use round head screws through the rails to hold the shelf. The top may be fastened in two ways, with screws through cleats on the inside of the rails and under the top, or with screws slanting through the upper part of the rails and into the top as shown. The stool is assembled in the same manner as the stand.

The stand and stool should be finished to harmonize with the furniture and woodwork of the room in which they are to be used. Stains, fillers, wax and varnish can be purchased with directions for use.

ICE GIVEN A CERTIFICATE OF CHARACTER

Certified ice is the next commodity to succumb to the pure-food dictum and acquire a certificate of character from the hygiene experts. It is destined to make its bow to the public as soon as the necessary emblems of purity can be distributed. The Natural Ice Association of America has decided that its members must supply their customers with certified natural ice just as certified milk is sup-

plied to the consumers. While the members of the Association are unanimous in their belief that ice has never



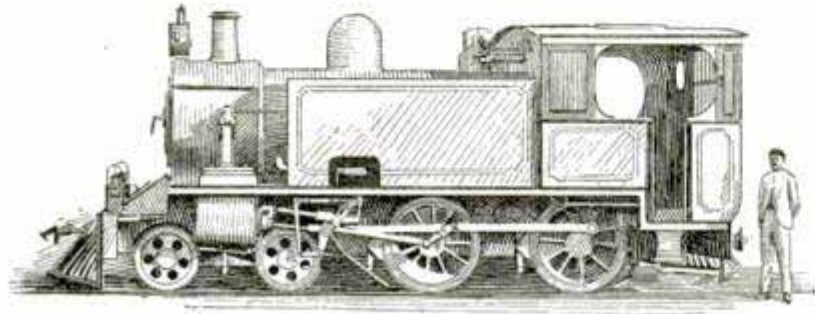
Telephone Stand and Stool Details

been a vehicle of disease, and their opinion is indorsed by eminent sanitarians, nevertheless they believe that the public generally does not know this fact, and by the adoption of a high standard of purity and the certification of the commodity under hygienic rules, they will forestall any criticism and allay any suspicion that may arise. The trademark or emblem will bear the name of the chemist who certifies the product.

German investigations covering a period of over 20 years show that telegraph poles have the greatest life when treated with tar oil as a preservative. The cost of such treatment is also less than that of other known processes.

NEW TANK LOCOMOTIVES FOR INDIA

The Madras and Southern Mahratta Railway, India, has just added several improved tank locomotives to its equipment. They are especially designed for working fast branch-line trains at an average speed of 35 miles an hour. A special feature of the boiler is the arrangement of longitudinal stays, which are stopped at each side of the dome opening and carried

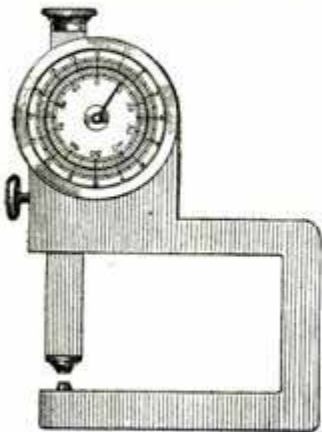


Oil-Burning Locomotive for Indian Railway

by cross beams. This provides sufficient space to admit a workman into the boiler when retubing is required. The smoke-box is exceptionally large and is fitted with baffle plates and a spark arrester.

TIME-SAVING MICROMETER CALIPER

A boon to the machinist or bench hand who would save time in calipering



his more accurate work is the automatic micrometer caliper recently introduced by an English manufacturer. American manufacturers have long been justly famous for the fine workmanship of their accurate measuring instruments, but all of these devices which were evolved from the historic Whitworth measuring machine are somewhat difficult to read, especially in a poor light. In the device illus-

trated herewith, the vernier scale of the usual form of micrometer caliper is replaced by a dial on which is indicated the measurement, which can be read off at a glance in decimal fractions of an inch or of a millimeter or in vulgar fractions of an inch.

trated herewith, the vernier scale of the usual form of micrometer caliper is replaced by a dial on which is indicated the measurement, which can be read off at a glance in decimal fractions of an inch or of a millimeter or in vulgar fractions of an inch.

THE SPERM WHALE'S OIL TANK

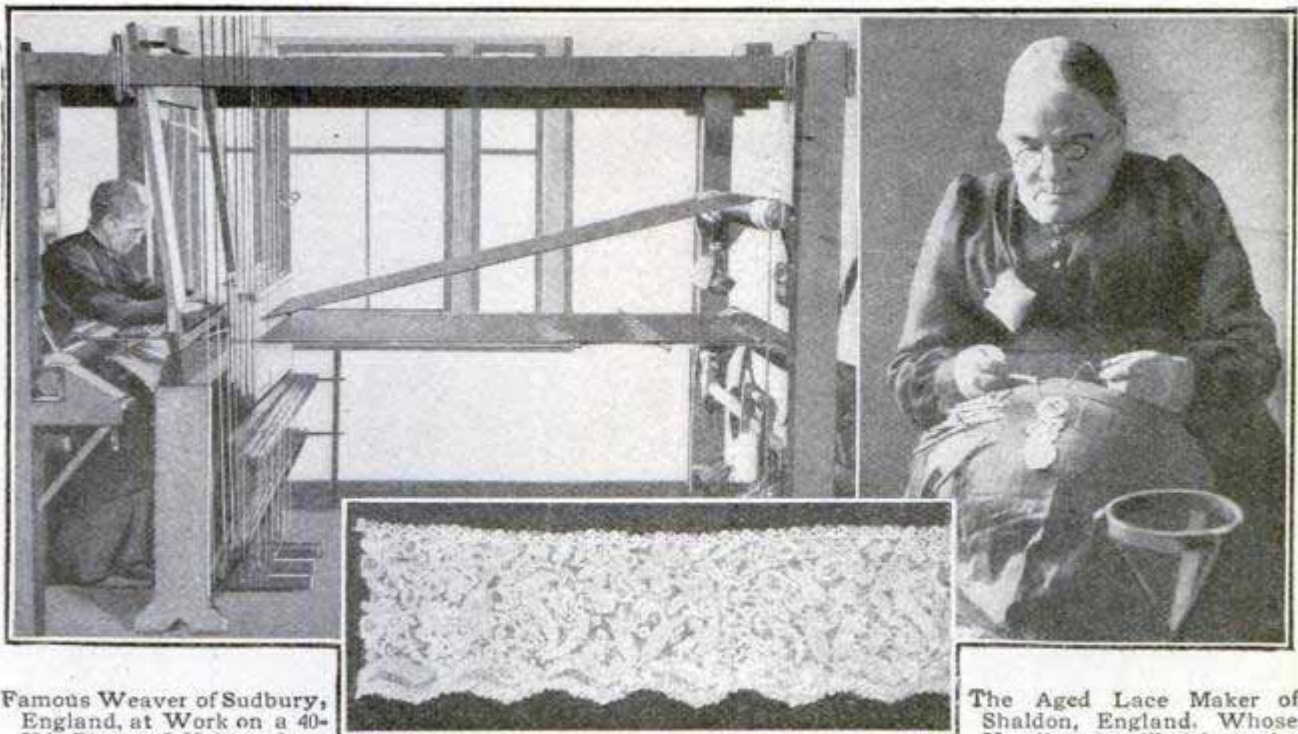
The oil tank in the head of sperm whales is believed by Prof. R. C. Andrews of the American Museum of Natural History to be a provision of nature by means of which it keeps from starvation when food is scarce. He says that his experiments seem to show that the oil from this tank is absorbed by the whale's body at times when food is scarce. It is said that as many as 20 bbl. of oil have

been found in the head tank of fat sperm whales, while the tanks in all thin whales captured have been found nearly empty.

Prof. Andrews has just returned from a 38,000-mile hunt in the Pacific for whale specimens. He brought back the skeletons of an 80-ft sulphur-bottom whale, a 70-ft. finback, a 46-ft. Sei, and two killer whales, one 22 ft, and the other 26 ft. long. He also collected hundreds of specimens of birds and animals, visiting many of the islands in the Pacific.

BURGLAR DISGUISED AS STATUE

Policemen, detectives and private watchmen searched the Fidelity Loan Building in Pittsburg for two hours after burglar alarms had served notice that thieves were at work, then one of the policemen idly tapped a sheeted statue in a studio on the second floor, and the hunt ended. The supposed statue suddenly came to life and started for the door, but the policeman felled it by throwing his club. The burglar had stood on the pedestal for nearly two hours.



Famous Weaver of Sudbury, England, at Work on a 40-Yd. Piece of Velvet for a Coronation Robe

The Aged Lace Maker of Shaldon, England. Whose Handiwork will Adorn the Queen's Robe

MAKING LACE AND VELVET FOR THE CORONATION

Hundreds of yards of velvet and lace will be used in the robes of the peers and peeresses of England who participate in the ceremony of crowning King George and Queen Mary at Westminster next June, much of which must be especially made for the purpose. Every one of the lords and ladies in attendance will wear a velvet robe. The making of so many robes requires a large excess over the normal output of the looms and mills turning out this material. Preparations have already commenced in England to supply the demand. Some of the finest velvet that will be used comes

from looms at Sudbury in Suffolk. Here much of the work is done by old-fashioned hand methods and each piece is a perfect production of the weaver's art. Miss Foakes, of Sudbury, is famous for the excellence of the quality of velvet made by her. She has already commenced her work on coronation orders, one of which involves the weaving of a piece of velvet 40 yd. long which will require three months' labor.

Some of the lace which will be worn by Queen Mary is being made by an aged woman at Shaldon who has made lace more than half a century.

ADJUSTABLE AUTOMOBILE STEERING COLUMN

A steering column that will meet the height requirements of a person of any stature is a new automobile feature. The inclination of this column and the height of the steering wheel may be altered in a few minutes. The column passes freely through a swiveling

socket which is pivoted to a horse-shoe-shaped casting in the dashboard aperture. By unscrewing the locking nut which secures the gear box at the bottom of the column in place, the inclination of the column can be changed at will, and the new setting is made fast by securing the locking nut, the column automatically sliding through the socket to take up its new position.



AUSTRIAN LIMBLESS PAINTER

This Austrian artist lost both arms and legs in a railroad accident but still makes a living by painting. He guides the brush with his chin, the brush handle being supported on the stump of his right arm. The paintings are necessarily simple.



RUSSIAN COUNTERFEITERS

The above photograph was taken when a band of Russian counterfeiters was arrested recently in Moscow. The metal from which the counterfeit money is stamped out is shown. Russian police photographs such as this are almost impossible to procure.



Japanese Woman Dentist in Her London Operating Room

JAPANESE WOMAN DENTIST

Europe has long considered the American dentist to be far superior to its own product, and the most successful dentists in both England and on the Continent have been Americans. The latest "foreign" dentist to set up a practice in London, however, is not an American, but a Japanese, and a Japanese woman at that.

Excavations near Liege, Belgium, unearthed a Roman villa, in the basement of which was found a quantity of coal in large pieces. This leads to the belief that the coal deposits of Belgium were exploited as far back as the beginning of the Christian era.

American brook trout and rainbow trout are being propagated at the ancient castle of Langen, Westphalia, Germany, the most of which has been transformed into a fish hatchery.

TO DETERMINE EFFECT OF LIGHTNING PHENOMENA

The authorities of the University of Illinois are preparing to continue next summer their experiments as to the best means of protection against lightning, using a more extensive apparatus. The experiments are to be carried out in an open field, in which twelve 40-ft. poles have been erected. Six of these are equipped with devices for registering the effect of lightning strokes at or near the poles. There is a series of spark gaps with induction, resistance and capacity fixtures, so that the lightning may jump across the gaps or pass around through shunt circuits. Any action due to lightning will be recorded on a moving strip of paper driven by clockwork so that the exact time of the electrical discharge can be told from the record. Three of the poles have been equipped with sharp needle points and three with brass balls.

A LARGE BALL BEARING

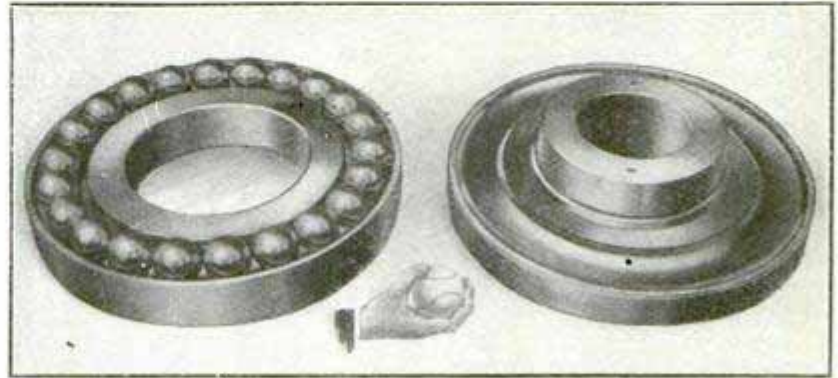
The construction of an enormous center ball bearing for a railway swing bridge at Yarmouth, England, may be seen in the accompanying illustration.

About 400 turns every month are made by this bridge, and after several years' service the V grooves of the original bearing were found to be so worn that the bearing had to be replaced. The original bearing consisted of two rings having V grooves in which there were 69 balls, 2 in. in diameter, said to have been the largest made at the time the bridge was installed.

In the new center ball bearing, the number of balls was reduced to 22 and their diameter increased to $3\frac{1}{2}$ in. The balls run in segmental grooves having a radius of $2\frac{1}{4}$ in. A cage for

separating the balls was omitted in order not to reduce the number of balls below the safety limit. It is held that the absence of the cage is not of great importance as the speed of the balls running in the grooves is extremely low.

The bearing sustains a weight of

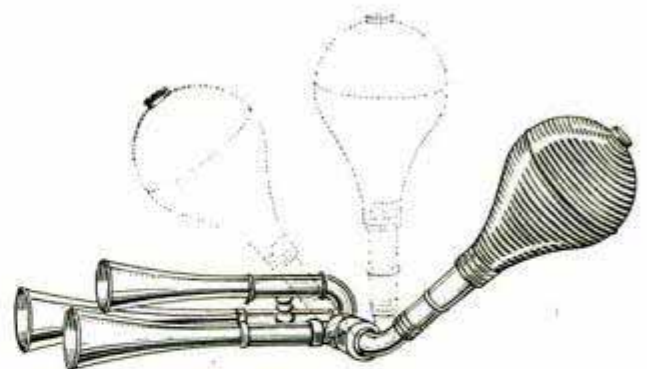


Ball Bearing That Sustains Nearly 1,000,000 Lb. Compare Steel Balls with Baseball Below

nearly 1,000,000 lb. and is one of the largest of its class in the world

PUSH OVER THE BULB AND CHANGE THE TONE

One of the latest things in motor horns is a novelty in which any of three tones may be obtained by pushing over the bulb, as shown in the accompanying diagram. The inventor's idea evi-



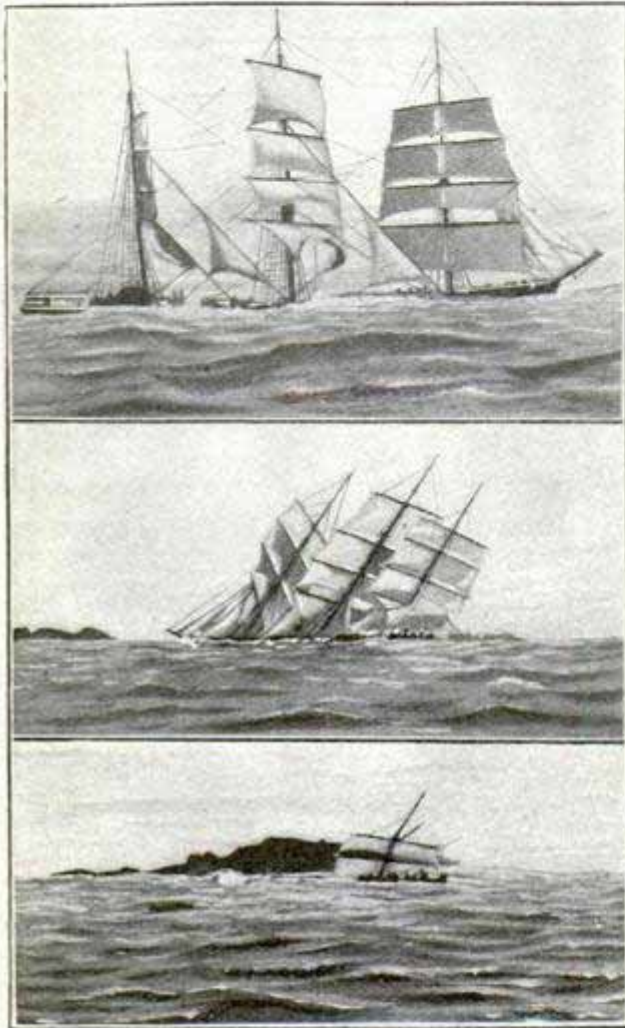
Dotted Lines Show Two Other Positions Producing Different Tone

dently was that a sudden change in tone might be the means of moving a daydreamer when a monotonous toot is ineffective.

CA mad buffalo that was terrorizing the community in Anoka county, Minnesota, was hunted down by marksmen in an automobile.

SHIP PHOTOGRAPHED WHILE SINKING

These illustrations are reproductions of the remarkable photographs taken of the three-masted sailing ship "Arden



The "Arden Craig" Sinking
Heeling Over for the Final Plunge
A Moment or Two after She Went Down

Craig" as she was foundering off the Scilly Isles, which are situated 25 miles southwest of Land's End, the extreme southwesterly point of England. The first photograph was taken just after the deck became awash, the second as she heeled over for the final plunge, and the third a moment or two after she went down. Several hundred people watched the sinking from the shore.

ⒸAn electric scarecrow, invented by an Austrian engineer, consists of a clock connected to an electric battery so as to ring a series of bells at frequent intervals to keep the birds unsettled and alarmed.

WIRELESS OPERATOR PICKS UP PHONE MESSAGES

A wireless-telegraph operator at Tatoosh, the extreme northeast point of the state of Washington, recently picked up a wireless-telephone conversation from San Francisco, more than 800 miles away, and audible signals were heard at intervals through the earpiece of the wireless-telegraph instrument for 2½ hours.

Considering the distance, and the ease with which the messages were determined, this is considered to be a remarkable feat in wireless communication, although it is a well-known fact that a similar phenomenon led Dr. Lee de Forest to develop his system of wireless telephony.

AEROPLANE NEWSBOY LATE WITH HIS PAPERS

An attempt was made at the Los Angeles aviation meet to test the value of the aeroplane to deliver newspapers to distant points, but little success was attained. Airman D. Masson left Los Angeles in the afternoon, driving a Curtiss biplane, with packets of newspapers to deliver at Pomona and San Bernardino. He missed Pomona and was lost in the hills north of the town. His fuel finally became exhausted and he alighted 12 miles west of San Bernardino, which town he finally reached 5 hr. and 40 min. after leaving Los Angeles.

SLEDBARROWS FOR COLD WEATHER

A Wisconsin inventor has designed a runner attachment which can be fitted to the axle of a wheelbarrow in place of the wheel, when the ground is covered with snow or ice. The runner is similar to the ordinary bobsled type, and has an A-shaped brace rising from it with a hole at the top through which the axle runs. The back of the barrow can be raised and lowered in exactly the same manner as when a wheel is used.

VACUUM CLEANER USED TO REMOVE WATER

A new use for the vacuum cleaner was found in New York recently when this simple device was utilized to save damage from water after a fire in a large office building. The greatest damage resulting from fires is usually from the water used to extinguish the flames. In many instances floors are soaked and the water accumulates in large quantities. In this case, the superintendent of the building set his force of janitors to work with vacuum cleaners immediately after the firemen had left the building, and within a comparatively short time practically every drop of the water had been removed from the floors, thus eliminating all possibility of damage from this source.

DEEPEST HOLE IN WORLD IS IN SILESIA

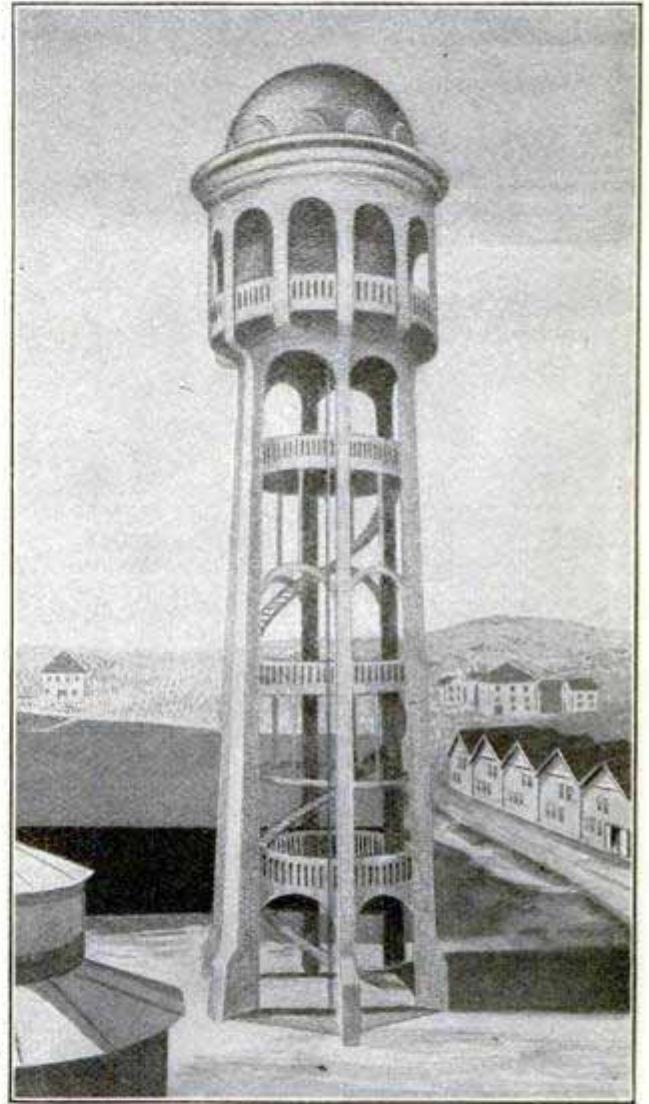
Scientific study of the temperature of the earth's crust is materially assisted by a well that has been sunk at the little village of Czuchow, in Silesia, Germany, to a depth of almost a mile and a half below the surface. This is believed to be the deepest hole in the world. The bore is $17\frac{1}{3}$ in. in diameter at the mouth and a little short of two inches at the bottom. The exact depth of the hole is said to be 7,348 ft. For a distance of 6,848 ft. it is lined with iron tubing. The experiments that have so far been made with the bore show that the temperature of the earth increases at the rate of 1 deg. Fahrenheit with each section of 58 ft., or 1 deg. Centigrade for each 104.3 ft.

CONCRETE OBSERVATION AND WATER TOWER

A novel combined water tank and observation tower, constructed of concrete, was recently erected at Singen, Germany. The tank has a capacity of

66,000 gal., and its bottom has an elevation of 98 ft. above ground.

In addition to the tank deck there are three intermediate decks, which, with the balustrade and stairs, form the wind bracing. The spiral stair-



Combined Observation and Water Tower of Concrete way is carried on the main columns by bracket reinforcement.

The tank itself, which is constructed of steel, has several interesting features. It is so mounted that the leaks which may develop can be stopped from the outside while the reservoir is filled. This requirement made necessary the use of a removable construction in protecting the tank from freezing. Reinforced concrete posts were erected at intervals around the tank to form supports for removable concrete panels, and the space between the panels and the tank was filled with heat-insulating material.

GRAVITY SPIRAL CARRIER

This spiral carrier is a unique device for handling merchandise by the force of gravity. The boxes and barrels slide along on ball-bearing rollers. A switch is provided which will divert the merchandise from the spiral to any floor desired.

CHANDELIERS OF CRUTCHES, CANES AND PIPES

Probably the oddest electric chandeliers in the country and perhaps in the whole world, are to be found in an institution in Los Angeles, California, which claims to have cured many sufferers by prayer.

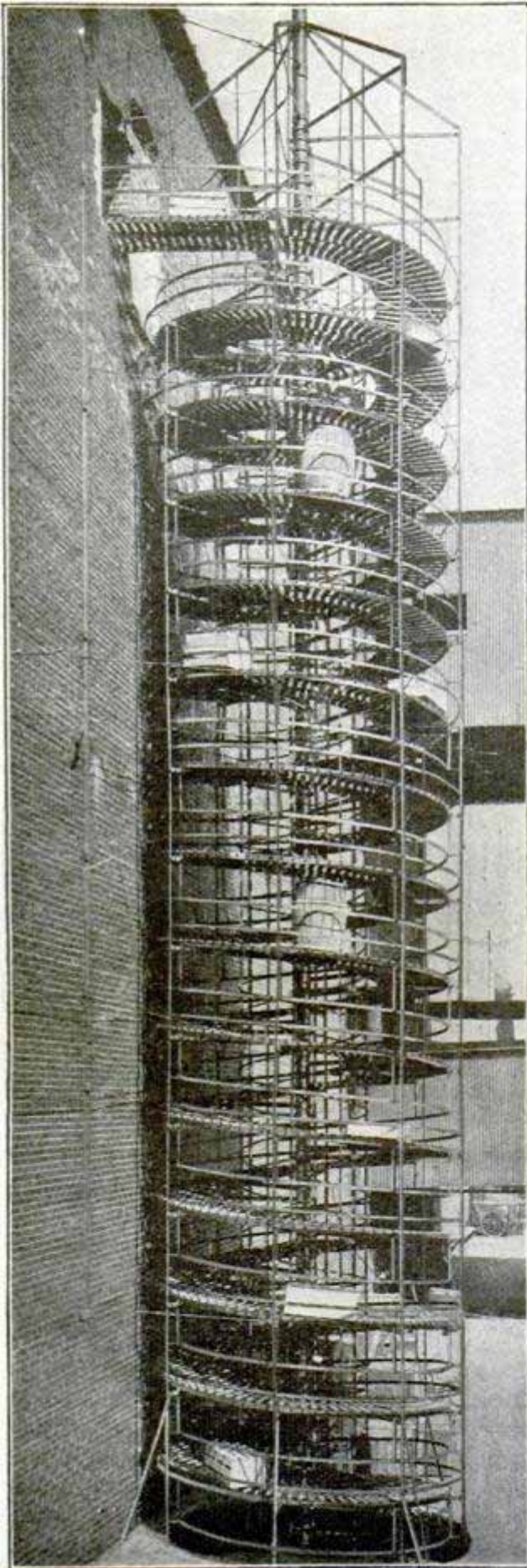
As proofs that the claims were justified, the evangelist in charge of this faith-healing institution has used the discarded crutches and walking sticks as wall decorations and chandeliers for the tabernacle. The lighting device is composed of a frame of crutches wired together in a symmetrical form, and electric bulbs are suspended from them and from the end of the canes.

The final artistic touch is given to these chandeliers by a collection of pipes hanging from the wires. It is part of the teaching of this sect to abandon the use of alcohol and tobacco and each pipe represents a converted devotee of the weed.

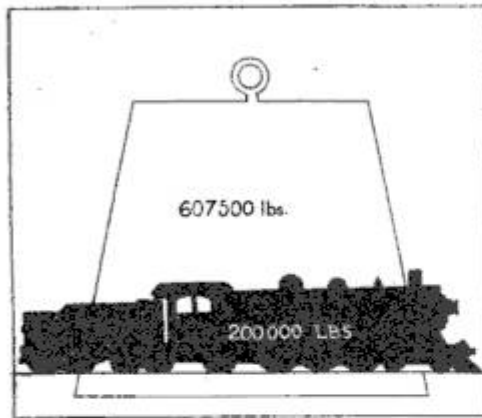
HIGHEST RAILROAD IN WORLD

The highest point reached by any railroad in the world is claimed to be on the Morococha branch of the Central Railway of Peru, a broad-gauge line operated by the Peruvian Corporation. It reaches a height of exactly 15,865 ft. above sea level, poised upon the backbone of the continent.

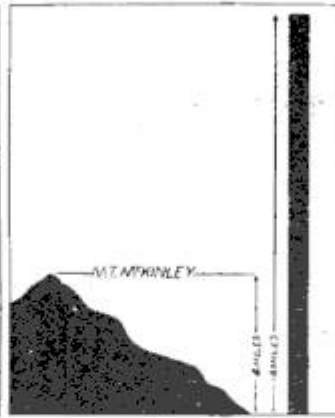
The highest railroad station in the world is at Ticlio, the western portal of the Galera tunnel, at a height of 15,665 ft. above sea level. This is the junction of the Morococha branch with the main line.



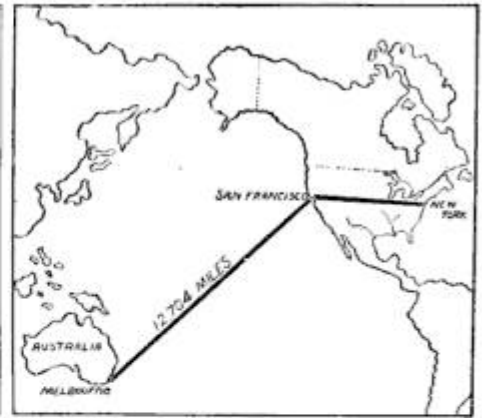
Utilizing Gravity to Lower Merchandise



The Total Weight of All Census Cards is More Than Three Times That of a Locomotive



If Stacked One Upon Another They Would Make a Pile 14 Miles High



If Placed End to End the Cards Would Encircle More Than Half the Earth

TWELVE THOUSAND MILES OF CENSUS CARDS

PICTURE in your mind a single row of cards more than 12,000 miles in length, if placed end to end after the fashion of a train of cars, and you will have a fairly accurate conception of the number of pieces of cardboard that are needed to compile the census of the United States.

This odd bit of information was brought to light at the census office in Washington recently when an estimate was made of the amount of shelving necessary to hold this great number of cards while the finishing touches are being added to Uncle Sam's decennial nose-counting bee. The cards used in this enormous undertaking are printed at the Government printing office on a specially prepared grade of manila paper, composed largely of hemp in order to insure toughness. The cards measure $3\frac{1}{4}$ by $6\frac{5}{8}$ in.

The first step in their preparation is to run them through an electrically-operated punching machine, having a keyboard resembling that of a typewriter. This machine punches them in accordance with the data found on the sheets used by the enumerators in their house-to-house canvas and at the same time registers the number of cards handled.

The manner in which these data are transferred from the enumerating sheets to the cards can be better understood from the accompanying illustration showing one of the census cards after the punching process.

After this punching process has been completed, the cards are run through a verifying machine that rejects any that have been punched improperly. The cards are then assorted into groups by another type of machine and then forwarded to the electrical tabulating machines which record the final counting.

According to the present plans of the census office, there will be two sets of cards to be counted. There will be a card for each one of the 93,402,151 persons who represent the total population of the country and to this number will be added something more than 28,000,000 cards on which family statistics will be recorded. In all, there will be about 121,500,000 cards to be handled.

The paper on which the cards are printed is $7\frac{1}{2}/1000$ of an inch in thickness. In other words if the cards are stacked one upon another after the fashion of a deck of playing cards there will be $133\frac{1}{3}$ to the inch. If the entire number could be stacked up in this fashion, they would make a single pile over 14 miles high. This would be equivalent to more than three times the height of Mt. McKinley in Alaska which is nearly four miles high.

If it were possible to place the cards end to end they would make a row 12,704 miles in length or in other words more than half way around the world. This would permit a row of cards from New York City to Melbourne,

Australia, via San Francisco, and there would still remain over 500 unused miles of cards.

As there are 200 cards to the pound, the total weight of the 121,500,000 cards is about 607,500 lb. An idea of such an enormous weight can be better understood when it is compared with the average railroad locomotive which weighs about 200,000 lb.

If the total number of cards were

AERO RUNS AWAY WITH THE GOVERNOR OF TEXAS

The first aeroplane runaway on record occurred at Dallas, Tex., Jan. 9, and Gov. O. B. Colquitt of Texas was a victim of the machine. The governor was seated in an aeroplane with Airman John J. Frisbie having his picture taken by a moving-picture machine. To make the picture more realistic the

1	2	3	4	Hd	0	50	N	Ala	Ill	Mo	Pa	US	LC	US	LC	NP	No	0	10	0	0	0	Emp
33				27				Ata	Gee	Ptg	L	21	19	17	12								
5	6	7	8	Wf	1	55	F	Ari	Ind	Nbr	R. I.	Un	OL	Un	OL	FP	Al	1	11	1	1	1	W
								Au	Ger	Rou	Arm												3
1	2	3	4	SD	5	60	S	Ark	Kan	N. C.	S. C.	Au	Hol	Au	Hol	IO	Pa	2	12	2	2	2	OA
								Bel	Ill	Rus	CFr												6
A	B	C	D	Ot	10	65	M	Cif	Ky	N. D.	S. D.	Can	Hun	Can	Hun	09	Un	3	13	3	3	3	Un
								Ega	Hun	S. A.	Cro												7
1	2	3	4	N	15	70	Wd	Col	La	Nev	Ten	Den	Ire	Den	Ire	08	En	4	14	4	4	4	Yw
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5	6	7	8	F	20	75	D	Ct	Mas	N. H.	Tex	Eng	It	Eng	It	07	LC	5	15	5	5	5	No
								Can	It	Ser	Lit												4
9	1	2	3	W	21	80	Un	D. C.	Mch	N. J.	Vt	Fr	Nor	Fr	Nor	06	Ot	6	16	6	6	6	0
								Chi	Jap	Sp	Mor												5
4	5	6	7	B	25	85	0	Del	Md	N. M.	Va	Gce	Rus	Gce	Rus	05	00a	7	17	7	7	7	1
								Cub	Lux	Swe	Pol												6
8	1	2	3	Mu	30	90	1	Fla	Me	N. Y.	Vt	Ger	Sc	Ger	Sc	01	Un	8	18	8	8	8	7
								Den	Mex	Ssd	Rut												13
4	5	6	7	Ch	35	95	2	Ga	Min	Ohl	Wis	Wyo	Swe	Szd	Swe	98	CA	9	19	9	9	9	14
								Eg	Mto	Tya	Slk	Yid											26
6	1	2	3	Jp	40	Un	3	Ia	Mis	Okl	Wah	et	W	Szd	01	CN	NG	Ot	Yes	X	X	27	
								Fin	Nid	TyE	Siv	OL											52
4	5	6	7	In	45	5	4	Ida	Mot	Ore	W. Va	NS	Ben	Dt	Wa	Ot	UA	UN	X	No	YY	NN	YN
								Fr	Nor	Wa	Syr												

ONE OF THE CENSUS-TABULATING CARDS AFTER THE PUNCHING PROCESS HAS BEEN COMPLETED

It tells the following story:—The figures 2,978, on the side, show that the details tabulated on the card are to be found on line 77 of Population Schedule Sheet 29-3, Wage earner—4, Had employment April 15, 1910—5, Unemployed 6 weeks during previous year—6 and 7, Works in stone yard—8, Can read and write—9 and 10, Is a stone cutter—11, Does not attend school—12, Is naturalized—13, Speaks the English language—14, Came to this country prior to 1890—15, Fought in Union Army during Civil War—16, Born of foreign parents—17, Mother spoke language of country—18, Mother born in England—19, Father spoke language of country—20, Father born in England—21, Speaks English language—22, Born in England—23, Is married—24, Foreign born—25 and 26, Sixty-three years old—27, Head of family—28, Male—29, White—30 to 36, Punch marks in first 4 columns of figures are known as "gang punch" marks. This portion of the card is divided into three sections known as "fields" which indicate state or city, ward or other municipal division, and enumeration district. This card shows that the person whose enumeration statistics it contains lives in the 29th enumerating district of the 4th ward of the city of New York

spread on the ground, they would form a sheet of paper large enough to make a cover for a 417-acre field. This area is equivalent to more than one hundred times that occupied by the United States Capitol, or about one half of that occupied by Central Park in New York City. The cards cost the government about 55 cents per thousand. At this rate, the entire number cost \$66,825.

engine was started at top speed. The machine started down the field with E. H. Green, a son of Mrs. Hetty Green, and Airman Joe Seymour hanging to it. They were soon shaken off as the engine gathered speed. Governor Colquitt managed to shut off the power before he had been carried more than a foot or two from the ground, however, and he came down again with a slight jolt.

¶The prosecuting attorney of a Michigan county has announced that he regards the service of papers by telephone as strictly legal and will adopt this form of service.

¶Dr. Sambon, in the course of a tour of investigation in Italy, has found that the date of the outbreak of pellagra was coincident with the appearance of the full-fledged sand fly.

2978

11-288

COLD LAMP PREVENTS HEAT IN PICTURE MACHINE

By means of an electric lamp, which is intermittently lighted and extinguished, a French inventor claims to have eliminated all danger of fire and explosions in moving-picture outfits.

In his apparatus he places condensing lenses in front and back of the film. Behind the rear lens is the "cold-lamp" box, containing a small incandescent lamp with metallic filament. The current is periodically interrupted, so that the lamp is intermittently lighted and extinguished, but so rapidly that, while the filament is given time to cool off during each period of darkness, the impression on the human eye is one of continuous incandescence.

CHURCH WHICH CROSSED NEW YORK HARBOR

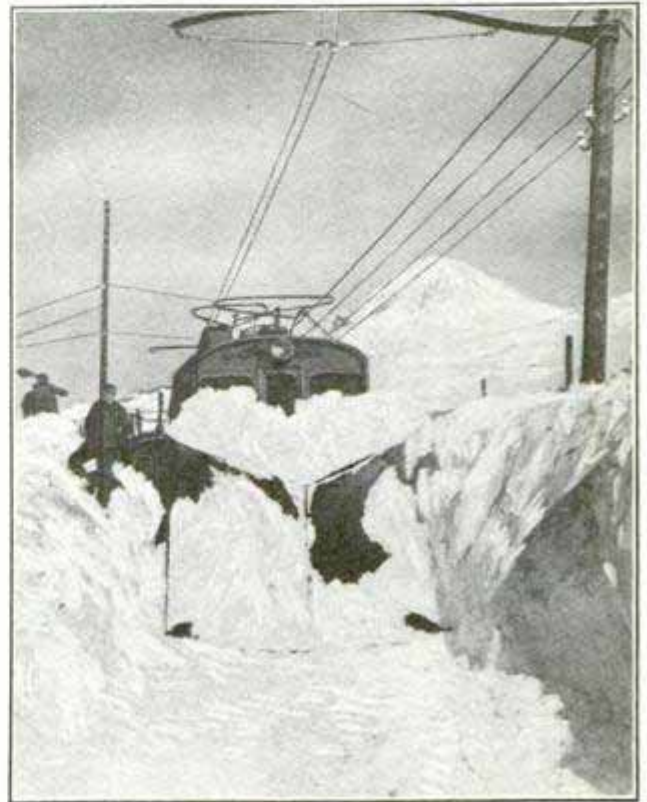
The only church on record that has literally crossed New York harbor, recently completed the voyage and now occupies permanent moorings at the dock of the Sailors' Snug Harbor on Staten Island. Since the days of the Civil War, the church, which was built on a barge, was moored in the East River. The room it occupied was needed for docks, however, and after much discussion the moorings that held the structure to the shore, were cast off and it was towed to Staten Island where it was again made fast, and where it will be used by the sailors. It was known as The Seamen's Church.



The Seamen's Church Which was Towed to Staten Island

FIGHTING THE SNOW IN SWITZERLAND

The Swiss railways encounter the same difficulties in keeping the tracks



Clearing the Way in Switzerland

clear of snow as do the railroads in Canada and many parts of this country following heavy falls of snow. The illustration shows a plow at work on one of the electric railroads of Switzerland.

PAINLESS REMOVAL OF ADHESIVE PLASTER

Dr. E. J. Beardsley, of the Jefferson Medical College Hospital, Philadelphia, has discovered, quite by accident, that oil of wintergreen applied to adhesive plaster will completely destroy its adhesive power in a short time. It is necessary to use only a small amount of the oil, which is applied directly to the plaster and easily spreads itself throughout the adhesive material.

The removal of adhesive plaster from the skin is not infrequently accompanied by considerable pain, especially if the plaster has been placed over hairy surfaces. The oil of wintergreen is said to act under all conditions.

FIREPLACE AND FLOWER BOX COMBINED

One of the pretty ideas of California home builders is the use of growing flowers as an architectural feature. The photograph reproduced herewith shows



Beautifying a Fireplace Chimney

a detail of cobblestones and cement which combines the rustic fireplace with the flower box; a shallow trench under the window being filled with earth and supporting an ivy geranium. Two smaller niches, nearer the ground, contain growing plants, which give a touch of color to the grey stones. The chimney is of burned and broken bricks.

FUMES OF MOTORBOAT ENGINE KILL

That the fumes from the gasoline engines of motorboats may cause carbon monoxide poisoning and death is shown by a case which occurred in New Zealand recently. Five men went out fishing on a motorboat propelled by a 6-hp. engine. One of them, strong, and in good health, crawled forward

past the engine and lay down in the cabin. Soon afterward he was heard to groan, but, as the groans did not continue his companions thought him asleep. When the boat reached shore, two or three hours later, he could not be awakened and a physician was called. Although the face was of natural color and the body warm, there was no sign of heart action or respiration, and all efforts of resuscitation proved unavailing.

At the post-mortem examination the next day, a specimen of the blood, which was of the color of vermilion, was found to contain carbon monoxide to the extent of 50 per cent saturation. As there was no fire on board the boat, the only possible source of poisoning was the engine.

Inquiry proves, according to the Journal of the American Medical Association, that men attending gasoline engines in cabins often have toxic symptoms—headache and dizziness. As a precaution against such possible fatalities, physicians suggest that the supply of gasoline and air be adjusted as accurately as possible to secure complete combustion, and that as much ventilation as possible be insured.

HATPINLESS HATS

Hatpins are not required for several of the new types of toques. Instead, the drapery trimming of the toques is wound rather tightly around the head and lower part of the toque body in a manner which reminds one of the



The Drapery of This Toque is Wound Around the Head and Fastened with Hooks and Eyes

cloths women wind around their heads as a dust protector when cleaning house. The free end of the drapery is fastened by means of hooks and eyes after being wound.

A SPACE SAVER FOR THE BEDROOM

The clothes drawer or hat box shown herewith has a capacity equal to that of a large bureau drawer and takes up room that is not ordinarily used for any other purpose. It slides in and out from either side of the bed. The top edge of each side of the drawer is grooved to fit the long edges of a

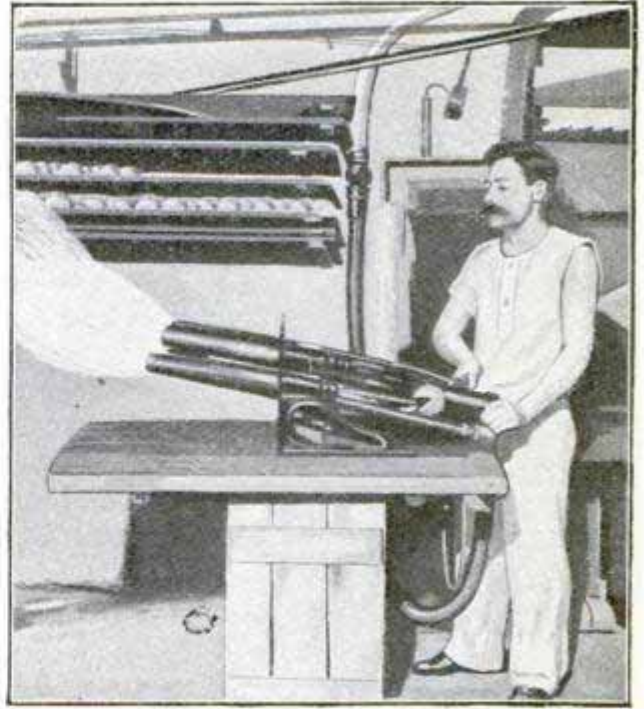


Economizing Space Under Bed

board secured under the side rails. This board acts as a cover when the drawer is pushed in under the bed. The drawer is made of fiber, wood or sheet metal, the first being the preferred material.

GAS TORCHES HEAT BAKING OVENS

Several types of gas torches are being used in France to heat baking ovens. Some of the torches have six or seven Bunsen burners arranged in the form of diverging rays, while others have only one burner, which, however, is of unusual size. The one

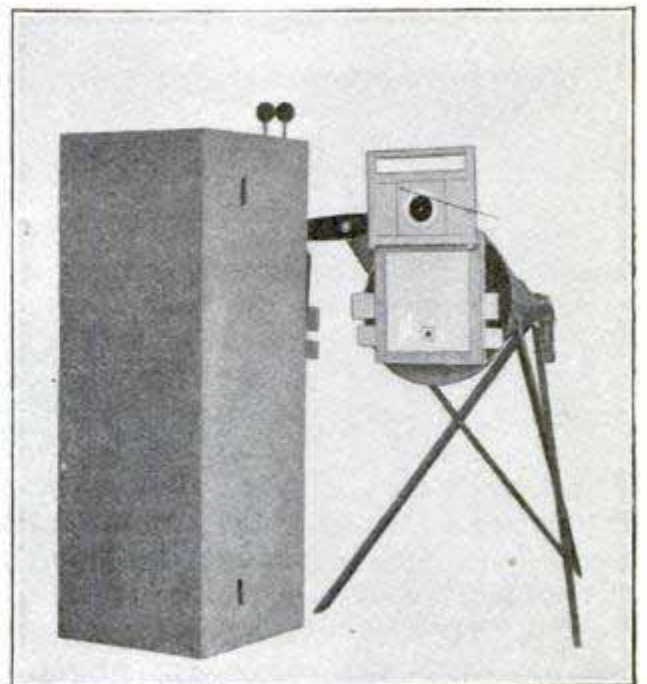


Baking with Gas Flare

shown in the illustration is of the seven-burner type.

CATCHING BULLETS WITH A MEGAPHONE

Catching bullets in a megaphone is not literally the basis of the new indoor target practice device invented by a Michigan rifle expert, but that is what the machine he has turned out and used successfully appears to



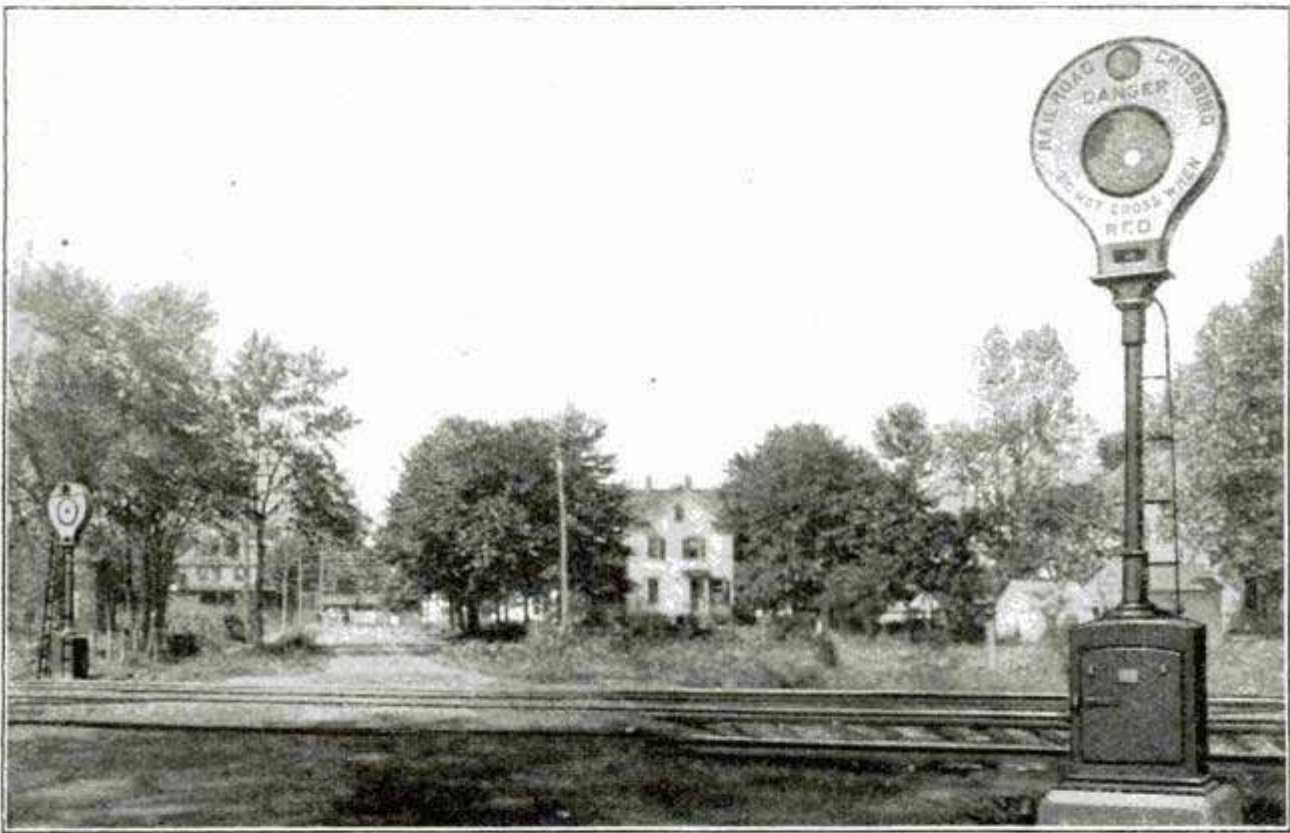
Indoor Target Practice and Bullet-Catching Device.
Invented by a Michigan Militiaman

do. The machine combines a target and bullet stop which enables the person practicing with it to use the bullets over again, prevents the lead from being scattered all over the floor, and gives a target which is easily "spotted" or marked. The entire device consists of an iron or steel funnel-shaped tunnel, which has all the appearance of a megaphone, 4 ft. long and 2 ft. in diameter at its largest end which is mounted on an adjustable steel tripod beside a booth or upended packing case protected by a steel bottom. The steel-covered portion of the booth and the

fresh target into the view of the marksman while he "spots" the target at which the last shot was fired, and indicates the course of the bullet with a needle-like pointer, which is affixed to the larger bullseye.

SAFEGUARDING GRADE CROSSINGS

A novelty in the practice of protecting grade crossings has been introduced at some of the more dangerous of these intersections of railroads with public highways on the lines of the



Device for Protecting Railroad Crossings

Courtesy the Automobile

wide end of the funnel are turned toward the marksman, the funnel being slightly behind and to one side of the booth. In front of the funnel and bracketed to one side of its mouth is placed a frame containing the targets. The marksman fires, the bullet passing through the targets, which are made of paper, and, striking inside the funnel, the slanting sides of which deflect it to the elbow in the far end, it falls into a receptacle placed to catch it. The shot fired, the spotter in the booth swings the pivoted frame, bringing a

Lehigh Valley Railroad. This consists of a warning device very similar in appearance to the banjo signal which is so largely used on American railroads.

It is about 20 ft. in height and bears a conspicuous caption: "Railroad Crossing. Danger. Do not cross when Red." Audible warning is also given by means of an electrically operated gong. At night time a red light is displayed in place of the red-colored disk, the bell also being used as in day time.

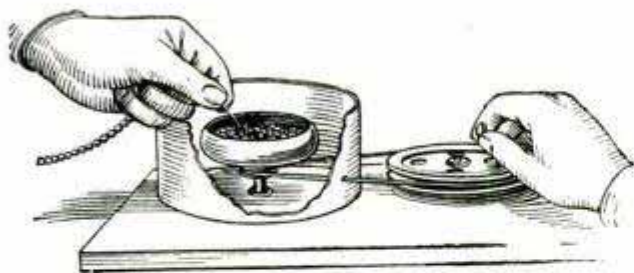
TRAPPING DUCKS WITH SEARCHLIGHTS

Searchlights and wire-screen cages are being used in France to trap ducks at night. The cage, several feet long and about 1½ ft. high, with one side constructed as an easy-swinging trap-door, is placed at the edge of a swamp or lake, with the door side fronting the water. An acetylene searchlight, mounted on a tripod back of the cage, is turned on when a flock of ducks is heard approaching and the beam of light directed toward them. Fascinated by the light, they fly to the luminous point, and all the trapper has to do is to gradually swing the searchlight until the beam projects through the cage, the ducks flying into it.

It is claimed that as many as 80 ducks have been caught in this manner at one time.

BEAD-STRINGING MACHINE

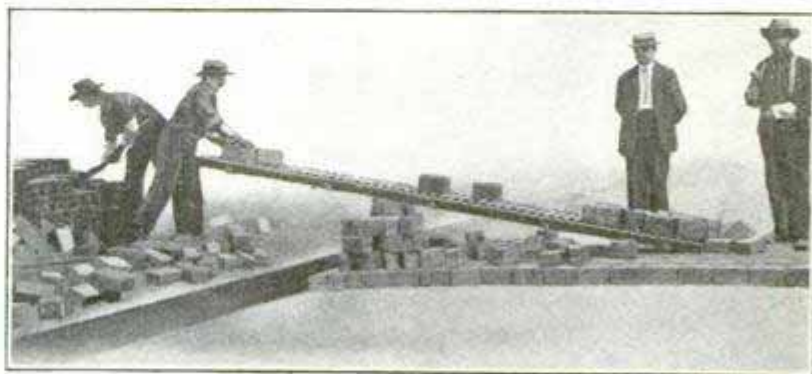
A simple machine which depends more upon chance than anything else in the efficiency of its operation has been invented in France for stringing



French Bead-Threading Machine

beads. The beads are placed in a cup-like receptacle, which is revolved rapidly by means of a wheel, and a bent wire, slender enough to pass through the perforations in the beads, is held in the cup with its point in the opposite direction to the revolution of the cup. There is no law which compels the beads to arrange themselves so as to

become strung on the bent wire when the cup is revolved, but the probability that many of them will is borne out by tests. They crowd rapidly up the wire, from which, with finger and thumb, they may be pushed onto the string to which the bent wire is attached.



Gravity Conveyor in Operation

GRAVITY CONVEYOR FOR PAVING BRICKS

This gravity conveyor is being used on street paving work in Cleveland, Ohio. The frame is made of steel in 4 and 8-ft. lengths, coupled together. The bricks travel by their own weight any distance desired on a 4-per-cent grade, running over steel rollers. It is claimed that the conveyor saves the labor of eight men in supplying bricks to the pavers.

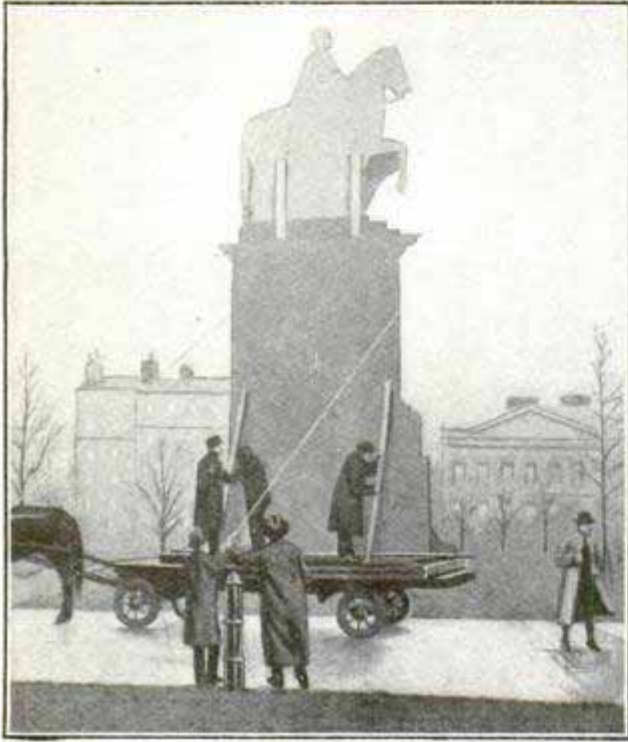
HANDLING ORE WITH ELECTROMAGNETS

Electromagnets are used at the Moose Mountain mines in Ontario, Canada, for loading the magnetite iron ore into cars for the crushers. The ore-bearing material is in the side of a hill, and the mining is of the open type, the masses of rock and ore, loosened and broken up by blasting, rolling down to the bottom of the incline. Here the electromagnets pick it up and load it into the mine cars, at the same time effecting a crude form of separation, as the rock and other non-magnetic material is left behind.

The magnetic quality of this unrefined ore is so great that nearly 1,000 lb. is picked up at a time.

HOW KING GEORGE SELECTED SITE FOR STATUE

A remarkably ingenious method was adopted to enable King George to determine a favorable location in the



Dummy Statue of King Edward on Wheels

Green Park, London, for the proposed memorial statue of King Edward. A flat wooden dummy representing an equestrian statue on a pedestal was placed on a wagon and drawn from point to point. The King watched from a window of Buckingham Palace.

THE SILKWORM'S TASK

If all the natural silk in the world (estimated at 110,000,000 lb.) were extended in one single thread, such as is woven by the looms, it would make a line that would go over $1\frac{1}{4}$ million times round the earth at the equator, or 344 times the distance between the earth and the sun. The speed of light is 186,000 miles a second. But even at this enormous velocity, a ray of light would take about two days to travel a distance equal to the length of this thread. The work of the silkworm will be dimly appreciated when it is taken into account that about six filaments

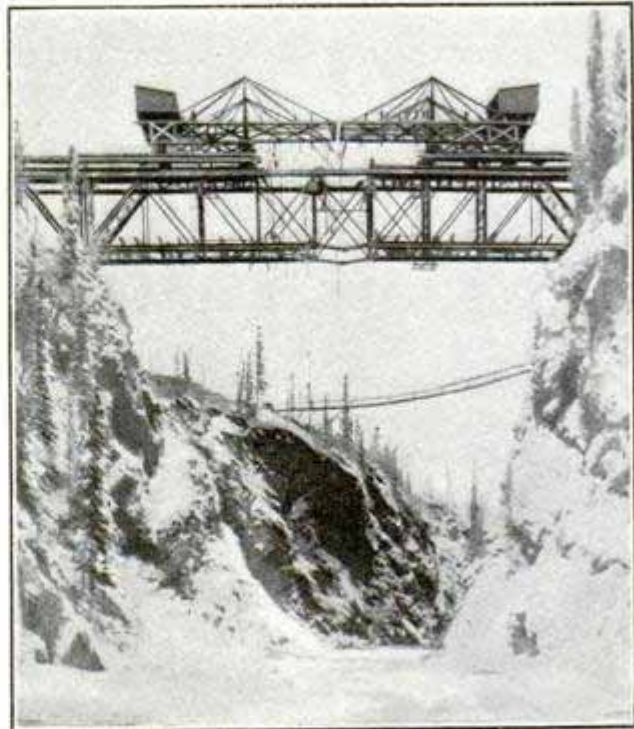
as spun by the worm in its cocoon go to form a single silken thread such as is spun into fabric by the loom.

BRIDGE BUILT IN ARCTIC NIGHT

Building a great bridge in the coldest regions inhabited by man, and during the long arctic night, is truly a remarkable performance. Yet this incredible feat was recently accomplished in Alaska when a cantilever bridge was built across the Kuskulana River.

The arctic night was turned into day by the lavish use of electric light, and the pneumatic riveters were enabled to work in spite of the extreme cold by forcing steam along with the compressed air.

The Kuskulana bridge forms the last important link in the Copper River & Northwestern Railroad from Cordova to the Bonanza copper mines at Kennecott, 200 miles distant. The bridge is 225 ft. above high water in the canyon below. It is 800 ft. long, including two 150-ft. cantilever spans, one 225-ft. central span, all of steel, and approaches of standard trestle construction. Solid concrete piers are used for anchorages.



Railroad Bridge Built in Arctic Under Extreme Difficulties



SCIENCE AND MECHANICS IN THE MIDDLE AGES

No. 2.—THE CLOCK MAKERS. Mechanics made great strides during the latter part of the fifteenth and the beginning of the sixteenth centuries, especially in the manufacture of clocks. The application of the hair-spring and the invention of the pocket time-piece are attributed to this period, but the use of the pendulum and the accurate measurement of time did not come until later.

No. 3.—THE OPTICIANS. At the left is the optician with his sign hanging over the street and his customers making selections. The shoemaker, the housewife, the scribe and the reader in and in front of the booths on the other side of the narrow street are wearing spectacles. Lenses, were not applied as an aid to defective eyesight until after the time of Roger Bacon, 1294.

WHO CONTROLS PROPERTY RIGHTS IN THE AIR?

Who owns the air?

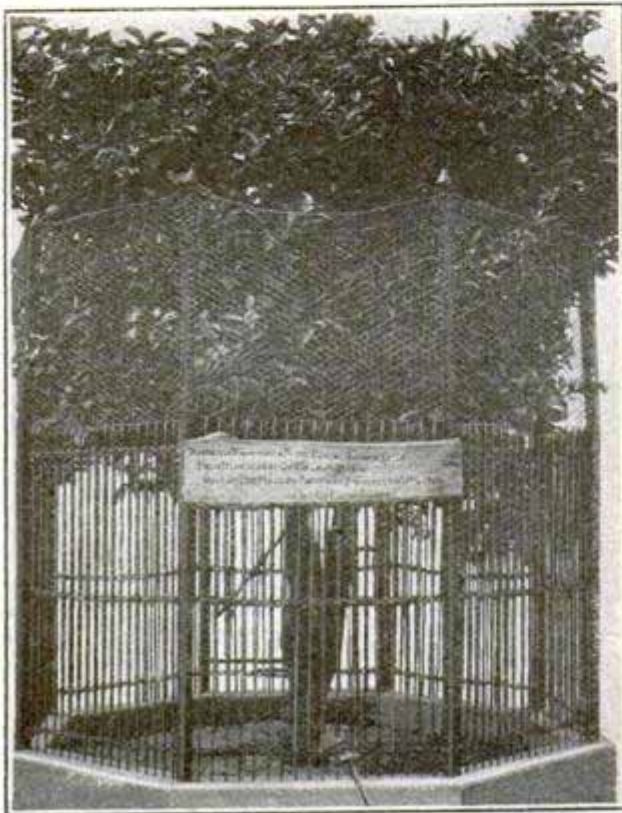
This interesting question has been raised between aviation experts and property owners in France and promises to lead to a long discussion of proprietary rights. Four owners of large estates have instituted proceedings against Henry and Maurice Farman, whose aviation school is near their estates, to recover damages. Their claims have in them something of the ancient dictum that the air above and earth below belong to the owner of the land. The constant flights over their property, the complainants set forth, constitute a nuisance to the property holders personally and cause actual damage by frightening and disturbing the domestic animals and by driving away all the game that formerly was found on the place. They ask damages in the sum of \$1,000 each and an order prohibiting flight over their property at any altitude below 650 ft. with a penalty of \$100 for each violation of such ruling.

The bill of complaint is attacked by airmen on the ground that the property owners show weakness through the prescription of a minimum altitude for flight. The experts claim that game and animals are as liable to be frightened by an aeroplane flying at a height of 650 ft. as lower. They also have asked whether or not it would be prudent to risk the lives of aspiring bird men by compelling them to fly at such an altitude when they have not yet familiarized themselves with the working of an aeroplane. The case has attracted considerable attention throughout France and the newspapers have devoted much space to comment it has provoked.

☞ An English engineer estimates that every fifteenth inhabitant of the British Isles uses a bicycle or motorcycle for business or pleasure. The British postal service alone utilizes 11,400 bicycles.

PARENT OF ALL THE NAVEL ORANGE TREES

The tree from which the navel orange groves of California originated is still growing and bearing fruit in the



Original Navel Orange Tree in California

courtyard of a Riverside hotel. It was imported from Bahia, Brazil, in 1870, by the Department of Agriculture, as the Bahia oranges were known to be finer than any then grown in this country. In 1874 the tree was sent to L. C. Tibbetts of Riverside, where it aroused much interest among orange growers, and the variety of fruit which it produced was given the name of the Riverside or Washington navel. It has been stated that every navel orange tree in California has been produced from this tree, directly or indirectly, and on the occasion of President Roosevelt's visit in 1903, it was transplanted to its present position, the president himself wielding the spade. In order to protect it from the undue enthusiasm of souvenir hunters, the tree is carefully enclosed in iron bars set in concrete. A tablet engraved on a slab of orange wood tells its story in a few words.

MEASURING VERTICAL SEISMIC MOVEMENT

The new seismograph invented by B. Galletzin, of St. Petersburg, is especially constructed for measuring the vertical component of seismic disturbances, which are said to be more important than the horizontal, although not studied in most observatories because of lack of suitable instruments.

The Galletzin apparatus consists of a girder beam, pivoted at one end on a horizontal axis, and supporting a 52-lb. cylinder. The other end carries a coil and a disk of copper, which move within the field of a powerful electromagnet. The girder is maintained in the horizontal position by a vertical spiral spring. The instrument records, not the absolute displacement of the seismograph under the movement of the ground, but the velocity with which this movement takes place, the coil being connected with a galvanometer in order to record the oscillations which are damped by the currents induced in the copper disk. The absolute movement of the ground is derived from a formula.

This type of seismograph is absolutely independent of temperature variations.

FRANCE MAY REQUISITION AEROPLANES

Certain kinds of private property in France, by authority of a law passed in 1877, may be requisitioned for military purposes in time of war. Automobiles of certain classes have been included for some time, and it is now proposed to amend the law to embrace aeroplanes. These machines would, of course, have to be classified, and such types as might be unserviceable made exempt.

ⒸThe announcement is made from Panama that the new formula known to the medical world as "606" has been used successfully in combating malaria.

"GIANTISM" CAUSED BY A TINY GLAND

Huge in stature, with great abnormal limbs that rivaled in length the creatures of mythical story, a giant, John Turner, recently died in Washington, D. C. A special coffin had to be made for his burial, and a moving van used in the place of an ordinary hearse. At the time of his death, Turner weighed 343 pounds; was 7 ft. 7 in. tall, with hands 16 in. long; spread of outstretched arms was 8 ft. 11 in., and his vertical reach 10 ft. 4 in. The illness which eventually ended Turner's life was one of a series of attacks of the so-called disease of "giantism" which marked his life from infancy.

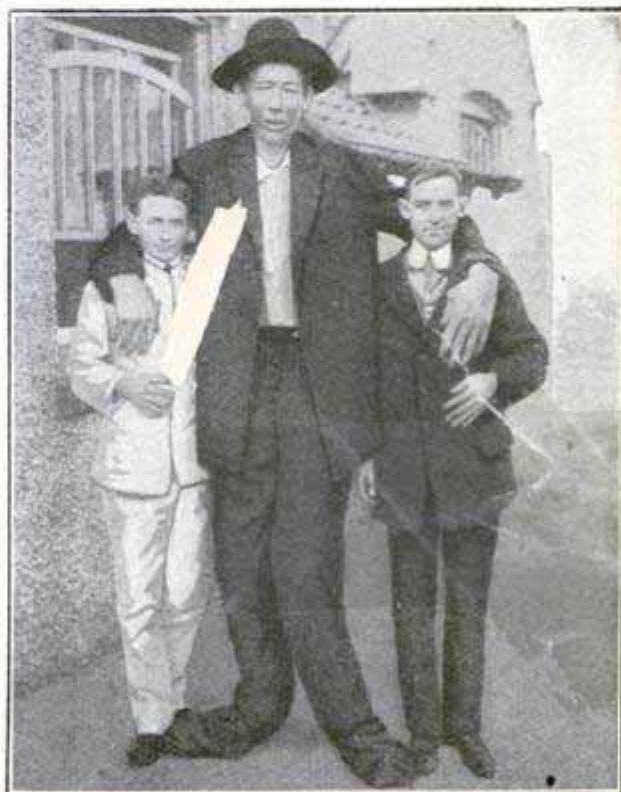
Turner was a teamster. His brain was as small as his body was abnormal, and no one subject could interest him for more than a few minutes at a time. The members of his family were of ordinary size. His rapid growth began when he was about 12 years old. After that, his body, figuratively speaking, "ran away" with itself. Huge as was the rest of his stature, his hands were abnormal, even for his giant frame. He could neither read nor write.

And the cause of all this great abnormal growth of man? Its discovery is one of the romances of surgery. Lying at the center of the base of the brain is a curious little gland about the size of a buckshot; perhaps in size and color it more nearly approaches the common garden currant than any other object. It is known as the "pituitary gland."

Medical authorities conclude that this little pituitary gland exercises a governing influence on the growth of the human body, and when it has reached a normal size it shuts off any further growth, just as the governor on a steam engine shuts off the steam from the engine when the requisite amount of power has been furnished. When this gland becomes diseased, its restraining functions cease and the victim continues to grow at the expense of both mental and physical strength. For there seems to be allowed by nature only a certain amount of vitality

to each individual, and when this is distributed over a vast amount of physical area the whole organism weakens and there is a woeful lack of energy, mentally and physically.

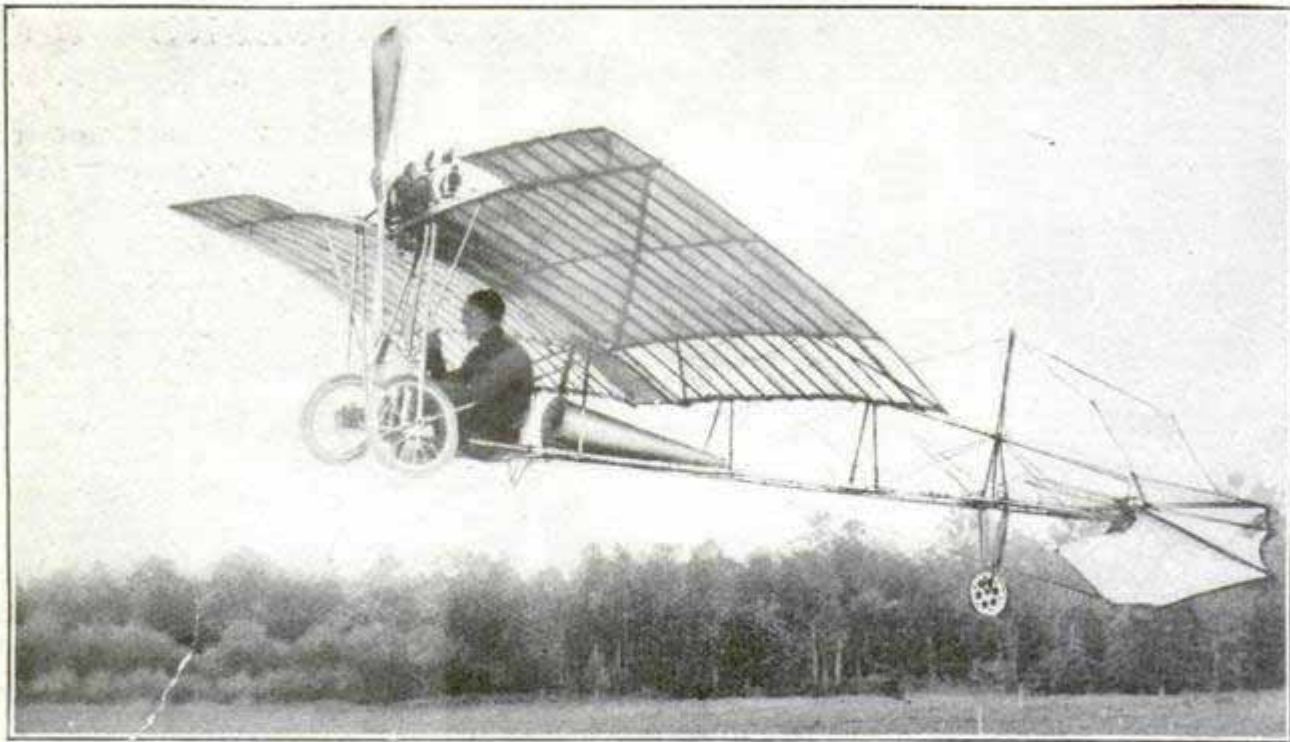
These great human creatures, say the



Giant Who Died Recently at Washington

medical authorities, are always dull in mind. The gregarious instinct in the human, evidenced most strongly in the desire to have companionship of the opposite sex, appears to be wholly lacking. They want merely to get enough to eat, to lie idle and be left alone. In the case of Turner, he did not live, he merely existed. He showed no signs of obtaining an education. His chief form of amusement was to sit and doze, under a broiling sun during the summer months, and in the winter before an open fire. He had but a normal appetite, and alcoholic liquors interested him but little.

CA badly designed muffler or silencer for an explosion engine may waste from 15 to 30 per cent of the power of the engine.



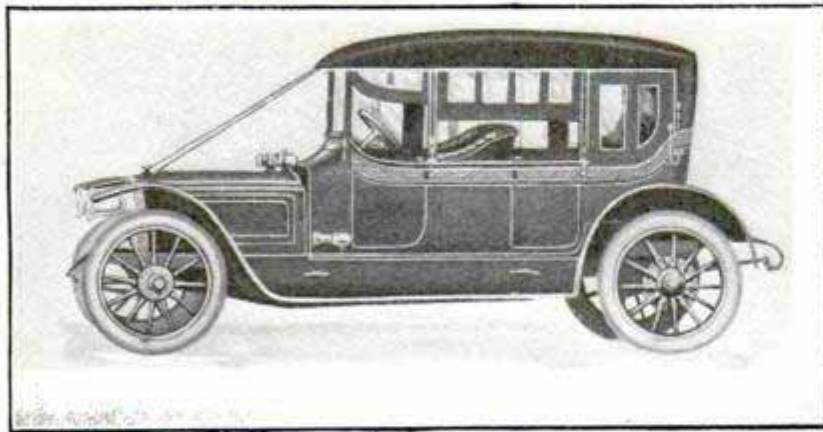
"Demoiselle" Aeroplane Built in Corinth, Miss.

AEROPLANE BUILT FROM MAGAZINE DESCRIPTION

There is hardly a section of the United States where inventors are not at work building and testing aeroplanes of their own pattern or along the lines of the well known machines. The publication of the plans for the "Demoiselle" in Popular Mechanics Magazine last summer stimulated the ambition of many enterprising young men who aspire to be airmen. Two of these live in Corinth, Miss. They have made a machine from the description

given in the magazine. They followed the directions exactly and as a result obtained a finished product which equipped with a 30-hp. engine, weighs 250 lb., 10 lb. lighter than the Santos-Dumont model that was described. This machine was shown at the St. Louis Aero Exhibition and attracted great attention. A photograph of the Corinth machine which the builders sent to the magazine attests their success.

ROLLER SIDE-CURTAIN FOR AUTOMOBILES



New Side-Curtain Which is Operated Like Window Blind

An automobile side-curtain that can be operated like an ordinary window blind, and which is proof against rain, dust and drafts, will shortly be placed on the market by a French manufacturer.

The curtain consists of a waterproof fabric, le into which are mica pane and the design is such tha the curtain will fold up with the rest of the hood wh-

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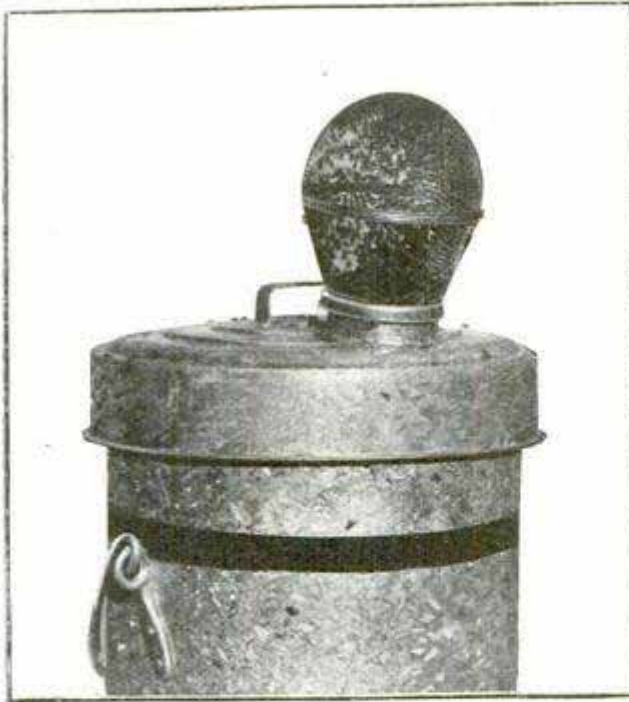
out difficulty. When the hood is spread for use on the machine, the curtain may be drawn up or down like an ordinary window blind.

CONVERTS THE GARBAGE CAN INTO A FLY TRAP

Every garbage can and swill barrel can be converted into a fly trap, if the device invented by Dr. Clifton F. Hodge, of Clark University biological department, be adopted.

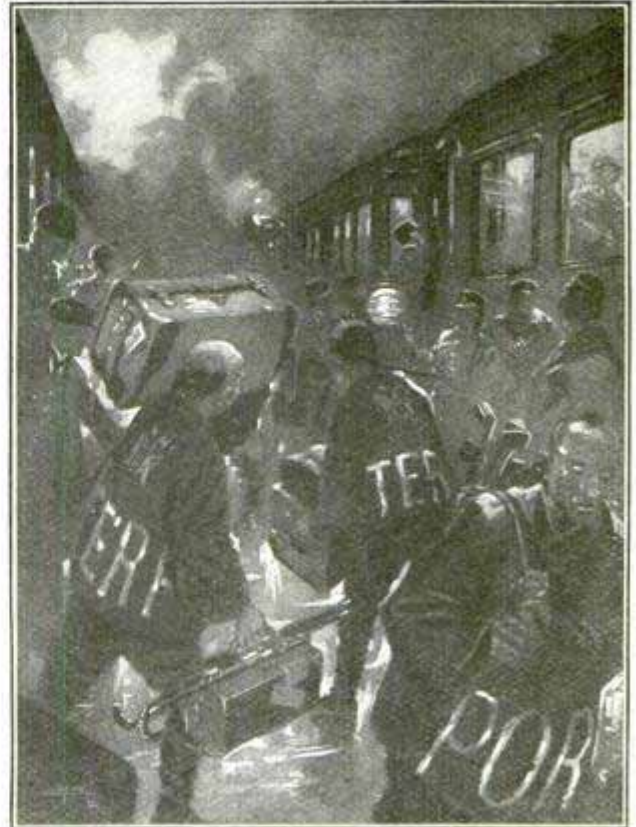
The can or barrel is fitted with a loose cover which permits the flies to enter. At the top of the cover is an opening leading to a wire-screen fly trap, and it is a peculiar fact that most of the flies entering the can in search of food will choose to make their exit at the top of the can and thus go to their death in the trap.

This method of killing flies before they get into the house is most effective and was devised after three years' experimentation. It is not patented and therefore may be used by everybody. Should it be generally adopted,



Simple Fly Trap on Garbage Can

it is probable that the annual fly scourge will be greatly diminished, and the health of the community correspondingly improved.



Courtesy Illus. London News
Carnival-Like Scene at the Russo-Japanese Boundary in Manchuria

THE CURIOUS UNIFORM OF CHINESE PORTERS

Instead of wearing caps with the word "porter" across the front, as is the custom in this and many of the European countries, the Chinese porters at Kwan-Chanee, a Manchurian town on the Russo-Japanese boundary, have the word marked in English letters a foot high running around their blouses. Their business is also marked in Japanese on front and back.

The scene on the arrival of the trans-Siberian express is described by an English writer as not unlike a carnival night, although all the participants wear their everyday working clothes. Mixed in with the weird costumes of the Chinese porters are paper lanterns on sticks, carried by little Japanese policemen, while the Russian train, illuminated with candles, stands on one track, and an up-to-date American Pullman is waiting on another to take passengers to Mukden or Port Arthur.

Wireless communication as a distinct branch of engineering is now being taught at the University of Michigan.

BABY DROPPED IN PILLOWS

Tied up in a bundle of pillows and bedding, a year-old baby was recently



How a Baby Was Packed in Pillows and Dropped to the Ground to Escape a Fire

dropped from the second story of a burning house in Chicago. Almost stifled by smoke before awakened, the mother hastily fastened the pillows around the child, leaned as far out the window as possible, and dropped the bundle a distance of about 20 ft. to the sidewalk. Then she climbed out on the roof of a porch and a few moments later was helped to the ground, where she found the baby none the worse for the experience.

BIG GAS AREA IN NEW BRUNSWICK

A big gas and oil area, the extent of which has not yet been determined, has been discovered near Moncton, New Brunswick, and 15 gas wells have already been sunk. The last well reached gas at a depth of 1,430 ft., and its flow, estimated by the force of escape, is about 6,000,000 cu. ft. per day. The well holding the record for gas flow has a discharge estimated at 12,000,000 cu. ft. per day. The record pressure for any of the wells is 640 lb. per square inch. The oil is in the strata underlying the gas.

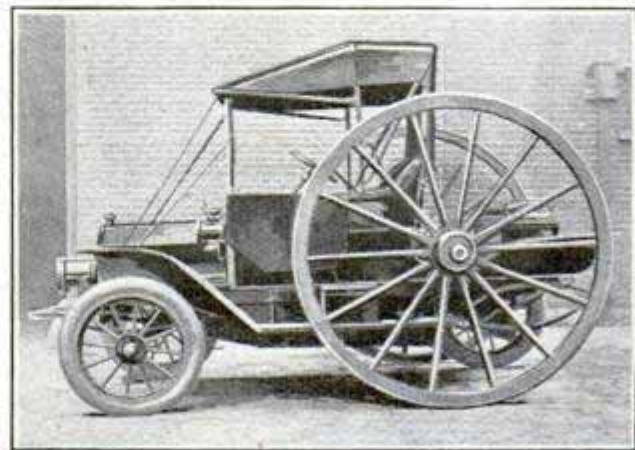
PHOTOGRAPHING THE VOICE

A French scientist has invented an apparatus by which the vibrations of the voice may be reproduced on sensitive films as are tangible objects in ordinary photography. The sounds strike a small disk of india rubber, the vibrations of which are reproduced in a small mirror. A ray of light, thrown on the mirror, reflects the vibrations at various angles on a sensitive film which is unwound by clockwork. According to the inventor, the reflections making the picture will indicate if a singer's voice is true, if his tempo is correct, and if his method of breathing is right. A true note is shown in the picture by a series of

parallel equal bands.

STRANGE SUBSTITUTE FOR AUTO WHEELS

This is not a 1911 model, but on account of a broken axle the high wheels were used in moving the automobile to a St. Louis repair shop. The wheels were 6 ft. in diameter and had for an axle a piece of 2¼-in. steel shaft from which the weight of the rear end of the automobile was suspended by means of ropes. The wheels are ordinarily used for moving and unwinding heavy reels of underground cable.

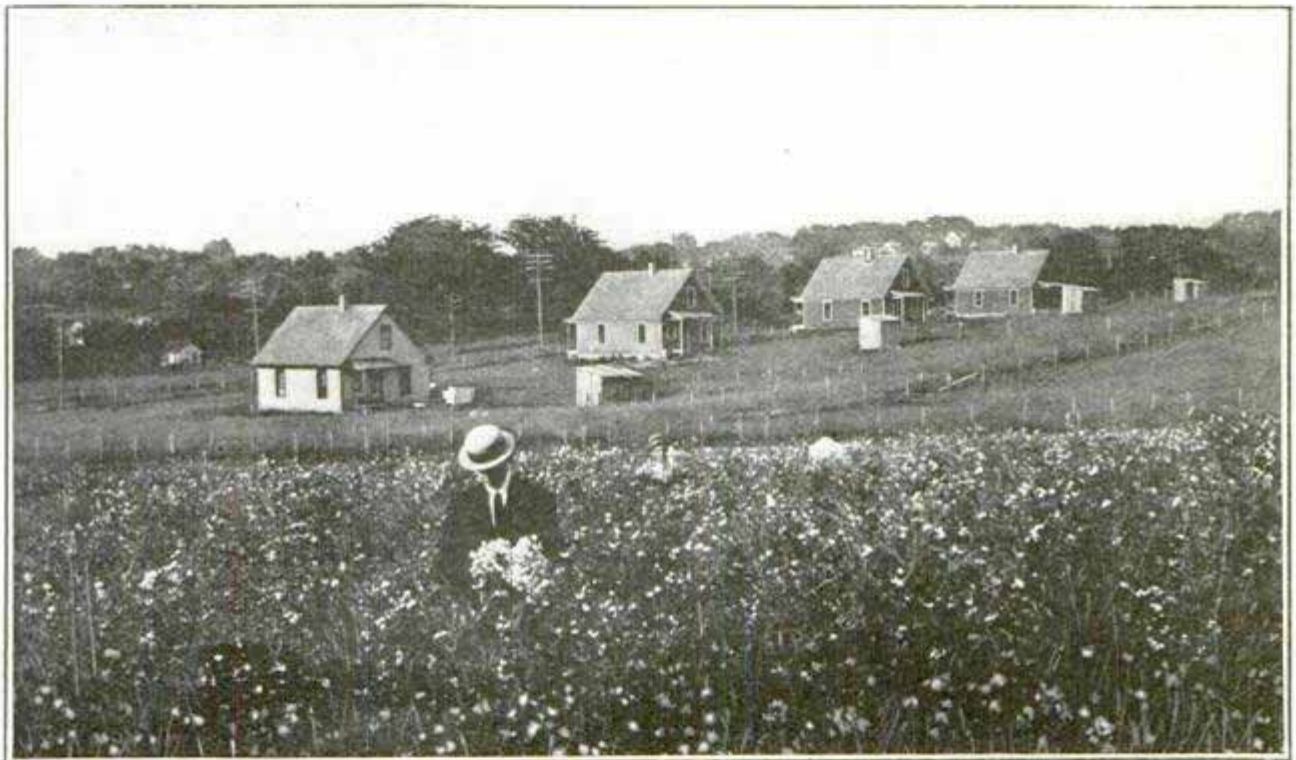


Moving an Automobile to Repair Shop

RAISING SWEET PEAS FOR PROFIT

THE man who has some spare time and an unproductive piece of ground that he desires to turn into money, nine times out of ten considers first the growing of vegetables or the raising of poultry. But, while everyone must eat, prospective gardeners seldom stop to estimate how many millions of dollars are spent for other things—flowers for instance.

many sections of the country as vegetables, easier to market and require no more care in the preparation for sale. Sweet peas will not grow themselves, but given the same amount of attention that a vegetable garden or a poultry yard requires, they are likely to be more profitable than either, and more certain. A young man in Independence, Mo., just out of high school,

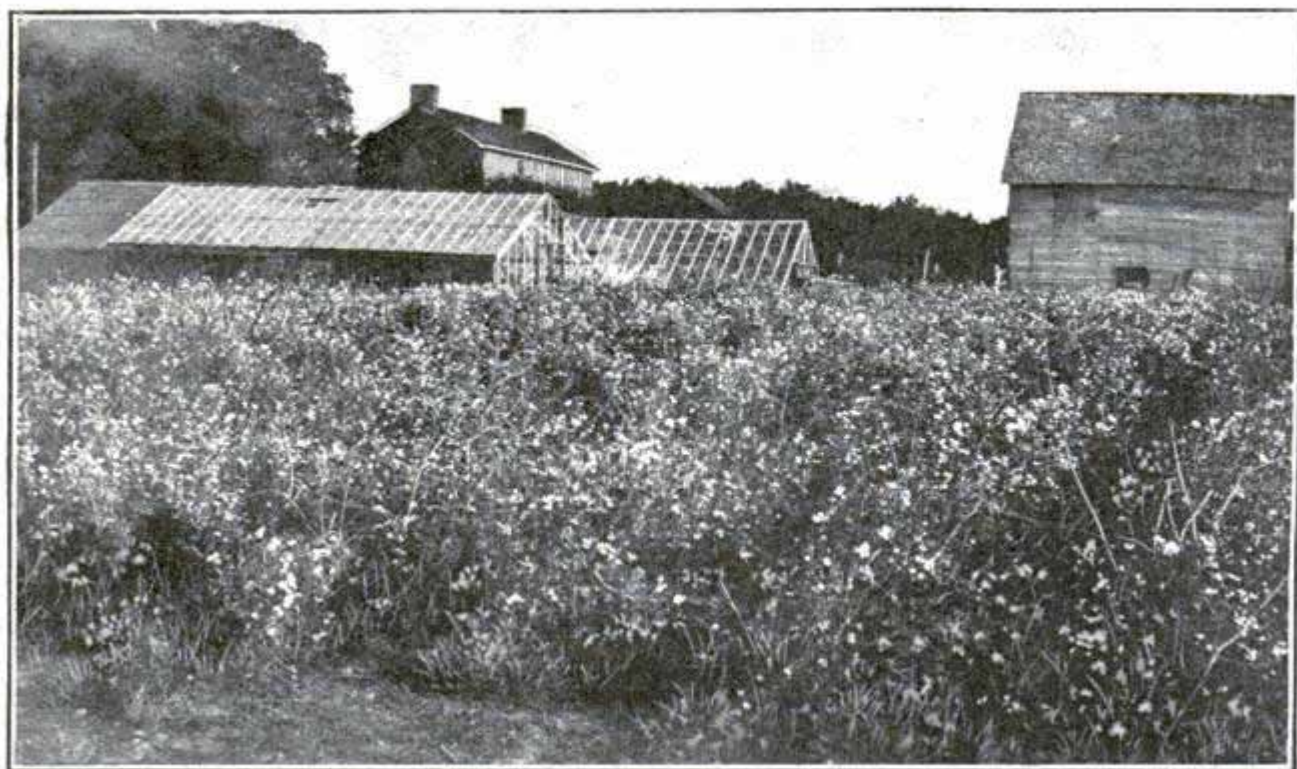


One of the Sweet-Pea Patches Covering One-Third of an Acre—A Boy Made \$800 by a Little Work on This Small Piece of Ground

Almost everybody who grows flowers has a sweet-pea patch, yet florists never have an oversupply of the fragrant little blossoms. Therefore, the man or the woman who desires to turn spare time and vacant ground into cash, will find the cultivation of sweet peas one of the surest means to that end. Near the larger cities there is always a market for them and, if one gives them his or her whole attention a profit of \$500 to \$1,000 is not too large to expect. A man with a family to help him ought easily to clear the latter amount in a season.

Sweet peas are as easy to grow in

cleared \$800 on less than an acre of sweet peas last year, and when he balances accounts this year on an acre of them he expects to show a profit of \$2,000 or more. When he started in this young man knew no more about growing sweet peas than the average high school boy does. Placed in charge of the home garden, he planted a small patch of sweet peas for table flowers. They grew so luxuriantly that thousands were given to neighbors or thrown away. A neighbor suggested that he sell those he didn't use. A florist agreed to take all he would bring, giving him instructions about preparing them for sale. That year he



Another Sweet-Pea Patch, Showing Greenhouse for Winter Culture

received nearly \$100 for his flowers. Last year he cleared \$800, meantime studying up on sweet-pea culture.

He had been planting ordinary home-grown seed, but this year he bought seed in California, planted early and late varieties, picked his flowers with more care, arranged them according to colors, made his bunches neat and uniform and at the height of the season sold as many as 25,000 blossoms a day. They were tied in bunches of 28.

At the season's end the plants were allowed to go to seed, and this seed he sells to dealers for home pea patches. Now the young florist is building a greenhouse to grow sweet peas in winter and further increase his income. Next year he will have about two acres in sweet peas and expects to clear \$5,000.

In growing sweet peas, the preparation of the seed bed should, if possible, be started in the late fall. The ground should first be given a good coating of manure and then plowed. Before freezing weather, the ground should be cross-plowed and harrowed. In the early spring it should be plowed and harrowed again and allowed to lie until planting time, when it should be

harrowed again. The best seed should be used, and it should be planted in shallow trenches 4 ft. apart. After the vines reach a height of about 4 in., they should be thinned out and the space between the rows covered with straw or stable refuse. This keeps down the weeds and retains the moisture in the soil. Brush is the best support for the vines, giving them a chance to spread and thus increasing the number of flowers.

The flowers are picked in the evening and the early morning, and, when possible, should be stored until marketed in a cool cellar. Care should be taken to pick only long-stemmed and perfect flowers, the others being picked off later and thrown away. This keeps the flowers from going to seed and reducing the number of blooms.

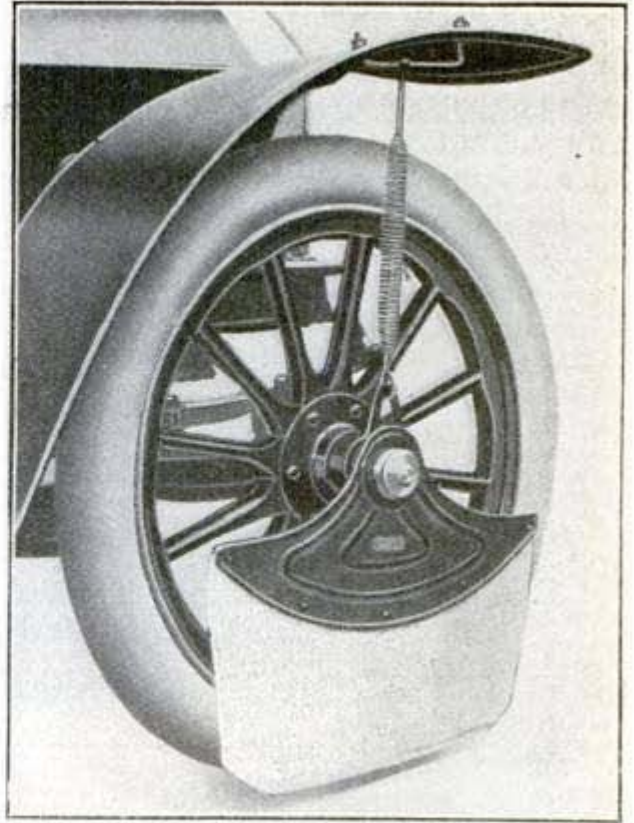
ⒸParabolic reflectors of solid silver rolled on copper are among the latest refinements in automobile headlights.

ⒸA gasoline-driven plow has been reported to have turned over 25 or more acres a day, at a cost of about 50 cents per acre.

STEEL-MESH SPLASHGUARDS FOR AUTO WHEELS

The municipal authorities of London have taken under consideration the complaints of pedestrians that mud-baths are forced upon them every wet day by motor-omnibuses and other street vehicles. Consequently, several tests have been made of a steel-mesh splashguard designed to keep the mud from flying outward when a wheel drops into a puddle.

The splashguards are suspended from the hubs of the wheels, the bottoms reaching to within a fraction of an inch of the ground, and forming a shield between the wheels and pedestrians. In one of the tests a white screen was erected on a suburban road near a mud puddle. Only a few tiny drops of mud were splashed upon it by a motor-omnibus equipped with the shields, while a broad, checked pattern of black and white resulted when the splashguards were removed.



Steel Mesh Shield Prevents Mud from Flying Outward from Automobile Wheels



Old Rain Gauge at Taiko, Korea

AN ANCIENT RAIN GAUGE

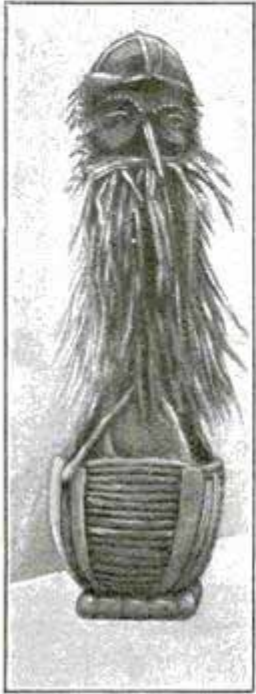
The first use of the rain gauge has been credited to Benedetto Castelli, an Italian contemporary of Galileo, but recent research shows that rain gauges were used in the 15th century, nearly two centuries before. In the second volume of the historical annals of Korea is found a reference to rain gauges which translates as follows:

"In the 24th year of the reign of King Sejo (1442), the king ordered constructed a bronze instrument to measure the rainfall. It is a vase resting on a stone base, and was placed at the observatory. Each time it rained the attendants measured the height of water in the vase and reported to the king. Similar instruments were also placed in all the provinces."

CA retired sea captain on the Pacific Coast is engaged in raising sea gulls to obtain their eggs, for which there is a large market and which compare favorably with hen's eggs.

DECORATED CHIANTI BOTTLES

Chianti flasks are often decorated in a manner shown in the illustration for special purposes, such as banquets and for sale during carnival weeks, etc. This cork probably represents a drink demon.



THE LONGEST CITY TRAIN

The heavyweight record in city passenger-carrying was established recently in the New York subway by the installation of its new 10-car express train service, this being the first time in the history of municipal traffic that a train of

such length has been used.

Before inaugurating the new service, which gives seats to 10,000 additional passengers hourly, with a corresponding increase of room for less fortunate strap-hangers, an expenditure of \$8,000,000 was necessary. For additional power apparatus and system changes, an outlay of one million dollars was made; the lengthening of stations to a point where passengers could be taken on and discharged by 10 cars simultaneously consumed another two millions; while the bill for new cars alone ran up to five million dollars.

The empty single car, 50 ft. in length, weighs about 77,500 lb. The entire 500 ft. of loaded train in actual service would tip the scales, figuratively, at 500 tons,—or a weight of one ton for every linear foot of trackage.

Permanent magnets of cast iron are now being made on a commercial scale. The saving in cost of manufacture over those made of steel is said to be from 25 to 50 per cent.

POWDER MANUFACTURE SAFE IN FRANCE

Incredible as it may seem to the general public, a French scientific magazine asserts that the manufacture of powder and explosives in general is one of the safest industries. Statistics in France prove that the percentage of deaths and injury in such factories is among the very lowest of all factories. This is accounted for by the extreme precaution taken to prevent accidents and the care exacted from the workers.

COMBINATION LAVATORY AND REPOSITORY

The convenience depicted herewith has been designed as an aid in the home, factory or hotel. Under the lavatory basin is a receptacle provided with an outlet and an overflow. Towels may be hung inside this receptacle from a heavy brass strip secured around the top just below the basin, and thus be kept out of the way or left in soak before washing.



Handy Receptacle for Soiled Towels Under Wash Basin

354 AIRMEN LICENSED IN FRANCE

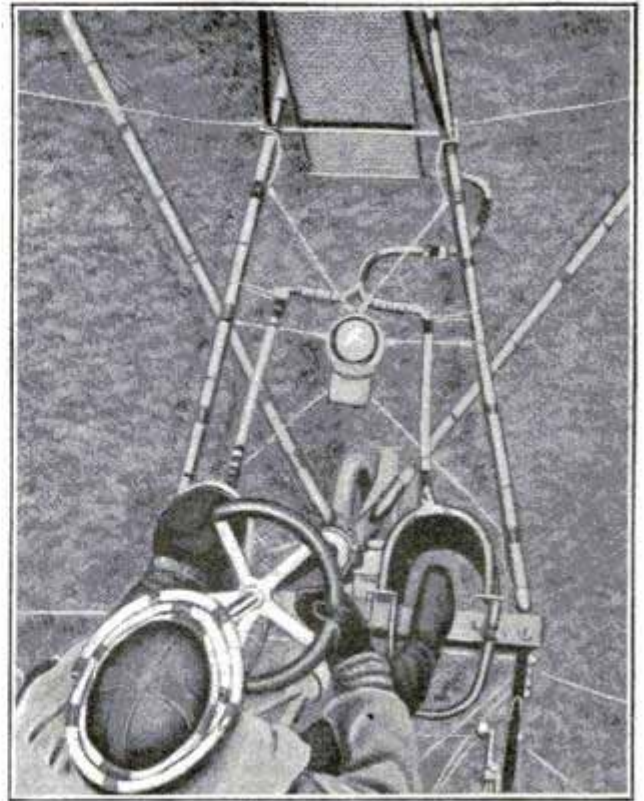
Since December, 1908, when the French Aero Club adopted regulations for airmen, a total of 354 have received licenses, 336 being given in 1910. The holders of licenses include four women, all French. As showing the preferences of airmen for the different types of machines, it is interesting to note that 180 used biplanes in the license-gaining trial flights, and 174 used monoplanes.

MOTORISTS COMPETING IN CAPE-TO-CAIRO TEST

An international motor contest from Capetown, South Africa, to Cairo, Egypt, was recently started by teams representing British and German interests. The contest is over a course 5,800 miles long and it is the hope of the motorists to complete it in 120 days. The British team left Capetown on Jan. 25 and the Germans started two weeks later to go over a slightly different route. The contest is being watched with intense interest by the commercial concerns and the governments represented, for, although it is not strictly a race, inasmuch as the two teams do not start together and go over the same route, the interests involved regard it as such, because of the intense rivalry and the rewards offered for success. The German government has backed the team representing Germany with a subsidy of \$50,000. The men in charge of both cars have had considerable motoring experience in Africa. Gasoline and other supplies have been placed at convenient points along both routes.

INGENIOUS DEVICES ON CODY'S AEROPLANE

This view of S. F. Cody's British aeroplane, taken from above, shows the many ingenious devices with which he has equipped it. His feet are kept warm by pipes connected with the engine and the radiator in front. The



Aeroplane Equipped with Foot Warmers, Watch, Compass and Mirror

air, passing through the radiator, is warmed before it passes into the pipes. On the framework in front of the airman is a watch and compass, and by his side is a mirror which enables him to see behind.

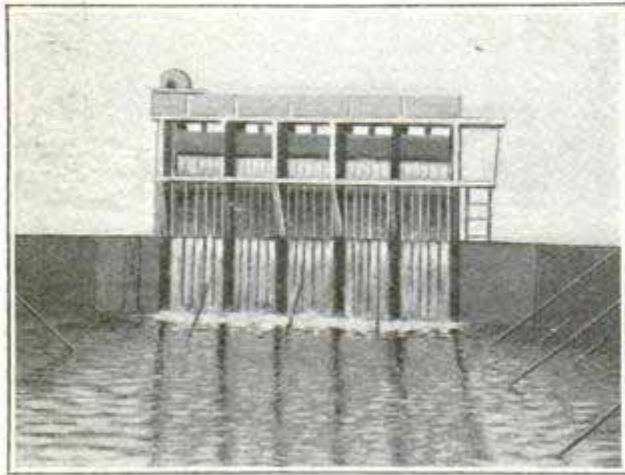
Cody is the American who built and experimented with England's first aeroplane. He won the British Michelin prize for 1910 by a flight of 183 miles in 4 hr. 47 min.

STEAM RAILROAD TRAINMEN ON ELECTRIC ROADS

Recent investigations by the railroad commissions of Indiana and Illinois are said by the Electric Traction Weekly to indicate that experienced steam-railroad trainmen do not make the best motormen and conductors for high-speed interurban roads. It is claimed that the steam-road employe is machine-like in his methods, and that it is difficult to impress upon him the difference between a 40-car freight train and a single-car interurban. He is said to be apt to regard the interurban car as something of a toy.

ALUMINUM WATERFALL AS BOILER-SCALE CURE

The two methods generally used in treating water to prevent scale in boilers consist of softening the water



Running Water Over Aluminum Plates as a Means of Boiler-Scale Prevention

before it is supplied to the boilers, and the introduction of chemicals into the boilers to minimize the formation of scale. There is a third method, however, now being used by three railroads

in England, which requires no chemicals, nor an extensive plant for settling purposes.

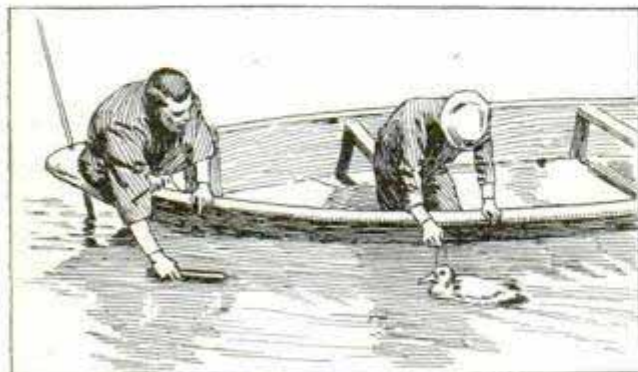
The treatment of this method is simplicity itself, the process consisting of nothing more complicated than allowing the water to flow over an aluminum-plate fall placed between the inlet and the storage tanks. The apparatus is automatic and uniform in action, and requires no attention beyond an occasional brushing to keep the aluminum plates bright and clean.

The passage of the water over the plates disintegrates the calcium and magnesium compounds in such manner as to prevent their deposition as a hard scale on the boiler plates and tubes. Instead, the deposition appears as a soft mud, considerably less in bulk than scale otherwise formed, and easily removed by ordinary washing or dry brushing. Water so treated is also claimed to soften scale previously deposited.

WATER RESISTANCE OF DUCKS

Rather interesting tests of the water resistance of ducks and geese have been made by Tatsugoro Inouya, a graduate of the Naval Architecture Department of the Tokyo Imperial University, who is studying water-fowl forms in comparison with fine-lined ship forms.

The tests were made in the running water of the River Katase, as there



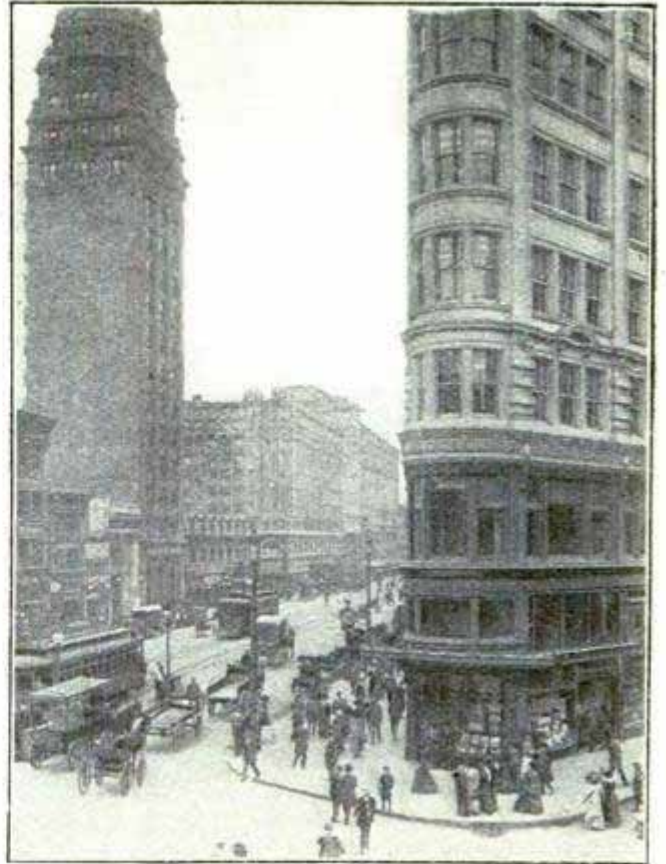
Measuring the Resistance of a Duck Against the Flow of a Japanese River

were no instruments available for computing resistance when towing the birds in still water. The webs of the feet and the wings were tied up tightly before the duck or goose was placed in the water, and the resistance against the water was measured by a spring-balance. The speed of the water flow was 157 ft. per minute, and the resistance of a duck against it was shown to be 0.385 lb., and of a goose 0.510 lb. Owing to the oscillations of the spring, considerable difficulty was experienced in reading the spring-balance, each observation occupying from 5 to 10 minutes.

The experiments are said to show, for a large range of speed, that the bird form has a distinct advantage over that of a fine-lined ship form having the same length, breadth, draught, and displacement.



Montgomery Street, Looking Toward Market Street. A Corner of the New Fourteen-Million Dollar Hotel is Shown in Center—Four New Bank Buildings Also Shown.



Market Street. No Evidences of Earthquake and Fire of 5 Years Ago—It is Now a Well-Paved Chasm Five Miles Long, Flanked on Either Side by Handsome New Structures.

THE NEW SAN FRANCISCO

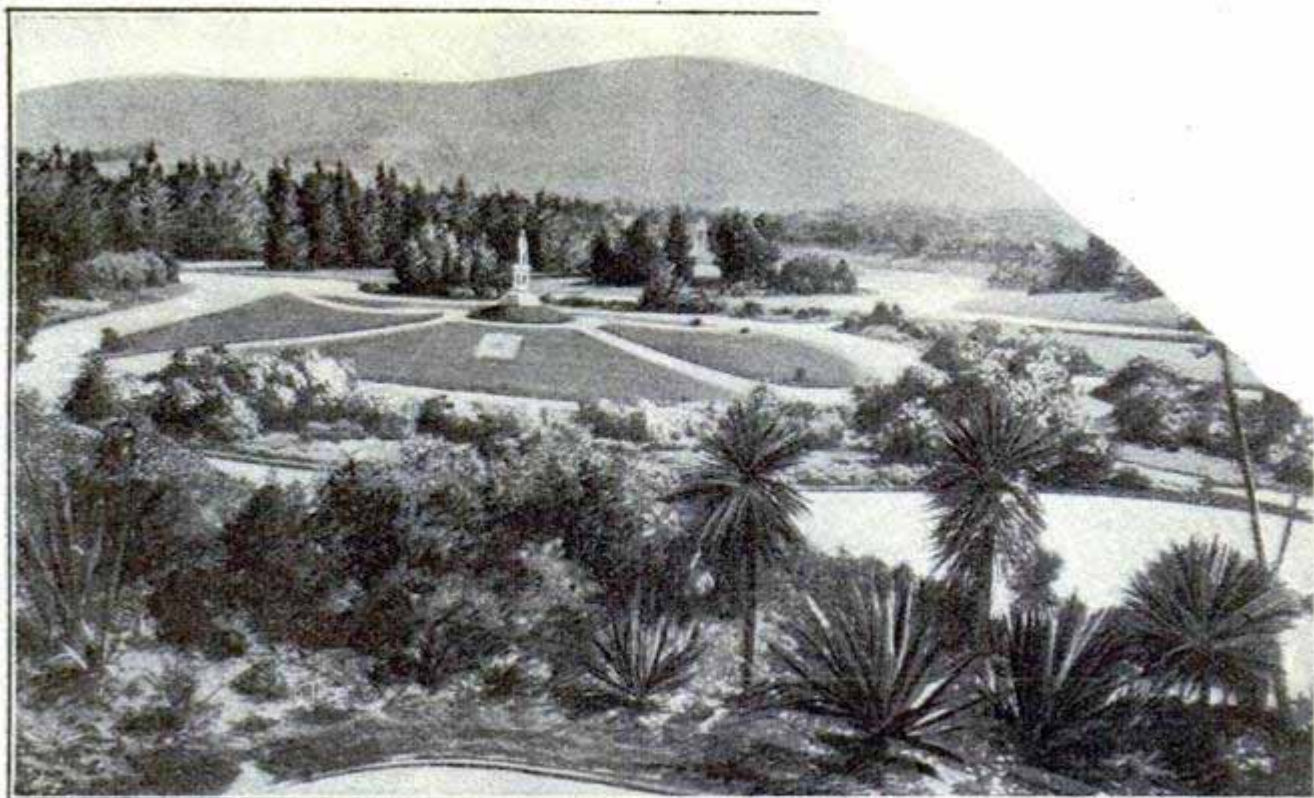
rival and a good loser and when the decision was rendered the New Orleans fair authorities declared the intention of New Orleans to take a prominent part in the exposition in San Francisco, and to place a great exhibit there.

Before formally appearing before Congress, San Francisco had guaranteed a fund of \$17,500,000 toward the exposition. An enabling act was passed by the state legislature authorizing the issuance of \$5,000,000 worth of bonds by the state of California and \$5,000,000 worth by the city of San Francisco.

The opening of the Panama Canal will mean perhaps more to the Pacific coast than any event since the discovery of the Pacific Ocean by Balboa, the advent of Lewis and Clark, or the driving of the last spike in the Union Pacific Railroad in 1868. Take a map of the Pacific Ocean and trace the most direct route to the ports of the Orient, following the great circle, and you will face the surprising fact that

ships bound from the Atlantic through the canal to China and Japan, the Philippines, Siberia or Siam, pass within 165 miles of the Golden Gate. The prospect of the early completion of the canal is already having a direct effect in stimulating Pacific coast shipping. Within the past year, a large steamship firm has engaged in freight traffic between San Francisco, the Isthmus and Atlantic coast ports. Even under the present necessity of transporting freight across the Isthmus, business of the line is more than doubled.

The canal will probably cut in half freight rates on California fruits to the east, and will create a large, new market for pine and fir from Puget Sound, and redwood from California. Emigrants to the west will be enabled to come from Europe through the canal direct to Pacific coast ports, and future lines through this direct connection are rumored. The opening of the canal will give a tremendous stimulus



View of Golden Gate Park Where Exposition May Be Held

SAN FRANCISCO GETS THE FAIR

By HAMILTON WRIGHT

Within five minutes from the time that the national House of Representatives cast its vote in favor of San Francisco as the place in which to hold an international exposition to celebrate the opening of the Panama Canal, bands were parading Market Street, sirens on the water front were pulled wide open and the streets of the city were thronged with great smiling crowds. The outburst of popular enthusiasm exceeded anything since Spanish war days. All business was cast aside for the moment and a judge excused a jury until they could regain their composure.

San Francisco started working for the world's fair in 1904 and a provisional corporation was formed at that time to take care of the movement. The catastrophe of April 18, 1906, put a temporary damper on the movement, but in a few days after the fire, banners announcing the fair 1915 were displayed among the ruins. In March, 1910, a permanent world's fair corporation was formed and on April 28,

1910, the active money-raising campaign began. A mass meeting was held in the Merchants Exchange Building on that day, and in less than two hours people of all occupations subscribed \$4,089,000 to the shares of the fair corporation. The sale of stock was actively pushed and within a few months \$7,500,000 worth had been raised from stock sales as a starter for the exposition movement.

Californians looked upon the fair as practically assured, but last spring it developed that New Orleans, also a suitor for congressional favor, was putting up an energetic and straightforward fight and seemed to have secured the favor of a majority in the House of Representatives for their claims. San Francisco immediately sent delegation after delegation to Washington and throughout the East, and secured the backing of the western senators and congressmen, with the result that when the matter came to a vote, San Francisco won. New Orleans proved a generous and worthy

to the California oil industry, since oil, being cheaper than coal and more easily handled, may be taken by tank steamers from San Luis Obispo and Port Harford to receiving tank stations on Atlantic ports, where it will be kept in quantities for large consumers.

The restoration of San Francisco is one of the marvels of American cities. The loss through the big fire in 1906 is computed by the insurance underwriters at \$400,000,000. As against this there was \$225,000,000 carried on insurable property, of which \$185,000,000 was collected. Since the fire, building permits have amounted to more than \$202,000,000.

The fair management has not yet selected a site, although a poll taken by one of the San Francisco newspapers indicates that Golden Gate Park, comprising 1,013 acres, and with much adjoining vacant property, is preferred by a majority of the people. Tentative plans for the exposition favor a lagoon in the shape of the Pacific Ocean with the buildings grouped around it. Eight western states through their legislatures have already voted appropriations for state buildings and exhibits. Pledges from China, Japan and the Philippines total \$6,000,000. The directors have promised a \$50,000,000 exposition.

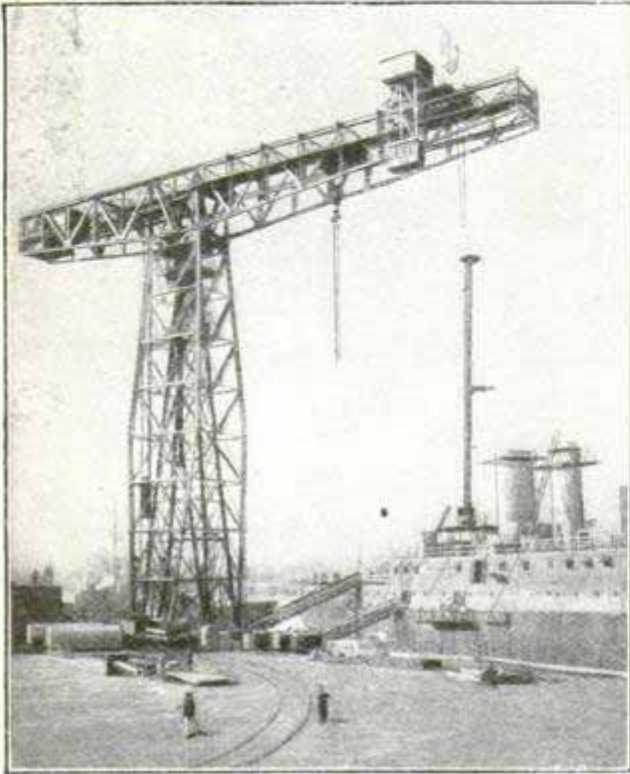


SPORT FOR THE IRON WORKER

The men who bolt together the massive structures of steel for great buildings take delight in going to and from their lofty perches in the same manner the steel girders are raised to the heights where they are destined to rest. A remarkable photograph was recently made of a workman going aloft on the new Whitehall Annex building in New York, the photographer making the picture from a perch in the new building, and showing not only the iron worker suspended between heaven and earth, but also an exceptionally clear view of the New York waterfront.

ELECTRIC CRANE 172 FT. HIGH

The giant 150-ton electric crane erected at the side of the fitting-out basin of the Penhoet shipbuilding yard



Giant Electric Crane Shipping One of the Masts of the French Battleship "Diderot"

at St. Nazaire, France, is one of the largest in the world. It consists of a central latticed column 134½ ft. high, provided at the top with a roller path, on which rests the crane proper. There are two tracks in the jib, the lower one carrying a crab operated by two 50-hp. motors. The upper track carries a 15-ton traveler which can run to the extreme end of the jib. The lower track is 163 ft. above the quay level, and the higher one, 172 ft. The crane can lift 150 tons at a 65-ft. radius, 100 tons at 90 ft., and 60 tons at 124 ft.

CARTRIDGE-MAKING MACHINE

According to a Paris journal, Captain Von Henriquez, of the Austrian artillery, has built a wonderful apparatus for making cartridges. It suffices to introduce the powder, bullets and cases—the machine does the rest. The cartridges come out ready for use, the imperfect ones being thrown aside. Three men can manufacture 1,500 cartridges in three minutes with the apparatus.

SONNET ON A BROKEN TEST-TUBE

By CHARLES M. DISERENS

Fair little test-tube, when I see thee there
 Reclining idly in that ancient rack,
 Fond memory leads my recollection back
 To those old days now past when free from care,
 I warmed thee gently in the Bunsen glare,
 Producing hydrogen to make a sound,
 When our professor wasn't looking round.
 For those dear memories fain would I spare
 Thy mutilated, venerable form;
 Cracked, broken, shattered, worn and useless now
 Doomed to adorn the graceless garbage heap
 The dire result of youthful ardor warm;
 Which plunged thee hot in frigid H₂O.
 And thus unmindful, caused thy endless woe.

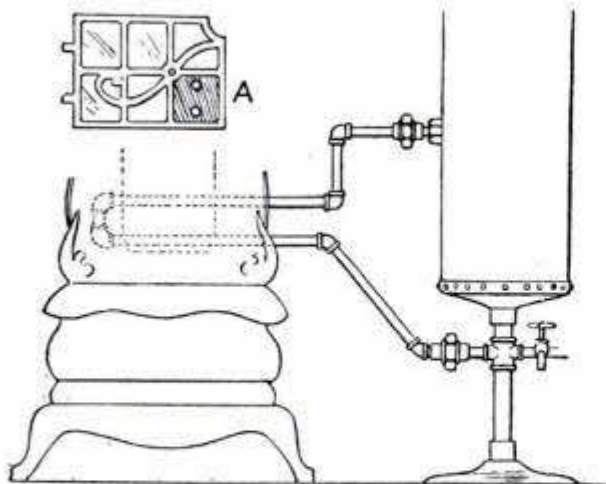


Base Burner as a Supply-Water Heater

A base burner can be made to heat the water in a kitchen-range boiler as well as in a kitchen range having a water front. Two $\frac{3}{4}$ -in. iron pipes, from 12 to 16 in. long (depending on the size of the stove), are connected together with a return or a combination of two elbows to take the place of the water front. This is placed behind the coal feed and above the fire pot at the rear of the firebox, as shown in the illustration, the ends of the pipes extending through a piece of tin, A, used instead of the mica in the side door.

From these pipes the ordinary connections to the range boiler are made. The top pipe must have some slant upwards to the connection in the side of the boiler. The pipes are not fastened in the stove, as their rigidity, when connected, is sufficient to keep them solid.

A continual supply of warm water, well-heated rooms and no ashes to

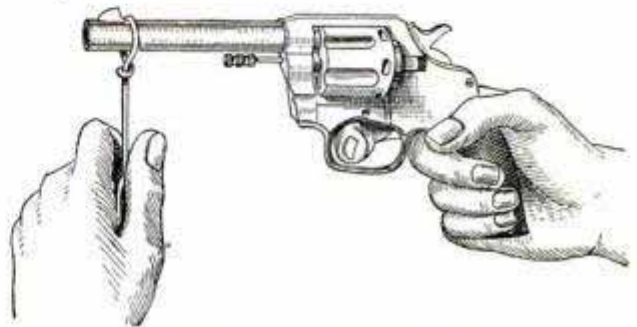


Coil in Heater

sift, recommend this device especially to those who cook with gas, as water is heated with little or no extra expense.—Contributed by Lloyd G. Miller, Chicago.

Holding a Revolver Steady

Paying a fancy price for a knife or razor does not insure getting a perfect blade. Similarly, in purchasing a re-



Holding End of Barrel Down

volver of large caliber, the largeness of the price does not necessarily enable one to get a weapon that will not kick. Some are so violent that accurate shooting is sometimes impossible, and the novice almost believes he will never learn to handle the gun he selected.

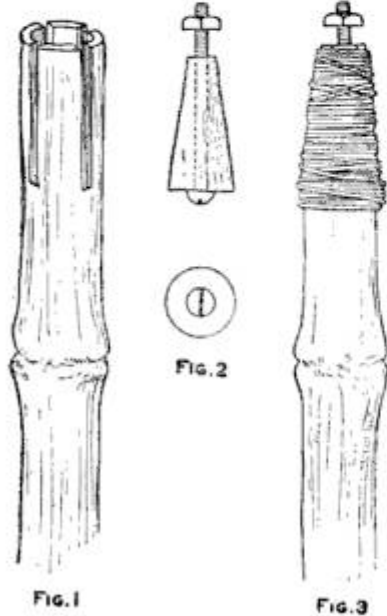
The sketch shows a wire device made to be slipped over the barrel just back of the sight and held in the left hand to serve in holding down the upward kick. This will steady the revolver in target practice and yet not cause the user to suffer powder burns as when holding the barrel with the hand.—Contributed by Victor Labadie, Dallas, Texas.

☞ A scribe made from hard brass wire gives a fine light yellow mark on black metal surfaces such as stove-pipe material, boiler plate, etc.

☞ Where oil will not act as a cooling agent on a drill working in hard metals, turpentine used instead will permit the drill to take hold and retain its temper.

Fastening Bolts in the End of Bamboo Poles

A good way to fasten a bolt to a bamboo pole for use in aeroplane construction is shown in the sketch herewith.

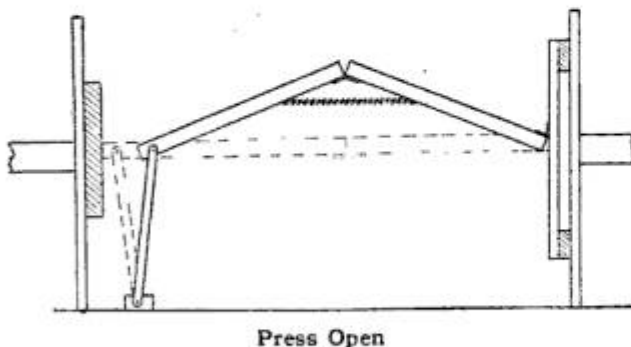


The end of the pole is cut with a hacksaw so as to form four or six pieces about $2\frac{1}{2}$ in. long (Fig. 1). A hardwood plug is made tapering (Fig. 2) and a hole bored through its center for a bolt. The bolt should

fit tightly in the hole so that it will not slip back when the nut is removed. Slip the plug into the slotted end of the bamboo with the large end first and wind tightly with No. 18 wire (Fig. 3). This will draw the slotted end of the bamboo in closely about the tapering plug.—Contributed by F. W. Stromer, Gig Harbor, Wash.

A Toggle-Joint Press

A quick-acting and powerful press that will find many uses in the shop



may be made in a few minutes, if constructed according to the sketch. Supports should lead from the top and bot-

tom of the press to the ceiling and floor to take care of the thrust. The upper of the two pieces forming the toggle joint is fastened by a hinge to a wood strip supported only at the ends. This forms a slightly yielding spring which will be found quite necessary. The dimensions of all pieces depend on the work, but the proportions shown are about right. Do not use too heavy material, as it will be cumbersome. If the toggle-joint members are 1 in. thick and 2 in. wide, they will be strong enough for ordinary use. A piece of leather should be nailed over the crack between the joint members, as otherwise the fingers may be seriously hurt, if caught in the crack as the press is pushed home.—Contributed by C. W. Nieman, New York City.

Wheelbarrow Handle Shield

The hand shield shown in the sketch was adopted in a shop where it was necessary to use a narrow doorway through which to convey material from one department to another, and chafing of knuckles was quite frequent and often painful. This annoyance has been entirely eliminated since the adoption of the hand shield.



The shield is made of a piece of strap iron bent as shown and attached to the wood handle with screws. The shields can be attached to iron handles with rivets.—Contributed by W. E. Roberts, Allentown, Pa.

An Improvised Safety Light

A pair of scissors had been dropped down 8 or 10 ft. between the studdings from the floor of an unfinished attic room. On trying to fish them out with a magnet, considerable trouble was experienced in dodging nails and other obstructions protruding from both sides of the walls. The space was too narrow to admit of an ordinary lantern

being lowered. There being no electric light, a short piece of candle was placed in a glass tumbler that had been securely fitted in a wire loop in such a manner that it balanced right side up when suspended from another piece of light wire. The tumbler containing the lighted candle was lowered to the bottom of the cavity and illuminated the place so well that it became an easy task to raise the scissors by means of an old telephone magnet and a piece of string. A bucket of water was kept close at hand in case of accident from fire.—Contributed by John Teigen, Lake Mills, Ia.

How to Fold Overalls and Jumper

This series of sketches shows a neat and quick way to fold overalls and jumper. After thus disposing of them once or twice, it will become a habit, and it really takes no more time than to throw the outfit in a corner or to gather it up roughly and rearrange it when again used. 1. Lay overalls flat and place the folded jumper on one of the legs. 2. Half fold over leg and jumper. 3. Fold over to top from fork. 4. Roll the folded part over toward length of other leg. 5. Turn the loose leg inside out and pull it over the rolled leg and jumper. 6. You now have a neat, compact parcel. Any tools you may wish to carry with the overalls and jumper may be pushed down the leg



FIG. 1



FIG. 2

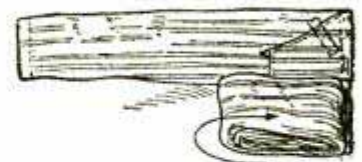


FIG. 3



FIG. 4



FIG. 5

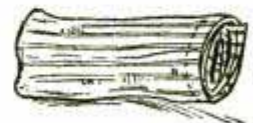


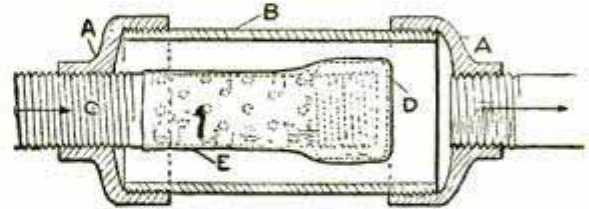
FIG. 6

A Neat Way to Fold Overalls and Jumper

and will thus be safely stowed and much more conveniently than if carried in a pocket.—Contributed by Amos Lithgow, Chicago.

An Air Check Valve

When installing a compressed-air tank in my shop I had trouble with leaks through the ordinary check valve. I could not find a valve that would hold



Made of Pipe Fittings

the pressure for any great length of time. I set about to make one which resulted in the device shown in the sketch. The parts were made of pipe and fittings.

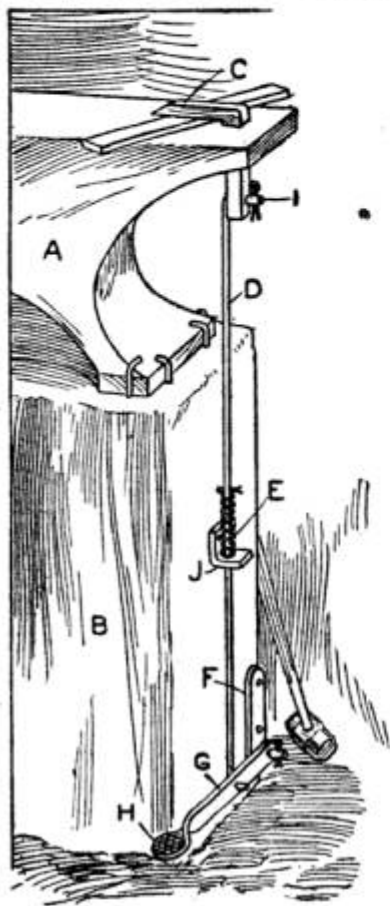
A number of 1/8-in. holes were drilled in the pipe C, which was covered with a cap, D. The cap and holes in the pipe were covered with a piece of inner tube, E, from a bicycle tire, and the pipe turned into the reducer A. Two or three thicknesses are used for high pressure. The two reducers, A A, are joined with a larger pipe nipple, B. The direction of the flow of air is shown by the arrows. The air coming into the pipe C will force itself out from under the rubber tubing which keeps it from flowing back through the holes.

The tank was made airtight by pouring in 1 gal. of liquid tar and rolling the tank around until it was well coated

on the inside, then the surplus tar was emptied. Pipe leaks were overcome in the same manner.—Contributed by E. E. Docker, Berkeley, Cal.

Mechanical Helper for the Anvil

The device illustrated herewith is designed to take the place of the human helper at the anvil in many a job ordinarily requiring two men.



Forge an angle piece, C, to fit snugly but not tightly into the hardy hole of the anvil A. In one end of this angle drill a hole to take the bent-over end of the rod D, and secure this end by cotter pin I. On the front face of the anvil block B secure the guide piece J for the rod, on which, just above J, is placed the compression spring E, which is held to place by the cotter pin above it. The lower end of rod D extends to within a few inches of the floor, and is bent at right angles to pass through the hole in the foot treadle G, the step of which is shown at H.

The action is simple. The spring E normally holds the gripping piece C well above the anvil face. The piece to be held is placed in position under C, and foot pressure on H causes C to grip the work as tightly as may be required. Releasing H causes spring E to press up rod D and release C from the work.—Contributed by J. N. Bagley, Webber, Kansas.

Iron or steel may be made rustproof by boiling in 1 gal. of water to which is added 4 oz. of phosphoric acid and 1 oz. of iron filings. A black noncorroding coating is produced.

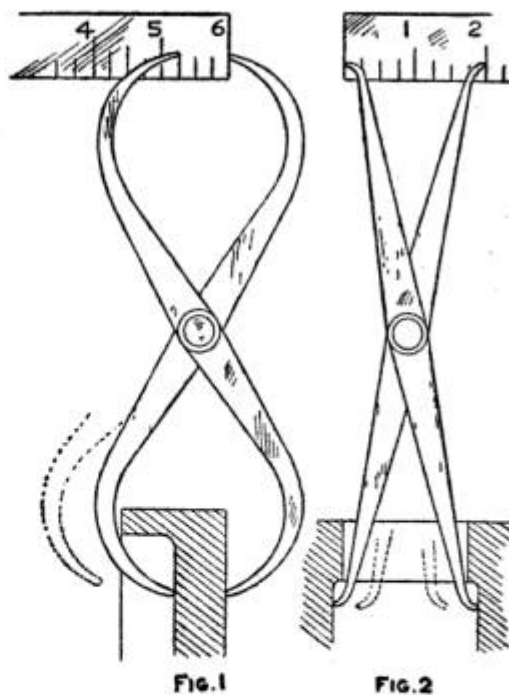
To Keep Windows Free from Frost

How most effectively to keep show windows from frosting in cold weather is to many an important consideration. A correspondent of the Optical Journal gives a cheap and simple method which is worth knowing. It consists of polishing the glass, after first washing in the ordinary way, with a piece of chamois skin on which have been scattered a few drops of glycerine. He says that this treatment is just as effective as the application of a proprietary article formerly employed by him with most satisfactory results.

Calipering over Flanges

A pair of outside and inside calipers especially constructed for calipering over flanges is shown in the sketch. These calipers have many advantages for measuring the thickness of metal back of a flange or an enlarged part in a bored hole.

These calipers should be made with all legs of equal lengths. The readings can be taken on a rule while the cali-



Outside and Inside Calipers

pers are set over a flange as in Fig. 1, or inside of a hole, as in Fig. 2.—Contributed by Philip J. Duff, Montreal, Canada.

A Hot-Water Incubator

A hot-water incubator possesses several important points of superiority over the lamp-heated kind. In the first place, it can be operated anywhere without danger of fire; secondly, it has a very steady temperature and consequently will produce healthier chicks; and thirdly, it is so simple in construction that with the exception of the tank, which any tinsmith can make, any person at all familiar with the use of a hammer, saw and plane can easily make one.

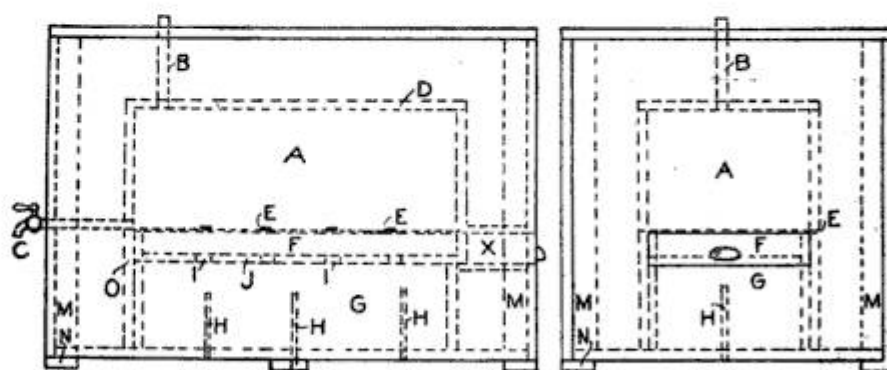
To construct a 100-egg machine have a galvanized-iron tank, A, made 12 in. deep, 15 in. wide and 30 in. long. There should be a pipe 1 in. in diameter and 9 in. long placed in the top for filling, and another of the same dimensions and ending in a faucet in the bottom for draining. Inclose all but the bottom of this tank with a close-fitting box of 1-in. wood, D, to keep the tank in shape when filled, and fasten strips of strap iron, E, crossways every 6 in. beneath the tank to keep its bottom from sagging into the egg tray.

The egg tray F is 3 in. deep, 15 in. wide and 37 in. long, outside measurements. Partition off the part X and make a box of it. Pack this with sawdust (as it forms the front of the egg tray) to keep the heat from escaping. Fit in four crosspieces for the bottom of the egg tray proper, and stretch wire window screening, J, over them, tacking it securely to the sides and ends.

The ventilator G is a frame of 1-in. material, 8 in. deep, 15 in. wide and 30 in. long, outside. There is no top to this ventilator, but it has a bottom which projects 6 in. on both sides and ends. Three tubes, each 7 in. long, are placed in the bottom to admit air beneath the eggs. The ventilator is then packed with sawdust to a depth of 6

in. This leaves a 2-in. space under the egg tray in which to place pans of water for supplying the proper moisture to the eggs. It also provides a ventilated air chamber.

The parts are assembled by placing the egg tray upon the ventilator, and



Details of Incubator

the tank, metal side down, on the egg tray. Vertical strips, O, 11¼ in. long, are nailed to the sides and back end of the ventilator and fitted close together. These support the whole weight of the tank so that the egg tray can slide in and out easily. They also seal up the spaces so that no sawdust can enter the egg tray chamber.

Place a post, M, 2 in. square and 30 in. high, at each corner of the extended ventilator bottom and form a box around these with 1-in. matched lumber. This box will be 6 in. outside of the three inner parts. Make the part around the end of the egg tray X so that the tray can be withdrawn without the sawdust entering the space. The 6-in. space on all sides and on top of the three inner parts is now packed hard with sawdust. Crumpled newspaper is even better, but whatever insulation is used should be packed hard in the open space. Nail six 1-in. pieces, N, on the bottom to allow the air below to circulate freely, and the incubator is ready for use.

The incubator is put into operation by filling the tank with boiling water and closing it tightly, first placing an accurate thermometer in the tray. It takes some little time for the heat to

penetrate through the packing, but when it does, a kettle full of boiling water once a day in moderate weather and a less amount twice a day in cold weather will keep it at a comparatively even temperature of 103 deg.—the proper temperature. It is best to practice with the incubator for three or four days before putting the eggs in, to find how much water is necessary to run it.

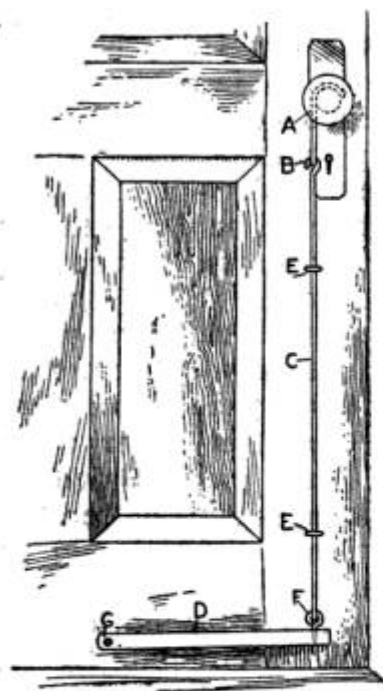
Never try to cool the incubator by putting in cold water; the heat is in the packing and it will take hours either to raise or lower the temperature 2 deg. This is what makes the machine so faithful. Before putting in the eggs, adjust the temperature to 110 deg. and place the thermometer in the center of the egg tray—the bulb on a level with the top of the eggs and the top slightly higher. The eggs will cool the drawer, but if in the course of an hour or two

the temperature has fallen below 100 deg., the addition of more hot water will soon raise it to the proper degree. If the temperature does not fall below 98 deg. or rise above 105 deg. the best results will be obtained, though a temperature of 108 deg. for a short time may do no harm. Always cool by opening the tray. Keep shallow trays of water in the ventilator and change this daily. Keep several moist sponges in the egg tray; if they are found to be dry, it is a sign that the eggs need sprinkling with tepid water. The general care of the eggs (cooling and turning) is the same as in any other incubator.

With a little experience, an operator can obtain as nearly perfect results with this machine as with the most expensive lamp-heated apparatus made.—Contributed by W. E. Morton, Marinette, Wis.

Foot-Operated Door Latch

A simple device for opening a door with the foot is shown in the sketch.



A thin leather strap, A, $\frac{5}{8}$ in. wide, is fastened to the shank of the knob by the holding screw. The strap is then given two turns around the shank and connected at B to the lever with a piece of wire. The wire C is held in place

with two staples, EE. The lower end of the wire is fastened to the foot lever D with a screw-eye, F. The foot lever is pivoted at G with a screw.—Contributed by C. H. Corner, Sedalia, Mo.

Working Aluminum

Aluminum is not worked as often as steel, wrought iron, cast iron or brass, and the average machinist does not know how to machine it. On all cutting except tapping, work the metal dry. Aluminum, like other cast metals, is lifeless; that is, long curling shavings cannot be taken off as with steel, but rather a shower of small chips as in cutting cast brass.

The metal is easily torn, especially in thread-cutting in the lathe, where, if not careful, the tool will dig in and rip out rough threads. In making fine, smooth threads, take several light finishing cuts. For a nice surface finish, either in a lathe or planer, use a broad tool, but with a light cut, and employ the same caution as in thread-cutting to prevent digging and tearing the metal. Aluminum can be cut as fast as brass.

ⓄWhen winding a small rope into a ball, wind it from the bottom out and over the top toward you and the rope will not twist into knots.

Driving Nails in Brick Walls

The accompanying sketch shows a device which was successfully used in a building where a large number of spikes had to be driven into the brick-work.

A piece of hardwood was dressed square and rounded off at one end to form a handle. Holes to receive different sized nails were drilled in a line through the center of the square part. The block was then sawed through so as to cut the holes in half and a large



Nail Holder

strap hinge screwed to the back and bent over the sides. A ring made of a piece of pipe was slipped over the handle to hold the parts together. If necessary, different sizes can be made for use successively as the nail is driven. —Contributed by L. M. Eifel, Chicago.

A Mixing Stick

The mixing stick shown in the sketch has better stirring qualities than the usual variety, because the V-shape formed by the two flat pieces of wood draws the liquid to one point in the center and forms two spaces behind the stick when it is kept in motion. The liquid flowing through the opening between the sticks comes in contact with that passing around the outside, thus



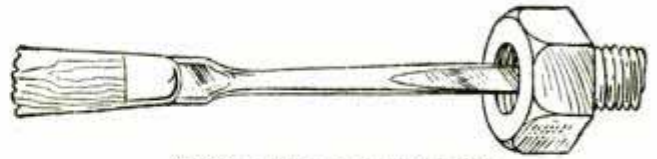
Double Stirring Stick

causing the unmixed portions to come together from both sides.

The handle part is made from a square block of wood turned on one end for a handhold. Two strips of wood are nailed or screwed to the sides of the square at right angles, allowing a space of $\frac{1}{2}$ in. between them. —Contributed by F. G. Rempe, Oakland, Cal.

Removing Hot Nuts

In removing nuts from hot engines, hot boxes or other hot parts, the method shown in the illustration is the



Taking Nut on Screwdriver

one I use to hold the nut and keep it from falling into moving machinery. The nut is turned until it is almost off, then a screwdriver, scratch awl or a short piece of rod is placed against the head of the bolt and the nut is then turned off and on to the holding tool. —Contributed by Herbert H. Van Kerner, Baldwin, Kans.

A Tin Weather Strip for a Hinged Window

The sketch herewith shows a little device to prevent dust and soot from blowing in at the bottom of windows where the sashes are hinged at the top. It is made of tin, about $1\frac{1}{2}$ in. wide,

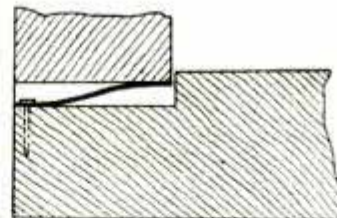


Fig. 1

Strip in the Casing

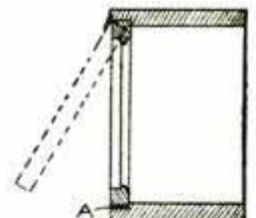


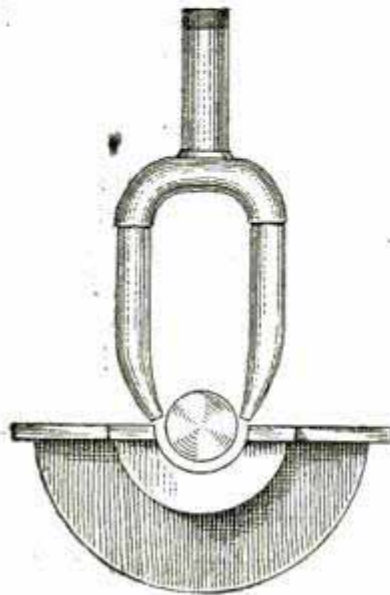
Fig. 2

bent in the shape shown in Fig. 1. Then it is nailed to the lower edge of the window sill. When the sash is closed, the tin will fit tightly against the edge, as at A, Fig. 2. If the sides are loose, the tin is used in the same way. —Contributed by Otto J. Kling, Youngstown, O.

☐ Where an annealed copper gasket fails to make a tight joint, try wrapping the gasket with heavy cord or wicking. Soak the wrapped gasket in valve oil. When the gasket is again inserted you will have a permanent repair.

Babbitting Automobile-Engine Bearings

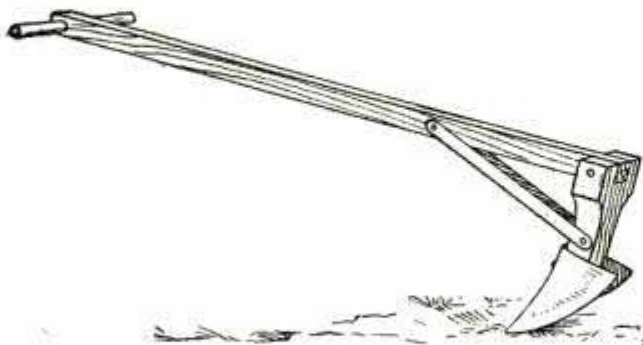
The main bearing on the crankshaft of an automobile engine is not easily accessible for rebabbitting. There is



no way to get to the bearing with a ladle of melted metal without taking the engine apart. I did not care to take the time for this, so I made a device from an old bicycle fork and used it as a gate for the metal. The fork was cut off to make it about 12 in. long and shaped as shown in the sketch. The fork must be heated so that it will not chill the metal. It is then quickly placed over the bearing as shown. The melted metal poured in at the top flows down the fork sides and into the bearing.—Contributed by Chas. Straughan, Sprague, Wash.

A Garden Plow

The hand plow stock shown in the sketch is made preferably of white oak,



Hand Plow

but any kind of hard wood will do. The shovel arm is fastened to the beam with a wood pin or iron bolt. Two braces of iron or wood are bolted, one on each side of and connecting the

beam and shovel arm. Several holes may be bored through the center line of the beam so that the draft of the plow may be regulated.

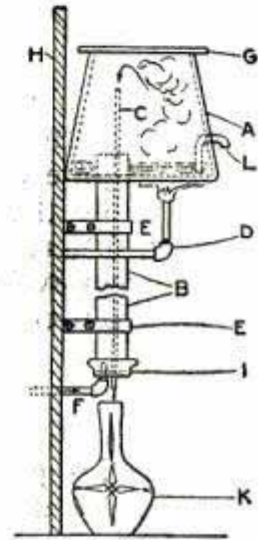
The shovel is fastened to the arm with a bolt. Shovel plows, or solid or winged sweeps may be used. A hole is bored through the front end of the beam and a wood handle inserted.—Contributed by R. A. Bryan, Corsicana, Texas.

Home-Made Water Still

The accompanying illustration shows a still made of pipe and fittings. The receptacle A has a 2-in. pipe, B, 24 in. long, capped on the lower end with its upper end extending into the receptacle about 1½ in. The cap I is drilled and tapped offset for two ¼-in. pipes. The ¼-in. pipe C is 30 in. long, and is threaded on its lower end so that it will extend through the cap I about 2 in.

The ¼-in. pipe F leads to the water supply and should have a valve for regulation. The receptacle A is covered with a metal plate, G. The opening L is for the overflow. The pipe D leading from the gas main is fitted with a burner for heating the receptacle A.

The whole apparatus is fastened to a back board, H, with bands of metal, E E. The water enters the pipe B at the bottom and rises to the receptacle A, where it is converted into steam. The steam is forced downward through the pipe C, where it is condensed by the surrounding cold water, and then drops into the receiving bottle K.—Contributed by R. H. Burdick, San Diego, Cal.



ⒸNever loosen nuts on a lathe with a hammer. Always use a wrench and do not set them so tight that it requires a blow to start them.

A Time Regulator for a Furnace

Anyone who lives in a cold climate knows how disagreeable it is to get up in the cold and start the furnace. A time regulator such as the one described in the following makes it possible to have the drafts turned on at any desired hour of the day or night, so that the fires may be banked for the night and yet have the house nice and warm when one is ready to get up.

Secure a piece of strap iron about $\frac{3}{8}$ in. thick by $\frac{1}{2}$ in. wide, with a length of about 14 in. Bend the top over at right angles so that the arm is about 12 in. long. Drill a hole at the lower end to receive the hook to which the chain is fastened. File a notch in one side, $1\frac{1}{2}$ in. from the bottom as shown. File another similar notch $2\frac{1}{2}$ in. above the first one.

Cut and shape two pieces of strap iron as shown at A, Fig. 1, and drill holes for screws. Shape a buffer, B, from a piece of hard wood and attach a rubber bumper which can be purchased at any hardware store.

Secure an ordinary alarm clock with a good strong spring on the alarm wind. The parts are attached to the back of the clock as shown in Fig. 1. The location of the tripping nail or

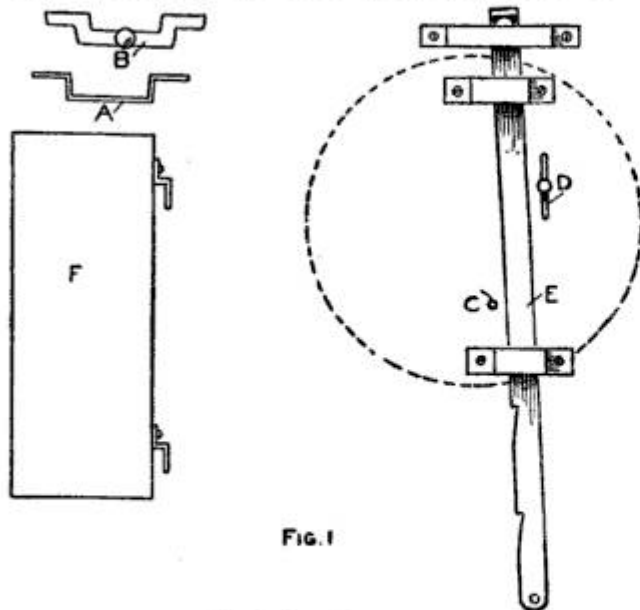


Fig. 1
Clock Attachments

screw, C, is to be determined by trial. It should be about $\frac{3}{4}$ in. above the top of the lower cleat. The alarm wind is

shown by D. When the bar E is set with one of the notches on the lower cleat, it remains in this position until

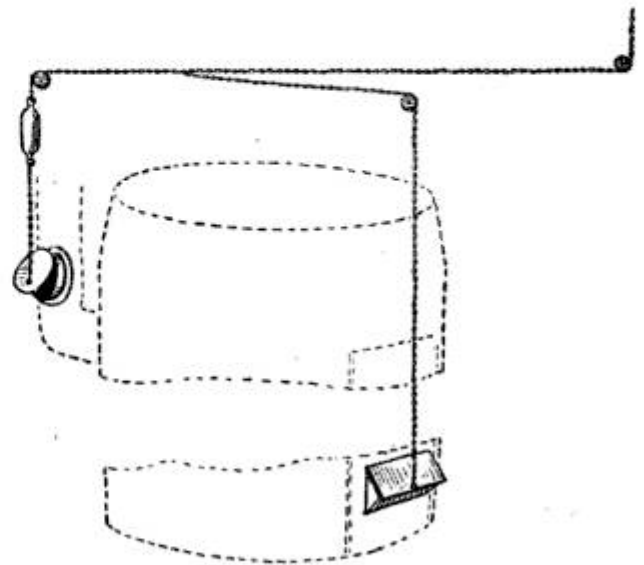


Fig. 2
Chains Attached to Furnace

the key D turns and pries it off by pushing it against the pin C. The dropping of the bar E releases the chains to the drafts of the furnace. Two brackets are soldered or screwed to the back of the clock as shown at F, Fig. 1, after the other parts are in place. These are for holding the clock in place when used on the time regulator and to make it easy to remove the clock. The brackets slip into staples placed in the wall where the attachments are used.

The chains are connected as shown in Fig. 2. When the lever is down, the weight in the basement opens the draft door. When the lever is in its highest position, the check is open; when in the middle position, neither draft nor check is on. In adjusting the chains, the lever should be placed in neutral position and both chains made taut. An ordinary window weight is used and it should be no heavier than is necessary to raise the draft door.

One loose bearing on a machine has a tendency to loosen others, causing knocks, loss of power and the crystallization of metal.

Ice Scraper on a Broom Handle

Packed snow and ice on steps and sidewalks cannot be removed with an ordinary broom, and I made an attach-

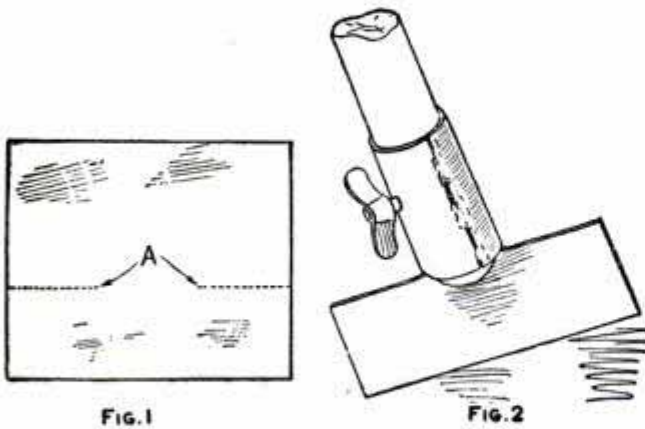


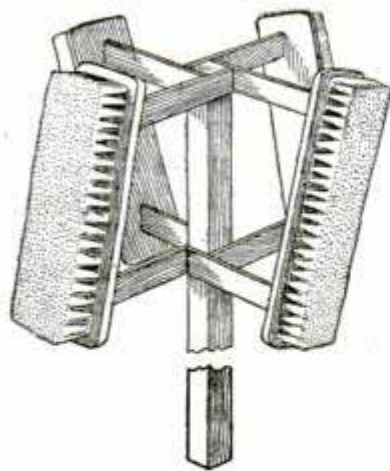
FIG. 1

Scraper on End of Broom Handle

ment for the handle, as shown in the illustration, so that I could have a scraper and broom combined. The scraper is made of a piece of sheet iron cut on the lines A, Fig. 1. The metal above these lines was bent around the handle and fitted with a setscrew, as shown in Fig. 2. When the scraper is not in use, it can be removed.—Contributed by C. C. Brabant, Alpena, Michigan.

Stovepipe and Stack Cleaner

The construction of this device for cleaning stovepipes and stacks will be



readily understood from the sketch. The center piece is $1\frac{1}{4}$ in. square, and on this are nailed eight 3-in. strips, $\frac{1}{4}$ by $\frac{1}{2}$ in. in thickness. These strips are so nailed on the center piece that the brushes when attached are set at a slight angle. For pipes or stacks of large diameter, the strips may be made longer.—Contributed by Maurice Baudier, New Orleans, La.

Cutting Threads with a File

Having to repair some farm machinery about 10 miles from a machine shop, we had to shorten a 1-in. bolt about 4 in. This meant cutting off the threaded part and making new threads on the smooth shank of the bolt. The only tools at our command were a vise and some files. The problem was solved in the following manner:

A piece of paper, about $1\frac{1}{2}$ in. wide, was cut so that the edges would meet when it was wrapped around the bolt. Eight threads per inch being the standard for a 1-in. bolt, the paper was laid out in eighths, as shown in Fig. 1. It was then pasted around the bolt, as in Fig. 2, the thread being correctly indicated by slipping one edge of the strip forward one division.

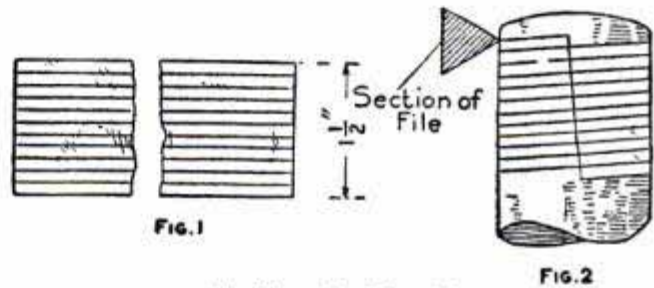


FIG. 1

FIG. 2

Marking the Threads

The threaded end of the bolt having previously been cut off, the new threads were cut by following the lines on the paper with a three-cornered file. The depth of the threads was tested by following the file with the nut as the threads were cut.

The thread thus made was not comparable with one made by the dies, but it was good enough to answer the purpose.—Contributed by Arthur D. Johnson, Philadelphia, Pa.

Self-Heating Soldering Iron

A soldering iron that carries its own heating device on the handle, shown in the sketch, is useful for the trouble man, as it can be made small enough to be carried in the pocket, also it is a useful household tool.

No dimensions are given as the size may be determined by the conditions.

The only caution is not to place the pan too far from the copper. The copper can be used from an old soldering-iron or one of the proper size may be purchased. A small rod is threaded on both ends, one end having sufficient length of threads to hold the copper and also a small pan. The pan is made of a cover from a baking powder tin which is filled with asbestos and covered with wire gauze, then placed on the rod back of the copper and fastened in place with a nut on each side.

The handle part may be made of wood, but to have the whole iron self-contained, it should be made of a small screw-top can for holding the fuel fluid. A can such as used for holding metal polish makes a good container. A hole is cut in the screw top to admit the threaded end of the small rod and is held in place with two nuts between which a leather washer is placed to prevent any leaks.

The copper is heated by placing a small quantity of the heating fluid—preferably denatured alcohol—in the pan and lighting it while the whole device stands in an upright position. A sufficient quantity of alcohol burned



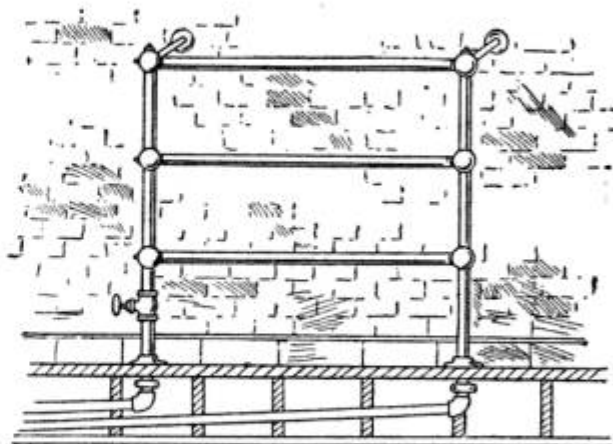
Heating Attachment

in the pan will heat the copper.—Contributed by Clarence A. Anderson, Halifax, N. S.

Heated Towel Rails

A fixture of considerable utility in the bathroom, and one that can be made to have an exceedingly attractive appearance, is the heated towel rail; yet it is one that has been almost entirely overlooked by plumbers, says the Metal Worker. The ordinary bent tube as a convenience for hanging towels upon is good enough, but the comfort and convenience of always having warm and dry towels in the bathroom are obvious.

The illustration shows a rail made of nickel-plated brass tube, $1\frac{1}{4}$ or $1\frac{1}{2}$ in. in diameter. The tees are of an ornamental design and the wall and floor



Rails Connected to Steam Main

flange connections are provided for flow and return pipes. The connection to these are in the floor. The method of connecting a towel rail is identical with that of connecting a radiator, and there is no trouble at all in heating it, if the position is such that a circulation is possible.

Milling in a Lathe

In an emergency, the lathe can be used as a milling machine on surface planing. Mount an arbor between centers on which cutters are placed and the lathe is converted into a milling machine for light work. The manner of holding the piece to be worked depends on its shape. Sometimes a vise can be bolted to the cross slide and the work clamped in it, and sometimes work can be bolted to the cross slide by means of the tool-post slot. The feed is taken by the cross-feed screw.

A limited class of work can be bolted to the lathe parallels. This method is suitable for work requiring not a cross feed, but a feed up and down, which is obtained by means of the rise-and-fall carriage of the lathe when the latter is so constructed. Keyways of considerable length have been milled in the lathe by feeding the full length of the cross screw and then resetting the work. Very good work can be accomplished rapidly with a little practice.

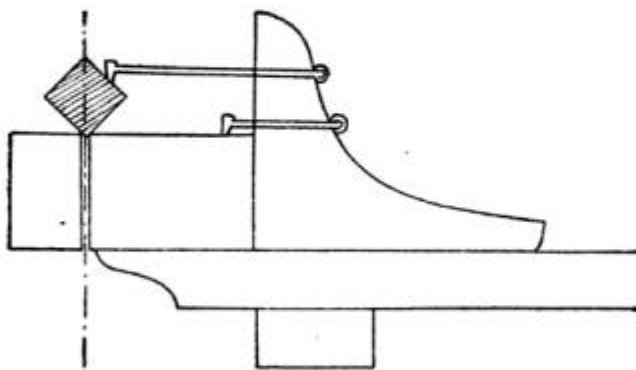
Clip for Holding a Trapdoor Open

A clip used in the place of a hook for holding a trapdoor open is shown at A in the sketch. It consists of a piece of strap iron, B, nailed or screwed to the wall or support. The screw or nail is set in just far enough to allow a space for the width of the door and the thickness of the strap iron. This device is much better than a hook

as it will not shake loose if the door is disturbed by the wind or given a jar from a bump of a box or other article.—Contributed by E. A. Rauchschwalbe, Milwaukee, Wis.

Cutting Three-Cornered Pieces in a Sawmill

An order came into our sawmill for a large number of timbers to be sawed with three faces. Such a large num-



Holding Pieces to be Sawed

ber of pieces to be cut in an ordinary sawmill presented quite a problem. The sketch shows a clever way we

used to get the work out. The view is in section and the dotted center line is the position of the saw. The ends of the large timbers on the carriage were held with double-ended dogs. Care must be taken not to run the carriage back too far as the dog in the end of the timbers is in the path of the saw.—Contributed by J. W. Bauholster, Gresham, Ore.

An Old Piston Used as a Pattern

It was necessary to have our gas-engine cylinder rebored and a new piston made to fit the enlarged diameter. As it would have taken considerable time to procure a new piston casting from the manufacturers, and not wishing to pay the price of a pattern, we decided to use the old piston as a pattern. This was done as follows:

The ring grooves were filled in with wood, which was driven in tight and smoothed off flush with the outside of the piston.

Three layers of thick rubber packing were used to increase the diameter and

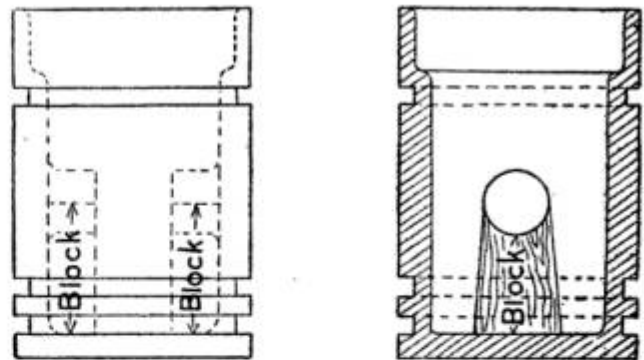


FIG. 1

FIG. 2

Old Casting Used for a Pattern

allow material for finishing. The packing was put on with shellac, and twine was wound around the outer layer to hold it in place while drying.

Under each of the connecting-rod-pin bosses, a block of wood was fitted as shown in the sketch. This made it possible for the molder to "lift" or "cope" out the inside of the piston and fill in the voids left by the blocks, using a loose boss to "make up" any deficiencies.—Contributed by Joseph A. Shelly, Brooklyn, N. Y.

A Method of Handling Liquid Manure

One of the hardest and most disagreeable chores on a dairy farm is handling the manure, from the cleaning of the barn to the final disposal of it on the land. How to lessen this labor, is a problem to which many dairymen have given considerable thought, as well as to save all or most of the fertilizer. A plan which proved successful to a correspondent of Hoard's Dairyman is given as follows:

We first dug a cistern outside of the barn where all the gutters would open directly into it. The cistern was made 16 ft. deep, 11 ft. wide and 30 ft. long, and is used for 30 cows winter and summer. If

we were to make any change we would make it larger, as the longer the manure remains in it, the more liquid it becomes and the easier it is to handle. This size would be ample if cows were not stabled in the summer, and works very well as it is, but we would recommend 30 cu. ft. per cow each month the cows are stabled during the year.

Into this pit all manure, both solid and liquid, is pushed with a shovel, care being taken to keep the hay and bedding out of the gutters as much as possible. If the gutters have a slope toward the pit, it will be some advantage.

We used a 2-in. centrifugal pump to which was attached a 3-in. inlet pipe and a 2½-in. outlet. Such a pump will pump anything resembling liquid. This will pump a load in 2 or 3 minutes. A 2½ or 3-in. size is preferable, as it is not so likely to clog with the hay and trash that are so liable to get into the cistern.

The inlet pipe extends almost to the bottom of the pit and is fitted on that end with a plain sliding gate valve operated by a rod which extends up

where it can be lifted with the hand. When the pump is in motion, the gate can be raised and the pump will operate. The gate must be closed before the pump is stopped or the pump will lose its priming.

The inlet pipe is placed inside a curb

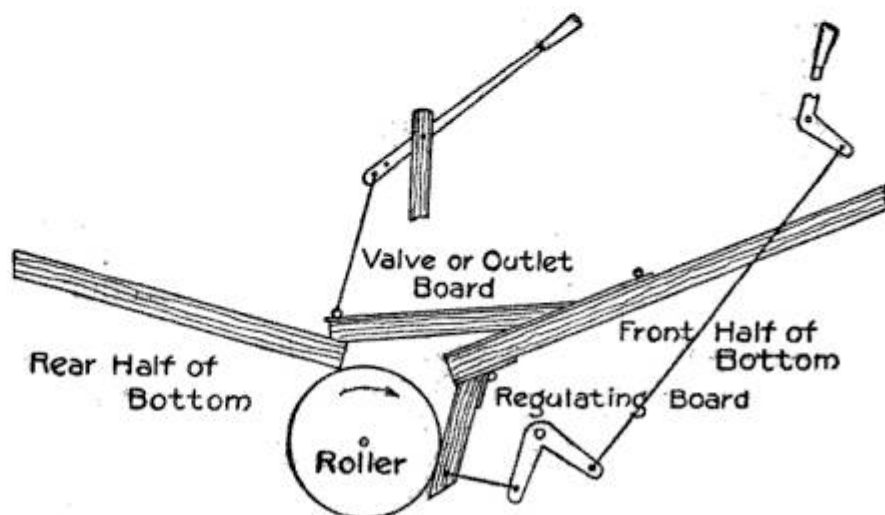


Diagram of Spreader

3 ft. square made of boards 1 ft. wide and 16 ft. long. A piece of heavy galvanized sheet iron perforated with 1-in. holes 4 in. apart each way is used on one or more of the sides in place of a board. This arrangement is to keep back the hay and trash and let the manure through. It is necessary to use a long-handled rake on the outside of this screen to keep it clean and draw out the hay. It is convenient to have a tight-and-loose pulley arrangement on the pump so that the latter may be started and stopped without stopping the engine.

Water should be supplied to the cistern when the manure gets too thick to pump. The water should be applied where the rake is used. The longer the manure remains in the cistern the more liquid it becomes, so that if the pit is large enough, but very little water will be needed. It is not necessary or desirable ever to empty the pit or lower it more than enough to insure plenty of room at all times.

A tank for spreading the manure is made of lumber and put on a wagon. The bottom of this tank slopes from

each end to the middle with a pitch of 1 ft. in 4 ft., so the liquid will all flow to the outlet going either up hill or down. The front and rear portions of the bottom lack about 4 in. of meeting in the middle, so there is an opening 4 in. wide extending across the whole width of the bottom, over which is hinged a board that can be raised with a lever from above. When this board is down, no liquid will flow out.

A 6-in. roller is placed under the rear edge of this opening with its top touching the bottom board. A board is

hinged to the under side of the front edge which swings up against the front of the roller and is controlled by a lever to regulate the flow of the manure as desired. When the valve or outlet board is raised, the manure flows in the V-shaped space between the regulating board and the roller. The roller is made to revolve forward by a chain from a sprocket wheel on the rear wheel of the wagon, and by so doing keeps the space between itself and the regulating board clear, and the liquid will flow out in a solid sheet.

A Cistern Strainer

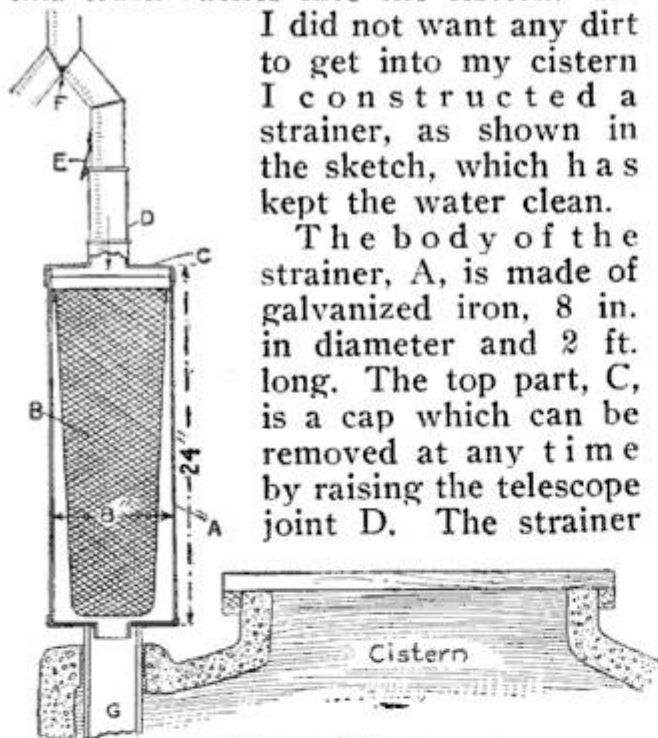
The first dash from a shower on the roof of a house carries with it all dirt, soot, leaves and branches. If the cut-out valve in the pipe is forgotten all this trash rushes into the cistern. As

I did not want any dirt to get into my cistern I constructed a strainer, as shown in the sketch, which has kept the water clean.

The body of the strainer, A, is made of galvanized iron, 8 in. in diameter and 2 ft. long. The top part, C, is a cap which can be removed at any time by raising the telescope joint D. The strainer

important as the new water stirs up the old, and, if there is any overflow, most of the old water is forced out. If the cistern is made of concrete, the pipe G can be fastened into the top of the cistern.

A finer screen can be placed inside of the coarse screen B to hold finer particles of dirt. Most of the sediment which comes from soot and dirt blown on the roof will be found in the bottom part of the screen when it is taken out for cleaning.—Contributed by F. E. Dougan, Pawnee, Okla.



Filter on Cistern

part B is made of a fine quality of screen wire having about $\frac{1}{4}$ -in. mesh. The screen is made tapering with an iron band at the top to hold it in place. A band of iron is riveted to the shell A to make a shoulder on which to set the band in the screen.

The outlet from the strainer and inlet to the cistern, G, is a pipe that is as long as the cistern is deep. This is

Painting the Bathtub

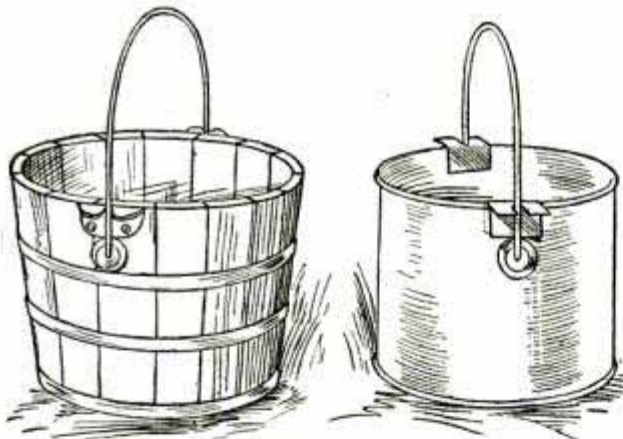
A very essential thing in painting a bathtub is to first clean it thoroughly. All old paint, if there is any, must be removed, and the surface sandpapered smooth. It may be necessary to use strong sal-soda water to get it right. When clean and perfectly dry, give it a coat of white lead in oil, mixed with equal parts of gold size and turpentine. Two or three coats should be given, says the Master Painter, allowing two days between each coat for drying. Lightly sandpaper each coat of paint. Now apply one or two coats of bathtub enamel, sold at the paint stores. Let this stand several days to dry. After this, a coat of enamel paint once or twice a year will keep the tub in fine appearance.

Labeling Barrels

Drug stores, oil cellars, chemical houses and liquor stores have many barrels and kegs from which the contents are taken from time to time and put into bottles. These barrels must be marked in some manner to identify each particular substance contained within. The ordinary way is to paste a label on each barrel as often as another is wanted. A much better way is to have an extra hoop securely labeled and which can be slipped easily over the top of the barrel.—Contributed by Jacob Zeithlin, New York, N. Y.

Bail Holders for Buckets and Pails

The devices shown in the accompanying sketch are made from small pieces of sheet iron and attached to the edge of the pail to hold the bail in



Bail Holder Attached

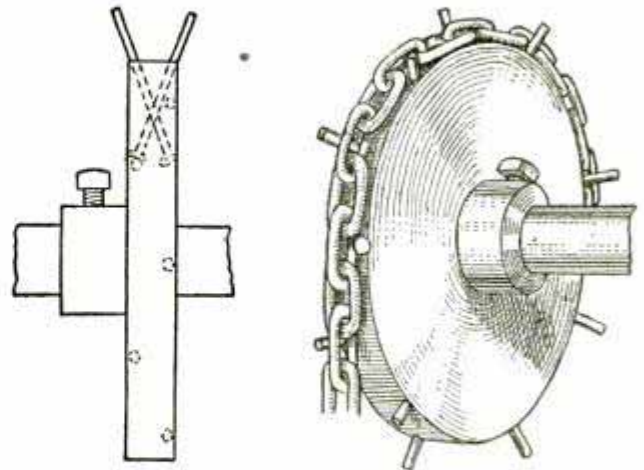
an upright position. The metal clip is fastened with screws to wooden buckets and clamped over the edge on tin pails. These clips are very handy for paint, glue and paste pails, to keep the handle clean.—Contributed by W. A. Jaquythe, Richmond, Cal.

A Temporary Chain Sprocket

The chain sprocket on an overhead traveling crane in a small foundry was so badly broken it could not be repaired. The sprocket was replaced in a quick and novel way as follows:

A pattern similar to a flange coup-

ling was used and spaced on its circumference by wrapping a tape measure on the face. These spaces were marked



Nails Used as Sprockets

on the mold before the pattern was drawn from the sand. Nails were placed in the sand on the marked divisions. The hole for the shaft was made $\frac{1}{8}$ in. larger than necessary so there was no machine work except to drill and tap the boss for a setscrew. This emergency repair was used until a better sprocket could be made.—Contributed by M. E. Duggan, Kenosha, Wisconsin.

A Double-Bladed Offset Screwdriver

An ordinary offset screwdriver is a handy tool in an unhandy place, but in such a place it is usually awkward to shift the screwdriver end for end after turning the screw each quarter turn. Recently I saw a double-bladed screwdriver which was an improved type of the offset kind. The advantages of this screwdriver is that to change grips it is only necessary to turn it over in the



Offset Screwdriver

hand, thus bringing the other blade into use.

The screwdriver is easily made by upsetting the end of a steel rod and filing the blades into shape as shown in the sketch, then hardening and tempering to a deep blue.—Contributed by Chester L. Lucas, E. Saugus, Mass.

Boiler Water Level Determined by Gauge-Glass Shadows

Under certain conditions it is impossible to tell by examination of the water glass whether a steam boiler is

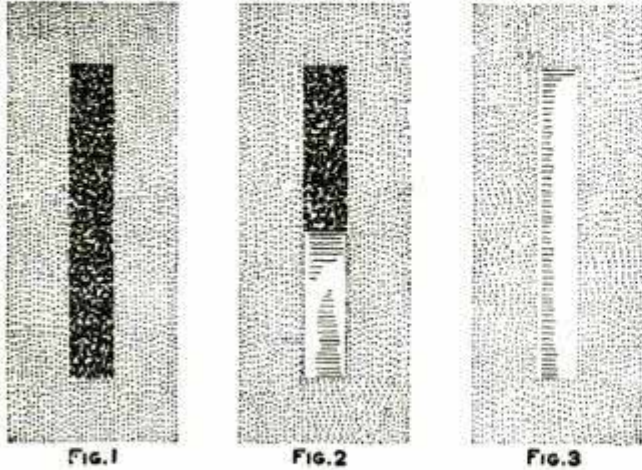


FIG. 1

FIG. 2

FIG. 3

Shadows from the Glass

full or empty, particularly if the glass is dirty, as it has the same appearance for its entire length. The trycocks will, of course, show the condition, but there is another way: The shadow cast on the boiler by an empty glass will be similar to Fig. 1, a dark line; but with one partly full, as in Fig. 2, or a full water gauge, a luminous stripe, as in Fig. 3, will appear. The full tube concentrates the light like a condensing lens, while the empty tube absorbs part of the light and therefore casts a shadow. These conditions are best noticed at night when a single light always hangs in front of the boiler.—Contributed by James M. Kane, Doylestown, Pa.

Pulleys for Aeroplane Construction

If no lathe is at hand, a good way to make pulleys for aeroplane construction is as follows:



Take a piece of round hardwood (a fork or broom handle will do), and cut as many blocks (A) $\frac{1}{4}$ in. thick as

is necessary for the number of pulleys. Bore a $\frac{3}{8}$ -in. hole in the center of each block. Fill the hole with babbitt metal, B, and drill a hole, C, through the metal

to admit a pin for a bearing. Cut a groove for the rope in the circumference, as shown at D. The bearing support may be constructed of sheet metal to suit the place where the pulley is located.

Quick Practical Method of Centering

In general machine shop practice a quick way of centering a bar for turning purposes is always very desirable. This can be readily accomplished accurately without the use of tools; that is, dividers or center square, in the following manner: Place the bar to be centered, which may be round, square or hexagonal, in a vise, allowing the face of the end of the bar to set about $\frac{1}{8}$ in. below the top surface of the vise jaws, as shown in Fig. 1. Then place a rule, scale or any flat piece of metal of about one-half the diameter of the bar to be centered along the front jaw of the vise and scribe a line across the

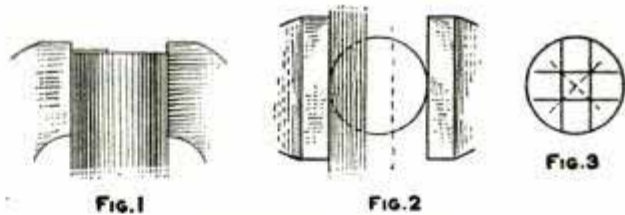


FIG. 1

FIG. 2

FIG. 3

Holding Shaft in a Vise

end surface of the bar. Then shift the scale or rule to the back jaw of the vise and scribe a second line across the end surface of the bar. This gives two lines close together and parallel. Turn the bar about one-half turn and fasten it in the jaws of the vise in the same manner as before, then draw a line across the end surface of the bar with the rule or scale resting on the front jaw and on the back jaw of the vise, as shown in Fig. 2. This will give two parallel lines crossing the first two at the center, as shown in Fig. 3. The small square formed by the four lines intersecting is exactly in the center of the bar. The center may be easily determined by the eye or two cross lines as shown by the dotted lines.—Contributed by Angel Afanador, Indianapolis, Ind.

Combination Square and Handsaw

The sketch shows how to make a handsaw serve the purpose of a square, a scratch-awl holder and a rule. Another addition of a square and protractor can be attached by drilling a small hole in the saw blade close to the handle and inserting a machine screw to hold a piece of metal having its sides planed smooth. A thumbnut is used on the bolt for convenience. These parts are shown in Fig. 1.

Place the saw on a board with the smooth surface of the metal guide against the edge of the board and mark on the saw positions for the attachments such as 45 and 90 deg., as shown

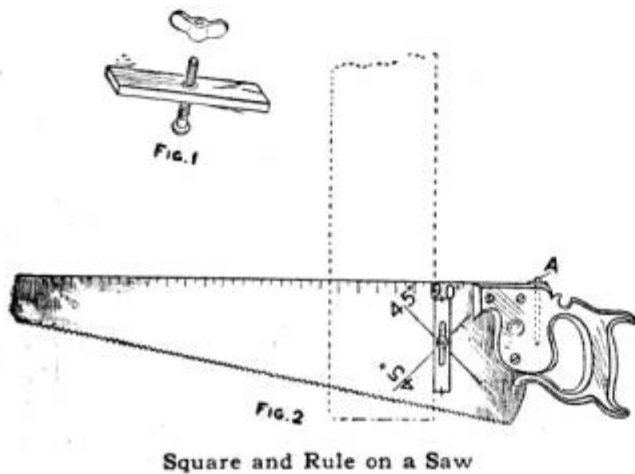


Fig. 2
Square and Rule on a Saw

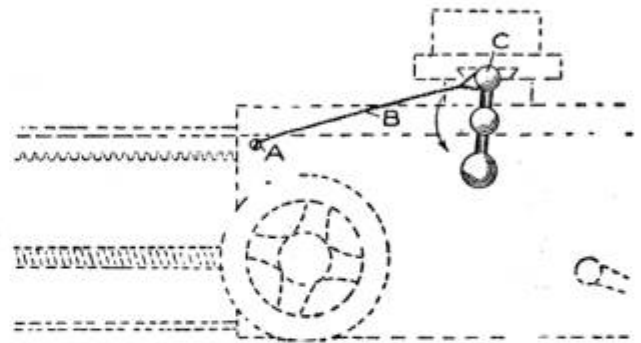
in Fig. 2, using a square or protractor to get them accurate. The straight-edge of the saw is marked the same as a square.

A hole is drilled in the handle at A for the scratcher. The scratcher must fit snugly in the handle to keep it in place. It may be necessary to use a red-hot wire in making the hole, for the purpose of getting it small enough. —Contributed by A. P. Connor, Washington, D. C.

An Aid to Cutting Threads in a Lathe

A small hole is drilled and tapped for a screw, at A, in the apron of the lathe. One end of a chain, B, is fastened to the screw A and looped at the other end to slip over the handle C. The length of the chain from A to C must be just long enough to allow the

crank to be rotated a little more than a half turn. The swing of the handle being limited, the feed will be always



Gauging Depth of Cuts

the same. The handle is at the top in the position shown, when the tool is cutting; it is turned around to the bottom position for backing up to take another cut. The additional depth of cut is obtained with the compound screw feed, which is set anywhere inside of an angle of 30 deg. either side of straight across. —Contributed by C. R. Poole, Los Angeles, Cal.

Repairing Rubber Shoe Heels

If a rubber heel is worn as shown in Fig. 1, cut a leather wedge the shape of the worn place and put it between the shoe and the rubber heel, as shown in Fig. 2. In Fig. 3 is shown the wear

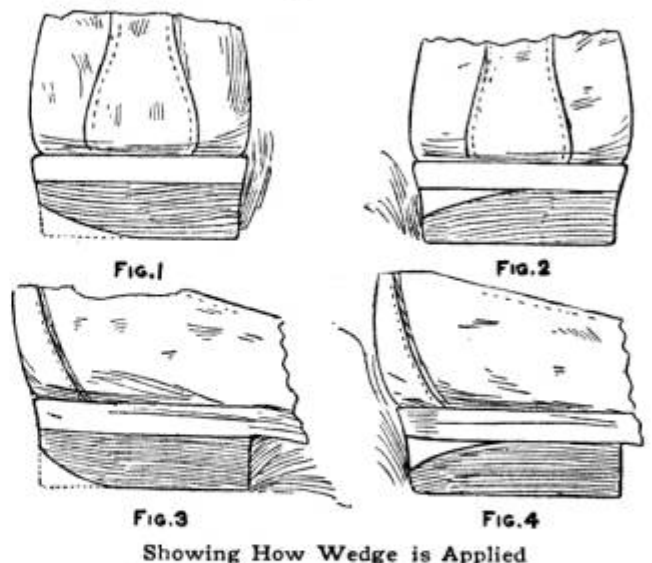


Fig. 3 Fig. 4
Showing How Wedge is Applied

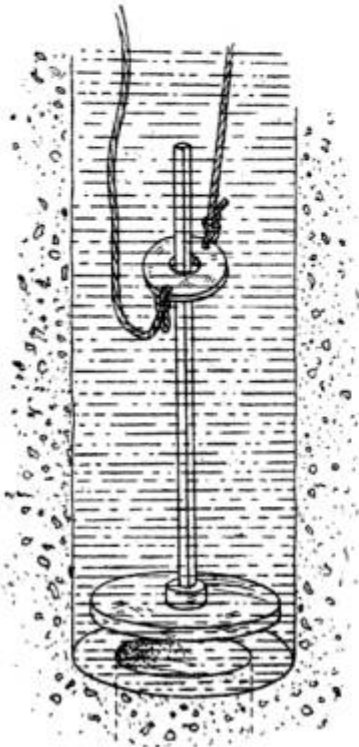
on the rear part of the heel, and in Fig. 4, the method of applying the wedge. —Contributed by Walter W. White, Denver, Colo.

Lifting a Gate Covering from a Penstock

The lifting of the gate covering as shown in the sketch not only applies to this one article, but

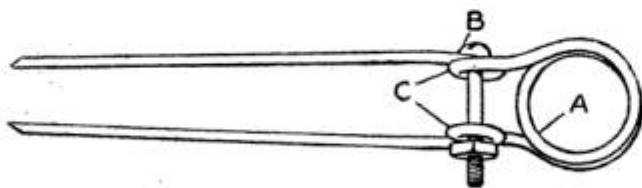
the method may also be used on similar articles in similar places. The lifting device consists of a large washer with teeth filed on the inner edges of the hole and the ends of a rope attached to each side as shown.

When the washer is held level it can easily be dropped over the article sought, then by slacking on one rope, the disk will tip and the teeth on its inside circumference will engage the article which can then easily be drawn up.



Home-Made Compasses

When an ordinary compass is not at hand a very good substitute can be made of a piece of wire, as shown in the sketch. The wire is given a two-turn coil, A, and then each end is given a



Compass Made of Wire

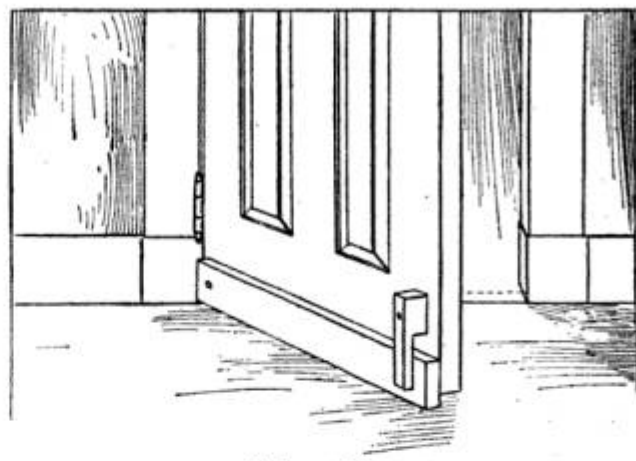
coil, C, to form a loop around the stove bolt, B. The two extending ends are pointed.—Contributed by Geo. Madsen, Chicago.

Preparing Calcimined Ceilings for Wallpaper

A size made of vinegar with a little paste added to give body and make it easy to apply kills the lime in the calcimine. The component parts of this size are things found in every household, and when the solution is applied to the calcimined surface, it dries quickly.—Contributed by Thos. F. Williams, New Bethlehem, Pa.

Automatic Weather Strip for a Door

The floors of an old house I used for a residence were not very level, especially in the hall. The inside partition had settled, making the floor in the hall so much out of level that the outside front door and also the inside vestibule door did not fit close to the floor. There was an open space of about 2 in. on one side when the door was shut. Mats or pieces of carpet were kept against the door to keep out the cold air. When the door was opened, the mats would



Strip on Door

cause trouble. I devised an automatic weather strip, as shown in the sketch, to take the place of the mats.

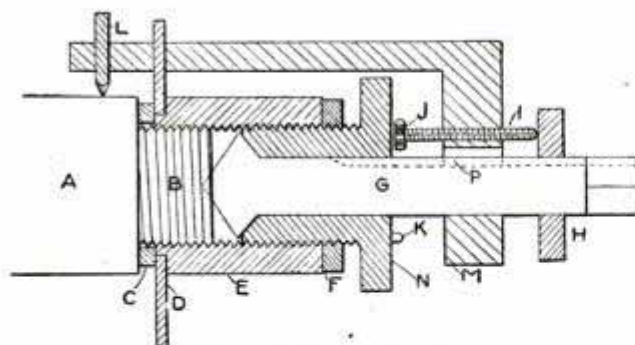
The strip was made of a piece of wood $\frac{3}{4}$ in. thick and 3 in. wide, with a length equal to the width of the door. One end was fastened to the door with a screw on the side near the high part of the floor, in this case the hinged side of the door. A piece of wood was cut out and fastened to the opposite side to act as a keeper for the strip of wood.

A piece of cloth was wrapped around the stick to make it close fitting and to lessen the noise when opening and closing the door. The movable strip would slip over the uneven floor and close the opening when the door was shut.—Contributed by R. Jocelyn, Toronto, Can.

Crankpin Truing Tool

The sketch shows a device for truing a crankpin without removing it from its place. The device is temporarily fastened to the crankpin A by turning it on the threaded end B. The washer C on the end of the socket E provides a groove for the metal piece D that holds the end of the cutter bar to prevent chattering. The main shaft G revolves in a bearing, N, which is screwed into the sleeve E.

The lock nut F sets the bearing N so the conical point on G will turn freely in the center of the crankpin A. The arm M is keyed loosely, at P, to the shaft G so that it will slide laterally. The feed is driven by a screw, I, having a six-winged knocker, J, which strikes on the pin K each revolution of the shaft. The collar H is shrunk tightly on the main shaft. The cutting



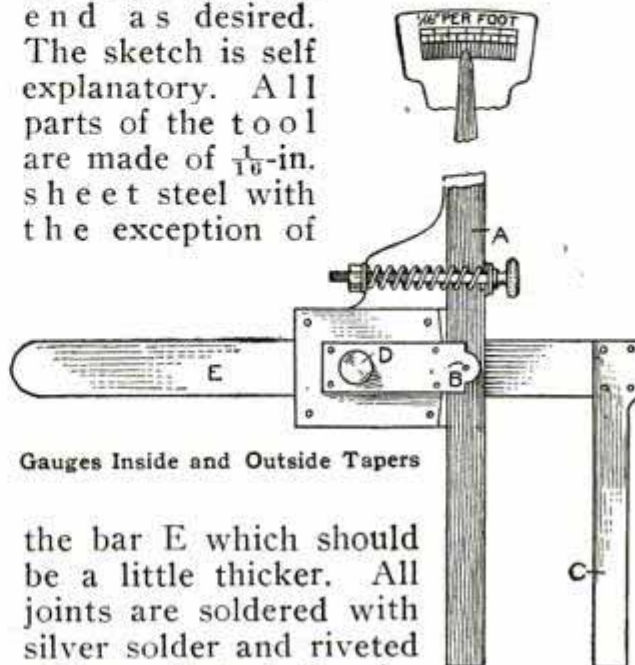
Details of Truing Tool

tool L is fastened into the end of the arm M with a setscrew. The shaft M may be turned with a flexible shaft or by hand with a crank. The method of truing the pin is obvious.—Contributed by Oliver S. Sprout, Harrisburg, Pa.

☐When lettering on a dark ground, add some aluminum bronze to a white or light paint.

A Taper Gauge

The tool shown in the sketch is one with which the user can ascertain immediately and accurately the taper of a hole, plug, keyway or the like, from the large or small end as desired. The sketch is self explanatory. All parts of the tool are made of $\frac{1}{16}$ -in. sheet steel with the exception of



Gauges Inside and Outside Tapers

the bar E which should be a little thicker. All joints are soldered with silver solder and riveted with small steel pins, for rigidity.

The measurements of the length of the pointer arm A from the swivel pin B to the pointer tip at the graduations should be exactly 6 in., and the graduations should be laid off very carefully to $\frac{3}{16}$ in. and engraved on the dial with a jeweler's small engraving tool. These measurements then give a direct reading of tapers in sixteenths of an inch per foot.

In selecting the zero or central point in the graduations, the blades A and C should be set perfectly parallel to each other, and the edges on both sides of each blade parallel, thus making the one reading dial correct for both inside and outside measurements when the pointer is set at zero. The tool may be used as a caliper square if so desired.

The swivel pin B passes through only the plate D and the pointer, and should be a very neat fit, as is also the case with the sliding head on the bar E. The neatness of these fits and the graduating of the dial are essential to the accuracy of the tool.—Contributed by L. S. Bunker, Vallejo, Cal.

Gas Engine Muffler Made of Funnel

A gas-engine muffler that will give good results and not materially affect the power of the engine is described

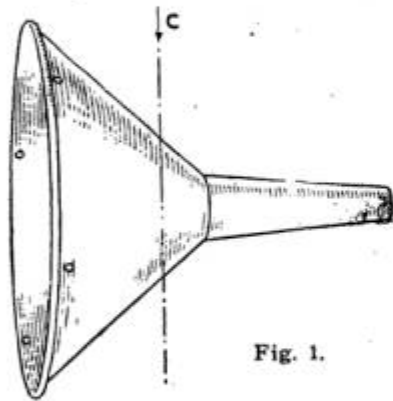


Fig. 1.

by a correspondent of the Automobile Dealer and Repairer. It is made from a number of funnels and a piece of 6-in. stovepipe. Procure funnels that are the right size at the large end and cut each one off on the line C, Fig. 1, or about the size of the opening in the exhaust pipe. Slip these cut-off funnels into the stovepipe B, Fig. 2, and fasten the bell ends with small stove bolts in about four places around the pipe.

In placing the funnels, they should be in such shape that the small end of any one comes in exact line with the opening of the next one, as shown by the dotted line C. Place the funnels in this manner until the entire length of pipe is taken up. The ends are made of floor plates threaded to receive the exhaust pipe from the engine. Turn the flange to fit into the end of the pipe as shown at A. Tap this to receive a number of machine screws to hold it in place.

In the exhaust end place the same kind of a plate and screw a short nipple into the threads. The funnels should be placed so that the holes at

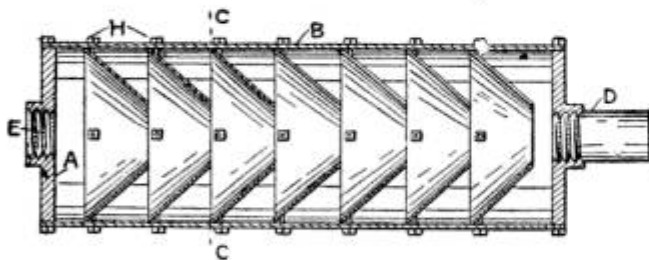


Fig. 2.—Funnels in Place

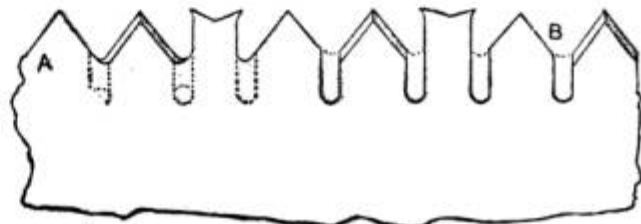
the small ends will be in direct line. This gives a straight line for the exhaust gases to escape and still deaden

the noise satisfactorily without the danger of the muffler becoming stopped up as sometimes happens with other kinds of silencers.

Many authorities claim that the muffler greatly lessens the effective power of the engine, but in making a brake test with a muffler made after the method described there will be found to be no appreciable change in power.

Metal Removed between the Teeth of a Crosscut Saw

An old crosscut saw having the teeth worn so that the spaces between them have entirely disappeared, can be made as good as new by drilling $\frac{1}{4}$ -in. holes at the depth desired for the spaces, as shown by the dotted lines A, and cut-



Notches Cut Between Teeth

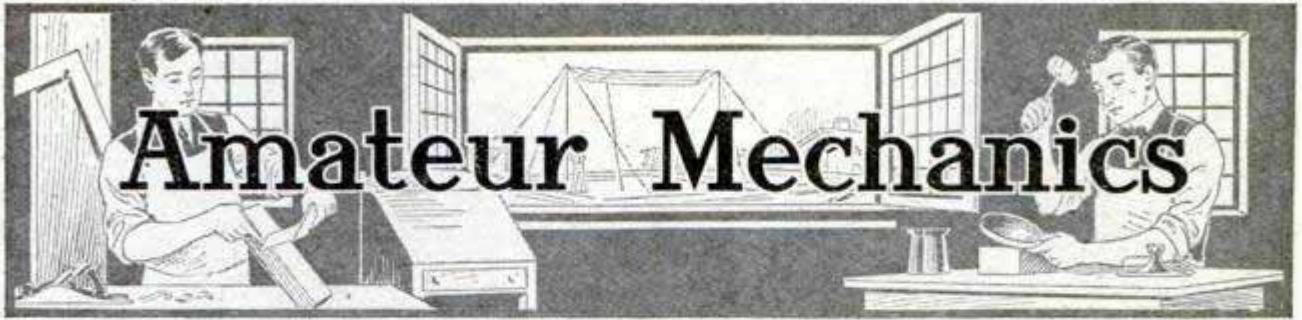
ting out the metal with a cold chisel. The finished openings between the teeth are shown at B.—Contributed by F. M. Warren, Central City, S. Dak.

Home-Made Tobacco Moistener

The man who smokes a pipe and has a hard time to keep his tobacco moist, can do so by placing a small piece of apple with the tobacco in the box. This will not only keep the tobacco moist, but will also add a flavor that is relished by many.

In a tobacco jar the apple may take the place of a sponge. It should be renewed occasionally and must not be allowed to become rotten.—Contributed by J. F. Campbell, W. Somerville, Mass.

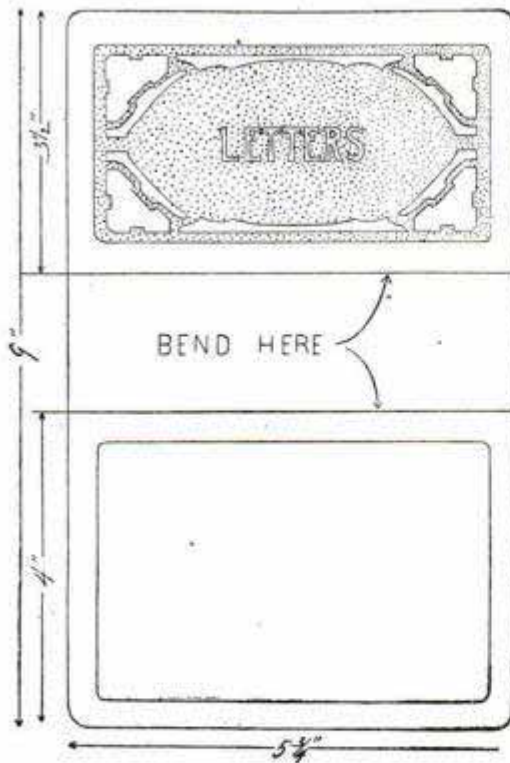
Ⓒ Never rebabbit a crank box without liberal liners in it to take up the wear.



A Letter Holder of Pierced Metal

The letter holder shown in the illustration will be found convenient for holding out-going letters that await the postman's coming. It can be made of either copper or brass and need not be of very heavy material. Gauge 22 will be sufficiently heavy. One sheet of metal, 6 by 9½ in., a board on which to work it, and an awl and hammer, will be needed.

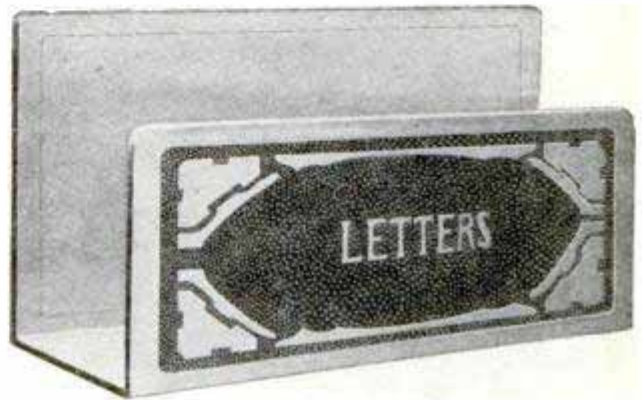
Prepare a design for the front. If one such as is shown is to be used, make one-quarter of it first, and then get the other parts by folding on the center lines and tracing. This will insure having all parts alike. The letters can be put on afterward.



Layout for the Metal

Fasten the metal to the board, using tacks and nailing outside of the required

space, in the waste metal. Trace the design on the metal with carbon paper;



Finished Letter Holder

or, if desired, paste the paper design right on the metal. With an awl pierce the metal between the marginal line and the design, as shown. The holes should be uniform along the outlines but should be pierced promiscuously otherwise. On the back, only the marginal line is to be pierced.

Remove the metal, together with the paper if the latter was pasted to the metal, and trim off the surplus metal where the tacks had been placed. File off any sharpness so that the hand may not be injured in handling it. Place the metal on the edge of a table or between two boards, and bend on the two lines indicated in the drawing, to right angles.

A good finish is obtained by just letting the copper age with its natural color. If any polishing is required, it should be done before the metal is fastened to the board and pierced.

CA detail drawing made of a piece of furniture before starting the work will often save time and mistakes.

An Electric Engine

The parts of this engine are supported on a base $\frac{3}{4}$ in. thick, 4 in. wide and 7 in. long. The upright B, Fig. 1,

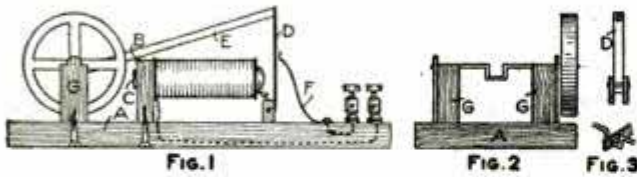


Fig. 1
Shaft Turned by Magnetism

which is $\frac{1}{2}$ in. thick and 3 in. high, is secured across the base about one-third of the distance from one end and fastened with a wood screw put through from the under side. The magnet core C is made of a carriage bolt, $2\frac{1}{2}$ in. long, which is fastened in a hole in the top part of the upright B so that the end C will protrude slightly. Before placing the bolt in the hole of the upright, slip on two cardboard washers, each 1 in. in diameter, one at the head end and the other against the upright B. Wrap a thin piece of paper around the bolt between the washers and wind the space full of No. 22-gauge magnet wire, allowing each end to project for connections.

The driving arm D, Figs. 1 and 3, is made of a piece of soft sheet iron, $\frac{1}{2}$ in. wide and 3 in. long. A small block is fastened to the lower end of the metal and pivoted between two uprights, $\frac{1}{2}$ in. high, which are fastened to the base. The uprights on each side of the block are better shown in Fig. 3.

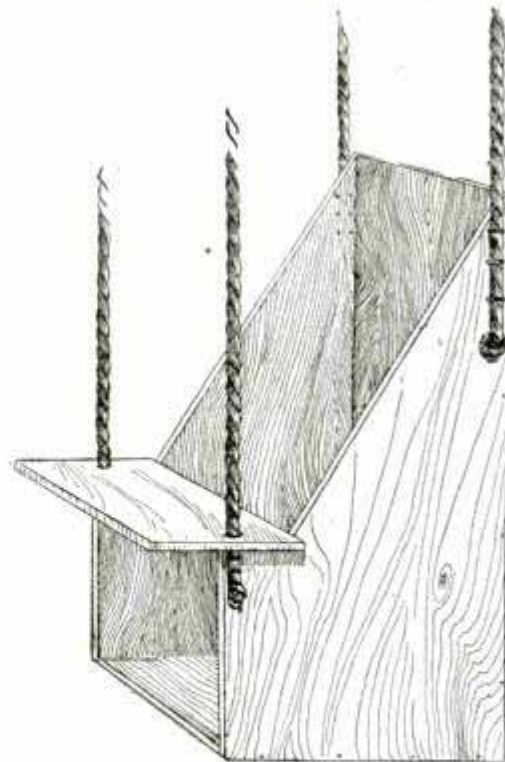
Two supports, each $\frac{1}{2}$ in. thick and 3 in. high, are fastened with screws about half way between the end of the base and the upright B, Fig. 1. The end view of these supports is shown in Fig. 2, at GG. A $\frac{1}{8}$ -in. hole is bored through the top part of each support so they will be in a line for the axle. The axle is made of a piece of steel $\frac{1}{8}$ in. in diameter and about 4 in. long. An offset is bent in the center, as shown, for the crank. A small flywheel is attached to one end of the shaft. The connecting rod E, Fig. 1, is made of wood and fastened to the upper end of the driving arm D with a small screw or nail. The contact F is

made of a strip of copper; $\frac{1}{4}$ in. wide. This is to open and close the circuit when the engine is running. The connections are made as shown in Fig. 1.

Connect two dry cells to the binding-posts and turn the flywheel. The current passing through the magnet pulls the driving arm toward the bolt head, which gives the shaft a half turn. The turning of the shaft pulls the arm away from the copper piece F, causing a break in the current. As the shaft revolves, the arm is again brought back against the copper strip F, thus the current is broken and applied at each revolution of the shaft.—Contributed by S. W. Herron, Le Mars, Iowa.

Child's Home-Made Swing Seat

A very useful swing or seat for children can be made from a box or packing case. Procure a box of the right size and saw it out in the shape shown in the illustration. The apron or board in front slides on the two front ropes. The board can be raised to place the



Made of a Box

child in the box and to remove him. The ropes are fastened to the box by tying knots in their ends and driving staples over them.

Home-Made Water Motor

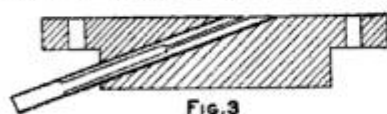
The small water motor shown in the illustration is constructed in the same manner as a German toy steam turbine. The wheel, which is made of aluminum $\frac{1}{8}$ in. thick and 7 in. in diameter, has 24 blades attached to it.

The lugs or extensions carrying the rim must be made from the metal of the wheel, therefore a circle 8 in. in diameter must be first described on the aluminum plate, then another circle 7 in. in diameter within the first and then a circle for the base of the blades, $3\frac{1}{2}$ in. in diameter. Twenty-four radial lines at equal distances apart are drawn between the two smaller circles and a $\frac{1}{4}$ -in. hole drilled at the intersecting points of the radial lines and the innermost circle.

Centrally between each pair of radial lines and between the two outer circles, $\frac{1}{2}$ by $\frac{3}{8}$ -in. lugs are marked out and the metal cut away as shown in Fig. 1. A $\frac{1}{8}$ -in. hole is then drilled in the center of each lug. Each division is separated by cutting down each radial line to the $\frac{1}{4}$ -in. hole with a hacksaw. Each arm is then given a quarter turn, as shown by the dotted lines in Fig. 2, and the lug bent over at right angles to receive the rim. The rim is made of the same material as the disk and contains twenty-four $\frac{1}{8}$ -in. holes corresponding to those in the lugs to receive brass bolts $\frac{1}{4}$ -in. long.

The disks PP were taken from the ends of a discarded typewriter platen, but if these cannot be readily obtained, they can be turned from metal or a heavy flat disk used instead.

The casing was made from two aluminum cake pans whose diameter was 8 in. at the base, increasing to 9 in. at the rim. The centers of these were located and a $\frac{1}{4}$ -in. hole drilled for the



shaft. The disks P are the same as used on the wheel. Six holes $\frac{1}{8}$ -in. in diameter were drilled through the flat part of the rims while the two halves were held together in a vise. Bolts were placed through

these holes to join the casing when ready for assembling. One side of the casing was then bolted to two 4-in. ordinary metal shelf brackets which were

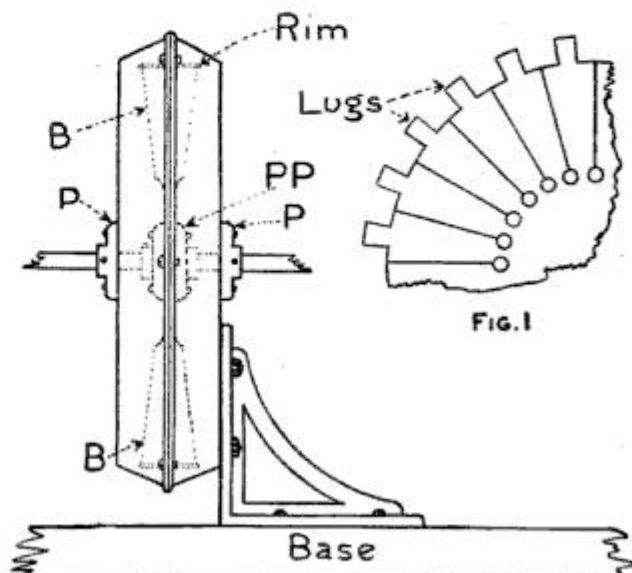


FIG 2
Details of Motor

screwed to a substantial wood base. This kept one-half of the casing independent of the main structure so that the wheel is easily accessible.

The nozzle was made of $\frac{1}{2}$ -in. brass pipe which was first filled with molten babbitt metal. When the metal was cool, a $\frac{1}{4}$ -in. hole was drilled halfway through the length of the tube, the hole being continued through to the other end by means of a $\frac{1}{8}$ -in. drill. The lower orifice was then slightly enlarged with a small taper reamer, and the upper portion of the bore was reamed out almost to the brass to make a smooth entrance for the water.

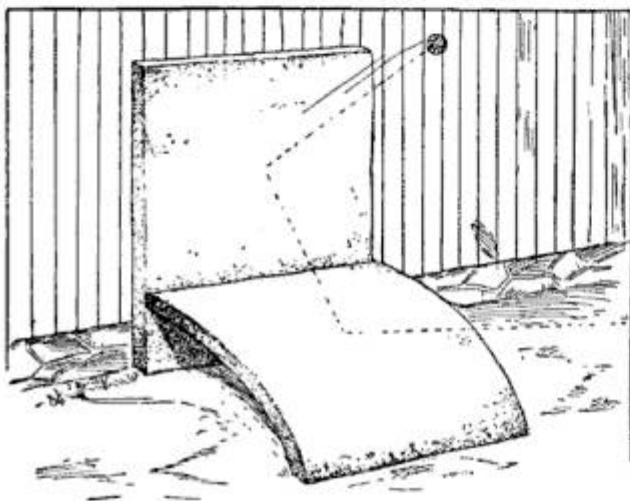
A fixture to hold this nozzle is shown in Fig. 3. It was cast of babbitt metal in a wood mold. The hole for the nozzle was drilled at an angle of 20 deg. to the plate part. An alternative and perhaps easier way would be to insert the nozzle in the mold at the proper angle and cast the metal around it. A hole was then cut in one of the sides of the casing at a point $2\frac{7}{8}$ in. along a horizontal line from the center. The nozzle fixture was then bolted on with

the exit orifice of the nozzle pointing downward and through the hole in the casing.

Six $\frac{1}{8}$ -in. holes were drilled through the flat portions of the rims while the two halves of the casing were held securely together in a vise. Bolts were used in these holes to join the casing.

Device for Baseball Throwing Practice

Anyone training to be a baseball player will find the device shown in the accompanying illustration a great help



Ball Bounding on Concrete Slabs

when practicing alone. It consists of two cement slabs, one flat and upright, the other curved and on the ground. The vertical slab is fastened securely against a fence, barn or shed. The barn or the shed is preferable, for if the slab is fastened to a fence, the ball will bound over a great many times and much time will be lost in finding it.

The player stands as far as he cares from the slabs and throws the ball against the lower slab. The ball immediately rebounds to the upright slab and returns with almost as great a force as it was delivered. If the thrower does not throw the ball exactly in the same spot each time, the ball will not rebound to the same place, consequently the eye and muscles are trained to act quickly, especially if the player stands within 15 or 20 ft. of the slabs and throws the ball with great force.

The wheel was used on the drip-board of a kitchen sink and no provision was made to carry off the spent water except to cut two $\frac{1}{2}$ -in. holes in the bottom of the casing and allowing the waste to flow off directly into the sink.—Contributed by Harry F. Lowe, Washington, D. C.

This apparatus also teaches a person to throw accurately, as a difference in aim of a few inches on the lower slab may cause the ball to fly away over the player's head on the rebound.—Contributed by F. L. Oilar, La Fayette, Indiana.

How to Mail Photographs

Cut a piece of cardboard 1 in. longer and 1 in. wider than the mount of the photograph and lay the picture on it in the center. This allows a $\frac{1}{2}$ -in. border on all sides of the photograph. Punch two holes 1 in. apart at A, B, C and D, Fig. 1, in the cardboard border close to the edge of the picture. Put a string up through the hole B, Fig. 2, then across the corner of the photograph and down through the hole C and up through hole D, then to E, etc., until the starting point A is reached, and tie the ends.

The photograph will not get damaged, if it is covered with tissue paper and placed with the face to the cardboard. The extension border of cardboard prevents the edges of the mount from being damaged and the corners

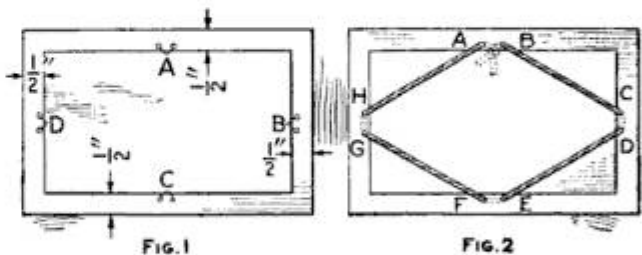


FIG. 1

FIG. 2

Back for Mailing Photo

from wearing. Both cardboard and photograph are wrapped together in paper, and the package is ready for mailing.—Contributed by Earl R. Hastings, Corinth, Vt.

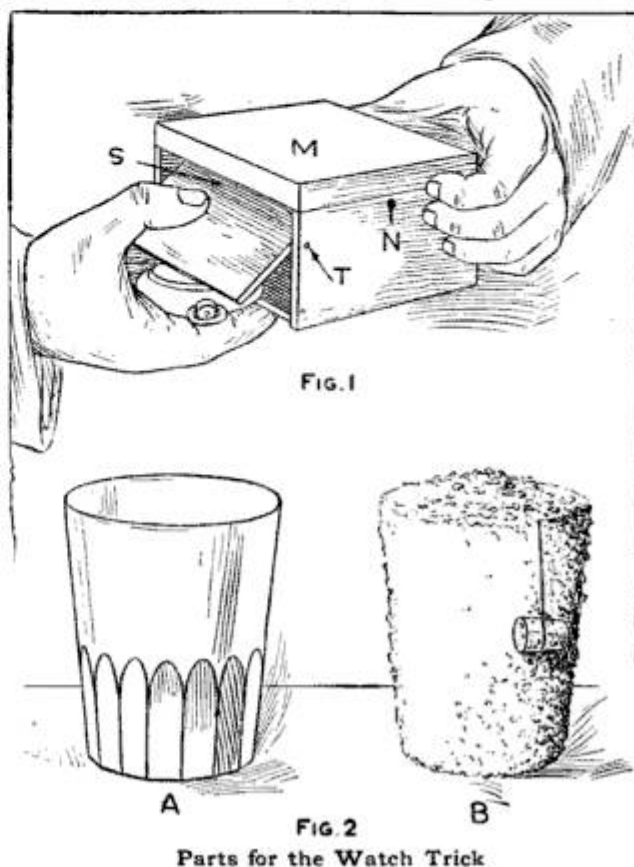
A Mystifying Watch Trick

Borrow a watch from one of the audience and allow the owner to place it in the box, as shown in Fig. 1. This box should be about 3 in. long, 4 in. wide and $2\frac{1}{2}$ in. deep, says the Scientific American. It should be provided with a hinged cover, M, with a lock, N. The tricky part of this box is the side S, which is pivoted at T by driving two short nails into it, one through the front side and the other through the back, so that when S is pushed in at the top, it swings around as shown in Fig. 1 and allows the watch to slide out into the performer's hand. The side S should fit tightly when closed, so that the box may be examined without betraying the secret. As the side S extends down to the bottom of the box, it facilitates the use of the fingers in pulling outward at the lower part while the thumb is pressing inward at the top part. The side of the box opposite S should be built up in the same way, but not pivoted.

Use a flat-bottom tumbler, A, Fig. 2, containing an inner cone, B, for the reproduction of the watch. The cone is made of cardboard pasted together so it fits snugly inside of the tumbler. The cone is closed except at the bottom, then bran is pasted on the outside surfaces to make the tumbler appear as if filled with bran when it is in place. Place the tumbler with the cone inside on a table somewhat in the background. Put some loose bran on top of the cone and allow the cork, attached as shown in B, Fig. 2, to hang down on the outside of the tumbler, away from the audience. A large handkerchief should be laid beside the tumbler.

After the watch has been placed in the box, Fig. 1, the performer takes the box in his left hand, and while in the act of locking it with his right hand secures possession of the watch as previously explained. Tossing the key to the owner of the watch, the performer places the box on a chair or table near the audience and, with the watch securely palmed, walks back to

get the tumbler. Standing directly in front of the tumbler with his back toward the audience, the performer



quickly raises the cone with his right hand, lays the watch in the bottom of the tumbler and replaces the cone.

The loaded tumbler and the handkerchief are then brought forward, and the former is placed in full view of the audience with the cork hanging down behind it. The performer calls attention to the tumbler being full of bran and picks up some of it from the top to substantiate his statement. He then spreads the handkerchief over the tumbler, commands the watch to pass from the box into the tumbler and the bran to disappear.

The box is then handed to the owner of the watch so that he may unlock it with the key he holds. As soon as the box is found to be empty, the performer grasps the handkerchief spread over the tumbler, also the cork tied to the cone. Raising the handkerchief, he carries up the cone within it, leaving the watch in the bottom to be returned to its owner.

Sharpening Skates with a File

Two methods are shown in the sketches for filing skates—one for hollow filing and the other for filing flat

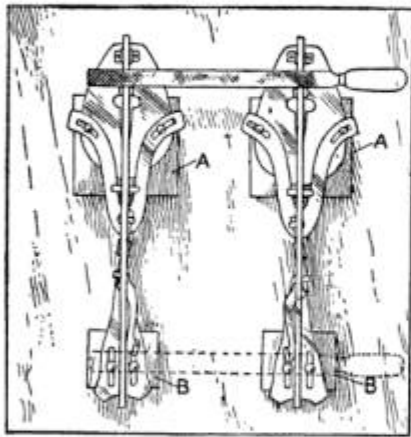


Fig. 1

Filing a Flat Surface

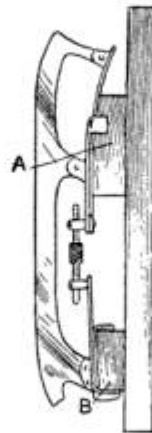


Fig. 2

and straight across the blade. The method shown in Figs. 1 and 2 is for filing the blade flat. The device for holding the skates consists of a board on which four blocks, AA and BB, are nailed. These blocks are fastened on the board in the relative positions of the heel and sole on a shoe. The skates are clamped on them in the same manner as on a shoe. A flat file is drawn across both blades of the skates as shown. After the roundness is cut down on the edges of the blades the skates are removed and the file is drawn along the sides to remove the

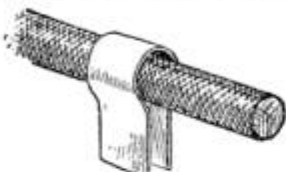


Fig. 3

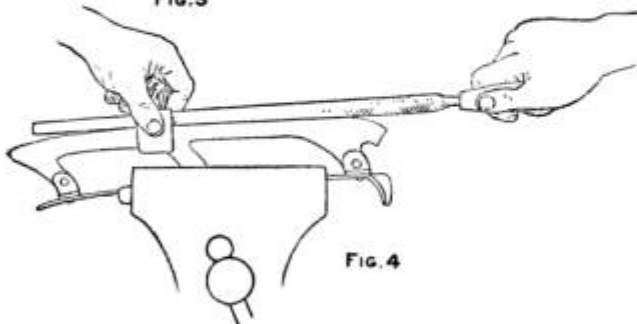


Fig. 4

Filing a Curved Surface

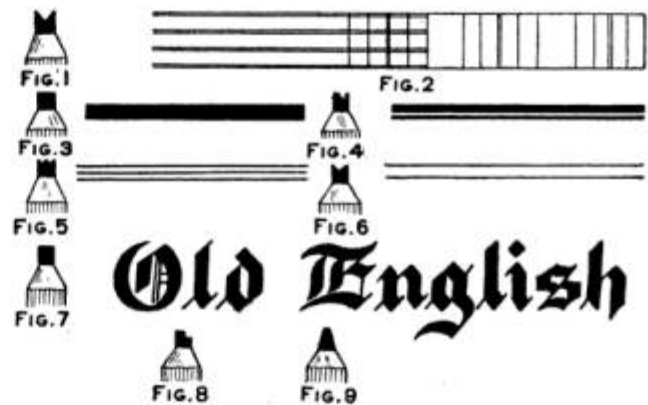
burr. Skates filed in this way have flat surfaces with sharp edges.

Some skaters like a hollow-ground skate and the method shown in Figs.

3 and 4 can be used for filing a slightly curved surface in the blade. A piece of tin or sheet metal is shaped over a round file as shown in Fig. 3. The manner of filing the curves is shown in Fig. 4. The piece of metal is held over the file and blade of the skate as the file is worked.

Lines and Letters Made with a Carpenter's Pencil

The sketch shows some unusual work made with a carpenter's pencil. If the flat lead is notched with a three-cornered file (Fig. 1), two parallel lines may be drawn at one stroke, or various rulings may be made, as shown in Fig. 2. Broad lines can be made, as shown in Fig. 3, or unequal widths as in Fig. 4.



Pencil Points and Their Work

In Figs. 2, 5 and 6 are shown lines especially adapted for the bookkeeper or draftsman. If one lacks the ability to draw old English letters with a pen, the letters may be first drawn with a carpenter's pencil (Fig. 7) and the outlines marked with ink and finally filled in. Narrow lines are made with points cut as in Figs. 8 and 9. A little practice with the carpenter's pencil in making these letters will enable the student to finally produce them with the pen used for the purpose.

Aluminum wire plunged hot into a cold solution of carbonate of soda becomes coated with a strong layer of oxide which forms an excellent insulator to electricity.

Wood-Working for Beginners

By IRA S. GRIFFITH

Chapter XIII—How to Make an Umbrella Stand

Typical Method of Laying Out and Working a Cross-Lap Joint

The umbrella stand (Fig. 81) and the other pieces that will be described hereafter are best made of quarter-sawed white oak. It should be purchased mill-planed to the desired thicknesses and should be well seasoned. Using the accompanying working drawing, Fig. 82, first make out a stock bill and then work the pieces to the sizes and shapes indicated. The back frame should be made first, then the bottom and front, next the sides and finally the pegs. The general directions for laying out duplicate parts as given for making the taboret apply to the making of this stand as well as to all other projects.

In the making of the back framework, a new joint has to be reckoned with, the cross-lap joint. Proceed as follows: Having squared up the pieces of the back to their proper sizes, measure from their ends the distance the nearer edge of the joint is to be and at this point square a sharp line across the edge. It is taken for granted that the pieces are to be worked in

point the location of the other edge. At this point square sharp knife lines across, using try-square and knife.

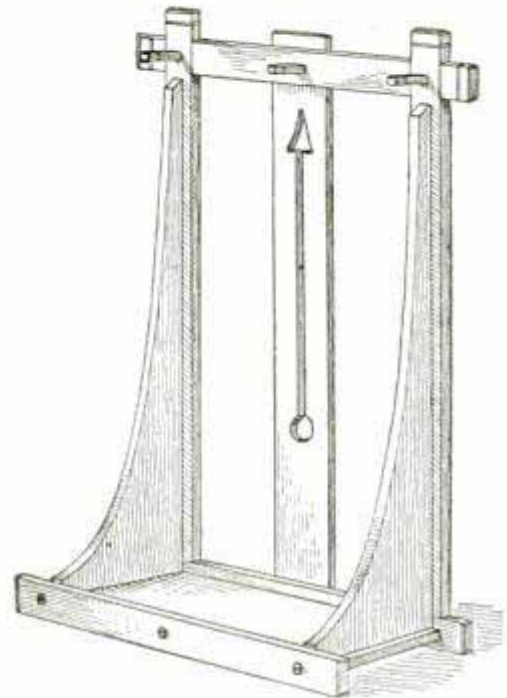


Fig. 81—Umbrella Stand

The pieces are to be so placed in the finished work that all the face sides shall be on the same side of the frame, therefore the cross lines will be on the face sides of half of the pieces but

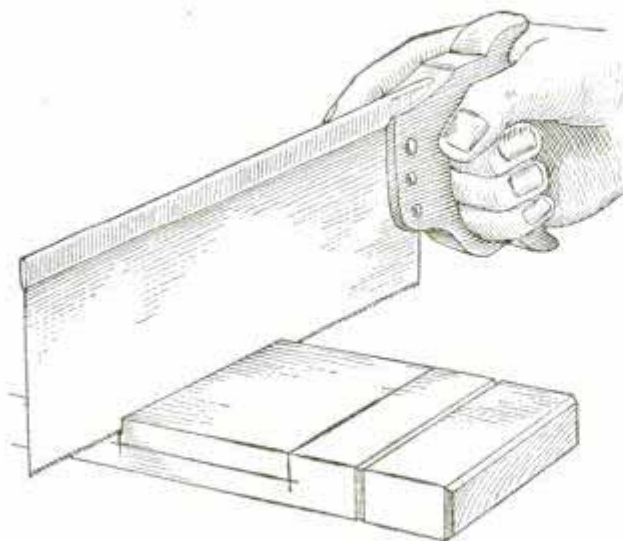


Fig. 83—Sawing on the Line

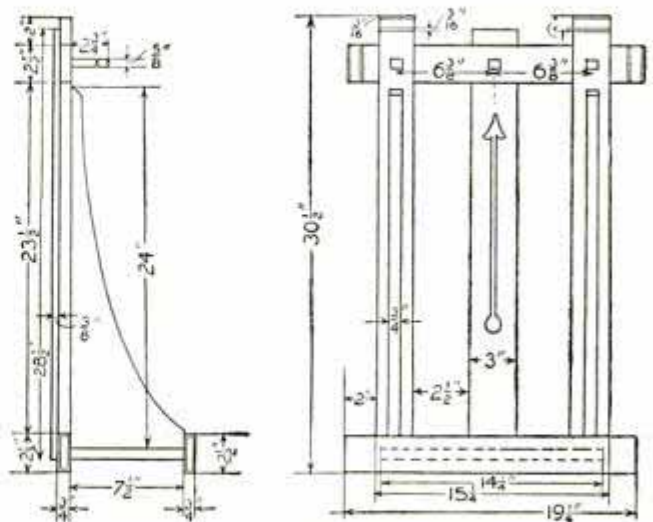


Fig. 82—Details of Stand

pairs. By superimposing one piece on the other, find and mark with the knife

across the back sides of the other pieces. It is well to lay the pieces in the posi-

tions they are to hold relative to one another in the finished piece and mark

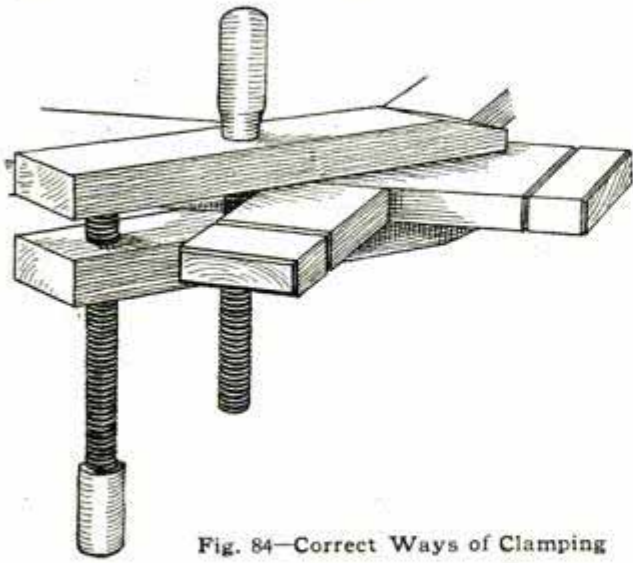


Fig. 84—Correct Ways of Clamping

the corresponding parts of the joints as was indicated in the making of the taboret. They may be marked temporarily with pencil marks but as soon as the joints are cut and the parts fitted, chiseled Roman numerals should be made in the bottoms of the grooves.

The parts of the cross-lap joint are to be laid out and the bottoms chiseled as was the dado of the taboret. Lines are carried across the broad surface where the groove is to be made, and down the two edges. Gauge lines between these knife lines, on the edges, indicate the depth. The gauge should be set to one-half the thickness of the piece. The same setting will serve all the pieces, but it is of the utmost im-



Fig. 85—Rotating a Clamp

portance that the head of the gauge be held against the face sides only of the

pieces. Beginners frequently think that because the groove is cut on the back side of some of the pieces that the gauging must be done from the back side. If the pieces were all of the same thickness, and the gauge set exactly in the middle of that thickness, no harm would be done. This is very seldom the case. If the head of the gauge is held against the faces, no harm can be done, for should the groove be gauged too deep on one part, the other part will have the groove correspondingly shallow and the faces will be even and smooth after the parts are assembled.

The sides of these grooves should be sawn exactly to the lines, the kerfs coming on the waste wood (Fig. 83).

The wood being hard, no more paring than is absolutely necessary to make the parts fit properly should be required.

A good cross-lap joint is one in which the parts fit snugly, yet not so tightly as to spring the pieces out of line. Having fitted

the parts, scrape the pieces and fasten the joints, using good hot glue and hand clamps.

Figure 84 shows the correct way of placing a hand clamp. Figure 85 illustrates the manner of rotating a hand clamp to open or close the jaws to the approximate setting. When the opening has been made, place the jaws, then tighten the shoulder spindle and after that the end spindle. In releasing a clamp, the end spindle must be released first.

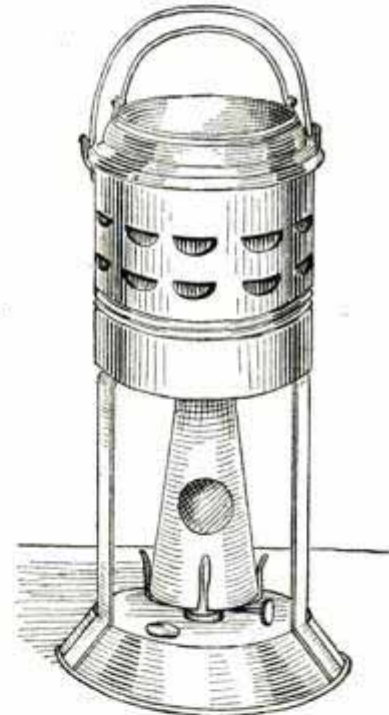


Fig. 86—Glue Pot

Hot glue is obtained by boiling chip glue in a double boiler, Fig. 86. In the outer boiler is water. The glue in the inner boiler is heated by the steam and hot water of this outer boiler. To prepare the glue, place the chips in the inner boiler and pour water over them so that they are just covered. Allow them to soak over night, then heat. Cabinet workers usually heat the wood too in cold weather, a warming oven of steam pipes being used.

While the glue is hardening, the

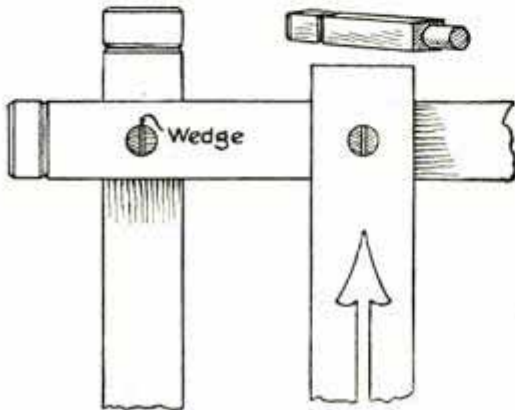


Fig. 87—Wedging the Pegs

other parts may be made. There is nothing requiring special instruction except, perhaps, the design. The arrow is merely suggestive. The one end is made by boring a hole through the slat. The shaft is cut with the ripsaw. The head is sawn with a coping saw or scroll saw.

Plane the pegs up in one piece. They are to be "let in" to holes bored into the frame. Use glue and in addition wedge the peg tenons from the back, Fig. 87.

By working the end pieces as in Fig. 88, lumber will be saved. Put the rest of the frame together by means of screws.

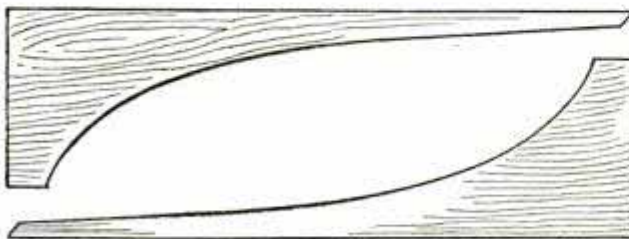


Fig. 88—Cutting End Pieces without Waste

A copper drip pan should be made for the bottom. The copper need not be

heavy since the tray is supported on all sides.

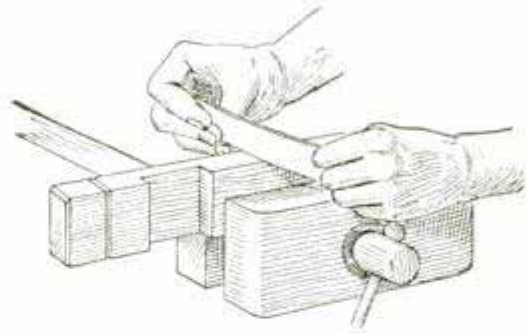


Fig. 89—Scraping

In this, as well as in making the pieces of furniture to be described later, it will be necessary to have a cabinet scraper for smoothing the surfaces. The mill-marks should be removed as far as practicable with the smooth plane. The scraper is to follow and will be found necessary where the grain is curled or crossed. There are special forms of holders for the scraper steels, but they are not necessary. Figure 89 shows a scraper in use. It may be either pushed or pulled. For a scraper to do good work it must be sharp, be held at the correct cutting angle* for the burr formed and be bowed by pressing with the thumbs so as to make the middle of the cutting edge cut first

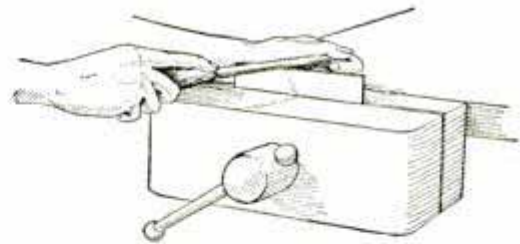


Fig. 90—Filing a Scraper

and most. A shearing cut is best and the stroke should be along the grain so that the hard grain may support the soft spring growth of wood.

When the scraper ceases to take off shavings, it should be sharpened. To do this: (1) Place the scraper in the vise and file the edge straight; it may be slightly rounded from end to end, if desired, and square across. (See Fig. 90.) (2) By means of the oil stone remove the wire edges and leave the edge of the scraper with good square corners. (See Fig. 91.) (3)

Again place the steel in the vise and using a burnisher, a smooth piece of

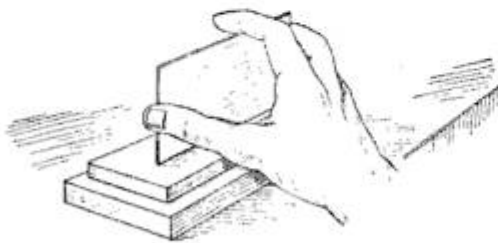
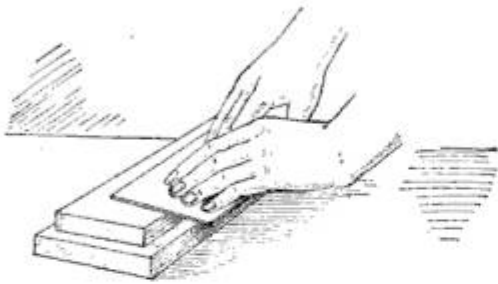


Fig. 91—Whetting and Removing the Wire Edge

steel, draw up the arrises, as in Fig. 92-A. (4) Now force the arrises down as in Fig. 92-B. The angle at which the scraper is to be held in cutting will depend upon the angle at which this

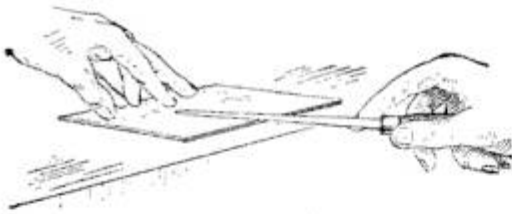


Fig. 92A—Flattening the Edge

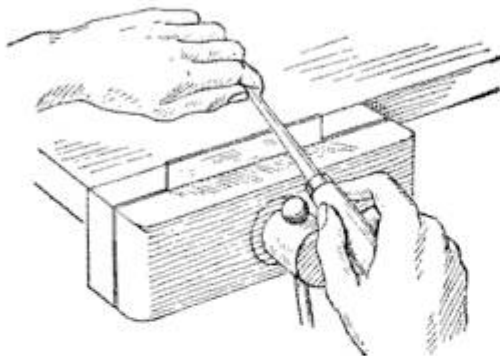


Fig. 92B—Turning the Edge

burr is formed with reference to the scraper's surface. It can be told only by trial.

(To be continued.)

Glue that is forced out of a mortise joint and allowed to become dry and hard can be easily removed with a sharp chisel dipped in oil.

Re-Inking Old Typewriter Ribbons

A solution of pure glycerine mixed with an equal part alcohol is prepared in a small deep pan, and to this is added any good dye or dry color of the shade desired. The best method is to add the dye and stir until it becomes incorporated with the alcohol and glycerine.

The old ribbons are soaked in this solution for at least 12 hours and then, by using one of the tiny wringers sold at toy stores, you can easily squeeze out all the surplus solution by running the ribbon through it. After the ribbon has dried, it may be smoothed out with a warm iron, but if you use care in the wringing process, this is not necessary.—Contributed by A. A. Houghton, Northville, Mich.

Imitating Ground Glass

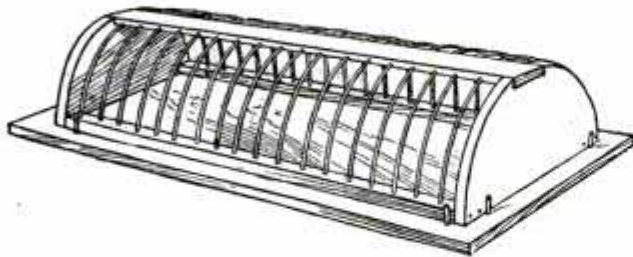
Make a mixture of white lead in oil, 1 part; varnish, $\frac{3}{4}$ part; turpentine, $\frac{1}{4}$ part, and add sugar of lead as a dryer. Make a very thin paint of this and use a broad, flat brush, says Master Painter. With care you may succeed in getting the paint on quite evenly all over, which is desirable. One coat will do. If it becomes necessary to remove this coating for renewal, it may be effected by an application of potash lye, or the old may be renewed by a coating of a mixture of 2 parts hydrochloric acid, 2 parts white vitriol, 1 part sulphate of copper (blue vitriol) and 1 part of gum arabic, applied by means of a brush.

Restoring Tone to a Cracked Bell

Many a bell with a deadened tone due to a cracked rim, can be given its original clear ringing sound by sawing out the crack with a common hacksaw. Make the saw cut along the line of the crack. The opening caused by the saw will allow the free vibration of the metal.—Contributed by F. W. Bently, Jr., Huron, S. Dak.

Feed Box for Chickens

The sketch shows the construction of a feed box designed to prevent the scattering of feed and give the coward



Chicken Feed Box

rooster as much chance to fatten as the game cock. The base may be made of a $\frac{1}{2}$ -in. board, 1 ft. wide and 3 ft. long, although any of the dimensions may be varied to suit special requirements. The ends are semi-circular pieces with a notch, $\frac{1}{4}$ in. deep and 3 in. wide, cut in the center of the rounding edge. The ends are connected together with a piece of wood set in the notches. The strip of wood is $\frac{1}{4}$ in. thick, 2 in. wide and as long as the box. Notches $\frac{1}{8}$ in. wide and $\frac{1}{8}$ in. deep are cut on the under side of this piece of wood, $1\frac{1}{2}$ in. apart. Heavy pieces of wire are bent in the form of a semi-circle, as shown. The wires are set in the $\frac{1}{8}$ -in. notches cut on the under side of the top piece of wood. The ends of the wires are set in holes in wood pieces joining the bases of the end pieces. The baseboard and top are separable.—Contributed by Maurice Baudier, New Orleans, La.

A Book Rest

A book that does not open flat is rather inconvenient to write in when one of its sides is in the position shown in Fig. 2. A wedge-shaped piece of

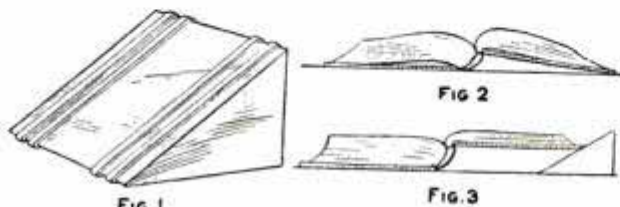


FIG 1

FIG 2

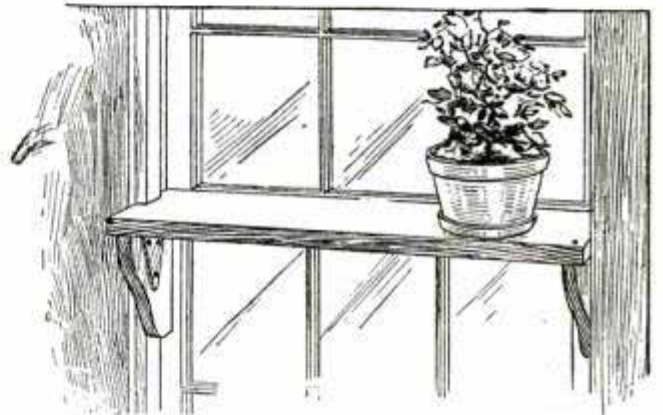
FIG 3

Book Back Holders

metal, stone or wood, as shown in Fig. 1, will, when placed as in Fig. 3, raise the sloping half to the level of the other pages. Cover the block with rubber, wide rubber bands or felt, to prevent its scratching the desk top. The block can also be used as a paperweight.

Window Shelf for Flower Pots

On the ledge formed by the top part of the lower sash of the window I fitted a board 7 in. wide into each side of the casing, by cutting away the ends. I placed a small bracket at each end of the shelf, so that it would fit solidly against the lower window sash to support the weight of the plants.



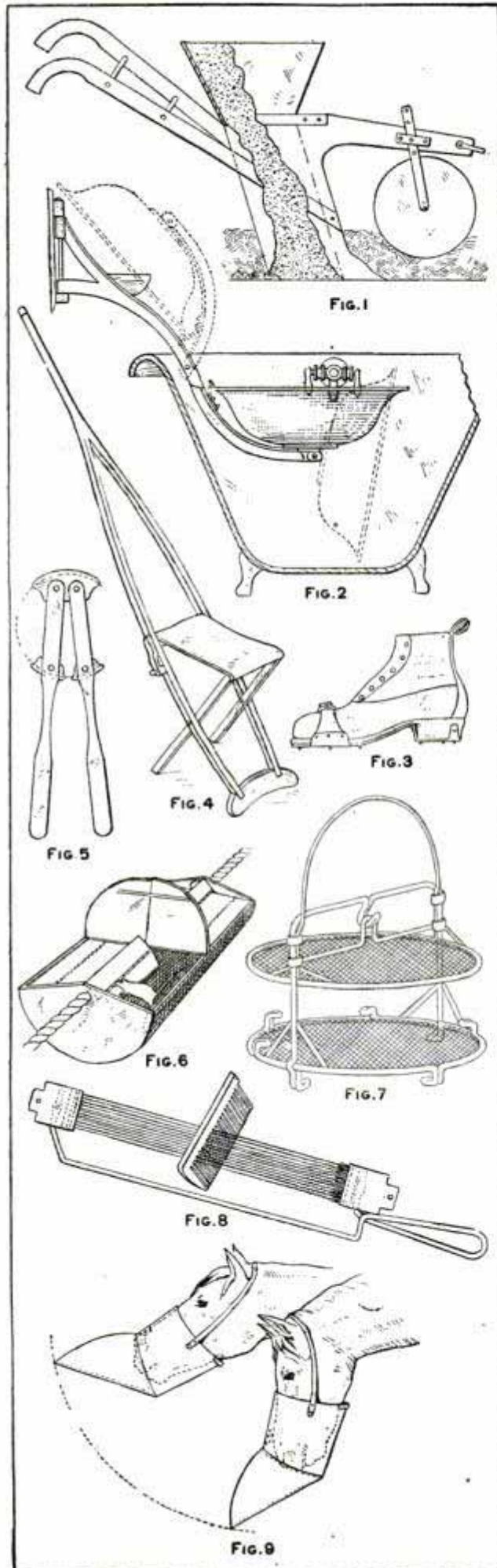
Shelf in Window

One of the brackets I nailed to the shelf and the other I held in place with a hinge, the reason being that if both were solid, the shelf could not be put on the window, as one end must be dropped in place before the other. Such a shelf will hold all the plants a person can put on it. When not in use, it can be removed without marring the casing.—Contributed by G. A. Wood, West Union, Ia.

Magnet for the Work Basket

Tie a ribbon or strong string to the work basket and fasten a large magnet to the other end. Needles, scissors, etc., can be picked up without any trouble. This device is very convenient for invalids.—Contributed by Nellie Conlon, Worcester, Mass.

INTERESTING PATENTS



SYSTEM FOR LAND DRAINING—An implement for preparing land for drainage, without digging or turning up the soil, is shown in Fig. 1. It presses the soil apart to form a narrow trench and then fills the trench with a drainage material.

BATHTUB WASH BASIN—Figure 2 shows a wash basin for bathtubs, provided with a bracket which holds it solidly under the bathtub faucets when in use and allows it to be swung back out of the way when not required. The bracket is made fast to the wall at the side of the tub.

SOLE AND HEEL PLATE TO PREVENT SLIPPING—The spiked devices shown in Fig. 3 provide the same protection for human beings as do the emergency ice shoes for horses. The pivotally connected plates carrying the spikes or spurs are held in position by prongs adapted to engage with the heels, and a strap which buckles over the toe. Thus the plates may be put on and removed like skates.

COMBINED CRUTCH AND CHAIR—A crutch that can be converted into a chair when the user desires to rest is shown in Fig. 4. The handle of the crutch forms the back support for the canvas seat, and the forward end of the seat is carried on legs, which fold into the crutch framing when the crutch is used in walking.

FRUIT-JAR WRENCH—Figure 5 is a wrench for the removal of tops from fruit jars. It comprises a main clamping plate provided with handles on which auxiliary clamping members are mounted.

RAT TRAP FOR HAWSERS—A device which not only prevents rats from boarding ships by means of the hawsers, but captures them as well, is illustrated in Fig. 6. It comprises two cage sections, each having a trapdoor at the top. Skids are arranged over the hawser to slide the rat onto the trap doors, which tilt downward and drop him into the cage.

DOUGHNUT DIPPER—Figure 7 is a device for dipping doughnuts into the boiling lard in which they are to be cooked. The upper screen can be raised and lowered on the supporting standards.

COMB-CLEANING DEVICE—A comb cleaner comprising a set of spaced wires carried by a handle is shown in Fig. 8. A brush having its bristles disposed parallel with the wires is provided at one end to remove the matter loosened from the spaces between the teeth by the wires.

IMPROVED FEED BAG FOR HORSES—Anyone who has watched a horse tossing its feed bag in an endeavor to reach all the grain will see the reason for the shape of the bag illustrated by Fig. 9. The neck portion of this feed bag is like that of the ordinary bag, but the lower portion is a laterally extending pocket supported entirely from the lower end of the neck portion and provided with a flat bottom inclined to the axis of the neck portion. By lifting his head, the horse causes the angle of the flat portion of the bag to change and the grain slides into a position where it can be easily reached.

FIRE ESCAPE—The feature of this rope fire escape (Fig. 10) is the novelty of the arrangement and construction of the parts. The carrying device is a loop fastened by a swivel snap-hook to a zigzag block having a pair of pulleys and a pair of brake shoes journaled in it. The rope providing the means of escape is threaded zigzag through the pulley block so as to pass over the grooved face of the brake shoe at the upper end of the block, round the pulleys, and over the grooved face of the brake

PRACTICAL OR UNIQUE

shoe at the lower end of the block. The person using the escape may easily control the descent, either by setting the rope at an angle to the block, or drawing it inward in direct alinement with the block. All that is required to descend is to move the rope so that the lower brake shoe will tip with the grooved face in alinement with the groove in the lower pulley, which gives the rope a straight passage onto the lower pulley. With the friction of the lower part of the block thus removed, the block will descend, the upper brake shoe providing sufficient friction to limit the speed. An insensible person may be placed in the loop and the descent of the block be regulated by someone on the ground holding the rope taut or allowing it sufficient slack to tip the lower brake shoe.



CUFF MEMORANDUM TABLET—Figure 11 shows a memorandum attachment for the cuff, designed to reduce the laundry bills of men who have contracted the habit of making notes on shirt cuffs. It is a celluloid tablet carried between the cuff and the coat sleeve. Ordinarily concealed from view under the coat sleeve, it may be drawn out when required for notes.



SHAMPOO SHIELD—This device (Fig. 12) which might be taken for a curious hair ornament of a savage people, is a protecting shield for use when washing the hair. It comprises a steel frame and a piece of rubber sheeting, providing an opening for the head.



CIGAR PIPE—Figure 13 is a pipe disguised as a cigar. The tobacco is placed in the bore running through the center of the cigar-shaped casing. Air conduits are provided to make the pipe draw properly. The inner surface of the cylindrical portion is lined with asbestos, and an asbestos coil is located between the mouthpiece and the bore.



PIPE SCRAPER—Cutting away the "cake" in a pipe is a rather disagreeable task, and also spoils the blades of a pocket knife, but a scraper such as is shown in Fig. 14 cleans out the bowl quickly and evenly.



AUTOMOBILE ROBE—Figure 15 is a robe designed especially to protect motorists in cold weather. It has a waterproof lining and is shaped to fit closely around the limbs. Cords are provided at the bottom to fasten it around the tops of the shoes.



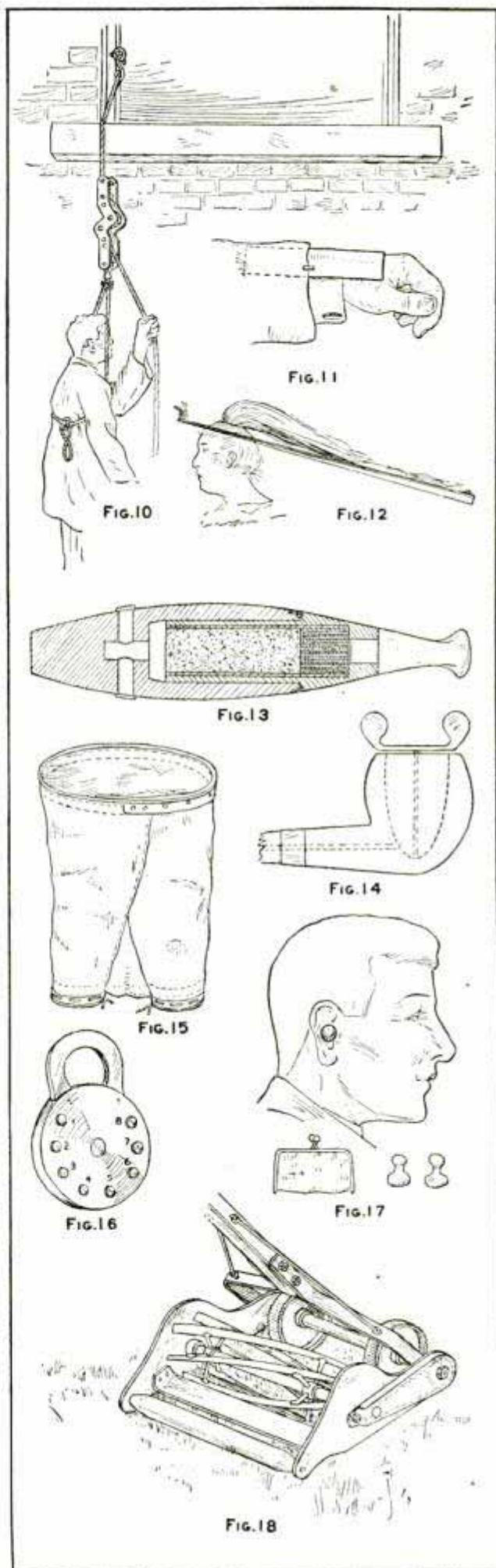
KEYLESS PADLOCK—This keyless padlock (Fig. 16) is unlocked by pressing the buttons on its face. There are eight buttons, any of which may be included in the combination. More than 40,000 combinations are possible. A quick and easy manipulation of the lock in the dark is made possible by the raised buttons.



EAR STOPPERS FOR NERVOUS PEOPLE—These little ivory buttons or plugs (Fig. 17) were invented to take the place of the rather unsightly cotton wads often used by nervous business men for the purpose of excluding the nerve-racking noises of city streets, factories and offices. They are now being marketed in France in purses similar to those used for the carrying of coins.



NEW TYPE OF LAWN MOWER—The ordinary lawn mower has the knives mounted on the same shaft that carries the wheels, but in this machine (Fig. 18) the knife is located midway between the traction wheels and the roller. The drive is by chain and sprocket gear.



THE infant has been at it again.

"Dad," he asked, "does it cost much to keep a lion?"

"It does, my son."

"A wolf would make a good meal for a lion, wouldn't it, Dad?"

"Yes."

"And a fox would be enough for the wolf, wouldn't it, Dad?"

"I suppose so. Go on and play."

"A fox would be satisfied with a hawk and a sparrow would satisfy a hawk eh, Dad?"

"H'm! If you don't go away—"

"And the spider would make a meal for a sparrow?"

"Yes, yes! Now—"

"Wait a minute, Dad. Now we're coming to it. A spider would be satisfied with a fly, wouldn't it?"

"Ye-es, my son."

"And a drop of molasses would be enough for a fly, wouldn't it?"

"Well, supposing it would?"

"Yes; that's just it, Dad. Now, what I want you to tell me is this: Could a man keep a lion for more than a year with a quart of molasses?"

And then the sound of a falling slipper awoke the echoes of the stilly night.—Brooklyn Eagle.

◆◆◆

An engineer on a branch railway had frequently stopped his train to drive the superintendent's cow from the tracks, and by so doing invariably missed his connection at the end of the line, and received a severe reprimand.

One evening he became impatient and ran the cow down. Again he was called to the office, and asked why he had not stopped his train and driven her from the tracks.

"Well, boss," he replied, "if you want to run a cow on this road why don't you put her on the time card so I'll know where to pass her?"

"The motor car is fast superseding the horse."

"I've no doubt of it. I found a bit of rubber tire in my sausage this morning."

◆◆◆

A reporter was interviewing Thomas A. Edison. "And you, sir," he said to the inventor, "made the first talking machine?" "No," Mr. Edison replied. "The first one was made—long before my time—out of a rib."

◆◆◆

"Well, yes," confessed honest Farmer Hornbeak, the while a grim grin wrinkled his weather-beaten complexion. "It's a good 'eal o' trouble, but the satisfaction I feel amply repays me for the extry work. Ye see, by degrees I'm sharpenin' up the top of every stump on the place, and in the course o' time I hope to have matters so arranged that the hired man will find it fully as comfortable to stand up durin' the day as to set down."

—Puck.

◆◆◆

Mulligan, the contractor, put up a church building. Dunn was building inspector then, and when he saw the church he said: "Pat, it isn't plumb."

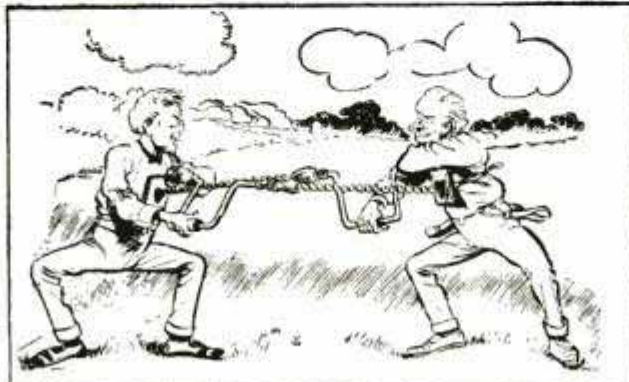
That made Mulligan pretty mad. He climbed right up and began to take measurements. Having squinted down the plumb line in a dozen different places he was ready to report. There was a ring of triumph in his voice.

"Mr. Dunn," he said, "Come and look at it y'rself. Plumb, eh? By th' piper that played before Moses, it's more than plumb!"—Cleveland Plain Dealer.

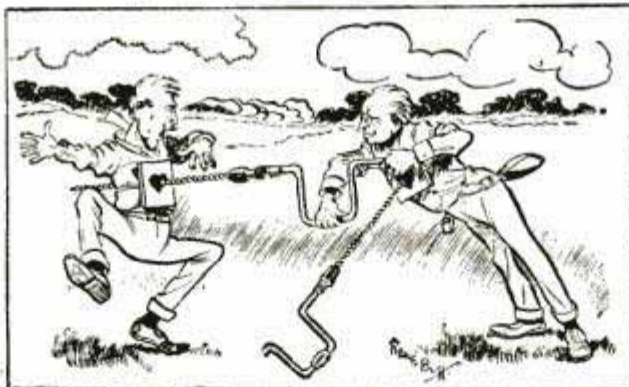
◆◆◆

She—So you've been up to see the Browns. Is their new flat very small?

He—Well, they've had to exchange all their statuettes for bas-reliefs.—Montreal Star.



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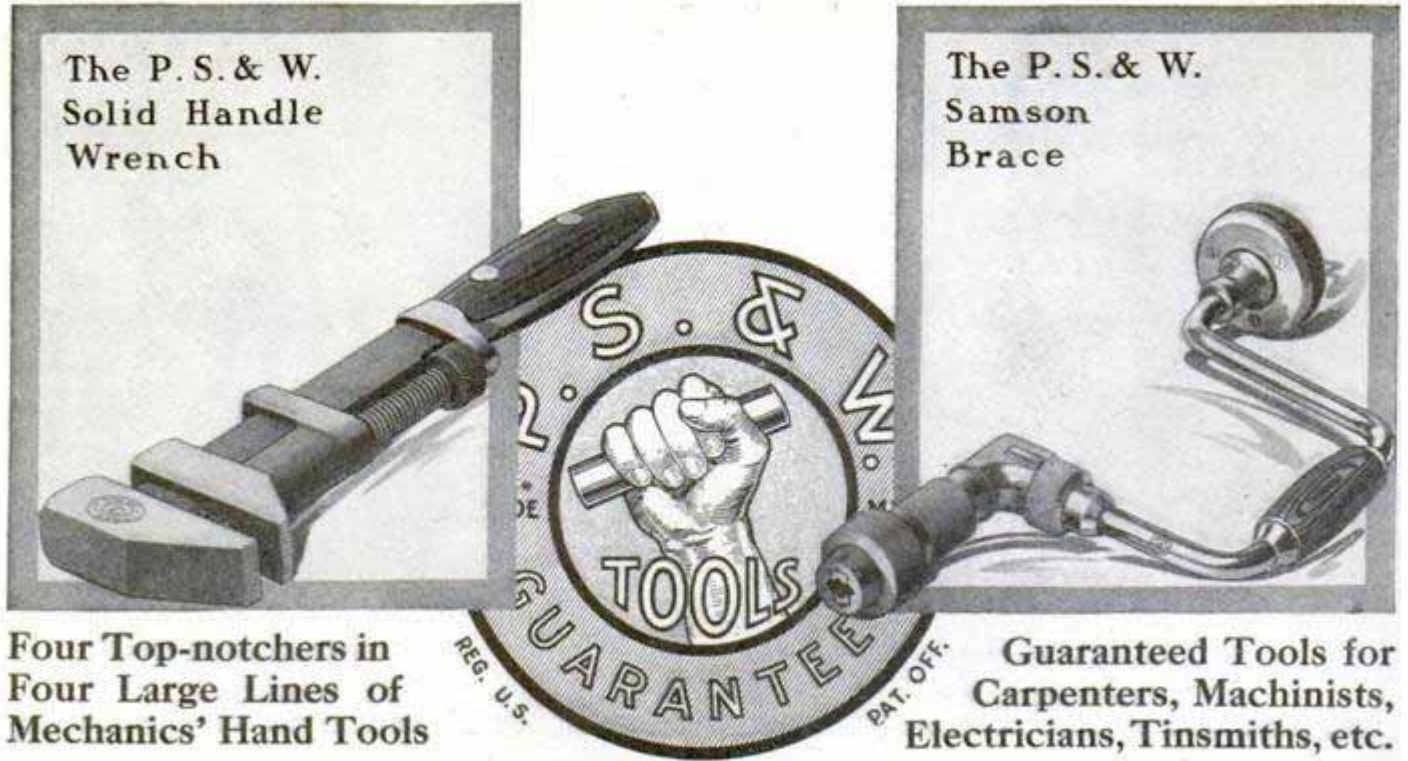
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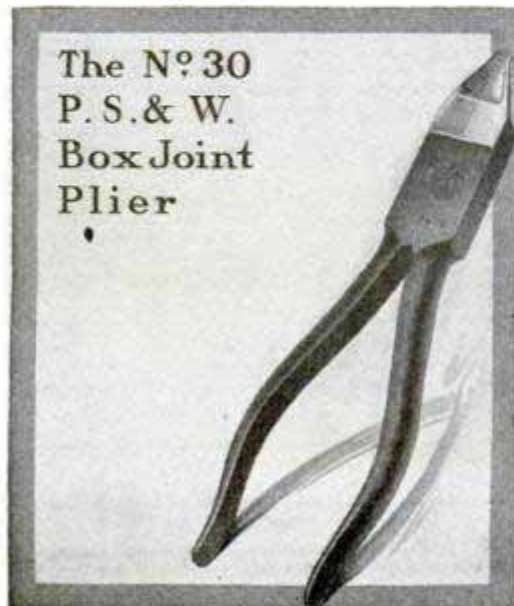
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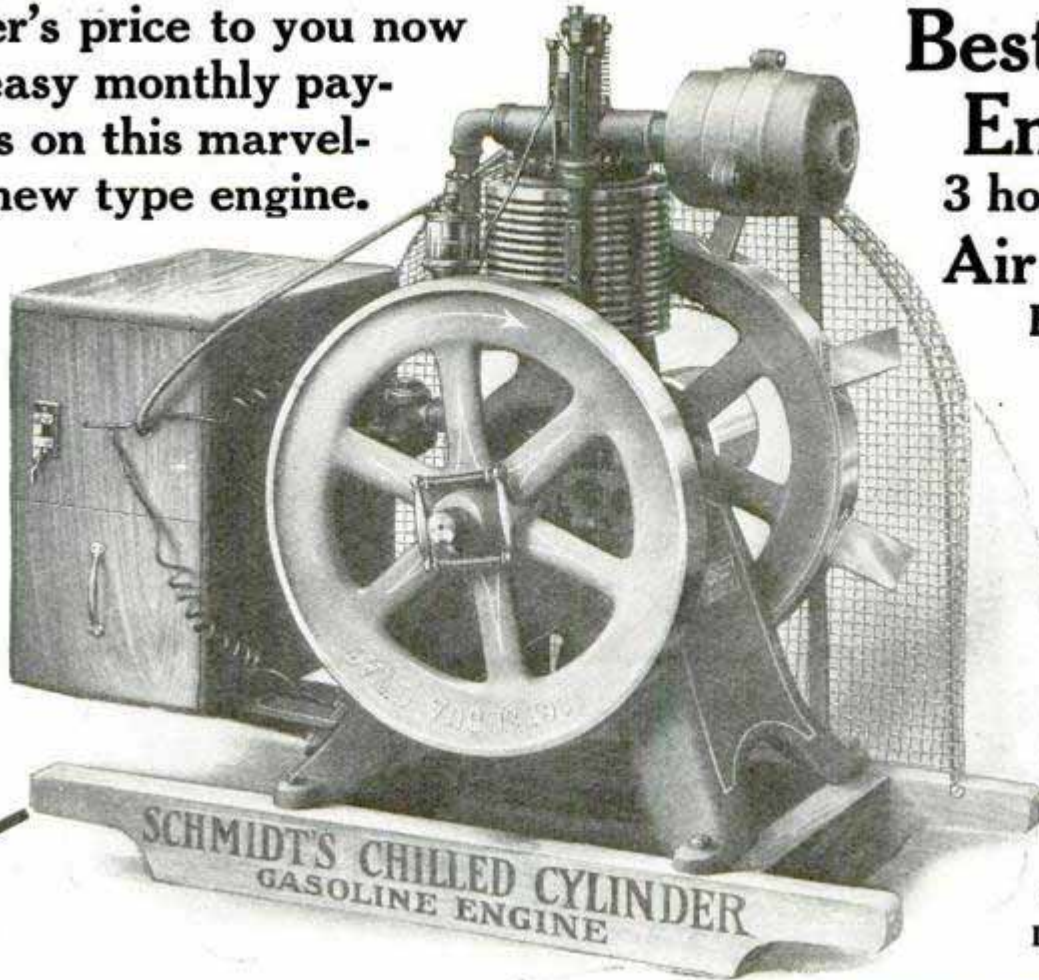
Our 165-p. "Mechanics' Handy List" shown above contains 35 pages of valuable shop information and a catalog of over 200 tools. Sent free at your request.

Dealer's price to you now and easy monthly payments on this marvelous new type engine.

Best Shop Engine

3 horsepower.
Air Cooled.

Has a Spark Retarder.
Send free coupon.



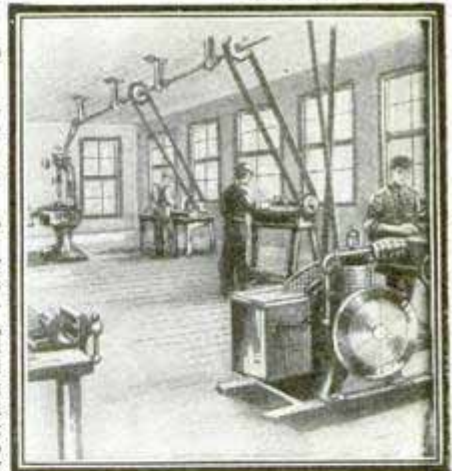
TAKES UP LESS FLOOR SPACE.

FREE This Marvelous Chilled Cylinder Gasoline Engine sent Free

Power Equipment for FARM OR SHOP.

Yes, absolutely free on the most liberal offer ever made. Use this engine ten days on your own place then send it back at our expense or keep it on easy monthly payments at dealer's price just as you choose. Send direct to the engine works and save dealer's profits.

Have your own power plant. With Schmidt's easy new type hangers, pulleys, shafting, bearing, etc., at small cost. On this special introductory offer you can get engine and power equipment at dealer's price. SEND FREE COUPON NOW



Send No Money
Easy Payments
5 Years' Guarantee

We send the engine to you on your request without a cent down in any way. Get all particulars of this amazing free offer.

Take long time to pay on your own security. No notes or mortgages. Same price as for all cash. Most liberal terms ever made to you.

SCHMIDT'S Chilled Cylinder Gasoline Engine is absolutely guaranteed in every part for five full years. You take no risk of any kind. You get the best and most economical engine on earth. The only engine with a chilled cylinder for all kinds of power work at the engine works' price. Send the free coupon now for catalogs and all particulars free.

Schmidt Bros. Co. Engine Works
Dept. 1194 Davenport, Iowa

FREE COUPON
Schmidt Bros. Co. Engine Works
Dept. 1194, Davenport, Iowa

Gentlemen: Without any obligations on me you may send me free and prepaid catalog explaining your new free offer and easy payment terms on Schmidt's Chilled Cylinder Gasoline Engine.

Name.....

Address.....

6 MONTHS FREE TRIAL

Special Offer on Shop and Factory Outfit

We want every tool user, every contractor, every shop and factory to try this grinding, buffing and polishing outfit for six months Free. We want you to test for a *whole half year* how this carborundum grinder saves tools, and time, and earns you money; makes tool-sharpening quick and easy and your general work easier. Try this outfit free for half a year, then, if you feel you can do without it, send it back. Return the coupon at the bottom of this page for details of this liberal 6 months' Free Trial Offer.

LUTHER DIAMOND TOOL GRINDER

Genuine Carborundum Wheels

The wheels are genuine Carborundum. Nothing is so hard as Carborundum except the genuine diamond. Wheels actually made of genuine diamond would cut no faster. Carborundum crystals are artificial diamonds, made by fusing the elements of real diamonds in the electric furnaces at Niagara Falls, in which fire brick melts and runs like butter. In this *utmost* heat, Carborundum crystals get a temper and sharpness that cuts hardest steel or toughest malleable iron as emery does copper. Carborundum wheels do not glaze—they peel steel away in tiny shavings at lightest touch—no hard pressure necessary, no frictional heat, no water cooling necessary, no danger of drawing temper. Genuine Carborundum wheels do not get soft in spots, wear lopsided. They outlast any number of emery wheels, saving that much money. They make it so easy to keep tools keen and bright, that tools are kept that way, and that means more, faster and easier work. They will not draw temper and tools last longer, which means another saving—to say nothing about the time saved in sharpening. But don't you take our word—prove these facts by a half year's free use of this splendid outfit.

Elmwood Haynes, of the Haynes Automobile Co., says:
"I have found your machine a very satisfactory device."

COUPON

LUTHER GRINDER MFG. CO.

68 A Madison Street, Milwaukee, Wis.

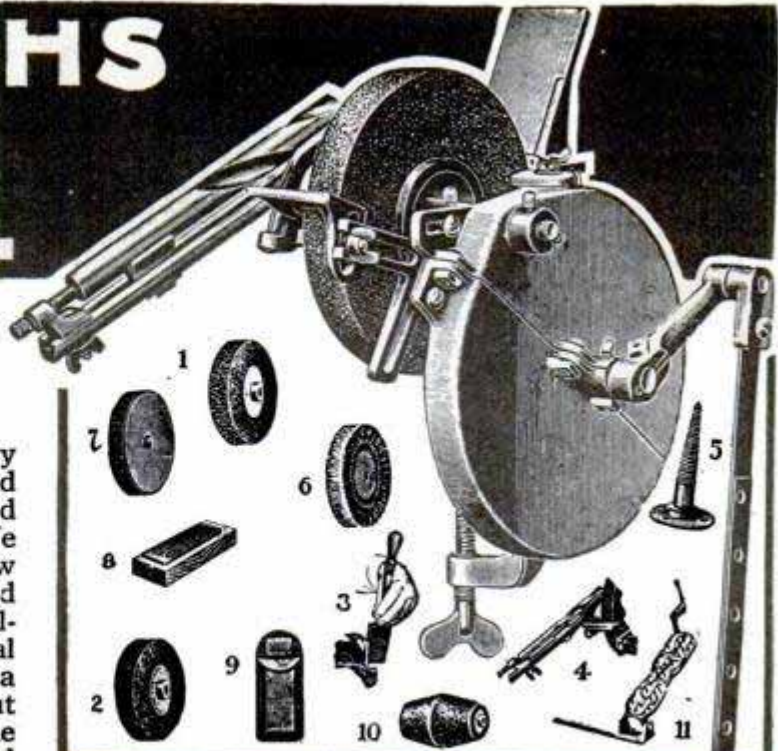
Please send me free and prepaid your free Carborundum booklets and 6 months' free trial offer on special shop and factory outfit.

NAME.....

ADDRESS.....

DEALER'S NAME.....

DEALER'S ADDRESS.....



11 Tools in One

This special offer on our shop and factory grinding, buffing and polishing outfit is a remarkable value—the greatest reasonably priced grinder offer ever made. This outfit, on which we will make a 6 months' free trial offer, consists of one Mechanic's Special Luther Diamond Tool Grinder, with the following accessories:

1. One rough, genuine Carborundum wheel
2. One fine, genuine Carborundum wheel
3. One chisel grinding attachment
4. One twist drill attachment
5. One polishing spindle
6. One buffer
7. One polisher
8. One oil stone
9. One Carborundum hone in leather case
10. One Carborundum scythe grinder
11. One foot power attachment

This outfit supplies every grinding, buffing and polishing need. The chisel and twist drill attachment make it easy for inexperienced persons to sharpen drills and chisels correctly.

Built Like a High-Grade Lathe

The Luther Mechanic's Special, forming the basis of this special shop and factory outfit, is built for a life-time of service—has steel and malleable construction, dust-proof, bronze bearings, machine cut spur gears, bearings run in oil bath—speed 2,500 revolutions per minute. Carborundum wheels guaranteed 5 years.

Return the
Coupon for
6 Months' Free
Trial Offer on
Shop and Fac-
tory Outfit.

By returning this coupon you will not put yourself under any obligations whatever. We will send you full details of our Six Months' Free Trial Offer, and full description of this splendid grinding, buffing and polishing outfit, also the reprint from McClure's Magazine, telling the interesting story of the discovery of Carborundum.

Luther Grinder Mfg. Co.
68 A Madison St., MILWAUKEE, WIS.

When the Last Wheel Has Turned



the workman has to go through the "cleaning up" process before he can go home and be presentable.

Grease and grime work their way into the pores, and it's mighty hard to get rid of them. Ordinary toilet soap is

not equal to the task; **Pummo Soap** is, however. The fine Italian pumice creates just friction enough—combined with the cleansing value of the soap itself—to do the trick. There's just enough glycerine in **Pummo** to keep it from being harsh. Most hand soaps are about the consistency of bath bricks. **Pummo** cleanses quickly, thoroughly, marvelously—yet leaves the hands soft and velvety.

With all its virtues, **Pummo Soap** costs but **5c** a cake—packed in an individual carton.

If your dealer does not have **Pummo** in stock, write us, giving his name, and we will send you a free sample by return mail.

Made by

The N. K. Fairbank Company
CHICAGO



Please Mention Popular Mechanics

“MORSE”



TWIST DRILLS

Will give you a Square Deal
by drilling Round Holes!

Honestly and accurately made.
Improved up-to-date, scientific
methods are used throughout.

“MORSE” Tools are at work in
modern shops all over
the world where the highest efficiency
and greatest accuracy are demanded.

Send for a catalogue, it's illustrated,
interesting and free for the asking.

MORSE TWIST DRILL & MACHINE CO.

New Bedford, Mass., U. S. A.

Let Us Put This Piano in Your Parlor
Not a Dollar To Pay Us.

SEND NO MONEY

Enjoy This Piano—Take Your
Own Time—Sent to You
on 30 Days' Free Trial

Write right now and let us put this piano
in your parlor — not a dollar to pay us.

Let us send you our big, free, actual photograph, color-illustrated, handsome book, and offers to trust you absolutely with any celebrated and artistic Reed & Sons Piano on as long time as you want, even three years or more, if you are satisfied after 30 Days' Free Trial. Not a cent to pay down—not a dollar for any of our beautiful styles you select from the book we send you on



REED & SONS PIANOS

Established 1842. Given Highest Award
at World's Columbian Exposition, 1893

We've sold through dealers, jobbers and agents—for over 68 years—but now we have cut out their big profits and are giving the savings to our customers. We have made our direct-to-you wholesale factory prices so low that you can have a celebrated Reed & Sons Piano, for lifelong service, at a price as low as the price of many "cheap" made pianos—and get the highest artistic quality. Our 25-year guarantee bond goes with every Reed & Sons instrument. Hundreds have had generations of enjoyment from our pianos. So can you on our plan and prove it positively at our risk.

Now Sold Direct to
You From Factory

Saves you from \$128.00 to \$222.00 on
price. No Security
— No Interest to
Pay—No Col-
lectors.



Also Self-Playing Pianos

Reed & Sons Self-Playing Pianos now sold on the most liberal plan. Thousands who "never knew a note" are now enjoying our Self-Players. See our offers and prices all explained in handsomest color-illustrated catalog sent Free.

Take Your Own Time
— On Trying and Pay-
ing — We Pay Freight
Both Ways.

Take 30 Days' Free Trial in your home with your family and friends to judge the beautiful tone quality—handsome exclusive design and finish—easy action and splendid satisfaction. After a full year's enjoyment send our Reed & Sons Piano or Self-Playing Piano back and we'll pay the freight if not exactly as represented. That's the fairest offer ever made. It means 365 Days' Approval Test, besides 30 Days' Free Trial and 3 years' time to pay if satisfied. When absolutely satisfied you can pay \$1.00 a week, or by the month, or 3 months, or twice a year. We don't care how. Suit your own time. We want you to be happy with one of our pianos or self-playing pianos—prove it at our risk—right now. Write right now—a Postal Today—or the Coupon—For Our Big Book.

REED & SONS PIANO MFG. CO., 253 Wabash Ave.,
CHICAGO, ILL.

Capital and Resources, \$1,750,000.00.—Largest Factory-to-Home
Piano Manufacturers in the World.



Big Book Free

Reed & Sons Piano Mfg. Co.,
253 Wabash Ave., Chicago, Ill.

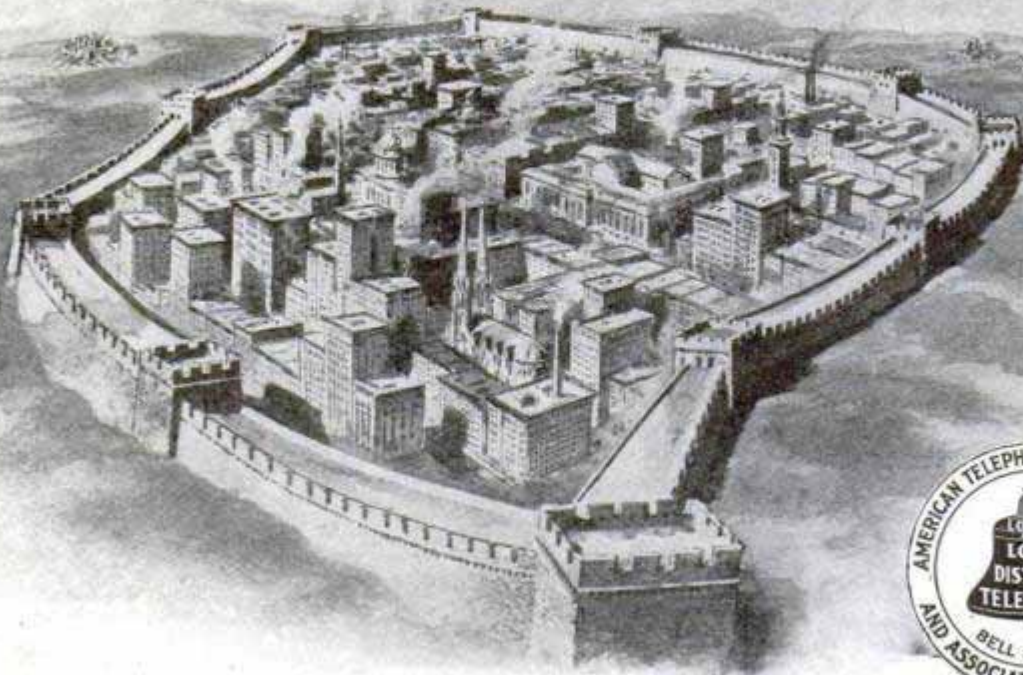
Please send me your Big Color Illustrated Piano Book and offer
FREE. Everything at your risk.

Name _____

Address _____

Town _____ State _____

365 Days Approval Test



A MEDIAEVAL CONDITION

Telephone Service— Universal or Limited?

TELEPHONE users make more local than long distance calls yet to each user comes the vital demand for distant communication.

No individual can escape this necessity. It comes to all and cannot be foreseen.

No community can afford to surround itself with a sound-proof Chinese Wall and risk telephone isolation.

No American State would be willing to make its boundary line

an impenetrable barrier, to prevent telephone communication with the world outside.

Each telephone subscriber, each community, each State demands to be the center of a talking circle which shall be large enough to include all possible needs of inter-communication.

In response to this universal demand the Bell Telephone System is clearing the way for universal service.

Every Bell Telephone is the Center of the System

**AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES**

Please Mention Popular Mechanics

What \$1,000,000 Did

New Bargain Book Picturing 3,000 Furnishings Bought from 98 Hard-Up Makers—Sold for CASH or CREDIT at an Equal Price

Our whole business is buying and selling bargains in housefurnishings. We buy makers' surplus stocks—we relieve hard-up makers—we buy when they must have money.

Our harvest time is at the year end—just before inventory. Hundreds of makers then want to close out stocks, often far below the cost. If they cut to their dealers it would hurt their whole business, so the makers unload on us.

We went to these makers in November and December with \$1,000,000 in cash. And we picked up amazing bar-

gains in 3,000 things for the home. In our new Bargain Book we picture all of these bargains. The prices will save you up to 50 per cent. We want to mail you that book.

Pay as Convenient

We sell for cash or credit at an equal price. We have charge accounts with 600,000 homes. They have goods sent on approval, and pay as convenient—a little each month. We allow on the average over a year to pay, without any interest or any extra price.

We are glad to give credit to anyone who buys things for the home. There is no security, no publicity, no red tape—just an open charge account.

But just as you wish—pay cash or pay as convenient. Either way gets our lowest bargain price.

A Month's Trial

Every article is sent on 30 days' approval. You can use it a month before you actually buy it. If it isn't such a bargain as you expected you can return it, and we will pay freight both ways. The trial will not cost you a penny.

On these fair lines we have built up the largest business of our kind in America. You ought to know it. Such bargains, such variety, such pleasant dealing will appeal to you.

Bargain Book Free

This mammoth book of 3,000 bargains will be mailed you free. The size of the book is 12x24 inches. The pictures are large, and many are in actual colors. This is our latest book, and every housewife should have it—new customer or old.

Cut out this coupon and send it to us, and the return mail will bring the book. Please do this now before you forget it.

Bargains in

Furniture Silverware
Carpets Chinaware
Rugs Graphophones
Draperies Refrigerators
Stoves Washing Machines
Ranges Sewing Machines
Pianos Baby Cabs
Clocks Lamps, etc.

Cash or Credit

Cut Out This Coupon

SPIEGEL, MAY, STERN CO.
1460 35th Street, Chicago

- Mail me the Bargain Book.
 Mail me the Stove Catalog.

Name _____

Post Office _____

State _____

I am particularly interested in _____

No. 40X 695—Kitchen Cupboard, built of selected solid oak, finished in golden. 78 in. high, 38 in. wide and 16 in. deep. Has 3 adjustable top shelves, 2 large drawers and 2 lower cupboards. Bought from an overstocked manufacturer below cost. Beyond a shadow of a doubt the greatest Kitchen Cupboard bargain ever offered. Fully 50 per cent saving guaranteed at . . . **\$6.95**



Cash or Credit



No. LX 485—English Folding Go-Cart Bargain. Newest 1911 design. We take the factory output at a specially low price. Has steel frame, fabricord leather upholstery and large rubber tires. The best collapsible go-cart on the market. Factory bargain price **\$4.85**

Cash or Credit



No. 30X1820—Steel Range Bargain. Made in our famous Empire factory. One of the grandest ranges ever built. We guarantee a saving of at least one-third on all stoves sold by us. This style, bargain price from **\$18.20** up, according to size.

Cash or Credit

No. 23X625—A splendidly Upholstered Rocker. 8,200 bought at a pre-inventory price from a manufacturer who gladly sacrificed his profit to turn these



rockers into cash before yearly inventory. This is a massively constructed rocker, upholstered in our guaranteed fabricord leather on a frame of solid oak, richly carved, handsomely finished and immaculately constructed. Unimpeachable bargain **\$6.25** at this factory price

Cash or Credit

SPIEGEL, MAY, STERN CO., 1460 35th Street, Chicago, Ill.

(108)

We Start You in a Wonderful Money-Making Amusement Business of Your Own! —and **GUARANTEE** Profits!

BOX BALL—the Most Fascinating, Exciting Amusement Game of Years—Turns Your Time Into Easy Dollars!
By Our New Plan We Shoulder the Care of Starting You Up On Small Capital! Read How We Absolutely Protect You, By Our Profit-Guarantee-Bond.

Men of every class have been astonishingly successful in making big money from operating Box Ball alleys, supplying fun, amusement and clean entertainment to men, women, youth, boys and girls—they have piled up **wealth!** For the amazingly fascinating game has taken the nation by storm! Scarcely anybody ever fails to "make good"—and cash in big!

\$300 a month is a very conservative profit-estimate. One man at Sullivan, Ind., operating only **one alley**, made **\$513 clear profit in 51 days!** An \$18-a-week clerk started up and made **\$1,845.20 clear profit first 60 days in business!** Four others, **\$3,200 clear first 9 months!**

Hundreds of other successes equally astounding. Write to us for the letters written by the successful men themselves, telling the marvels of Box Ball money-making.

Men who are anxious to go into this money-making amusement business need no longer fear they will not succeed big!

Practically All Box Ball Operators Are Eminently Successful—So Profits Are Now **GUARANTEED!**

We absolutely insure you against failure or loss—so you will make big money! That is what our **legally binding Profit-Guarantee-Bond means to you!** If you don't make a profit we'll take the alleys back and refund **every penny!**

Box Ball earnings are practically all profits!

It's a **one-man business**, although partners have been tremendously successful! One man can run an entire battery of alleys—no pin boys, helpers nor scorers are needed! A slight pull of lever at players' end automatically sets all pins instantly! Balls return to players' end by ingenious gravity device! So all operators do is pocket the entire receipts **themselves!**

The play is fast and furious—and at a nickel a game the money rolls into your cash drawer at a terrific rate! And **no expenses to wipe it out**, as with all other propositions. It's simply clear profit—practically every penny.

Box Ball stands higher in the estimation of people everywhere than any other pastime—it is attracting greater patronage from better classes of people than ever before!

And any man or woman who has or can get **small capital—\$120—** can start up in this business on a good, substantial scale! In a jiffy your alleys have paid for themselves, and are paying an **amazing profit** on the investment!

Get Into This Great Business Quick and Pocket Large Profits!

Right now is the ideal time of year to start up—so be fully prepared for the tremendous

spring, summer and fall amusement business! Our beautiful 1911 Box Ball Alleys—equipped with **real, life-size bowling pins**—double the game's fascination to patrons—and hence, increase profits tremendously. Get into the business in which you are **insured** against losing out—get in **NOW!** Our big book of money-making plans and the complete story are **yours** for the asking.

Also ask us for the Box Ball **monopoly** for your territory—it's a **valuable privilege!** Another "live wire" may write for it **tomorrow.** You write **today**—this minute—to

The American Box Ball Co., 363 Van Buren St., Indianapolis, Ind.

Please Mention Popular Mechanics

From Chicago
I have had as high as eight alleys running in different locations at one time.

In one day these eight alleys took in \$72, which is an average of just \$9 per alley for that day.

I figure that above all expenses I have cleaned up on the Box Ball Alleys since I started, something over \$1,000 in cash.
M. Cushman.

From Texas

The business I have done is almost unreasonable, all of which I give the alley credit for. My receipts on the two places since I opened have been something over \$750.

Have just ordered another alley and business is booming.

Respectfully,
W. L. English.

From Ohio

I wish to tell you of my appreciation of the alleys I bought of you. I have run four 42-ft. alleys all last winter in town and all summer at Spring Grove Park, and am running them in town now and find they are the best investment I could make. As a money-maker they are all a person could wish for.

J. H. Vincent.

From Iowa

My Box Ball business is going far better than I expected. It amounts to \$12 to \$18 per day average.

C. S. Rand.

From Florida

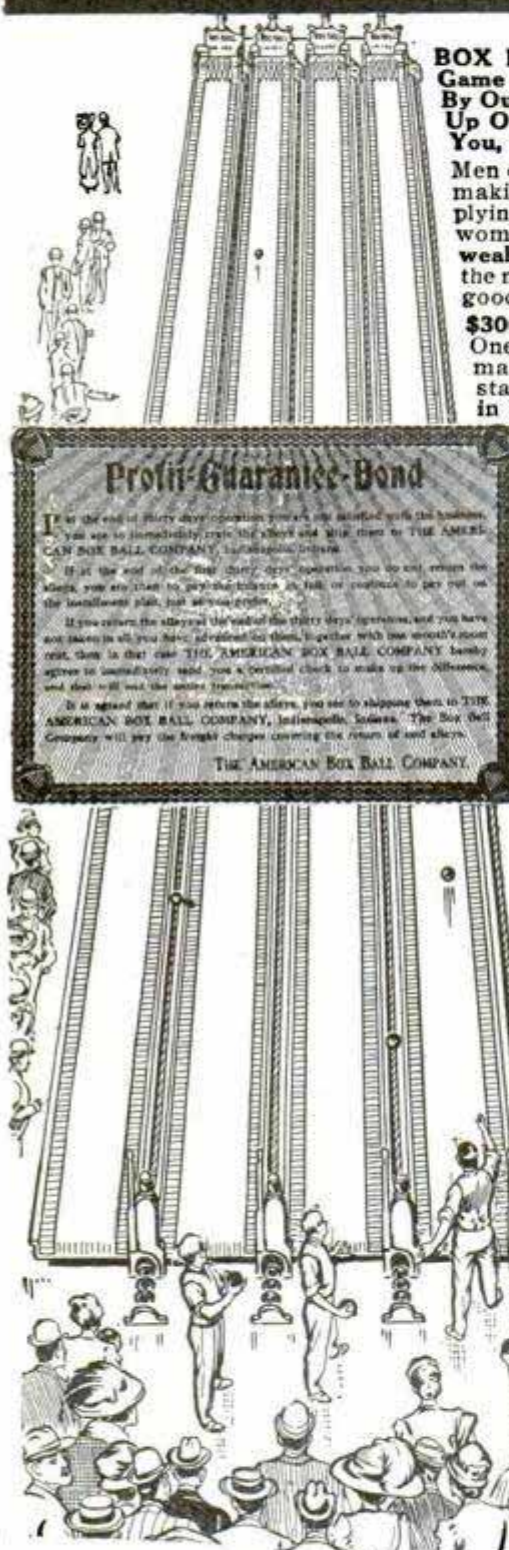
My receipts on two alleys for December are \$362.75. The population in this little town is 1,500. Alleys have been running here one year and eight months.

J. C. Sharp.

From New York

I know for a certainty Box Ball Alleys are money-makers and are all you claim for them. I cleared over \$2,000 in one year from 2 alleys. I have now sold out for 50% more than I paid for them.

E. T. Stannard.





Are YOUR Hands Tied?

Do you want to get on—**SUCCEED**—earn more money? Is there a certain line of work you think you could do better in—if you only had the training? Or a certain kind of position you would like to hold—only you fear your “hands are tied?”

Don't let your ambition die! Don't think your hands are tied! Don't think that you can't strike out for advancement and *success*—that you do not dare, because you must eke out your daily bread—that you must go on in the same old rut as long as you live.

Get out of the crowd of ordinary *untrained* men—whose each day's work puts them *no further ahead*—for whom the future has *no promise*.

Start your advancement **NOW**—mark the coupon with a cross opposite the occupation you prefer, mail it *to-day*, and let the International Correspondence Schools give you full information on how they can *help you* to succeed as they have thousands of others—costs but postage—you incur no obligation.

Simply let the I. C. S. tell you how they can assist you to become an **EXPERT** in your chosen work—in your spare time—at home—no matter where you live or how little you now earn.

Your hands are not tied. Victory is within your reach—you can succeed.

It's a winning game for you—if you will only enter.

More than 300 I. C. S. students monthly **VOLUNTARILY** report increases in pay due to I. C. S. help—363 in November.

The world owes you *success* if you demand it—the world owes you nothing if you do not.

Mark the coupon—make your beginning **NOW!**

This Coupon is for YOU

INTERNATIONAL CORRESPONDENCE SCHOOLS, Box 872, SCRANTON, PA.

Please explain, without further obligation on my part, how I can qualify for the position, trade or profession before which I have marked X.

Automobile Running	Civil Service	Spanish
Mine Superintendent	Architect	
Mine Foreman	Chemist	French
Plumbing, Steam Fitting	Languages—	German
Concrete Construction	Banking	Italian
Civil Engineer	Building Contractor	
Textile Manufacturing	Architectural Draftsman	
Stationary Engineer	Industrial Designing	
Telephone Expert	Commercial Illustrating	
Mechanical Engineer	Window Trimming	
Mechanical Draftsman	Show Card Writing	
Electrical Engineer	Advertising Man	
Electric Lighting Supt.	Stenographer	
Electric Wireman	Bookkeeper	

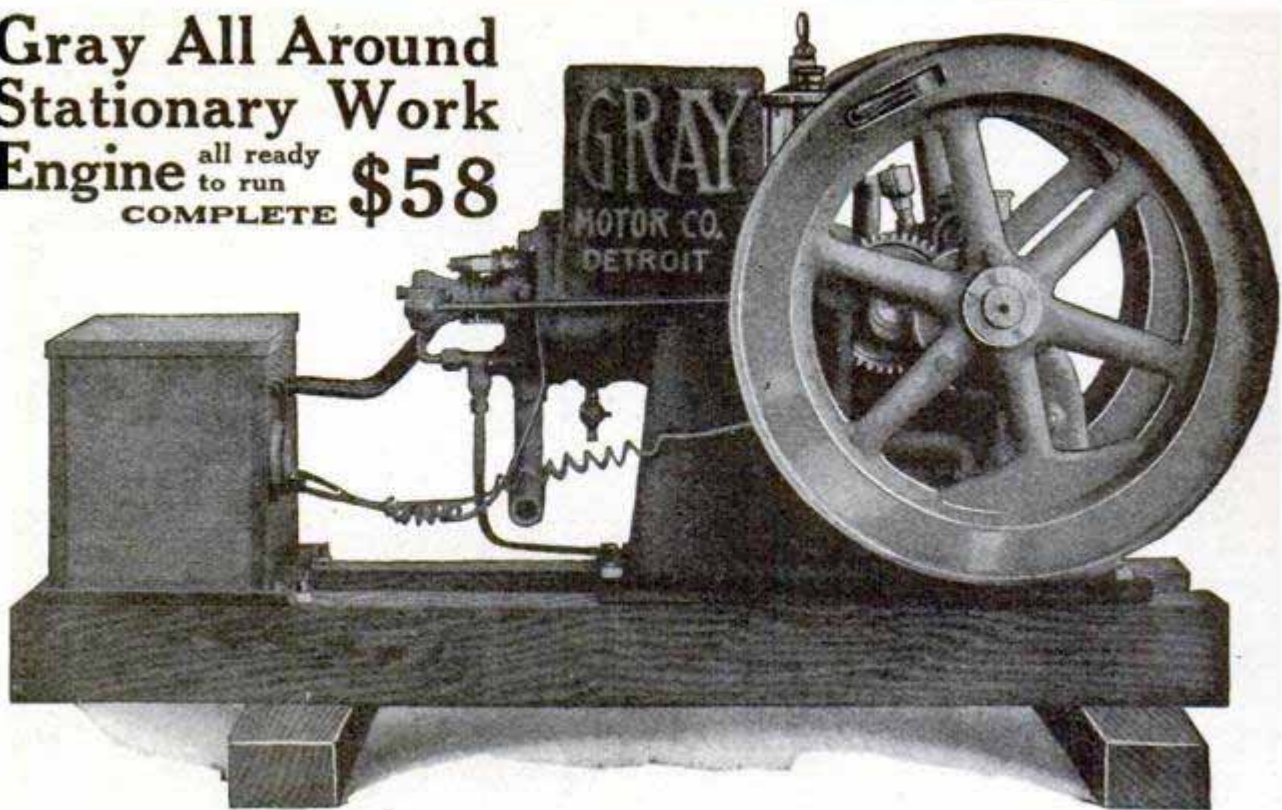
Name _____

Present Occupation _____

Street and No. _____

City _____ State _____

Gray All Around Stationary Work Engine all ready to run **\$58** COMPLETE



Built Right A good small motor. Guaranteed the

same as if it cost \$500, by a big responsible concern. Made to last a life time. A woman can run it. Hopper cooled. Powerful—good material, workmanship and finish. Comes mounted, already to run as you see it. Put in your gasoline and start it up.

Agents make big money selling it because it sells itself and makes no trouble after it is sold.

It looks good, runs good and is good. Occupies a field distinctly its own because of its high quality.

Write for agent's proposition today.

Gray Farm-Pumping and General Power Motors

Gasoline or kerosene, 3 to 36 horsepower.

6. h.p. Farm Engine, \$94 to \$124 complete.

3 h.p. Farm and Stationary

Engine, \$65, guaranteed to develop 4 h.p.

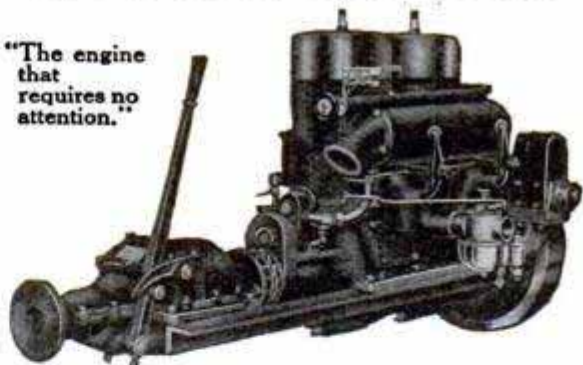
24 h.p. Irrigation Pumping Engine, \$346—36. h. p. for \$560.



Gray Marine Motors

For Cruisers, Work Boats
Speed Boats and Canoes

"The engine that requires no attention."



3 h. p. \$60—6 h. p. \$89.50—12 h. p. \$188.00
24 h. p. \$330.00—36 h. p. \$528.00—Complete ready to install in your boat.

Absolutely guaranteed in every detail.

7 to 36 h. p.—1, 2 and 3 cylinders—combination 2 and 3 port.

Bosch High Tension Magneto—the most up-to-date marine engine built.

Write today for Big New Catalog

[Be sure to specify whether you want Marine or Stationary
Catalog, and what you want to use the engine for]

GRAY MOTOR COMPANY, 61 Leib St., Detroit, Mich.
Canadian Gray Motors, Ltd., 917 River Front St., Walkerville, Ont.

FREE TRIAL

THE FOX

THE ONE PERFECT VISIBLE TYPEWRITER

THE FOX—"THE ONE PERFECT VISIBLE TYPEWRITER"—FOR 20 CENTS A DAY! Sent on **FREE TRIAL** to anyone—anywhere—at my expense—to be returned if not better than the best of other makes. If purchased you can pay me a little down after trial and the balance at the rate of 20 cents a day—no payments on Sundays and Holidays.

The Fox's Visible—you do not have to look beneath a lot of moving typebars to see what is written! It has a Back Space Key, Tabulator, Two-Color Ribbon with Automatic Movement and Removable Spools, Interchangeable Carriages and Platens, Card Holder, Stencil Cutting Device, Variable Line Spacer and Line Lock with Key Release. Its Speed is fast enough for the speediest operator or slow enough for the beginner. It is extremely Durable and almost Noiseless.

Will You Do This Now? I want you to fill out the attached coupon and give me a chance to "show you"—at my expense—what I have. Remember, I belong to no trust—no combination—and no one tells me at what price I must sell nor on what terms I must sell,



For 20 Cents a Day!

SEND FOR MY CATALOG, ANYWAY!



W. R. Fox, Pres. Fox Typewriter Co.

Date _____ 191__

W. R. FOX, President, Fox Typewriter Co.,
3804-4004 Front Street, Grand Rapids, Mich.

DEAR SIR:

Please send me a copy of your catalog and write me full particulars concerning your "20 cents a day" payment plan on the new Fox Visible Typewriter. It is distinctly understood that the signing of this coupon does not in any way obligate me to purchase, and that no typewriter is to be sent me unless I decide later to order one for free trial.

Name _____

Address _____

Business _____

H 15

FREIGHT PREPAID 30 DAYS FREE TRIAL
\$1 a Week For the Artistic
MEISTER
PIANO
SOLD DIRECT FROM FACTORY TO YOU



No Cash Down. No Interest.
No Extras.

Price \$175.00

STOOL and SCARF FREE

A guaranteed saving of \$100 at least, on each instrument

WE believe the correct way to buy a piano is to try it in your own home first. We don't want the trial to cause you any expense, hence we pay the freight—also the return freight if the piano is not entirely satisfactory.

Notwithstanding our easy terms of payments and our extremely low prices, the Meister is a high-class instrument of standard construction and quality fully guaranteed for 10 years. Ask your local banker to investigate our standing. Rothschild & Co's resources exceed \$3,000,000.00.

We sell more pianos direct from factory to home than any other concern in the world

Send A Postal for the Piano Book

It is free, and illustrates in the colors of the wood eight styles of the Meister

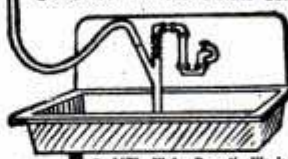
The Meister Piano Co.

Rothschild & Company, Sole Owners
 State, Van Buren and Wabash Ave.

Department 16E CHICAGO, ILL.

Clean by Water Power

The PRESTO Vacuum Cleaner uses water power. It takes all the dirt, dust and germs that enter the Cleaner direct to the sewer. The ONLY sanitary process. No fine dust or germs return through bags or screens to the air to be inhaled or to settle. No muss. No valves to clog; no motors to repair. The PRESTO stationary Cleaner obviates the most dangerous and unhealthy act in house-cleaning work; emptying bags and boxes of bacteria-laden dust. Costs less than one-half cent per hour to operate.



Guaranteed for **TEN YEARS.** Patents allowed. PRESTO portable Cleaner, complete with 50 feet of one inch vacuum hose, five cleaning tools, ready to connect to bib, only **\$30.00.**

"The Water Does the Work—the Air Does the Cleaning"—We manufacture both the portable and the stationary systems. Write for full particulars.

PRESTO CLEANER CO.

Office 114-116 Colonnade Bldg.

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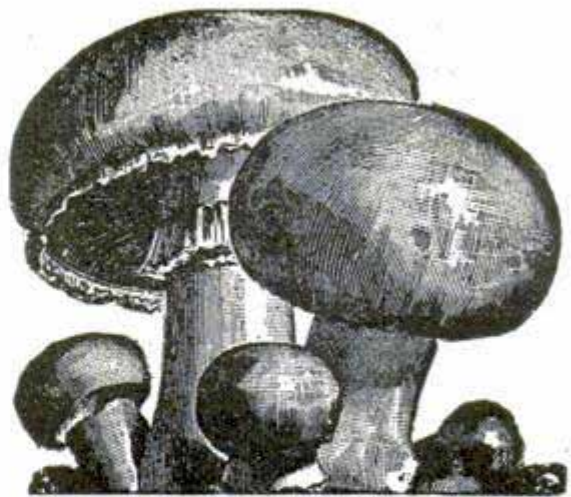
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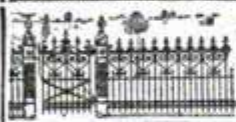


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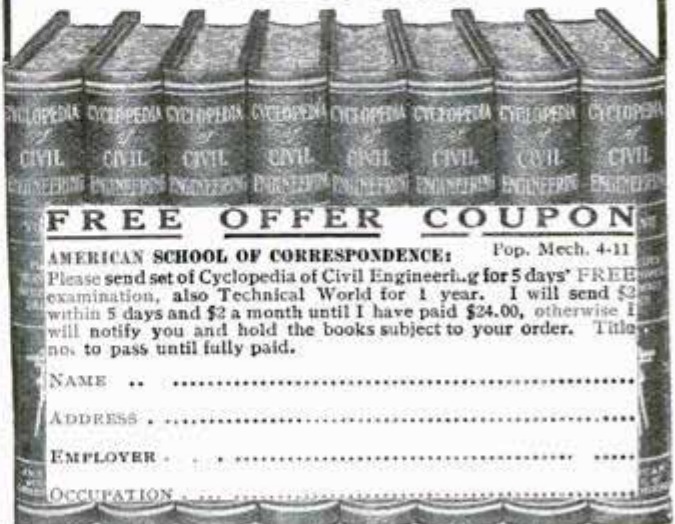
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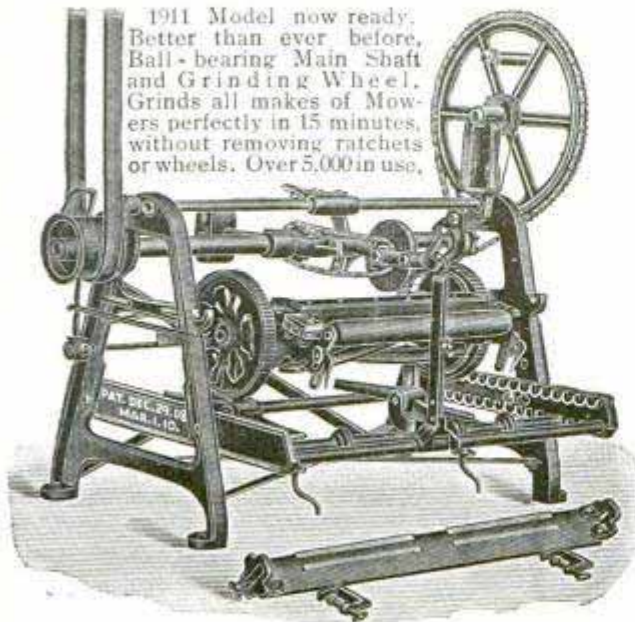
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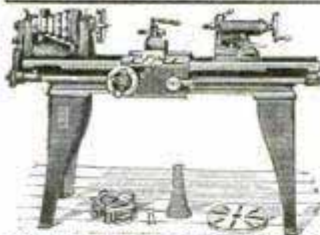
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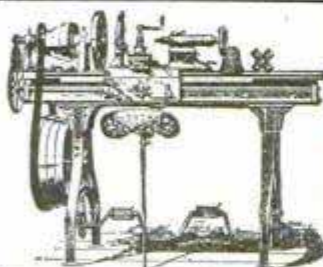
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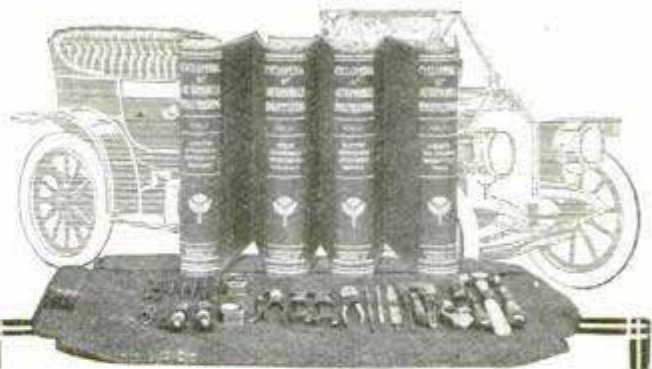
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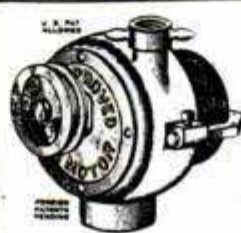
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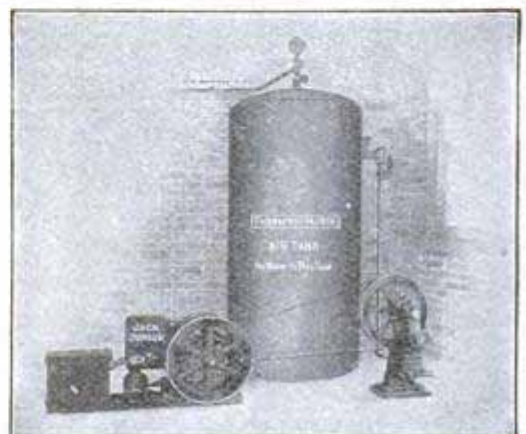
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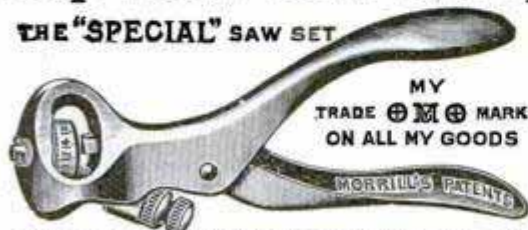
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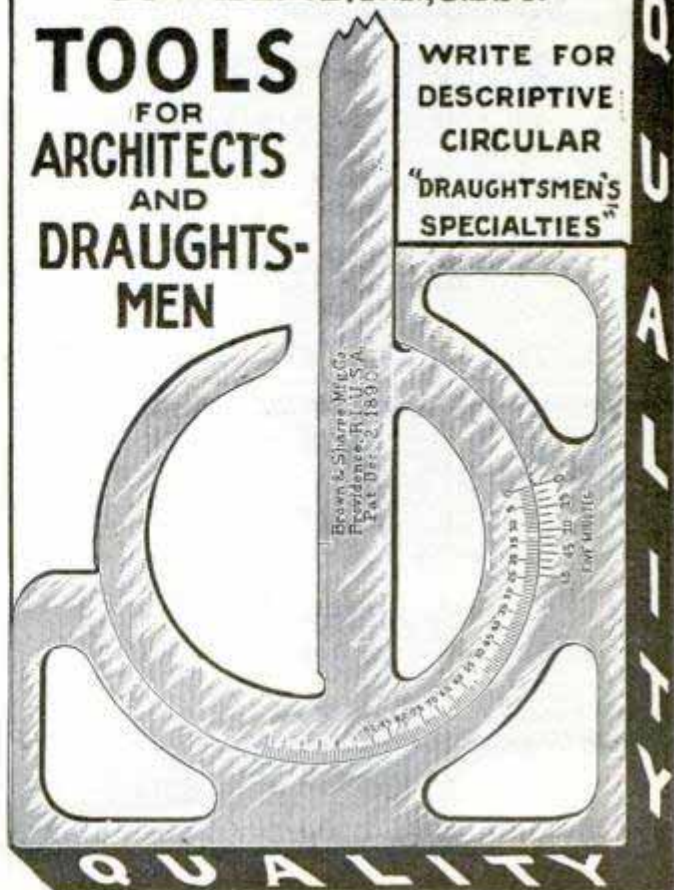
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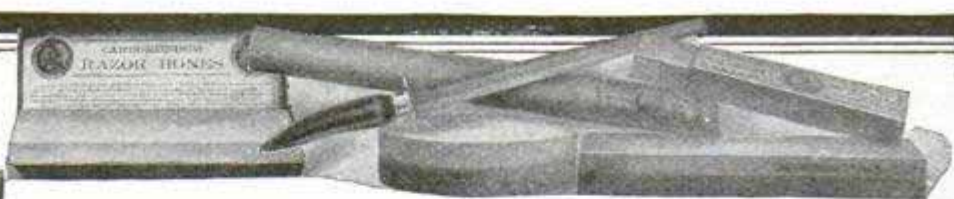
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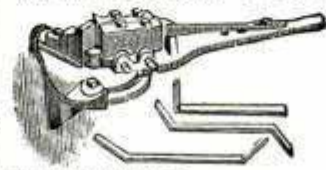
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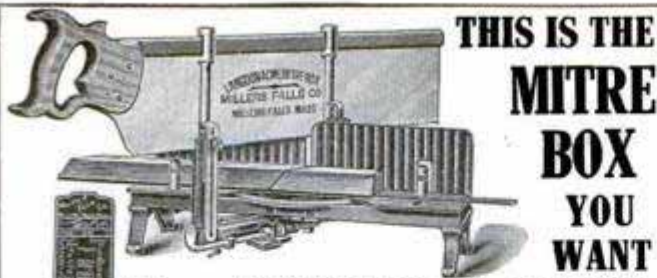
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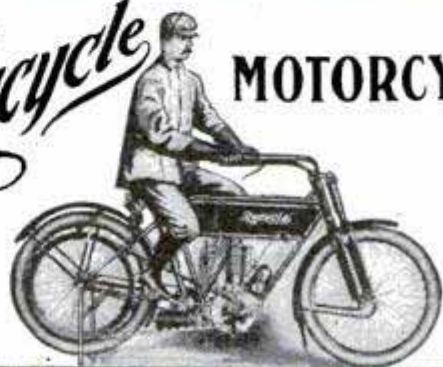
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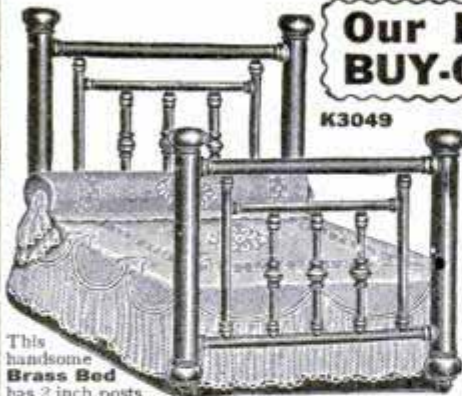
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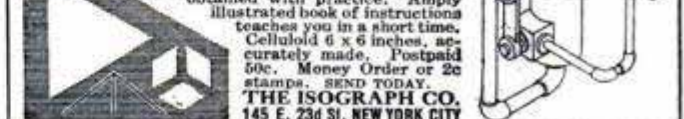
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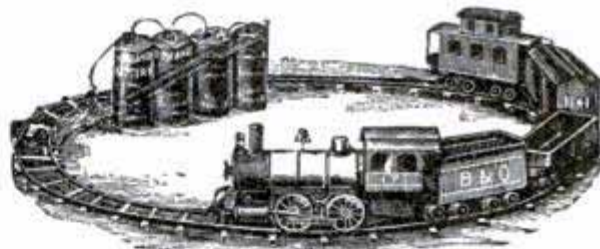
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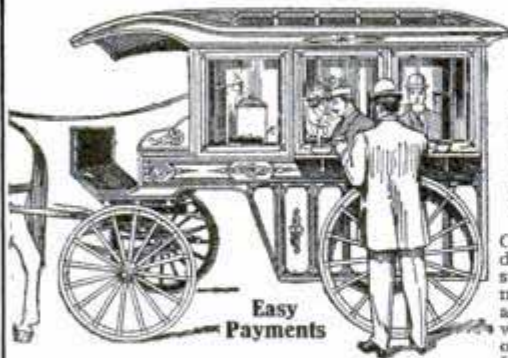
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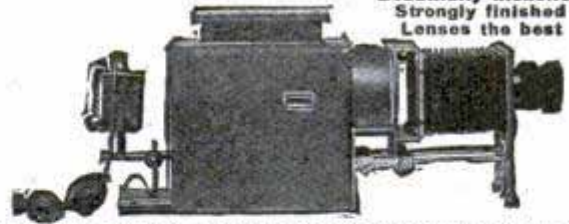
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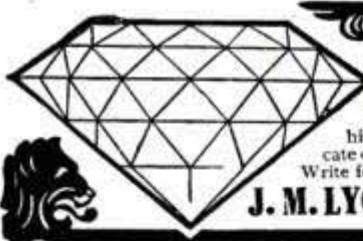


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This is just as good a Panama Hat as one costing \$10, except it is coarser weave. Warranted genuine, hand-woven, direct importation from South America. Weight 2 oz.; durable, flexible, easily shaped. Worn by everyone, man or woman. Looks like an expensive woman's Panama when trimmed. **Our Bargain Price to introduce only \$1.00.** 2 for \$1.88. We prepay all charges.

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FOR MEN AND OLDER BOYS.

An air gun that will shoot through half inch pine easily. Many times more powerful than spring guns. Uses compressed air, same as air brakes, rock drills, etc. 15c pays for 1,000 shots (delivered 30c). Practical for small game. 37 inches long. Walnut stock. Nickel barrel. Take down. Sold by dealers everywhere. If your dealer does not carry it, write us. Sent prepaid east of Rocky Mountains on receipt of \$2.50. Pacific Coast and Parcel Post Countries \$3. Circular free.

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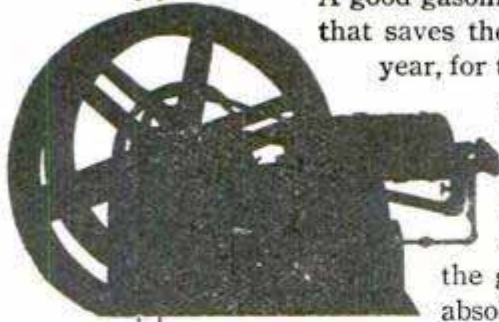
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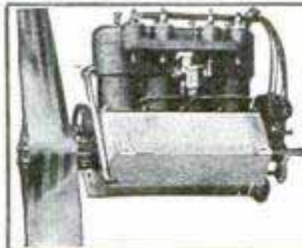
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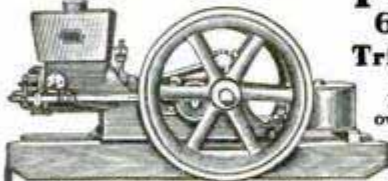
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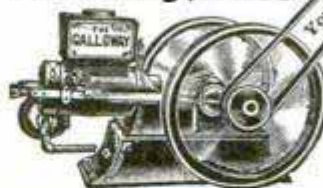
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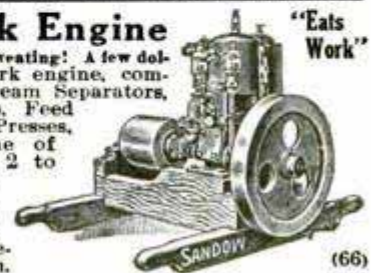
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With fittings, including propeller and shafting, stuffing box, wiring, etc.

Ready to install in your boat

This is a powerful engine for High Speed Boats, complete with all fittings. Absolutely Reliable. Extra Power and Extra Wear. Compact, Silent, Low running cost, Perfect two-cycle, reversing engine. 2 Year Guarantee. So simple a woman or child can run it. Used in Government Harbor Service and Chicago Police Boats.



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Prices Are In Proportion
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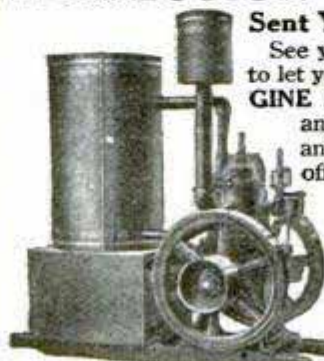
YOU should not even consider engines that operate on gasoline only. The rapidly rising price of gasoline, now 6 to 16 cents higher than kerosene, absolutely makes operation on this fuel too expensive. The Perfection Kerosene Engine operates on any engine fuel. When you purchase it you are on the safe side—proof against all fluctuations of the market. You can always run this engine at a great fuel saving and get the greatest amount of work done. The Perfection vaporizes its own kerosene and so makes it as efficient as gasoline—something other engines cannot do.

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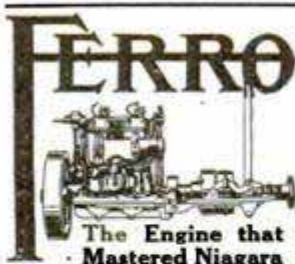
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inns can be obtained for 5 sen (about a penny). There is a reduction on the 8-sen inn if the room or cubicle be engaged for two nights. This class of room is furnished with a wool coverlet; for 10 sen a second coverlet is to be had, including the room with an area of 36 ft.; and if the best class of sleeping apartment be engaged, the cost is 25 sen, or about 5d. It seems that three travelers, if they wish to keep to themselves, can hire this latter class of apartment. The patrons of these inns for the most part belong to the laboring classes.—Economiste Francais.

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We have fitted a few—just a few—of these boats with a powerful 4 cylinder-4 cycle, 20 H.P. automobile type, magneto equipped engine and we are going to sell them to a few fortunate early buyers at a price that will be one of the surprises of the boating year. Here is a boat that will do her 20 miles at the price of a family launch, built in the Racine way, with Racine style and perfection of appointments, backed by the Racine Guarantee. It's your opportunity. Write now for our **SPECIAL OFFER**. Only a few boats at the price. Send now, or better still, send or wire a small deposit and we will hold one for you.

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LABELING TOWNS—M. Quinton, president of the National Aerial League of France, has proposed a means by which towns and villages may be marked in such a way that airmen in flying over them will be able to identify them without much difficulty. He points out that even if the names were inscribed on a flat roof in large letters the aviator would still have to search for the place on his map before knowing where he was. He therefore proposes that every notable place, town, village, factory, etc., should be designated by two num-

\$1000.00 IN PRIZES

Before the boating season opens

POWER BOATING

will distribute \$1000.00 in prizes

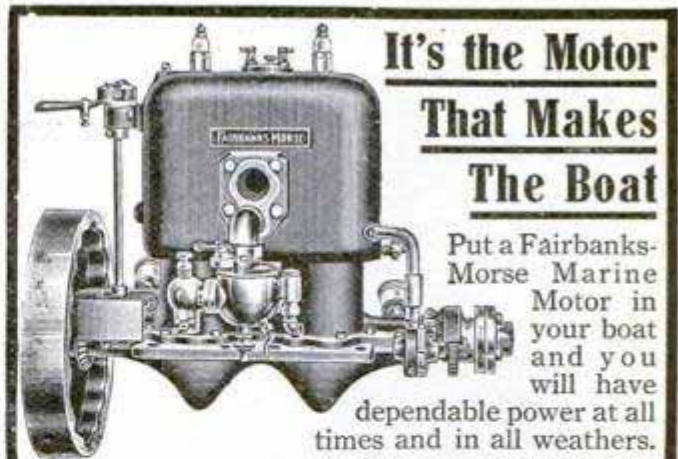
Including 20-foot Mahogany Runabout, 16½-foot Power Dory Skiff, 3 H. P. Marine Engine complete with reverse gear, High Tension Magneto, Batteries, Running Lights, Tool Kits, etc. Also several \$100.00 cash prizes.

You can get one. SEE APRIL

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That Makes
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Put a Fairbanks-Morse Marine Motor in your boat and you will have

dependable power at all times and in all weathers.

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Are Absolutely Guaranteed

They always run satisfactorily and develop more than the rated horsepower. They can be depended upon to take you "there and back" every time.

Always easy to start without a crank. Best designs, material and workmanship. We build engines for all crafts, large and small. Two cycle 3½ to 24 H. P., 4 cycle 4½ to 40 H. P. Send for Catalog No. 449BY and list of our 36 branch houses where our motors are carried in stock.

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Have led for 16 years in efficiency, dependability and consistent service. No engine so economical—so correctly designed and constructed. Made in all styles and sizes—2 cycle—2 port type—2 to 120 H. P. All are reversible and

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3 h-p. Gile Boat Engine \$42

**Bronze Propeller and Stuffing Box included
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"Runs Like A Scared Rabbit"

Writes Cleburne Grady, Montgomery, Ala., who while yet a green hand at motors averaged 12.92 miles per hour on a 8.62 mile river trip.

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The "Perfection" is so worthy of the name it needs little attention. Just a regular flow of gasoline and a good spark will keep it working on hard towing, ferrying or pleasure jaunts—and it will last as long as

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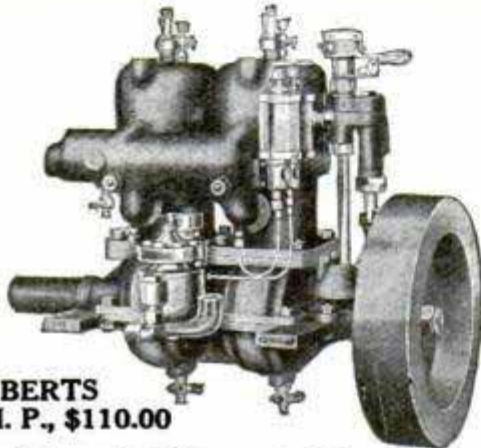
It would mean lunches home, quick pleasant trips to and from work and many a delightful trip to the country. But above all, it means an actual saving in transportation cost to you.

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The Motors That Never Backfire



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6 H. P., \$110.00

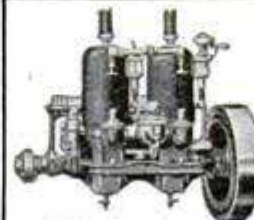
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Toledo **MARINE MOTORS**

SIMPLE — RELIABLE

HIGH GRADE GUARANTEED
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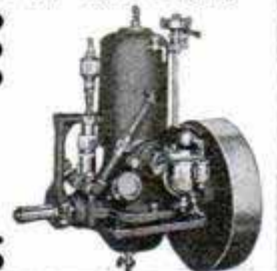
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18 H. P., 3 cyl., 250.00

Including complete engine
and electrical equipments.

2 cycle, 2 port $4\frac{1}{2}$ " x $4\frac{1}{2}$ "

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Universal Machine Co.
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bers. The first of these numbers would indicate the distance north or south of the parallel of latitude of Paris, the second the distance east or west of the meridian of longitude passing through Paris. Thus if an aviator passed over the sign marked plainly on the ground "168—53," he would know he was 168 kilometers north of Paris and 53 east of Paris. The numbers would be underlined to distinguish north from south and east from west.—New York Sun.

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This Toppan Power Dory as illustrated above is made of best guaranteed materials and is the standard rough water boat of the

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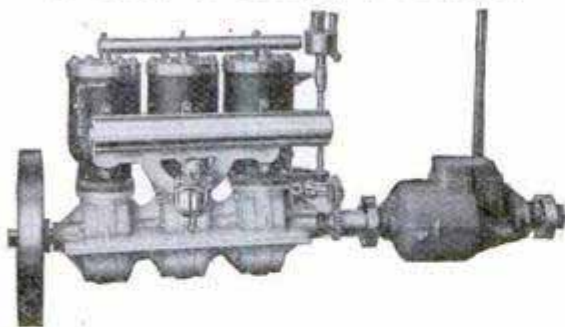
that has successfully made the terrific trip through Grand Canyons of Colorado and Arizona. Write for booklet describing trip. Gold medals awarded our Boats and Engines by Royal Imperial Tech. Society, St. Petersburg; Internat'l Exposition, Milan; Nat'l Motor Boat Show, Paris.

Equipped Bow and Stern with Air-Tight Compartments. The Non-Sinkable Boat—Absolutely Safe! Needs No Boathouse

Leave your Michigan Launch in the water or out on the beach in all kinds of weather for months. It is puncture-proof. Equipped with the wonderful Detroit Engine, guaranteed for five years, any horse-power from 2 to 50. Fewest moving parts of any engine made. Anyone can run it. Free fully illustrated catalog shows all 1911 models. Don't buy a launch until you see this book. Write for special proposition and prices to Demonstrator Agents. STEEL ROWBOATS, \$20. Need no boathouse. Big money in boat livery.

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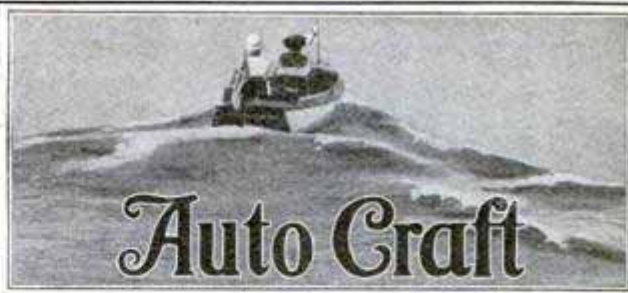
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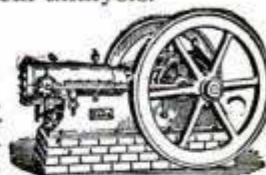
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strop gives the
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Break away from thoughts of the office, the shop or the store and put your mind for a few moments on the sunny days in the open that are just waiting around the corner for the man with a motor boat. No matter how many cares, no matter how thick the worries come, the wind that blows across the bows of your little craft will sweep them all away

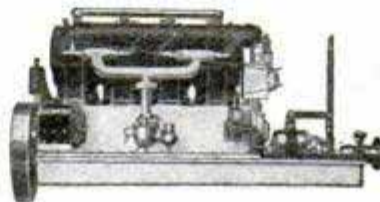
Of course, there's one care that comes to some boat owners, the care of a balky engine. But a little thought now can save you all the trouble that might spoil future days of delight.

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MOTOR
COMPANY**

650 Lincoln Ave.
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NAVIES OF THE WORLD—A report issued by the British Navy Department on the navies of the world gives Great Britain a tonnage built and being built of 1,871,000; France, 801,000; the United States, 770,000; Germany, 693,000; Japan, 445,000; Russia, 320,000; Italy, 284,000, and Austria, 143,000. The Navy Department excludes all vessels over twenty years old, unless they have been re-armed and re-constructed since 1900, and also vessels authorized but not actually begun. Great Britain is credited with having 53 battleships built and being built of a tonnage of 887,000, the United States with 29 of a tonnage of 406,000, France with 24 of a tonnage of 337,000, Germany with 28 of a tonnage of 354,000, and Japan with 13 of a tonnage of 191,000.—Philadelphia Inquirer.

\$4000 A YEAR TO AGENTS

100 good honest agents—salesmen—managers wanted at once. No experience required. Positions pay from \$50 a week to \$4000 a year. McGough, O., made \$160 in one week. Boy of 14 sold six in one afternoon. E. J. Durr, Mich. cleared \$22.50 in one day. Needed in every home, office, factory, public building. 150 per cent profit in each sale. Profits count up fast. Sale after sale is made in short time. 100 appointments in fine territory will be made at once. If you hurry you can get one of them. Don't waste time. Write us today. Agents recently appointed report startling records of sales. We are introducing one of the most marvelous and useful mechanical and chemical inventions of the age.

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WETMORE Adding Machine

An Opportunity to Share in the Profits of this Company

THE Wetmore Adding Machine Company will manufacture the simplest, most reliable, and durable adding machine ever produced. Those who organize the company are men of long and successful experience in manufacturing, and their interests are permanently bound up with those of the company.

The Wetmore Adding Machine is the only adding and listing machine ever produced whose addition does not depend upon springs, gravity, or friction. Every part in its adding mechanism is driven into position by cam, gear and lever.

A Few Prominent Features

1. Accumulators in direct line of sight.
2. Low key board.
3. Visible works.
4. Keys interlocking or flexible, at choice of the purchaser.
5. Especially convenient angle of keyboard.
6. A new and improved method of inserting paper.
7. Lightest operation of any machine on the market.
8. All keys and levers operated by the right hand, the left being free for turning checks.
9. Two sets of accumulators, one for the debit and one for the credit column, a feature which greatly extends the usefulness of the adding machine.
10. Positive operation; must add right or stop, no other alternative.
11. The design permits of substantial construction.

Eight years ago, the inventor, Mr. Wetmore, was engaged by one of the largest adding machine companies as their General Superintendent. At that time, the company had almost no factory equipment. Mr. Wetmore first undertook the redesigning of their machine and his name appears on the late patents. Next, Mr. Wetmore superintended the designing and building of the special equipment, selecting and installing the standard machinery and superintended for five and one-half years the production of what is known as one of the best adding and listing machines on the market today.

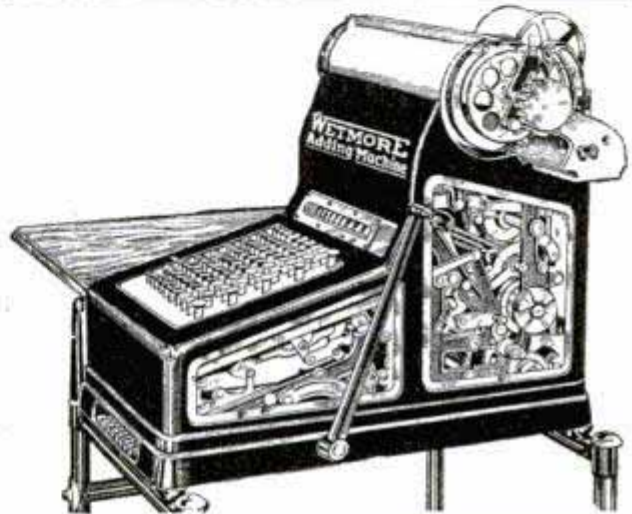
This five and one-half years of building adding machines for the market gave Mr. Wetmore an opportunity to carefully study every other adding machine and this experience convinced him that all adding machines up to this time were designed upon wrong principles.

No one would think of driving a cyclometer on an automobile with a belt. Why? Because belts slip. Why then trust your accounts to a mechanism whose accuracy depends upon its parts being moved by springs? If the spring weakens or the joint in the part becomes corroded or gummed with bad oil or clogged with dirt, you have an incorrect addition.

These troubles led Mr. Wetmore to spend years of time to produce an adding machine whose operation is as positive as a gear drive. If one part in the adding mechanism moves, all the rest must move. If one part is blocked, all parts are blocked. These are features embodied only in the WETMORE ADDING MACHINE.

The Wetmore Adding Machine Co. offers the following very liberal proposition to small investors. We will sell four shares, 7 per cent cumulative preferred stock, par value, \$100.00 per share, for \$400.00. This stock carries a bonus of two shares of common stock. This is the same proposition which is now being made to large investors. This common stock should pay

Not a Spring in Adding Mechanism



More Work with Half the Mechanism

at least 30 per cent when the factory is selling 3,000 machines per year. In addition to this, for the purpose of introducing our machines into every state in the United States, we will give to a limited number of purchasers of the above amount of stock, in each state in the United States, ONLY, an order on the factory for one of our \$400.00 adding and listing machines upon payment of \$200.00 in cash. If the stockholder wishes he may turn in his two shares of common stock in place of paying the \$200.00 in cash, that is, we will accept this common stock at par for payment on this limited number of machines.

For \$400.00 you get \$400.00 of 7 per cent cumulative preferred stock, \$200.00 common stock, and by paying \$200.00 in cash additional, you get a \$400.00 adding and listing machine. Or for \$400.00 you get \$400.00 7 per cent cumulative preferred stock and one \$400.00 adding and listing machine.

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Mrs. H. Cole, N. Y., writes: "I am simply delighted. Robs scrubbing of all its hard work and takes so little time. Can scrub dirtiest floors with scarcely any effort." C. Barnes, S. C., writes: "No other invention means so much to the home. I am booking orders like lightning. It takes every woman by storm." What woman hasn't been eagerly waiting for the Scrubbing Machine? It's here—perfected—selling like wildfire. Sells for \$3.25—banishes forever woman's worst torture. Could anything be more appreciated, popular, irresistible? **Don't delay—seize this live opportunity. Be first—get exclusive territory—make a fortune. Send today for agency, free sample and credit terms.**

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The only kind of exercise recommended and taught by me is exercise which is at all times just within the strength of each muscle or muscles employed. Never go so far as to overwork a muscle, external or internal, but make it do all that can be done comfortably. It is the wise provision of Nature that every muscle hold strength in reserve for emergencies. Thus, if a muscle be accustomed to exert every little while a pull of 50 pounds, Nature will provide that muscle with the power to pull 60, 70, perhaps 80 or 100. If the work is increased, so will the muscle strength increase in exact proportions. This is absolutely true, as Nature is never neglectful of her duty. **The Right Kind of Exercise** in physical training may be had by the use of my **PROGRESSIVE EXERCISER**. A machine with which you can uniformly exercise every muscle of the body. By combining the use of this wonderful invention with my instructions on health and strength building, you will not acquire an abnormal development, but your entire body will be uniformly benefited. My most recent book **"THE WHYS" of Exercise** tells all about this wonderful little exerciser. It also tells many truths about exercise which are startling to the average reader, giving as it does the "reasons why" so many systems fail, and proving conclusively that there is but one way to acquire **REAL HEALTH AND STRENGTH**. In sending for book enclose 4 cents in stamps to cover postage. My price for machine and complete course of instructions is extremely reasonable.



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MEND WITHOUT HEAT

Potmend is the most powerful cement in the world. A great help around the Repair Shop, Tool-House, Factory.

Most Excellent for General Repair Work

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The longer you use

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the more uses you will find for it



Potmend is a dry Powder Cement that will never deteriorate—never harden in the can. Most economical to use. No cure-all, but a practical, scientific preparation.

Potmend will stick solidly different substances, such as Brass and Glass, Marble and Wood, Silver and Glass or Bone or Cork, Iron and Glass, Leather and Metal, and so through any combination you want to make.

Try it once and you will never want to be without it.

You owe it to yourself that you at least will test this wonderful cement. Potmend will save you money.

To introduce Potmend, we will send by mail, postage paid, to any part of the United States and Canada, our "Factory Size" can upon receipt of \$1.00. Quantity prices and terms given upon application. We will not send any free samples but do guarantee our cement to be as represented.

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Telephone: Chelsia 6006 Cable Address: Potmend N. Y.

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Gentlemen: Enclosed find \$1.00 for which send me one can of Potmend—factory size. If for any reason I find Potmend unsatisfactory, I shall return it at your expense and you agree to refund the money.

NAME

STREET AND NO.

CITY

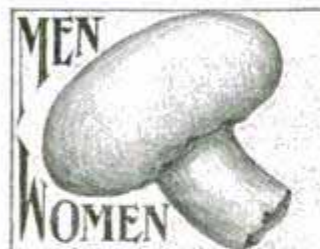
STATE

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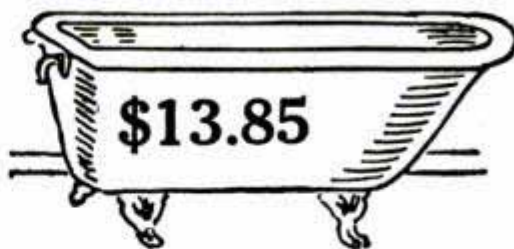
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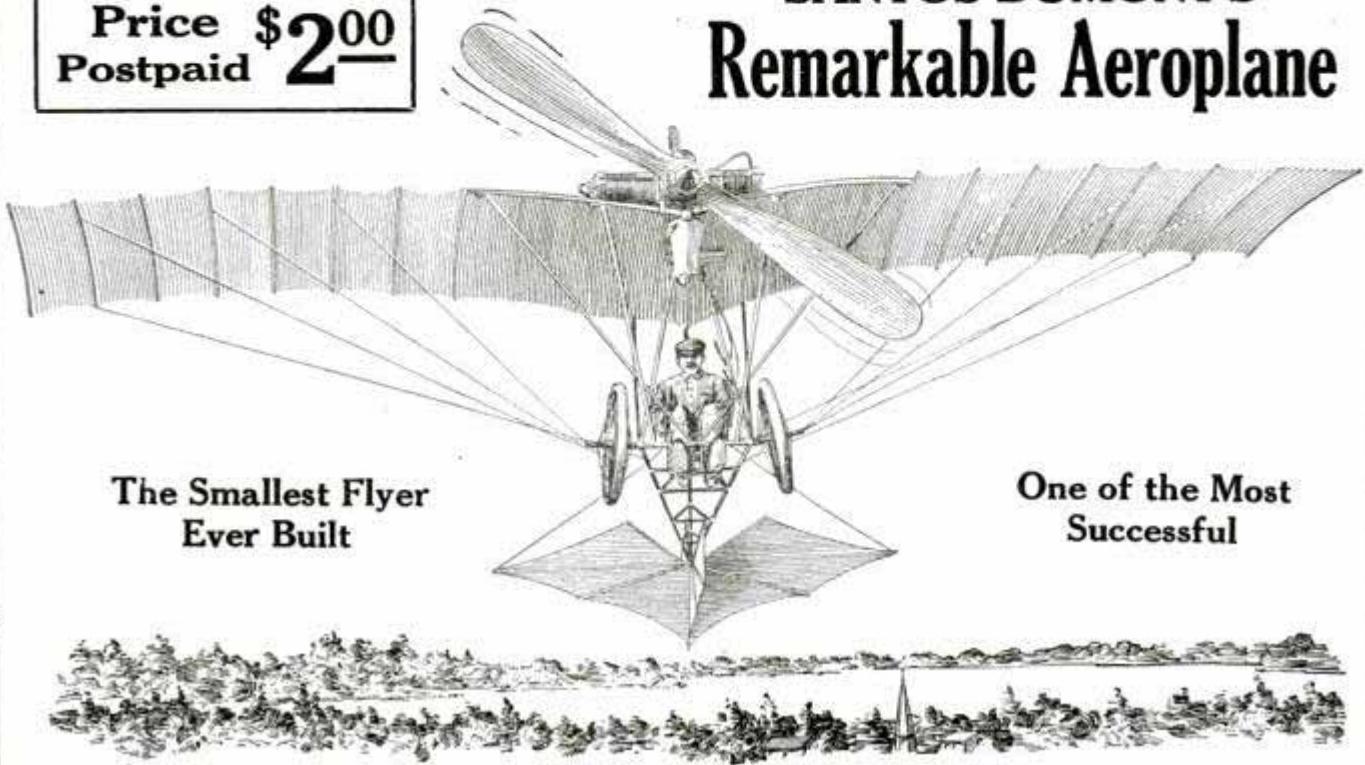
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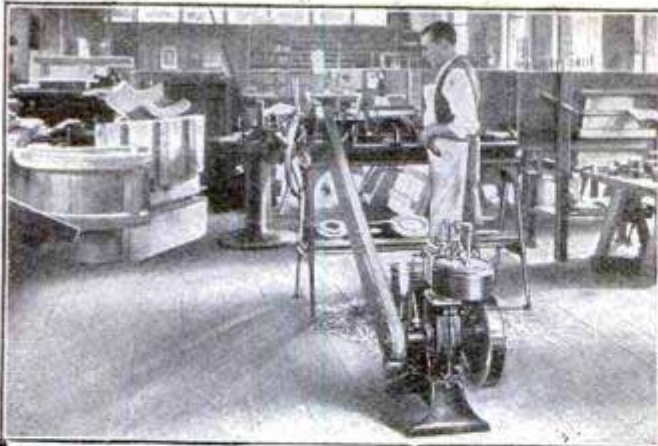
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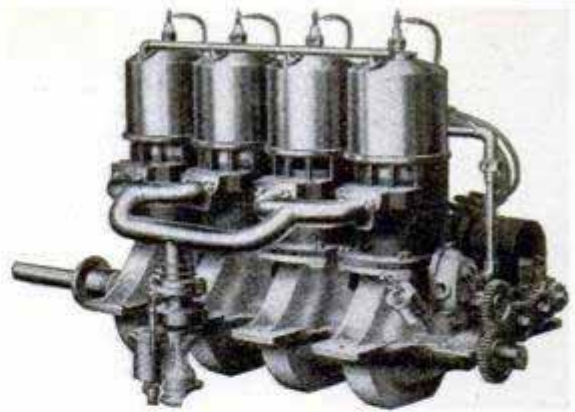
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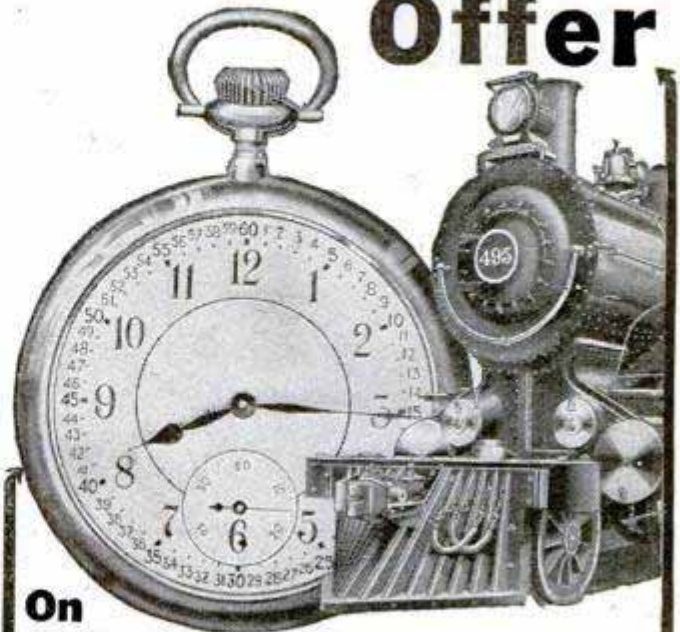
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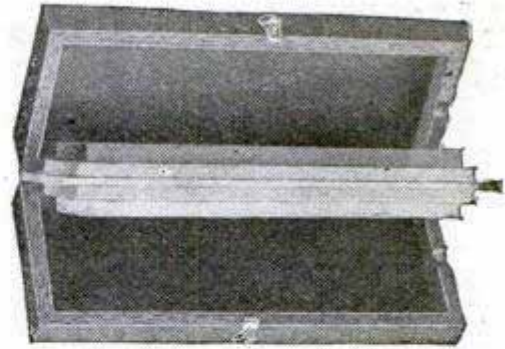
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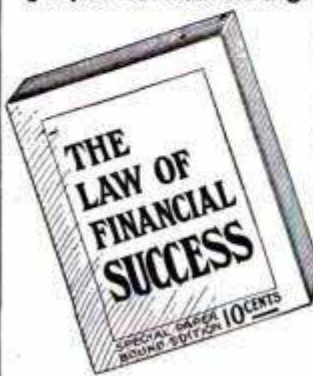
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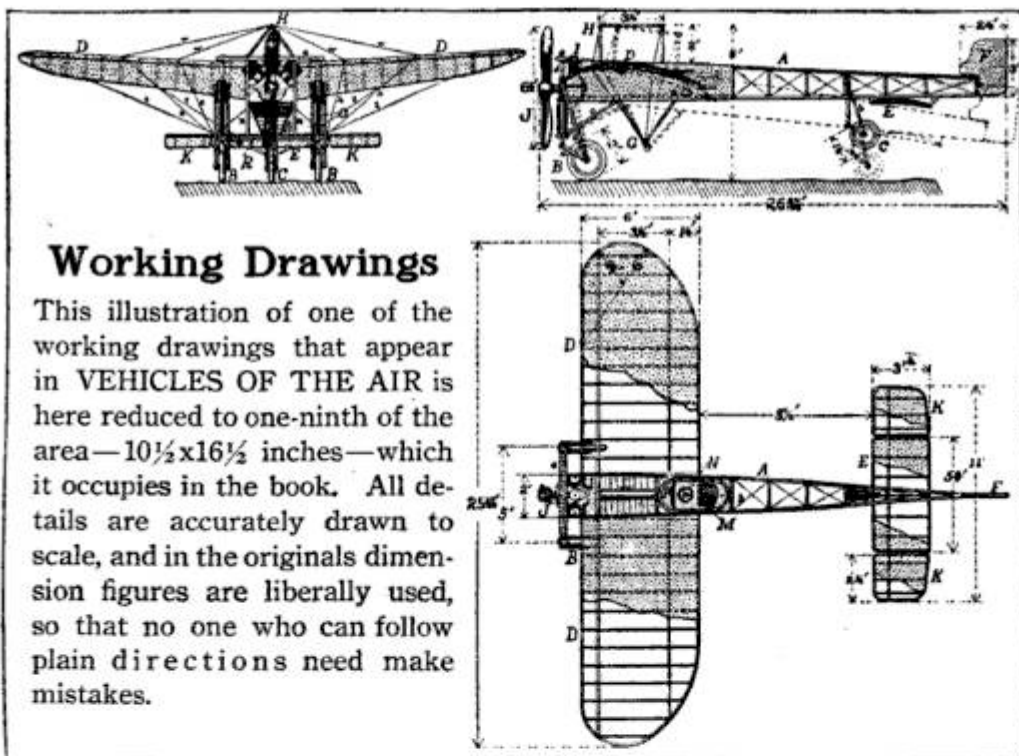
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Figure 197—Scale Drawings of Bleriot Monoplane Number XI

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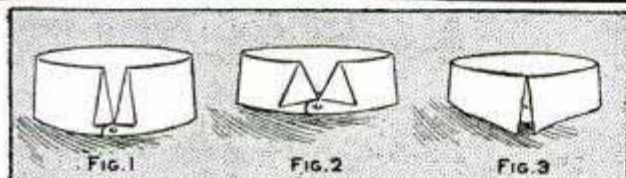
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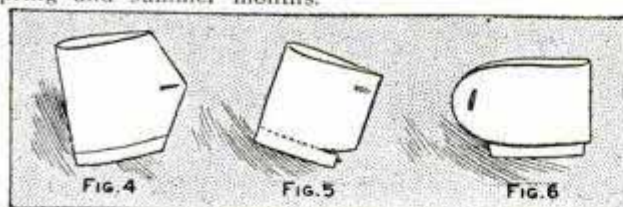
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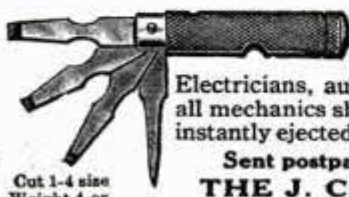
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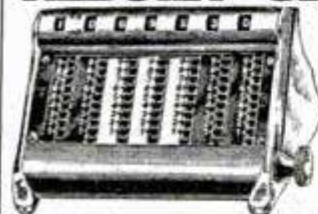
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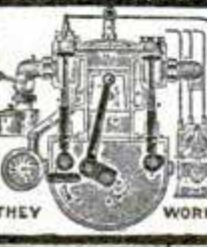
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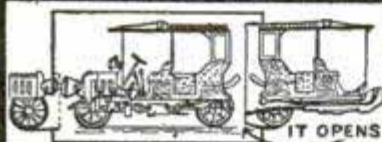
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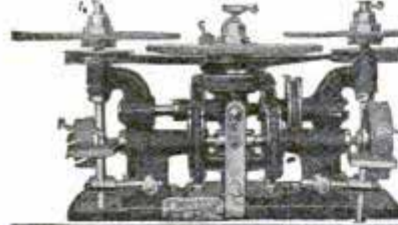
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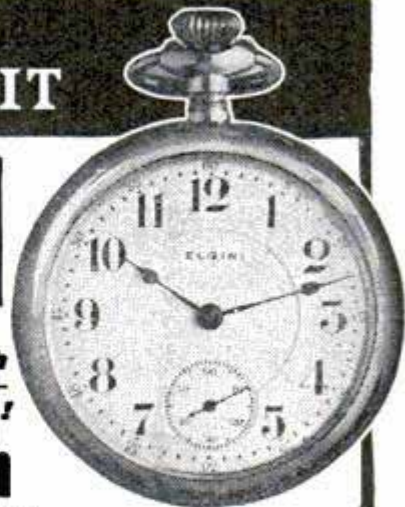
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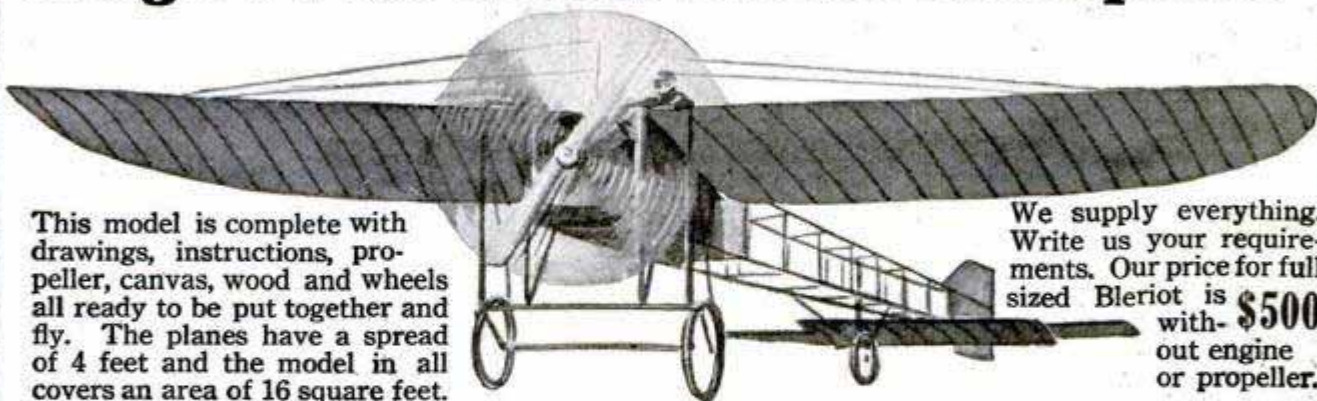
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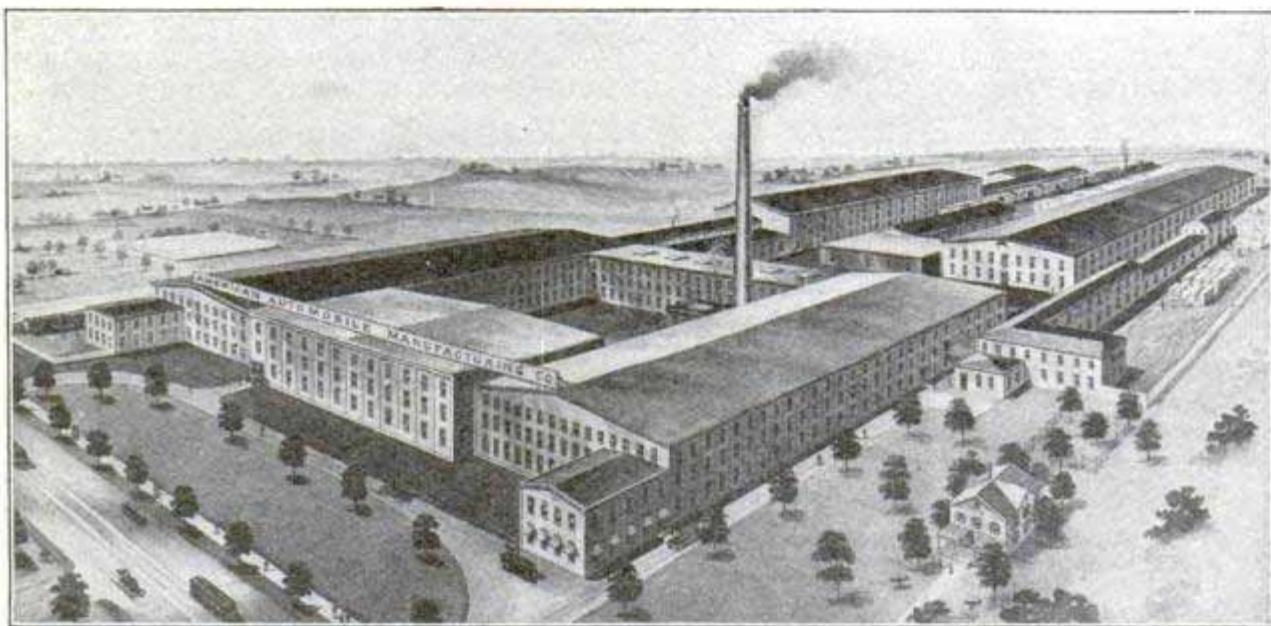
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The automobile is finding new uses every day—agricultural and industrial.

And careful statisticians compute that to-day only 5% of possible business is being done by automobile manufacturers.

That means that twenty times as much business could be done than *is* done.

That means that were the number of automobile manufacturers doubled, there would be more than enough to keep all going without disturbing existing companies' business in the least.

That means the *permanence* of the automobile industry.

You can't buy automobile stock to-day.

A man would be a fool to barter his proprietary right in a dividend that ranges from 60% to 1300%.

And when a new company is formed you can't buy stock in it usually.

For usually the stock is issued in denominations of \$1,000 or more and the big men snap it up like hot cakes.

For they know automobile stock is absolutely gilt edged.

There has never been any automobile stock offered to the private investor until now.

Now it is offered—and we offer it.

The American Automobile Manufacturing Company is an established manufacturing concern, and has purchased the plant, machinery, patents, and all rights, titles, and interests of the Jonz Auto Co., manufacturers of the famous Jonz engines.

We own a big plant at New Albany, Indiana, as illustrated on preceding page.

This plant comprises about 5 acres of floor space—several big buildings valued at \$200,000.

We are manufacturing Jonz cars.

We already have \$450,000 worth of these cars ordered.

We require an additional fund for additional machinery and equipment to manufacture the cars already ordered, however—

And we are securing that fund by the sale of stock.

Contrary to the usual plan, we are not going to one or a group of financiers—

But we are going to the private investor.

Every stockholder becomes a partner in our business, with a voice and a vote in the direction of its affairs.

The stock being fully paid and non-assessable, no responsibilities are assumed by any stockholder. But each stockholder will boost the sales of the cars manufactured by his own

company. That's why we sell stock to the private investor.

We believe, too, that by having a great many stockholders in all walks of life all over the country, directly interested in our Company, that its prestige will be strengthened and its success assured.

The investment is absolutely safe.

You deal with business men and manufacturers, all of whom have purchased their own stock direct from the treasury of the Company. Not one share of promotion stock has ever been issued.

This is an investment in a substantial Industrial Concern in a business that pays dividends from 60% to 1300% and which, all told, is doing only 5% possible business at the present time.

The car—the Jonz—the best made because it has the simplest and most powerful motor. The patent owned in its entirety by this Company, thus insuring monopoly.

\$450,000 worth of these cars have already been ordered from us and must be built and delivered.

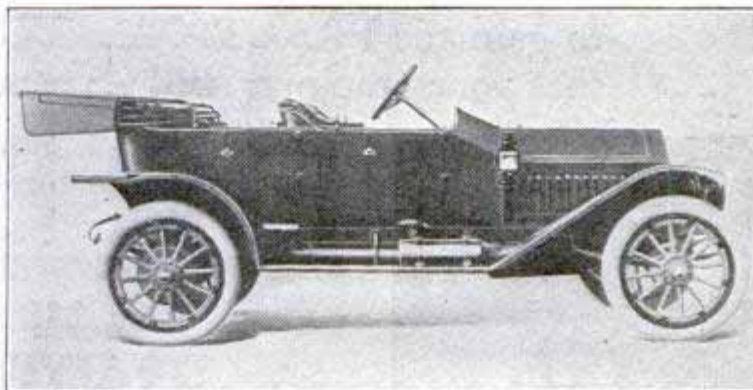
Dividends should be large and immediate.

Our Capital Stock is \$1,000,000, divided into two hundred thousand shares of the par value of \$5 each, fully paid and non-assessable.

If you have \$5, \$10, \$20 or \$100 or \$1000 that you would invest where it would be absolutely safe and where it would provide a maximum income immediately—with opportunity for still greater profits—fill in and cut out the attached coupon and mail it to us to-day.

We tell all about the proposition in our book—"From 60% to 1300% Dividends." Write for it.

The American Automobile Mfg. Co.,
408-12 Lincoln Bank Bldg., Louisville, Ky.



The Jonz—1911 Fore Door Construction

From 60% to 1300% Dividends Coupon for Popular Mechanics Readers

American Automobile Manufacturing Company,
408-412 Lincoln Bank Bldg., Louisville, Ky.

Gentlemen:—

Kindly send me your Book "From 60% to 1300% Dividends" relating to stock in the American Automobile Manufacturing Company.

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Please Mention Popular Mechanics



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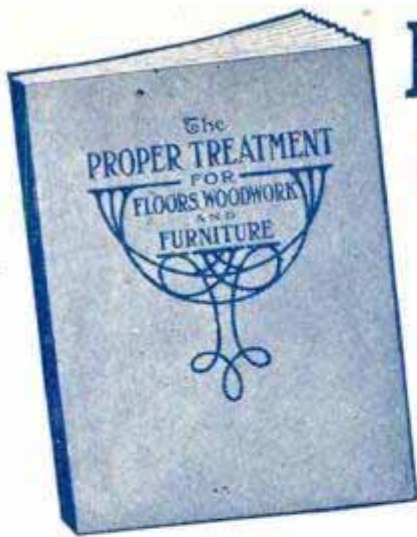
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Johnson's Wood Dye is made in many beautiful greens, browns, reds, etc. It is not a mere stain but a penetrating dye which colors the wood so deeply that if it becomes scratched or marred the natural color is not disclosed. It brings out the beauty of the grain without raising it, giving a soft, rich, permanent color. A coat of Johnson's Prepared Wax over the dye gives that beautiful, dull, artistic finish so much admired today. If you prefer a higher gloss than the wax gives apply a coat of **UNDER-LAC** over the dye and then one coat of Prepared Wax.

Under-Lac is a thin, elastic spirit finish very much superior to shellac or varnish. It dries hard in less than an hour. Under-Lac is just what you want for your linoleum and oilcloth; it brings out the pattern making it bright and glossy like new, protects it from wear and makes cleaning easy. It dries so the floors may be walked on in an hour.

We want you to try Johnson's Wood Finishes so we are supplying all leading paint dealers with samples for their customers' use. If your dealers haven't samples of our Wood Dye, Under-Lac and Prepared Wax and the Instruction Book—we will send them to you postpaid for the name of your dealer in paints. In writing us mention the shade of dye you prefer and Instruction Booklet, edition P A-4.

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