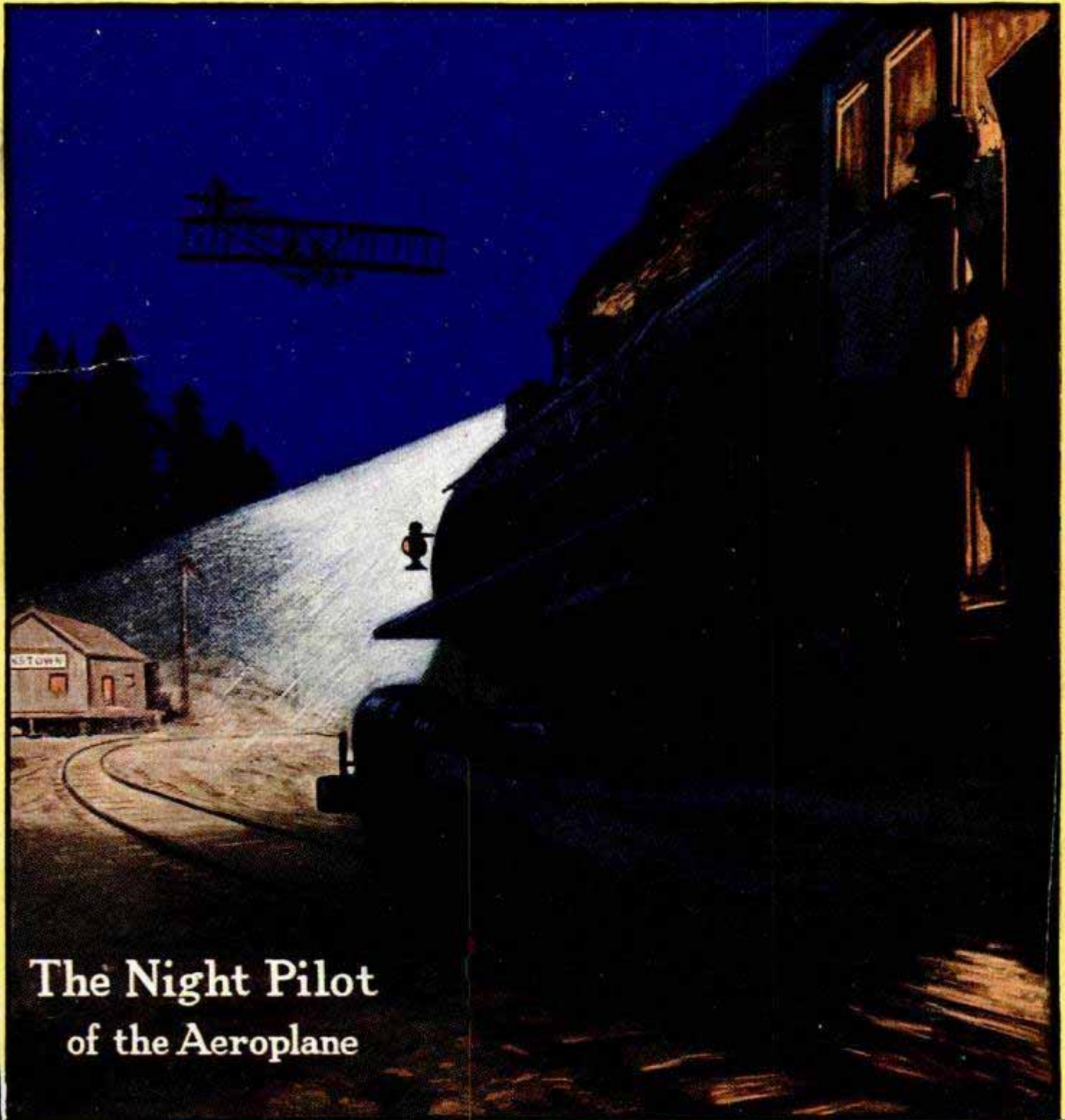


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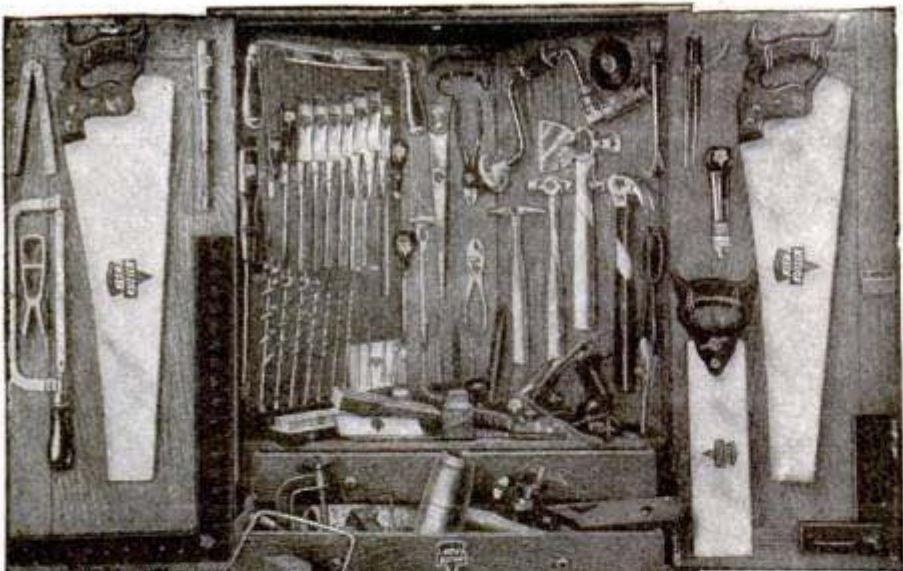
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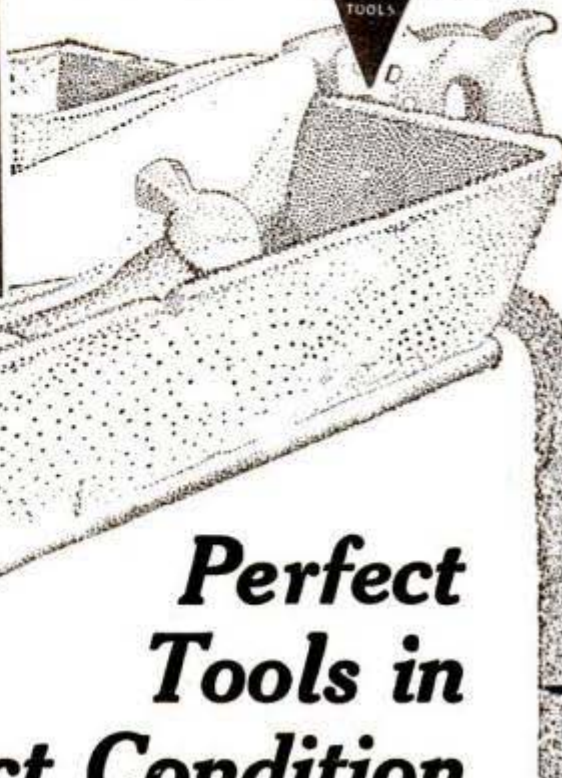
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Popular Mechanics Magazine

318 W. Washington Street, Chicago, U. S. A.

EDITED BY H. H. WINDSOR

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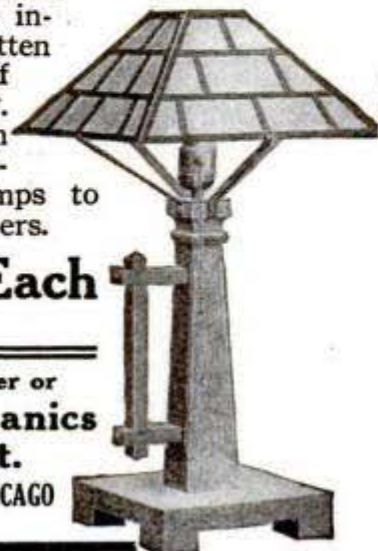
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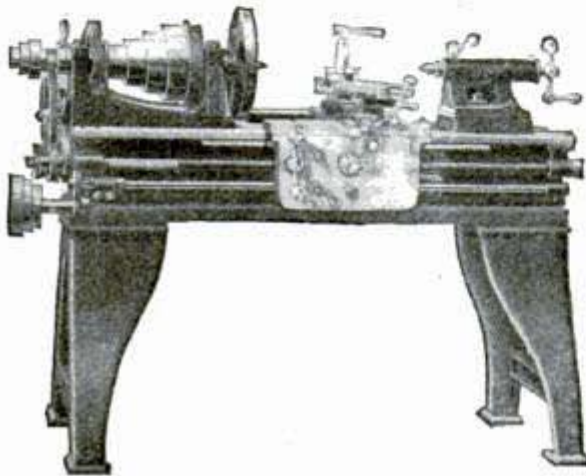
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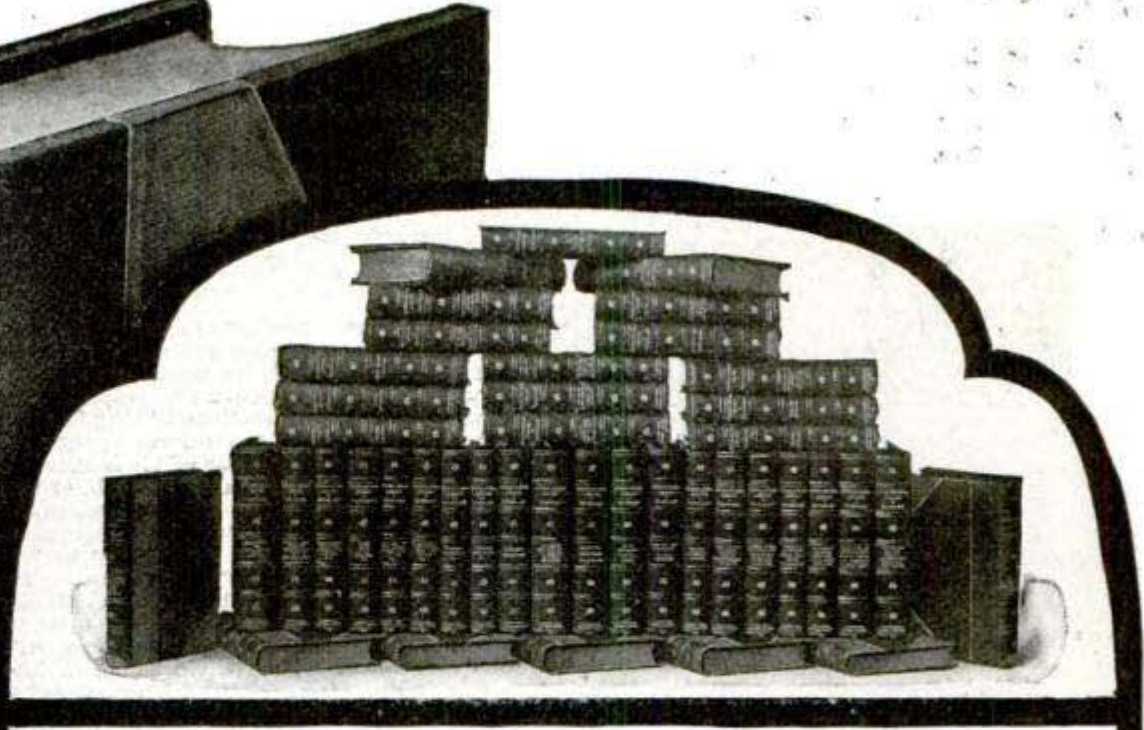
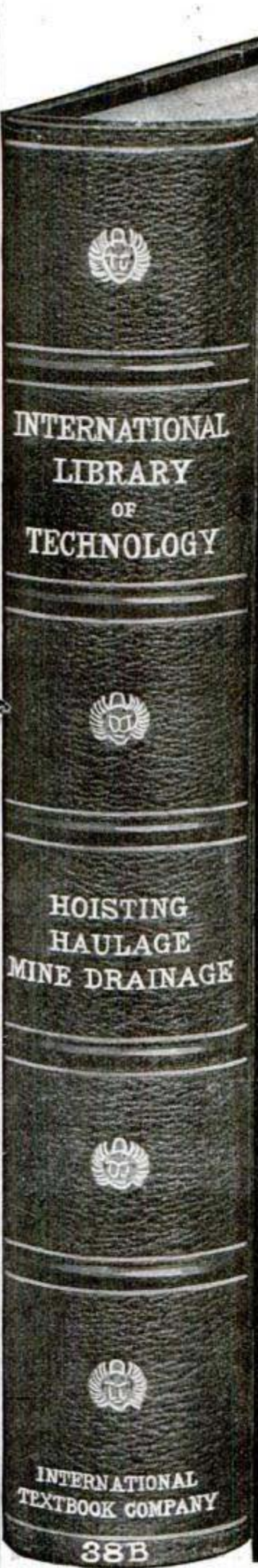
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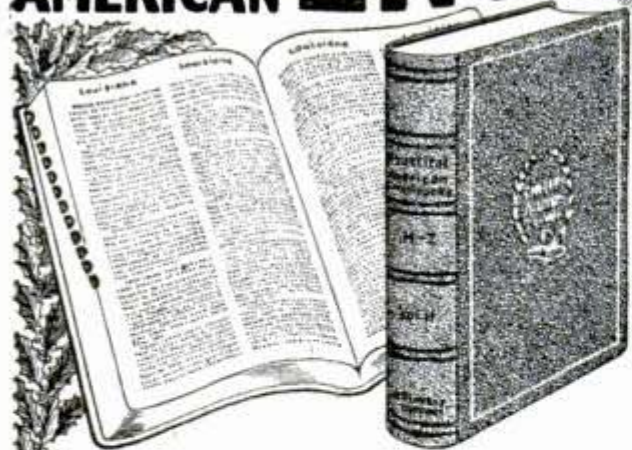
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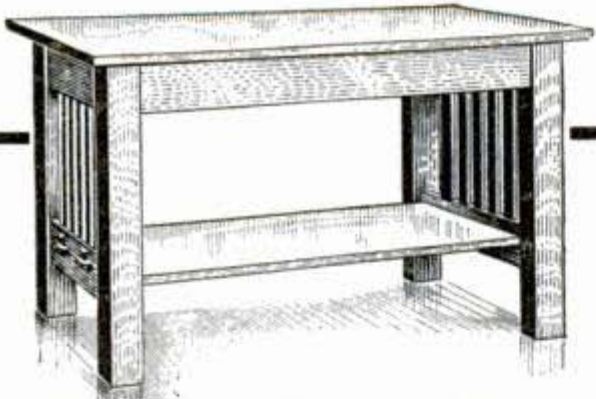
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MONTHLY CASH PRIZES

Until further notice in this magazine the Editor of Popular Mechanics will pay two cash prizes each month for the best original contributions to its

SHOP NOTES DEPARTMENT
\$10 for the Best Contribution
\$5 for the Second Best

THIS IS IN ADDITION to our usual rates for such contributed articles. Quality, not length counts. Checks will be sent on the last day of each month for the prize articles received during that month. Publication in the magazine will follow in about two months.

PRIZES AWARDED FOR OCTOBER, 1911

- First Prize—CHAS. HOMEWOOD, Waterloo, Ia. \$10
"Cork Corners for a Drawing Board"
- Second Prize—FRANK ROSENBERG, Worcester, Mass. ... \$5
"Hanging Pictures"

EXTRA AWARD

On account of there being five contributions this month, each of which deserved second prize, we have made an EXTRA AWARD of four additional second prizes, as follows:

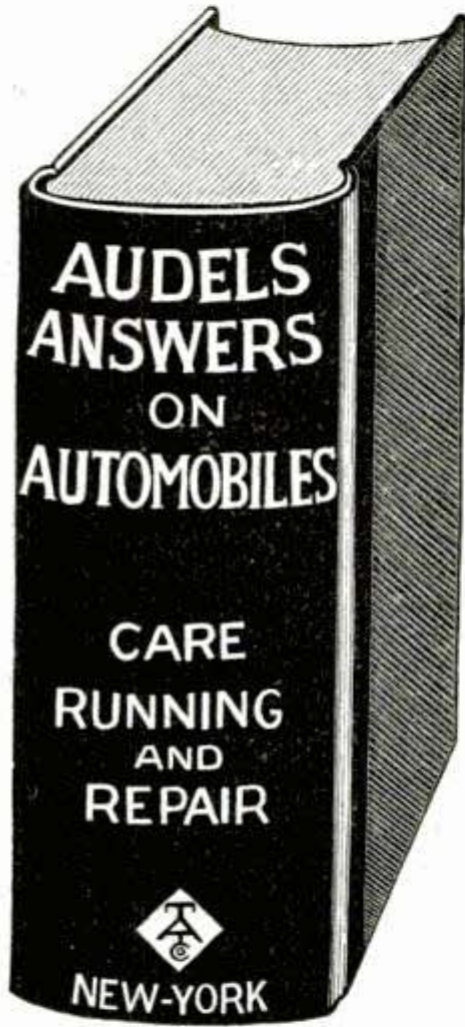
- FRED GRINHAM, St. Louis, Mo. \$5
"Removing Carbon Deposits in Gasoline Engines"
- F. G. MARBACH, Cleveland, O. \$5
"Wedge for a Hammer Handle"
- D. L. KELLOGG, Stillwater, Minn. \$5
"Weatherboard Spacing Gauge"
- BERT L. FORSE, Poughkeepsie, N. Y. \$5
"Keeping Dampness from Tools"

All accepted contributions to our departments, "SHOP NOTES" and "AMATEUR MECHANICS," are paid for immediately; checks for prize awards are sent at the end of each month.

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NOTICE—The below reduced size page will be read with great interest:

FIELD FOR DRAFTSMEN

*This Page taken from *Popular Mech.* Advertising Section Jan. 1910*

Big Demand for Mechanical Draftsmen. Positions Paying \$100 to \$150 Per Month

It is perhaps not known to many Readers of Popular Mechanics, but especially to the ambitious, wide awake, and progressive ones and to the large number of Mechanics reading this paper that there is no better field or opportunity for advancement than there is to the practical and well trained Mechanical Draftsman.

But not that man is wanted who has the largest or most expensive library of technical school books "at home," neither the one that carries along with him under his arm when applying for a position a nicely engraved "beautiful Diploma" on paper (costing \$50 to \$75 per sq. ft.) nor the "would be" Draftsman that can "copy" a nice looking picture from another picture with given dimensions.

No, the demand is for Draftsmen with practical Drafting Room training that can "Do Things," Do it "themselves," and Do it right away "Right."

No Employer cares for your Diploma, neither for your set of nice "Books at Home" in your Book-case. He wants you to "Deliver the Goods" for the money he pays. To Draw \$100—\$150 per month, the average Salary paid to Draftsmen, you must be able to do more than "Only make a Copy" of someone else's drawing. Originality and practical ability is demanded of you and this requires practical training.

The quickest and best way to be trained on practical Drafting Room work and to get the required practical experience is to receive personal and individual Instruction from a High

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An ordinary Draftsman, not even the best Draftsman can teach this trade unless he has many years of experience as an Instructor, and has ability to impart knowledge that is understood and that will stick forever. A special gift that 99 out of 100 do not have.

Mr. P. Dobe, Chief Draftsman of the Engineers Equipment Co. (inc.) Chicago, with 20 years experience in training and handling men has for a good many years given personal individual Instruction by mail with the most deserving success, because his Instruction work consists of actual practical Drafting Room work that gives his personal student and apprentice the required practical experience.

He treats each student personally and gives him individual practical working instruction according to the ability of the student to master the work and to advance. His instruction is not given as patent medicine the same for all alike, and his personal assistance is very valuable to anyone.

Mr. Dobe has been an advertiser in this paper for a good many years and will send his "Successful Draftsmanship" Prospectus, 6x9, also list of 250 open Draftsmen positions and full information free. Anyone earnestly interested should write to him personally, his advertisement appears on last page of this book.

*Read it over again *Every Word true**

NOTICE—I accept for Instruction only a limited number of desirable and success-promising students, and not, like schools do, anybody and everybody that can pay the price.

Read my advertisement on last page

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Classified Advertisements

Advertisements in this section, 10 cents per word, each insertion payable in advance. To insure ads being inserted under proper classified head in the January issue, copy must reach this office not later than December 1st.

Popular Mechanics Magazine,

318 W. Washington St., Chicago, Ill.

Gentlemen: It gives us pleasure to advise that the results received from our classified ads in Popular Mechanics Magazine have been very satisfactory. As a matter of fact they have been way beyond expectations. We have used the classified columns of Popular Mechanics Magazine for nearly three years. Although we advertise in several hundred other publications we consider Popular Mechanics Magazine the leader. We, of course, extend to you the privilege of using this commendatory letter in any way you may consider beneficial to your interests. We beg to remain,

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GREAT BARGAIN in National Electric. Tires and motor good. Write Parrett Machine Co., Wenona, Ill.

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STEAM CAR Correspondence School. Particulars, 520 Fourteenth St., Denver, Colo.

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WHITE STEAMER 30 hp. model G, luxurious, seven passenger touring. Elegantly and completely equipped. Cost \$4,700; sell \$400. Suite 457, Thoroughfare Building, 972 Eighth Ave., New York City.

CADILLAC 5 passenger touring car, perfect condition, first \$110 takes it. McDonough, 147 Morningside Ave., New York City.

BUICK 5 PASSENGER touring car, top, full equipment. Excellent condition, \$150. Spillane, 248 East 119th St., New York City.

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START AUTOMOBILE TIRE REPAIRING. Cost but a few cents a repair. Every owner ought to have an outfit. Send \$2 for complete Vulco Outfit, enough for fifty guaranteed repairs, with which you can earn \$25. Easy to do, no tools required. Richardson Tire Co., Hartford, Conn.

TIRE BARGAINS! A. C. C. A. prices talk; Diamond-Goodrich's and other standard makes—Guaranteed—Every size for every rim; 28x3, \$6.00; 32x3, \$8; 28x3 1/2, \$9.25; 30x3, \$7.00; 34x3, \$9.00; 29x3 1/2, \$10. All other sizes and tubes proportionately low. Shipped on approval. Write today for price list. The Automobile and Cycle Company of America, Dept. B, 1769 to 1787 Broadway, New York City.

WE MAKE A BETTER unguaranteed Automobile tire than most guaranteed tires. You get exactly what you pay for. Gums, Fabrics and Mechanical goods. National Company, 1400 Clybourn Place, Chicago, Ill.

FOR SALE—1" and 1 1/4" Planhard carburetors, latest type, with auxiliary air adjustments. \$4 for either size if taken at once. Snap. Never used. Address S. E. Brown, 23 Eldredge Court, Chicago, Ill.

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HAVE SMALL QUANTITY, best make Reliners. Will sell at cost. Write for prices. Also best make Red Rubber Goggles that sell elsewhere at \$1. Our price, 45c postpaid. Box 726, Trenton, N. J.

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AGENTS—DON'T accept an agency until you read our new book, "Piling Dollars;" its free. Darling Bros., Derry, N. H.

WANTED—HONEST MEN in every locality to represent us on Baking Powder. Experience unnecessary. Good opportunity. Prudential Baking Powder Co., Hudson & Canal Streets, N. Y.

AGENTS MAKE \$20 PER DAY selling the All-Purpose Wrench. Every Wrench in One. Indispensable to mechanics. Write, Universal Wrench Co., Denver, Colo.

\$50,000 CAN BE MADE in a county, building my patented overflow concrete bridges, cheaper than steel. Agents can make \$1,000 per month selling territorial rights. C. Horton, Belle River, Ill.

GENERAL AND LOCAL AGENTS—We control a new manufactured article with a great future. Profits that will astonish you. 15c sample free. United Sales Agency, Franklin, Penn.

AGENTS WRITE TODAY. We will positively show you how to make \$25 every day. Lehigh Specialty Co., South Bethlehem, Pa.

AGENTS GREATEST OPPORTUNITY; our fast selling line gives you \$1.00 profit on every sale of \$1.75. Watertown Supply Co., Watertown, Wis.

LIVE AGENTS to sell Wholesale, Patented Household article. D. Schaefer Mfg. Co., 889 23d Str., Milwaukee, Wis.

WANTED MANUFACTURERS AGENTS calling on the automobile trade to sell Men-Do and our other tire necessities. Liberty Rubber Co., Orange, N. J.

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

AGENTS—Increase your profits by adding our high-grade line of rapid selling household necessities. Quick sales and good profits. Write for catalogue and proposition. Northwest Specialty Supply Co., 1701 Blair St., St. Paul, Minn.

AGENTS—Our specialties net live men and women \$5 to \$12 daily. Attractive year round sellers. 100% profit. Particulars free. Armstrong, Box 405, Springfield, Ohio.

I MADE \$18,000 in three years in Mail Order business. Free booklet, tells how. H. System, Marlon, Ky.

GREAT SUIT OFFER! Just write us and we will send you absolutely Free, by return mail, postpaid, a large outfit containing a big variety of cloth samples, fashion figures, tape measure, order blanks, etc. Everything Free, and we will start you in a paying business. A most liberal offer on a suit for yourself that will make you wonder. Terms, conditions and privileges that will astonish you. We will name you so much lower prices on men's fine clothing that it will surprise you. We want a live agent in your town. You can make \$1,000 to \$2,000 per year. If you will write us before we get an agent in your town you will get a wonderful offer. As soon as we get an agent in your town he will get profits on every dollar we sell in his territory. We turn all our business over to him. That's why our agents make so much money. If you want a suit for yourself, answer Quick before we get an agent in your town, you will then get all of our great inducements. Address Dept. 468, American Woolen Mills Co., Chicago, Ill.

EXCLUSIVE TERRITORY—HOUSEHOLD NECESSITY—repeats for life—140% profit—sample, 10c. Nichols and Stone, Worcester, Mass.

WANTED—Agents to sell teas and coffees. Burns & Reed, 209 Hudson St., New York.

HERE'S THE LIVE AGENTS SELLER, needed in Homes, Offices, Factories, Rapid seller, 100% profit. Eleven cents brings sample and particulars. John Brent, 953 Center St., Chicago.

AGENTS—\$18.00 WEEKLY, collecting names, soliciting, delivering; Pillowtop portraits, pictures, frames; New plans free. Manager, Family Portrait Co., Wayne, Ill.

AGENTS MONEY-MAKING INFORMATION book and formulas. This copyrighted \$1.00 book sent postpaid to every agent for 25c silver. John H. Taylor Co., Detroit, Mich.

SMALLEST ALARM CLOCK, bible and telescope, 10c each prepaid. W. H. Garner, A-119 South Lafayette St., Evansville, Indiana.

MEN AND WOMEN EVERYWHERE make big money selling our new household specialties. Free particulars. Write today. Douglass Merchandising Company, Dept. 1, Cape May Court House, N. J.

EASY PIN MONEY! Easy Premiums! Particulars Free! Alvin Card Co., Connellsville, Pa.

AGENTS: DON'T HESITATE; write at once. We positively show you how to make \$6.00 to \$25.00 daily. Geo. R. Hoagland Co., 928 Wyandotte St., Kansas City, Mo.

FREE INSTRUCTIONS to make Mexican finger rings; most beautiful hand-made novelty. Sample ring, 25c. Particulars for stamp. Address, Western Bead Goods Co., D, 2, Box 637, Kansas City, Mo.

DRY GOODS REMNANTS at bargain prices. Woolens, silks, and other quick-selling materials at half price. Big opportunity for agents and storekeepers. Remnant Store, 1301 Linn St., Cincinnati, O.

POCKET CASH REGISTER and Rapid Change Purse. Smart, convenient and everlasting. Adds up or down. "When Empty Looks Full of Gold." Splendid side line or exclusive specialty. Agents sample and "Sixty-six reasons Why" 50 cents. Pocket Cash Register Company, P. O. Box, 1969, Los Angeles, Cal.

KEROSENE MANTLE LAMPS—1912 model; superiority guaranteed. Burners fit common lamps. We sell mantles for all mantle lamps; get our prices. Guilford Co., Seville, Ohio.

WANTED—OFFICE EMPLOYEES, EITHER SEX. Legitimate proposition, no novelties. Repeat orders. Work spare time. Work remunerative and pleasant. Send 25 cents to cover cost and mailing of samples and contract to Agents. Keen Edge Manufacturing Co. Ltd., 1018 Arch street, Philadelphia, Pa.

AGENTS, BIG MONEY FOR YOU selling new style self-filling Fountain Pens. Sample, 25c. Particulars free. Barney Gifford & Co., St. Paul, Minn.

AGENTS, ABSOLUTELY NEW, useful, novel invention to use menthol for headache, colds, etc. Greatest agents' article on earth. Secure territory. Sample, 10c. Anderson Mfg. Co., Billerica, Mass.

AGENTS WANTED to sell our beautiful Floral Wall Mottoes. Occidental Co., 106 Washington Bldg., Seattle, Washington.

GATHERING INFORMATION in your locality pays big money. Either sex. Particulars free. National Information Bureau, Drawer 15, Sta. A, Columbus, Ohio.

HOME BUSINESS. Collect names, information, etc., for business concerns. Steady income. Instructive booklet for stamp. Information System, 260, Marietta, Ohio.

SUCCESS IS YOURS if you work our new mail order plan. Particulars free. Write today. Chromatoscope Co., Dept. B, Norwalk, Conn.

WEeping DOLL. Latest patented toy, very laughable. Progressive Novelty Co., Roslindale, Mass.

ENVELOPE MOISTENER, NO-WHITTLE PENCIL! Self-selling. Sample, terms, 10c U. S. coin. Apex Sales Company, 1224-26 17th St., Denver, Colo.

AGENTS—Embossed Gold and Silver Sign Letters. Immensely profitable. Sample free. Johnston Co., Quincy, Ill.

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

A BIG WINNER FOR AGENTS: 7-in-1 Nickel Plated Combination Tool Key Ring; screw driver; bottle cap opener, envelop opener; pipe cleaner; cigar cutter; nail cleaner. Most useful pocket novelty invented. Sells itself. Sample 10 cents. Joseph Mathieu, 203 Court St., Brockton, Mass.

WANTED RELIABLE PERSON IN EVERY CITY. Either sex to push the sale of new patent household articles; new ironing device; keyless door locks; umbrella clothes bars; combination shirt and trouser hanger; folding sleeve board; ideal roaster; sanitary water proof rings; etc. \$5 to \$15 daily; easily made. Now is the time to get started. For particulars address, Dexter Supply Co., 508 S. Dearborn, Chicago.

AGENTS WANTED for the most rapid selling household article. ("The King Duscloth.") Every woman will buy one on sight. Extra commission; new proposition. Write Guard Sales Co., Phoenixville, Pa.

PICTURE AGENTS LOOK! \$10 daily selling our new copyrighted "Little Shepherd," "Negro Angel," "Jack Johnson," and 12 other negro pictures. Portraits 25c, 16x20 Frame 15c, Pill-tops 35c. We help beginners. Catalogues. Sample free. Berlin Art Association, Department 76, Chicago.

WANTED—COUNTY REPRESENTATIVES for Success Hand Vacuum Cleaner. Superior to any Cleaner made either Hand or Power or Stationary Plant. We prove this in any contest. Largest Hotels using Success Cleaners. Biggest kind of Profits. Hutchison Mfg. Company, 312 Wood St., Wilkesburg, Pa.

AGENTS WANTED—SELL RICH LOOKING imported 36x68 rugs, \$1 each. R. H. Carter, Milan, Tenn., sold 115 in four days; his profits, \$51. You can do as well. Write for sample offer and unique selling plan; exclusive territory. A. Condon, Rug Importer, Stonington, Maine.

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—Earn \$25 daily easily; write immediately for booklet; new patented specialty which doubles life of auto tires. Murray Co., 418 E. 31st St., Chicago.

WANTED—Both sex to sell Nickel-Aluminum Nameplates, no experience necessary, 100% profit. Public demands them over every door bell, price and style will sell thousands. Your name on sample with particulars, 20c. Clarence Hardage Mfg., Syracuse, N. Y.

(CELLULOSIA) DOOR PLATES, new, lettering pure gold. Send for sample case. Nothing invested, 100% profit; sell to every house. Public demand them. La Fontaine, Inventor and Mfr., Sherburne, N. Y.

GET BUSY. LEARN TO MAKE NAME PLATES, house numbers, etc. Make \$15 a day. Send for free booklet. Sixty illustrations. E. E. Palmer, Wooster, O.

WANTED—BOYS AND GIRLS to sell a very useful article which we are introducing. Cash paid for services. \$1 per evening, easily earned. Domestic Supply Co., Butler, Pa.

BOKARA DIAMONDS—Agents, everyone, wear and sell our famous Bokara Diamonds; write for sample offer and catalog free. Northwestern Jewelry Co., 52 Northwestern Bldg., Chicago.

KING MONEY MAKER, Particulars free. Godley Specialty Co., Chatham, Mass.

AGENTS—EITHER SEX. Legitimate. Address Dr. A. I. Clarke, 1840 Hammond St., Chicago.

60,000,000 PEOPLE are looking for the "Eversharp" Automatic Pencil. 100% profit. Write immediately for particulars or send a dime for sample. H. Kimball, 72 Hamilton Bldg., Paterson, N. J.

SIGN LETTER AGENTS, PAINTERS. Something new and better; Attracto Gold or Silver Letters. Look like Sign-writer's work, cost less, wear better. Anyone can apply them. Big money lettering store windows—making glass signs. Samples free. Attracto Sign Co., Kemper & Orchard, Chicago.

BECOME A MILL AGENT. We manufacture Triplewear Hosiery—outwears 3 ordinary kind, replaced free when hole appears. Large profits. 1st reply obtains agency your town. Write today. Triplewear Mills, Dept. D, 724 Girard Ave., Philadelphia.

BOYS ARE MAKING from three to five dollars each week, acting as our agents. Certificate worth one dollar mailed to boys who write. Kutrite Co., Thirteen South Sixth Street, Minneapolis, Minn.

BIG PROFIT. To sell a compound that cleans and makes silverware as bright as new by dipping article once in solution. Just the thing for every household and hotels. Sample package with agents terms 10 cents (silver). A. Lagerstrom Supply Co., Cannon Falls, Minn.

WIDE AWAKE PEOPLE by writing at once we will show you how to earn big money, selling furs on an investment of \$15.50 for samples. The Merchants Fur Company, 186 N. La Salle Street, Chicago, Illinois.

WHY NOT EARN \$5 to \$25 daily? Others do it with our new specialty. Send for booklet. The Rellemurd Company, East Greenville, Pa.

START BUSINESS OF YOUR OWN. Last year I cleared \$6,000 in one small mail-order business. Valuable information free. Vance, Marion, Ky.

AGENTS—SELL THE SANITARY Steak Shredder, a scientific nickle-steel meat pounder. Retail 50c. Excellent Christmas gift; 120% profit. Specialty Manufacturing Co., Dows, Iowa.

AGENTS—Everybody buys our readymade Air Brush Show Cards. Write today for free catalog. Popular Show Card Co., Desk D, 1235 Michigan Ave., Chicago.

AGENTS—MEN AND WOMEN for newly patented legitimate; quick seller. Marshall, 648 Railway Exchange, Chicago.

400% PROFIT SELLING GORDON Photo Pillow Tops. High grade work. Samples and catalogue free. Luther Gordon Co., 164 Washington St., Chicago.

COMMISSION SALESMEN WANTED—Willing to earn \$10 per day; new novelty for Cigar, Candy and Drug trade. Write: White, 1335 Van Buren, Chicago.

AGENTS WANTED EVERYWHERE to sell high grade household specialties; no talking needed; sells on sight; send for catalog. Pequot Supply Co., Pawtucket, R. I.

AGENTS WANTED to introduce Matchless Gaslighters. Light nothing but gas. Sample 15c. Particulars free. Elwell-Shaver & Co., Dunkirk, N. Y.

NAME ON RUBBER STAMP, 15c; with address, 25c. National Stamp Works, 42 N. Fifth Ave., Chicago. Catalogue.

MINIATURE NOVELTIES—SMALLEST ALARM CLOCK Novelty Scale; Dutch Shoes; Telephone and Bible; 10c each. Globe Novelty Co., 18 Leavenworth St., Omaha, Neb.

AMAZING INVENTION—SOMETHING NEW—Handsome nickel plated lamp burner, scientifically made. Produces large, brilliant, steady, white flame. Rivals gas. Guaranteed smokeless odorless. Not a mantle. Can't break. Beats anything you ever saw. Brings you quick sales, large profits. Only 35c retail. Territory going fast. Particulars free. "Radiolite," 364 Colonnade, Toledo, O.

SIGN PAINTING AGENTS, 1000% profit. Best and cheapest Window Letter made. Easiest mounted. Outfit free. Success positively guaranteed. Embossed Letter Co., 2563 Milwaukee Ave., Chicago.

AUTOMOBILE OWNERS—Be our agent and make from \$5,000 to \$20,000 a year. Our Air-Friction Carburetor will drive your car at two miles an hour on high speed; gives much more speed and power. Satisfaction guaranteed or money refunded. Air Friction Carburetor Co., Dept. W., Dayton, Ohio.

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

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

AGENTS—100% PROFIT—Genuine Leather Combination Purse, Billfold, Memorandum Book, Pencil, Identification Card. Sell at sight. Agents' sample 45c postpaid. LeRoy Specialty Co., 76 Park Place, Room 52, New York.

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

AGENTS—We manufacture four of the most fascinating game boards ever invented. 100% profit, orders bound to repeat, nothing like them on market, slot machines beat. Particulars free. Unique Novelty Co., Independence, Iowa.

AGENTS WANTED—Send 15 cents for smallest Bible in the world and one of each of our catalogues, with agent's price list. A. S. Mankin & Co., Alexandria, Va.

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

AGENTS MAKE \$30.00 WEEKLY selling our 500 Handy Household Articles; catalogue free. Scheff Company, 1637 Wells Street, Chicago.

\$DOLLARS\$ ADDER—Pocket Adding Machine. Wonderful seller. Guaranteed. \$1 postpaid. Globe Sales Co., N171 Leavenworth, Omaha, Neb.

WANTED—AGENTS, 7 cents profit each 10 cent sale; best little article ever offered; sample for 3 cents in stamps. Rawlings Box 945, St. Louis, Mo.

MAN CLEARED \$1182. Lady \$720, last six months, selling Holladay's Marvel Shoe Polish, selfshining, waterproof. Why not you? Write for demonstrated sample. P. M. Holladay, 25 W. 31st, New York.

SEE WHAT WE SAY under "Patent" heading. Swift, Attorney, Washington.

YOUR NAME AND ADDRESS on an aircushion rubber stamp 20c. Including pad, 30c. Smith Supply, Waukegan, Ill.

ANYONE, ANYWHERE, CAN START a mail order business of their own. Make \$10 to \$50 a week during spare time; experience unnecessary; we, as manufacturers, start you and furnish everything. Patented great repeat order getters; sold exclusively to our co-workers; big profits; small capital; get in now on our new leaders and new plan; get in touch with full particulars, "Whole Truth" and sworn statement. Write today. J. M. Pease Mfg. Co., 193 Pease Bldg., Michigan St., Buffalo, N. Y.

MAIL ORDER ADS THAT PAY. 20 different propositions fully explained. All bona fide, sure-fire Money-getters. Each one the foundation of a successful Mail Order business. Send 10c for full particulars and regular bulletin of new propositions. Mail Dealers Wholesale House, 450 Franklin Bldg., Chicago, Ill.

MEN AND WOMEN WANTED to control exclusive agencies rapid selling, low priced specialty. Universal demand, plenty repeat orders; good profit to hustlers. Write for free sample and terms to-day. The G. V. Sales Co., Room 1325, 150 Nassau St., New York City.

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

AGENTS—HANDKERCHIEFS, DRESS GOODS. Carleton made \$8.00 one afternoon; Mrs. Bosworth \$25.00 in two days. Free samples. Credit. Stamp brings particulars. Freepor Mfg. Company, 59 Main St., Brooklyn, N. Y.

AGENTS WANTED in every county to sell Transparent Handkerchiefs. Big commission paid. From \$75.00 to \$300.00 a month can be made. Write quick for terms. Novelty Cutlery Co., 57 Bar St., Canton, Ohio.

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.

WIN NEXT \$1,200.00. We tell you how. \$40,000.00 already won by 10 inexperienced people. Stoneman received \$1,200.00 one month, \$15,000.00 to date. Korsted \$2,200.00 in two weeks; Schleicher \$195.00 first 12 hours. Strange invention startles world. Gives every home a bath room with hot and cold running water for \$6.50. Abolishes plumbing, water works. Self-heating. Little wonder. Hart sold 16 in 3 hours, \$5,000.00 to date; Lodewick 17 first day. Credit given. Investigate today. Beat others to exclusive sale. Means fortune. Allen Mfg. Co., 383 Allen Bldg., Toledo, Ohio.

GENERAL AND LOCAL AGENTS: Here is your opportunity. Energetic men can make \$2,500 yearly and up. The Improved Canechester Kerosene Mantle Lamp revolutionizes old methods. Far superior to electricity, gas, acetylene or gasoline at 1/10 the cost. Burner fits all lamps. Safe; clean; odorless. Burns with or without mantle. Tested and pronounced by State of Pennsylvania "Most efficient light found." Greatest seller known. We want a few more live men in open territory. Canechester Light Company, Dept. P. M., 204 N. State St., Chicago.

LIVE AGENTS WANTED. A permanent income selling Koeth Combination Kit, 15 tools in one. Finest tool steel, guaranteed. Big profits. Wonderful seller. Exclusive territory. Send for free sample offer and terms. Currier-Koeth Mfg. Co., 52 West St., Coudersport, Pa.

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.

AGENT'S OUTFIT FREE. Quick profits. Best Handkerchiefs, Dress Goods and Fancy Goods on the market. Large Manufacturer. Particulars for stamp. Maricopa Mfg. Co., 93 Water St., Brooklyn, N. Y.

HONEST MAN OR WOMAN WANTED in every town to represent well-known wholesale firm. Experience unnecessary. Must furnish good references. Easy, pleasant work. Fair salary to start. McLean, Black & Co., 351 Medford St., Boston, Mass.

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—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., 202 S. Clark St., Chicago.

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.

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

PERFECTION POCKET ADDING MACHINE. Lightning seller. Agents wanted. Cincinnati Specialty Mfg. Co., Dept. R., Cincinnati, Ohio.

SELF-THREADING NEEDLES. 10c a paper. Agent's samples and terms free. Ladies' Art Co., Dept. 41, St. Louis, Mo.

BLACKSMITHS

HIGH GRADE steel welding compound. Formula, 25c. H. O. Bass, Hillsboro, Ill.

GOOD BLACKSMITHS ARE SCARCE and few learning the trade and the blacksmiths must make the tools for all—from surgeon to the safe blower. Buy Toy's Modern Methods Forging and Welding different kinds of steel solid, and doing all hard jobs easy, also hardening and tempering to a standard by colored charts. Any smith can be an expert that means good jobs and big money. All for one dollar. Send for valuable samples free. W. M. Toy, Sidney, Ohio.

HELP WANTED

ARE YOU THE MAN? Here is your opportunity. No matter where you live—if you want to make big money and establish yourself in an independent business requiring no capital—we will teach you, by mail, all the secrets of the Real Estate Business including thorough Commercial Law Course, list with you readily salable properties, co-operate with and assist you to permanent success. Our 64-page free book fully explains our methods and tells what it means to be the local representative of oldest and largest Co-Operative Realty and Brokerage Corporation in the World. Write today to International Realty Corporation, 2034 Manhattan Building, Chicago, Ill.

WANTED RELIABLE MEN to learn Automobile Driving and Repairing in the largest and best equipped school teaching this trade. A most interesting, healthful and paying profession. Can be learned in a few weeks and at small cost. Competent men always in demand at salaries ranging from \$18 to \$35 a week. Our 32 page book "How to Drive" gives full particulars. Greer College of Motoring, 1457 Wabash Avenue, Chicago, Ill.

NEW USEFUL NOVELTY—Interests every user of telephone, umbrellas, tools, brushes, doors. Attracts crowds at Fairs; Window and Street demonstrations. Big profits. Nickered pocket sample, 25c. Useful Holiday Gift. Handy Tool Holder Co., Ware-rooms, Brooklyn, N. Y.

WE TRAIN DETECTIVES. You can be one. Splendid opportunities. Travel. Earn \$100 to \$300 monthly. This fascinating profession taught practically and scientifically by mail at a nominal cost. American School of Criminology, Dept. F, Detroit, Mich.

MEN WANTED FOR GOVERNMENT POSITIONS—\$80.00 a month. Annual vacations. Short hours. Steady work. Rapid promotion. Thousands of appointments coming soon. "Pull" unnecessary. Farmers eligible. Send immediately for list of positions open. Common education sufficient. Franklin Institute, Dept P-21, Rochester, N. Y.

ELECTRICAL METERMEN WANTED IN EVERY STATE—\$900-\$1,800 yearly. Rapid introduction of Electricity creating new positions daily. We will fit you for splendid positions and assist you to get it. Booklet giving full particulars free. Write for it today. Fort Wayne Correspondence School, Dept. 20, Fort Wayne, Ind.

GOVERNMENT WANTS EMPLOYEES—10,000 appointments coming. Excellent salaries. Vacations. Write for list of positions open. Franklin Institute, Dept P-21, Rochester, N. Y.

THE VULCAN SOOT CLEANER offers an exceptional opportunity for power specialty salesmen. We have openings for high-grade steam specialty men or mechanical engineers as representatives. G. L. Simonds & Co., 806 Steinway Bldg., Chicago.

WHY NOT PREPARE for Civil Service Examination? Teaching? Stenographer? Bookkeeper? Stationary Engineer? Electric Wiring? Electrical Engineer? Mechanical Engineer? Mechanical Draftsman? Electric Wiring? Matriculation. \$5. Tuition free. Mail course. Address Carnegie College, Rogers, Ohio.

EARN \$30 WEEKLY taking orders for Cut Rate Groceries for America's largest grocery house. Outfit free. Standard Grocery Co., 352 Arcade, Cleveland, O.

ALCA \$6.00 HAND VACUUM CLEANER wins first prize at all exhibitions. It is the finest agents' proposition in the land. Write for money-doubling contract. Alca Vacuum Cleaner Co., Dept. A, 366 W. 50th St., N. Y.

WANTED—Railway Mail Clerks. Average salary, \$1,100. Alternate weeks off with full pay. Examinations everywhere soon. Send for schedule of places. Franklin Institute, Dept. P-21, Rochester, N. Y.

SALESMEN, WRITE AND FIND out why our lines bring increased commissions over other lines. 35 salesmen wanted throughout the country and in large cities. Brice Williams Calendar Co., Kokomo, Ind.

WE START YOU IN a permanent business with us and furnish everything. We have new 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., 191 Pease Bldg., Michigan St., Buffalo, N. Y.

WANTED—Active man in each locality to join this society and introduce our Memberships, Sick, Accident, Death benefits. All or spare time. \$50 to \$500 a month. Every Member secured gives you a steady monthly income. Box GA-293, Covington, Ky., U. S. A.

CAN YOU WRITE a Good Business Letter? Or Spell correctly? Have you command of English? Our Free Booklet 14 will tell you how to improve 100 per cent. Write for it today. School of Business English, Washington, D. C.

7,000 GOVERNMENT POSITIONS OPEN. Write for list. Franklin Institute, Dept. P-21, Rochester, N. Y.

GOVERNMENT POSITIONS offer steady, pleasant employment, big pay. Influence unnecessary. Get your preparation from former United States Civil Service Examiner. Write for big, free, descriptive booklet. Patterson Civil Service School, Box 826, Rochester, N. Y.

BIG MONEY WRITING SONGS. Thousands of dollars for anyone who can write successful words or music. Past experience unnecessary. Send us your song poems, with or without music, or write for free particulars. Acceptance guaranteed if available. Washington only place to secure copyright. H. Kirkus Dugdale Co., Dept. 265, Washington, D. C.

DANDY HOME BUSINESS. Collect names, information, etc., for business concerns. Steady income. Fascinating work. Instructive booklet for stamp. Information System, 261 Marietta, Ohio.

2,000 RAILWAY MAIL CLERKS WANTED. \$800 to \$1600. Examinations everywhere. Preparation free. Franklin Institute, Dept. P-21, Rochester, N. Y.

READ OUR ADVERTISEMENT under agents wanted. Pinless Clothes Line Co.

WANTED—Government wants Railway Mail Clerks. Average salary, \$1,100. Alternate weeks off with full pay. Examinations coming everywhere. Write for free sample questions and schedule of locations. Franklin Institute, Dept. P-21, Rochester, N. Y.

YOUNG MEN who desire to become professional base ball players write at once giving experience. American Base Ball Registration Bureau, Dept. A, 409 Phoenix Bldg., Minneapolis, Minnesota.

RAILWAY MAIL CLERKS WANTED—Average salary \$1,100. Write immediately. Franklin Institute, Dept. P-21, Rochester, N. Y.

WANT TO CORRESPOND with machinist, who wants to go in business, if you invest a little cash, will put you in charge of a good shop. Address, R. C., 6th floor, 318 W. Washington St., Chicago.

WANTED—DISTRIBUTERS of advertising matter everywhere. Oliver D. Barkley, Mount Pleasant, Pennsylvania.

I MADE \$18,000.00 in three years in mail-order business, free booklet tells how. H. System, Marion, Ky.

MEN AND BOYS TO LEARN AUTOMOBILE repairing, driving on up-to-date cars; electrical, civil engineering, surveying, in most practical way. Room and board while learning. Positions secured; satisfaction guaranteed; catalog free. National School of Engineering, 2110 West 7th, Los Angeles

CORRESPONDENCE SCHOOL, STUDENTS taking courses in Mechanical or Structural Drafting will learn something to their advantage by addressing G. Clair, 304 Lewis Building, Pittsburgh, Pa.

LIVE-WIRE SALESMEN everywhere for important new automobile specialty; field unlimited; liberal commission. Address, 463 Fourth Ave., Newark, N. J.

BIG FORTUNES MADE YEARLY in Mail Order Business. I make \$5,000 yearly from small start. My plan is free. Haynes, Marion, Ky.

WANTED, AGENTS, MACHINISTS, ATTENTION! Increase salary, new revised Saunders' Hand Book of Practical Mechanics. Best ever ready reference. Thousands in use. Postpaid \$1.00 cloth; \$1.25, \$1.50 leather flap. Big profits. E. H. Saunders, 216 Purchase St., Boston, Mass.

WANTED ONE THOUSAND CHAUFFEURS and repair men. Our demand for automobile engineers exceeds the supply. Calls for men of intelligence and mechanical bent capable of commanding \$100.00 to \$150.00 per month upon graduation. Resident course \$20.00 to \$60.00. Home Correspondence course completed by practical road and shop work at this school, highly successful. Look this up. Auto Schools of America, Dept. T, 1600 Michigan Ave., Chicago.

WANTED SALESMEN to sell Gasoline Lighting Systems; no experience necessary; attractive proposition. Doud Lighting Co., 174 No. Sangamon St., Chicago, Ill.

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

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.

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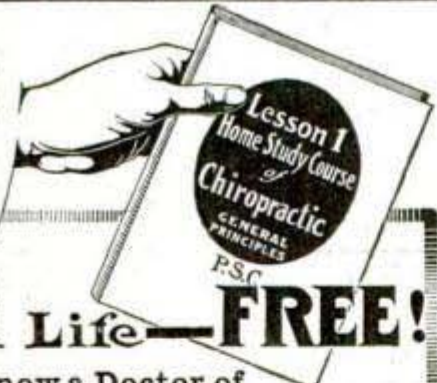
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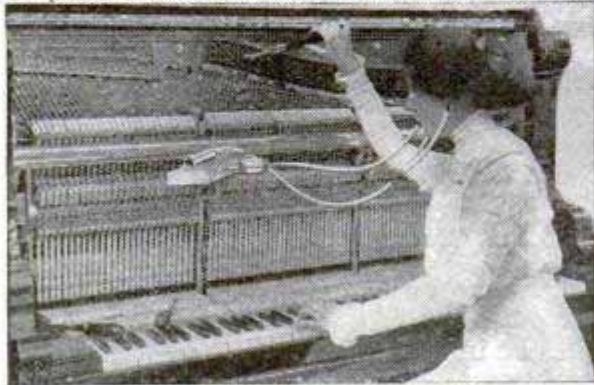
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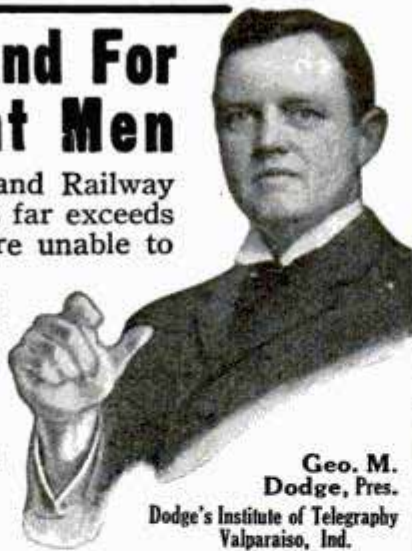
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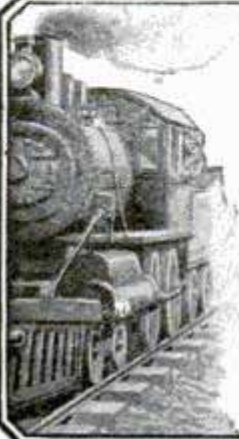
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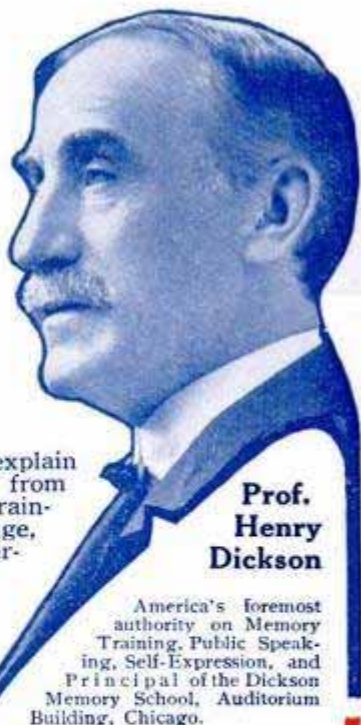
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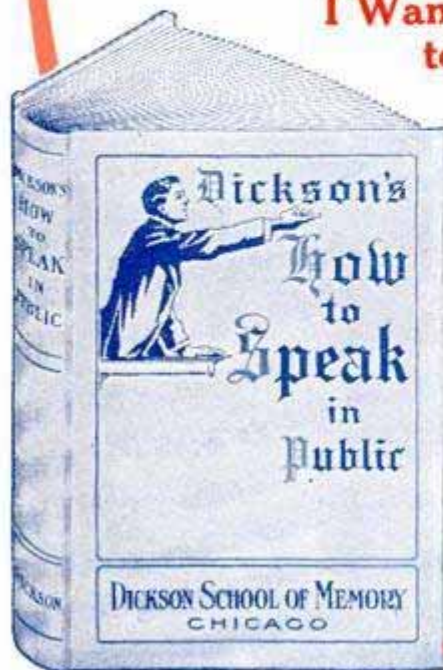
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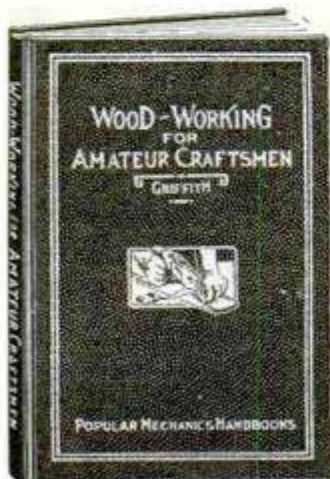
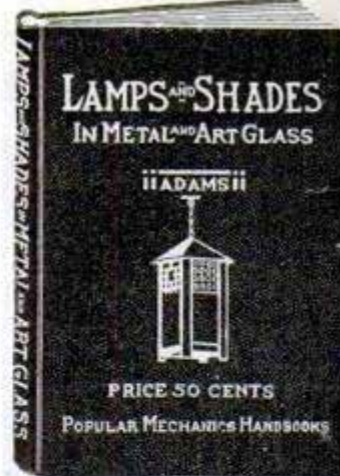
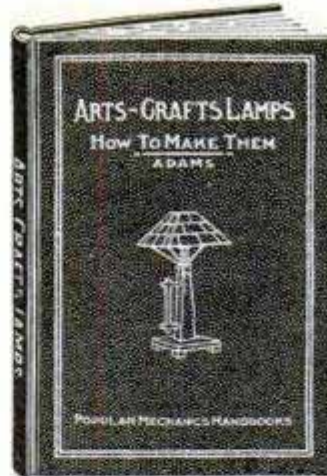
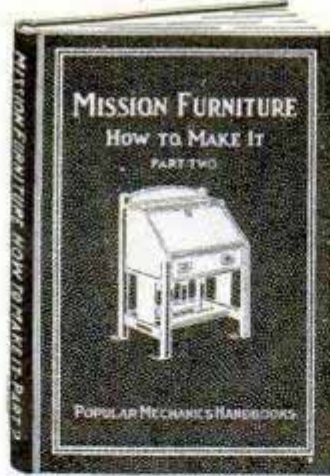
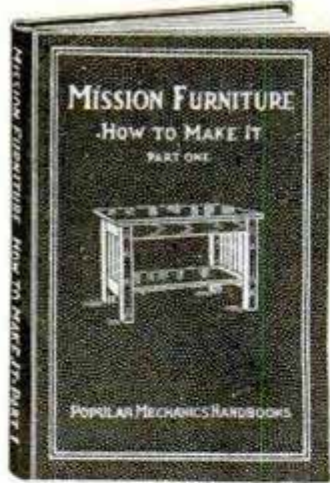
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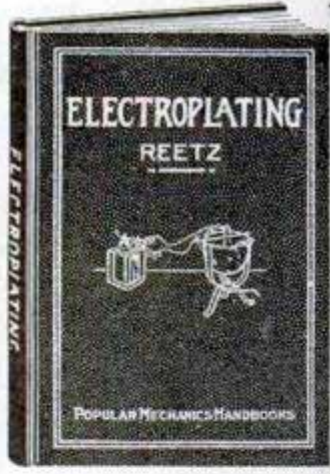
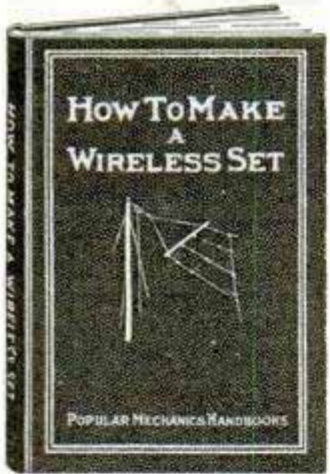
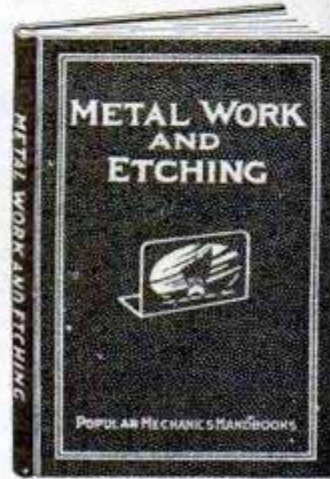
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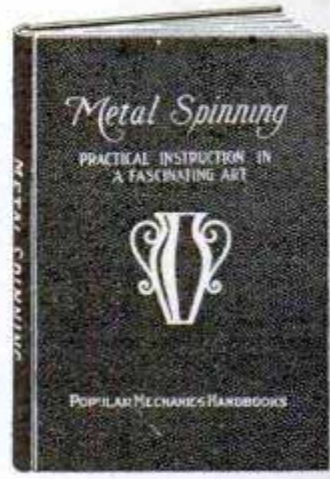
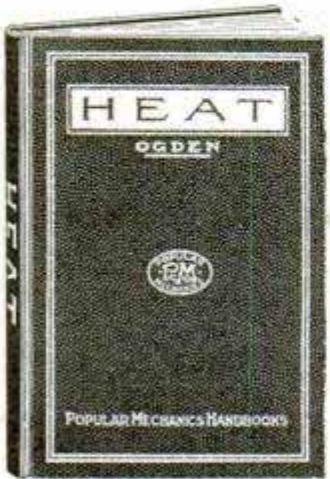
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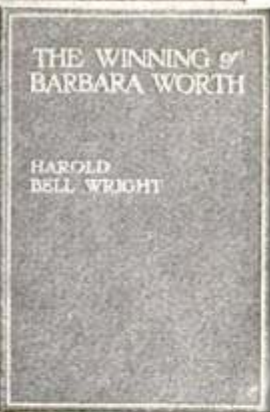
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WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 16

DECEMBER, 1911

No. 6

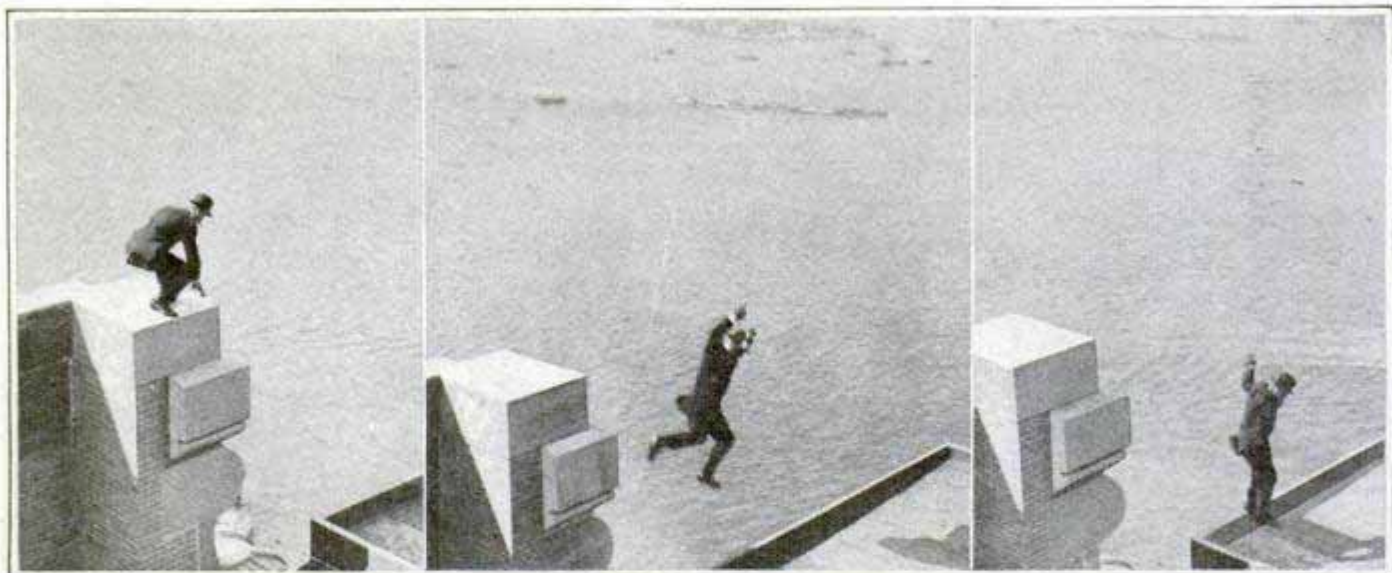
Motor Flywheel Keeps Car Out of Canal



Automobile That was Saved from Plunging into the Erie Canal by the Flywheel of the Engine

THE flywheel on the motor of an automobile qualified as a life-saver in Syracuse, N. Y., recently, when it caught on the brink of the Erie Canal and prevented a big touring car and its five passengers from toppling over into the water. As the curtains were buttoned down and the front raised to protect the occupants of the machine from a driving rain, it is probable all of the passengers would have been drowned had the flywheel

failed to catch. The driver of the car thought the still, smooth surface of the canal was part of an asphalt roadway and was attempting to drive diagonally across it when the accident occurred. The front wheels went over, but the flywheel prevented further progress by catching in the stone coping. When the car was pulled back to safety it was found that no damage had been done beyond the unusual strain to which the chassis was subjected.



Steeplejack Ready to Leap

An Interesting Moment of the Jump

Landing Very Close to the Edge

A STEEPLEJACK'S DARING LEAP

Steeplejacks, through a spirit of adventure, often take risks which are not necessary, simply to accomplish some feat which is a little different from those they are called upon to carry through as a natural consequence of

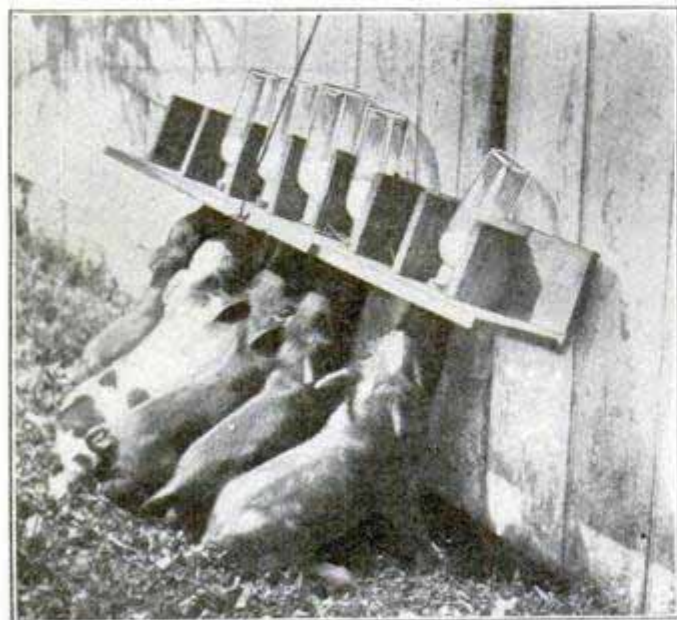
their work in the air. Such a feat is shown in the accompanying illustrations, the steeplejack jumping from one skyscraper wall to an adjoining structure. A miscalculation would have meant a fall of 250 ft. How close the calculation was is shown in the third illustration, in which he may be seen landing very near the edge.

RAISING PIGS ON THE BOTTLE

An ingenious farmer of Norwood, Pa., having to deprive a litter of pigs of their mother, thus cutting off the natural sustenance of the little animals, found his pigs pining and getting thinner daily. They refused to be com-

forted with a bottle of milk offered to them in the way it is welcomed by the human infant, and he was compelled to invent a mechanical mother. Enough bottles were fitted to a frame to furnish each little pig with one, and the nipples of the bottles were left protruding through the framework.

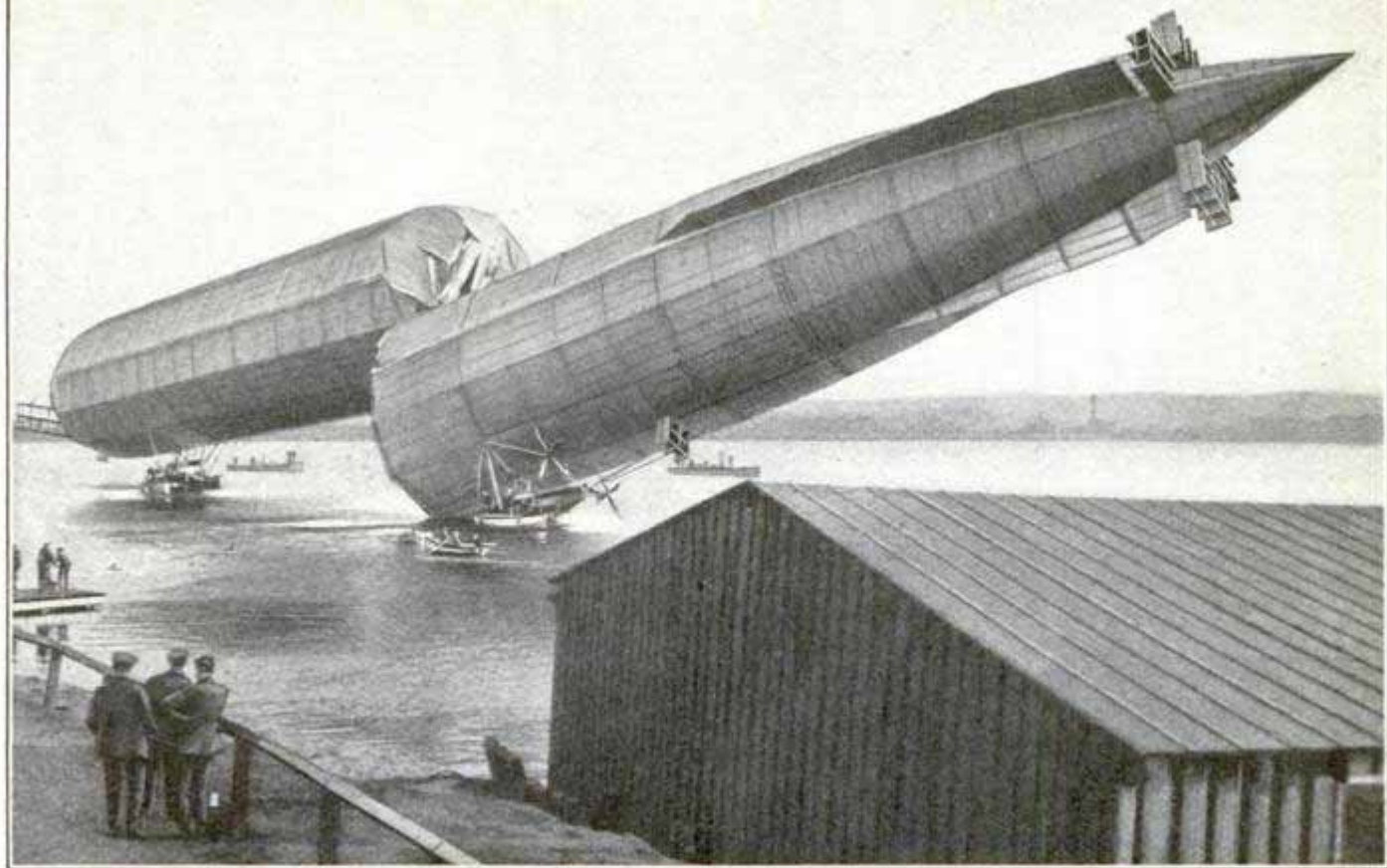
The deserted family took kindly to the mechanical mother.



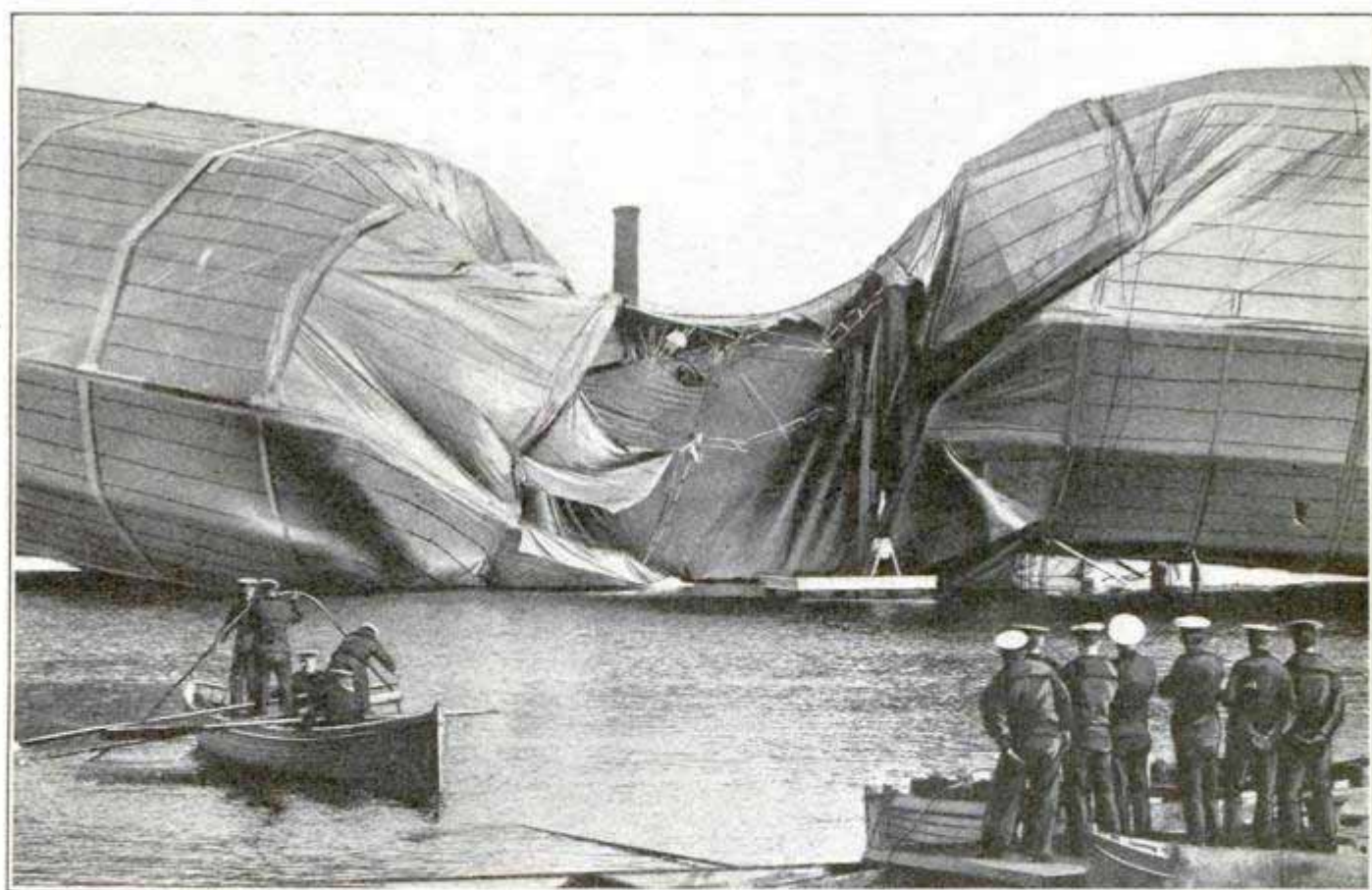
Orphan Pigs Fed with Nursing Bottles

PULP WASTE CONVERTED INTO WOOD ALCOHOL

The waste of pulp mills, manufacturing pulp by the sulphite method, ordinarily considered as useless, is now being converted into industrial alcohol by two pulp mills in Sweden. The output obtained through the installation of the special machinery amounts to from 100 to 115 lb. of absolute alcohol per ton of wood pulp made. The manufacturing cost of the alcohol is nine to ten cents per gallon.



The British Naval Airship as She Appeared Just after Breaking in Halves



Wreck of the British Naval Airship, Showing Its Appearance Where the Break Occurred

Another attempt will be made to launch the British naval airship which has cost \$400,000 to date, and which was wrecked at Barrow, Eng., Sept. 24. This is the dirigible that was finished in May but had never been tried because of unfavorable weather conditions. The framework of the great envelope broke in half as the balloon was being towed out of its shed, prior to an attempted trial, the break presumably being caused by the rupture of one of the 17 ballonets inside the envelope, thus placing an unequal strain on the frame.



Showing the First Stage of the Rescue of a Fire Victim in Cincinnati



To Safety at Last by Means of a Light Scaling Ladder

REMARKABLE PICTURES OF FIRE RESCUE

It rarely happens that even a newspaper photographer, who is supposed to be on the spot when anything big takes place, succeeds in obtaining such graphic photographs as are here illustrated. The first photograph shows a fire victim clinging to a fourth-story window ledge waiting to be rescued by firemen who had hoisted a ladder which fell a little

short of reaching him. Smoke and flame scorched his head and arms while waiting. The second photograph was taken a minute or two later as he was about to descend a light scaling ladder, the latter hooked into the sill above him and held by firemen on the large ladder and in the room underneath. The fire was in Cincinnati.

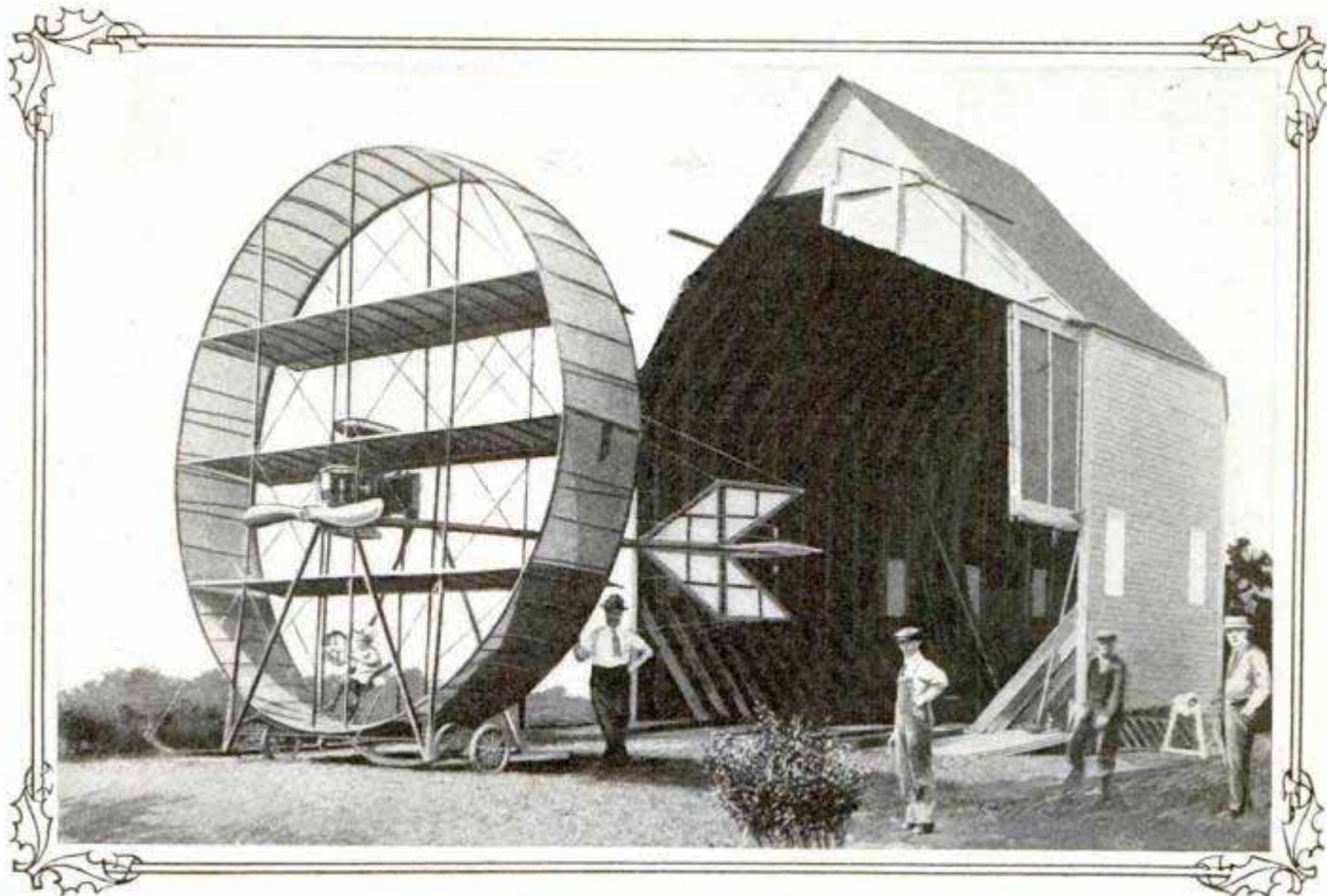


Automobile Plow Throwing Up a Trench on the Battlefield

AUTOMOBILE PLOW MAKES BATTLE TRENCHES

While industrial inventors have been at work harnessing motive power to plows for the tilling of the soil, a military inventor has applied the same principle to a plow especially designed for throwing up trenches on the battlefield as a protection for the soldiers.

ⒸTaxicabs are replacing 'rickshas and sedan chairs in Shanghai, China, a company having recently established itself in business there with a number of up-to-date vehicles.



A Curious Triplane Aeroplane within a Canvas Ring

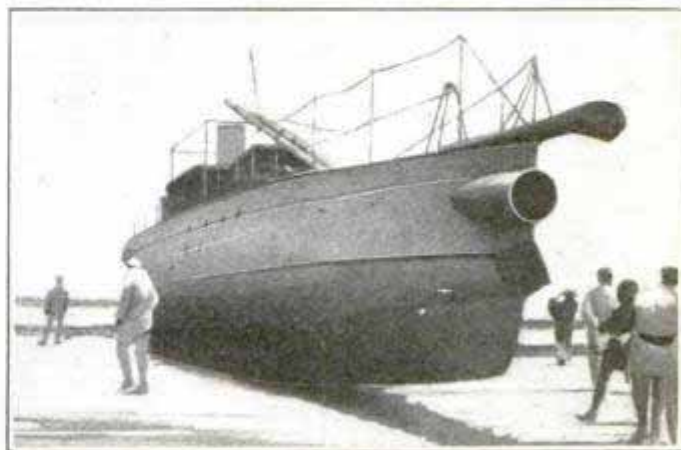
NON-CAPSIZABLE AEROPLANE EXPERIMENT

An inventor of Paterson, N. J., is at work on a curious aeroplane which he believes will be non-capsizable. His object in developing this type of machine is to maintain lateral balance and furnish a means whereby it would be impossible for the machine to acquire an angle in descent that would result

in lack of control and a fall. The inventor claims that the non-capsizable feature of the aeroplane has been proven in gliding and in towing flights, but that the engine with which it is equipped, as shown in the illustration, has not proved powerful enough for flights.

CARRIED ASHORE ON TIDAL WAVE

When Tokio was visited recently by a typhoon and great tidal wave, dredgers, barges, and other small craft were lifted and thrown several hundred feet distant, some of them being pitched onto one of the main streets of the Japanese city, which they completely blocked. Among the heavier craft pitched high up on the shore and left stranded in the way of pedestrians was a Japanese torpedo boat.

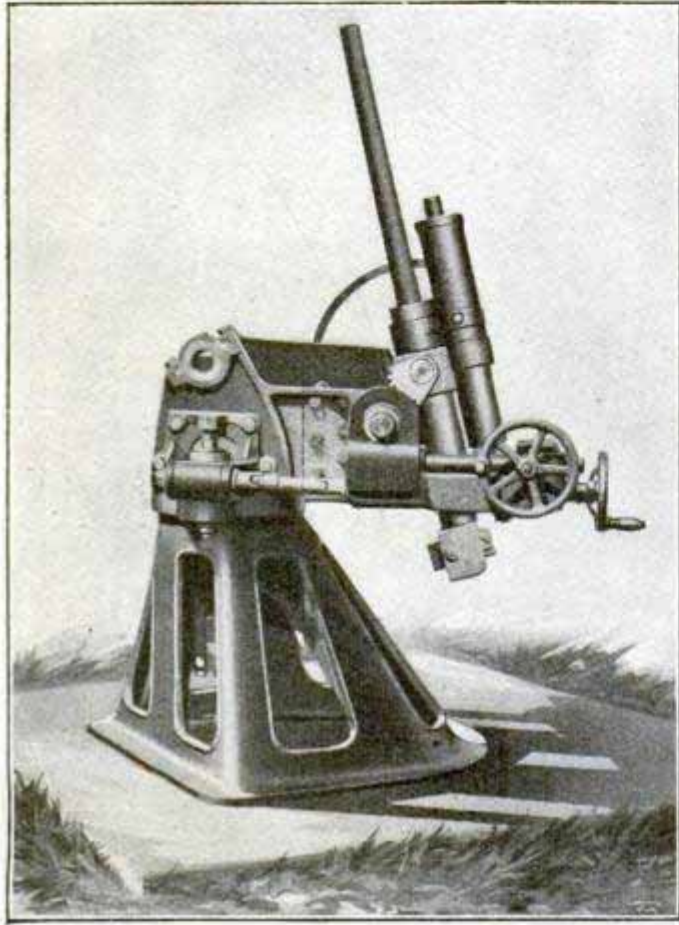


Torpedo Boat Which was Lifted Bodily on the Crest of a Huge Tidal Wave and Deposited in a Street in Tokio

ⒸAirman Atwood estimates the expenses of his trip from St. Louis to New York averaged \$900 per day.

NEW AMERICAN AERIAL WEAPONS

After shooting a shell 18,000 ft. into the air and closer to the skies than an aeroplane has ever flown, the experiments with the new one-pounder naval



Airship Destroyer That Shoots Shell to a Height of 18,000 Ft.

rifle, destined to destroy the airships of an enemy, were recently concluded at the Indian Head naval proving grounds near Washington. It was announced that the new weapon and its carriage had proven eminently satisfactory.

Fifty rounds were fired in the tests. The maximum range of 18,000 ft. was reached when the gun was elevated at an angle of 85 deg. The shot flashed accurately through a course for 10,000 ft. Beyond that distance it lost its velocity and was affected by the air currents, falling into the Potomac River, 1,500 ft. away from the spot where it had been reckoned it would drop. The airship-destroying rifle is the invention of Rear Admiral Twining, chief of the naval ordnance bureau.

The idea of this one-pounder will

be developed into a 3-in. gun. Naval ordnance experts believe that such a weapon would shoot 7 miles into the air with effect. The favorable performances of the new carriage caused naval authorities to express the belief that before long American warships will be equipped with another battery of guns to fight hostile invaders in the air.

Admiral Twining has also designed a dirigible aerial torpedo, which can be fired from an aeroplane or dirigible balloon at a hostile craft in the air or on the water, and at troops and fortifications on the ground. Like the submarine torpedo, it is self-propelling, and can be easily directed and controlled. It is fitted with a percussion fuse that is so sensitive that it will explode upon the slightest contact.

WAGON WHEEL USED AS MAILBOX TURNTABLE

Several residents of a suburb of Atlanta, Ga., whose houses are not on the exact line of the rural mail route adopted the plan of placing their individual boxes on a wagon-wheel turntable. The mail carrier drives up to the wheel and spins it around, thus bringing each box into a position in which he can reach it without leaving his wagon.



Nine Rural Mail Boxes on a Wagon-Wheel Turntable

GERMAN BABY CARRIAGES BEAR NUMBERS

Because of the similarity of baby carriages in Germany, a law has been passed compelling each car-



Numbered Baby Carriages Obviate Mistakes

riages to have a license number. So long as there is but slight danger of the nurse maid walking off with the baby and carriage after an airing in the parks.

TRUCK DEVICE FOR TRANSPORTING MOTORBOAT

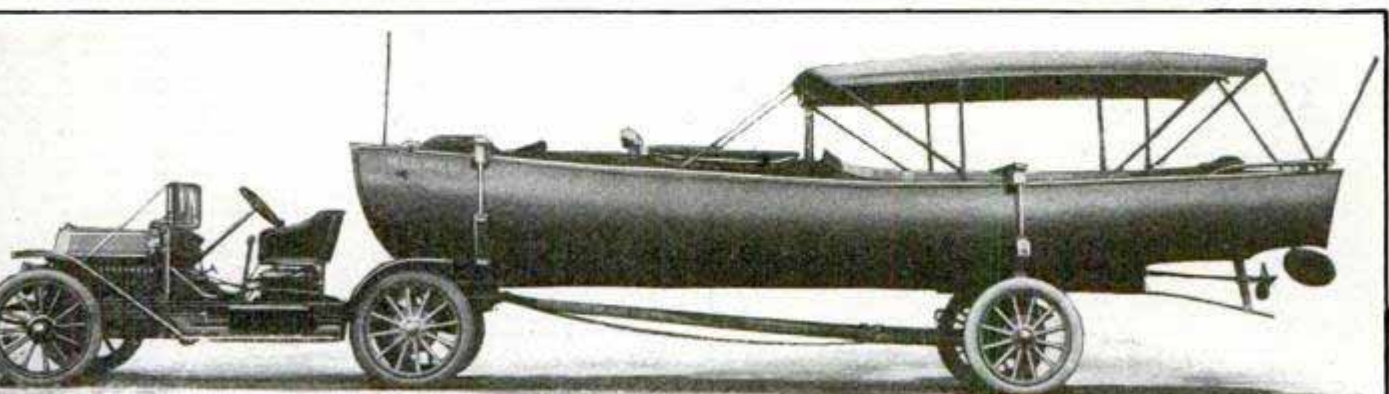
In the accompanying photograph is shown the clever method which was used to transport a motorboat from the factory where it was built to the lake

where it was launched, a distance of 150 miles. The 28-ft. vessel was secured upon an extra pair of rear wheels, which carried the greater part of the weight, while the bow rested on the chassis of the motorcar that towed it across country. The trip was made from East Moline, Ill., to Lake Delavan, Wis., in a little less than 24 hours, the manufacturer being at the wheel of the car. He states that the distance could have been covered in 15 hours but for a severe rainstorm lasting half a day, which transformed the dirt roads into seas of mire, just a little too thick for the motorboat and a little too thin for the automobile to navigate with any speed. In spite of the slippery roads, the trailer followed readily, and the method of transporting a seacraft by land was a pronounced success.

DIAMONDS SOMETIMES EXPLODE

According to a leading expert on crystallography, who gave a lecture recently before the Royal Society of Arts, in London, diamonds may explode. He cited many instances of diamonds exploding on being taken out of the diamond fields, and said that such explosions might occur months and even years after being released from the mines.

Diamonds, so it is presumed, were formed through the fusion of carbon at great temperature under such pressure as could exist only at great depths below ground. This expert points out,



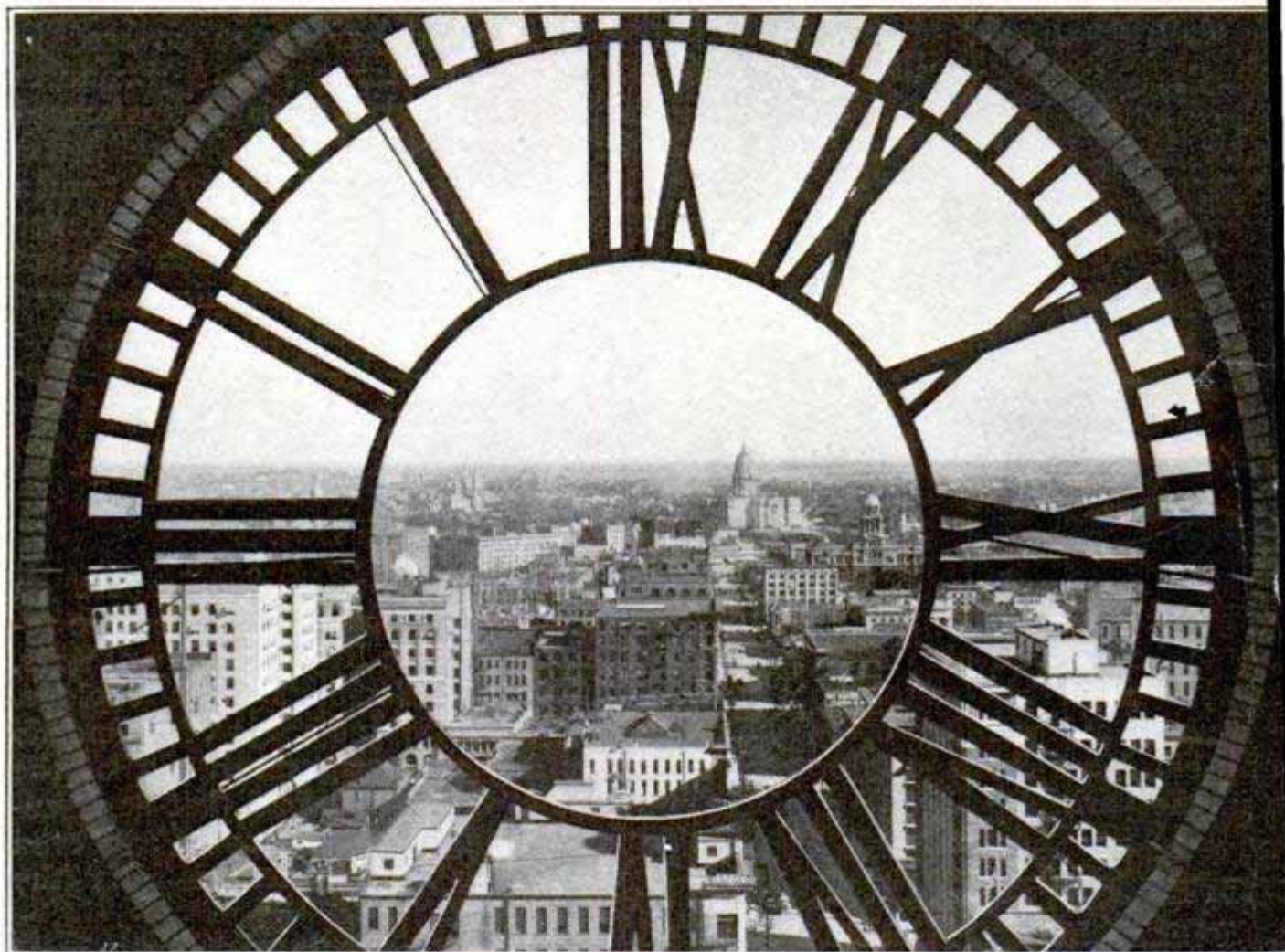
Auto Used to Transport Motorboat

DENVER THROUGH A CLOCK FACE

The illustration shows how a section of Denver's business district looks as photographed through the 16-ft. face of an unfinished clock in the tower of one of its new buildings. The clockwork had not yet been set in place. The numerals shown are 3

this year, however, seems to be practical, as the temperature of the one equipped with it is 30 per cent lower than the outside atmosphere.

The apparatus for cooling the car comprises an ice tank having a capacity of 1,000 lb., an air refrigerator composed of a cylinder filled with water and containing vertical tubes through which the air is forced



Denver's Business District Photographed through the Face of a Large Clock

ft. long. The dome seen in the distance is that of the Colorado State Capitol.

COOLING DINING CARS OF EGYPTIAN ROAD

The problem of cooling the cars of the Egyptian State Railways, and especially the dining cars, in which the atmospheric heat is supplemented by the artificial heat from the kitchen, is one that has kept railway officials in that country busy for some time. A new type of plant introduced early

means of a revolving pump, and rotary pump for the circulation of the ice water. Both the air fan and pump are driven electrically, current being supplied by a dynamo driven by one of the car axles. The cars are also especially constructed for service in tropical heat. The usual teak paneling is doubled, the outer surface is painted white to reflect the sun's heat; the floors are double, with a cork sheet interposed between the two thicknesses, the roofs are provided with a double cover of cork and asbestos, and the windows have double panes of glass and louvred sun blinds.

therefore, that by the time the gems had worked their way near the surface through volcanic disturbances and earthquakes and were within reach of the miner, the great pressure was gone.

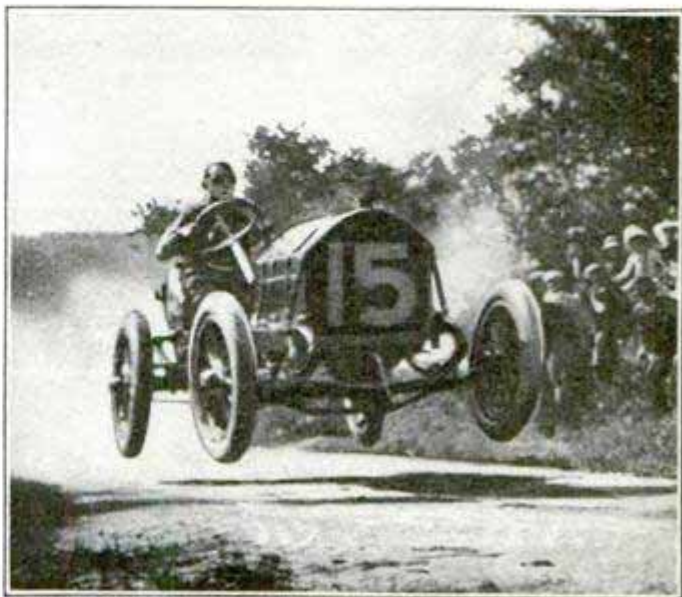
FREE MUNICIPAL LAUNDRY FOR THE POOR

Cincinnati has recently opened a municipal domestic laundry where poor women of the tenement districts may take the family clothing and do their own washing with the aid of the most up-to-date machinery. Thus, all the modern laundry mechanisms are brought within reach of the poorest families.

The equipment includes enough power washers, driers, and electric irons, to accommodate 500 family washings each week, and the city is preparing to build more laundries of like nature. The idea originated with the board of health, which was quick to recognize the sanitary advantages derived from removing clothes-washing operations from the living and sleeping rooms of the tenement dwellers.

AUTOMOBILE JUMPS FORTY-TWO FEET

While taking part in a hill-climbing competition at Poland Springs, Maine, one of the cars struck a gully at high



Courtesy Motor

Photographed while All Four Wheels were Off the Ground in a Leap Estimated at 42 Ft.

speed and made a leap estimated to be no less than 42 ft. before striking the road again. A photographer caught a picture of the car while all four wheels were off the ground.



Cincinnati Tenement Women Preparing to Do Their Family Washing in the Municipal Laundry



DUTCH COLONIAL
HOUSE



OF HANDSOME
DESIGN



First-Floor Plan



Second-Floor Plan

Wm. J. Ryder, Philadelphia, Architect

A Dutch colonial house that can be built for about \$4,800, makes a pleasing and attractive home that is entirely distinct from the usual run of moderate-price buildings. Economy of cost is obtained by constructing the walls of the basement and first floor of stone and the upper story of frame and stucco. The roof and pent eaves are to be shingled. The interior finish must be plain to come within the estimate. Provision is made for four bedrooms of good size on the second floor, a large living room, dining room and kitchen

on the first floor. Ample space for heating plant and storage can be provided in the cellar.

As a result of the general strike in England last summer there has been a universal demand throughout the British isles for a more general adoption of motor transportation, and manufacturers of trucks and delivery wagons have been swamped with orders for vehicles ranging in capacity from 2,500 lb. to 4 tons.

STREAMLINE FORM IN AEROPLANE DESIGNING

By VICTOR LOUGHEED

By special arrangement with the publishers of "Aeroplane Designing", a forthcoming book by Mr. Lougheed, Popular Mechanics Magazine is enabled in this article to give to its readers the first particulars of some new and most interesting discoveries in flight engineering, by the application of which the long-anticipated aeroplane of low power but high efficiency seems at last to be in prospect of early realization.

IT has been long understood that objects of certain shapes offer less resistance than do others of the same projected areas to rapid movement through the air and other fluids. But the reason for this phenomenon, despite a widespread knowledge of the forms that afford the most advantageous effect, seems not to have been heretofore detected, even by the most clever and resourceful investigators.

For this reason no intelligent or consistent application of these forms to aerial and submarine vehicles has been possible, and even the attempt to apply them has been widely neglected.

Yet the prevalence in nature of the streamline form is alone sufficient evidence of its vast superiority for its purpose. For—though modified in innumerable minor respects to meet special or individual conditions—its essential and fundamental characteristics appear in the body of every creature that moves with any but the lowest speed, through water or air.

In the water, from the smallest fishes to the largest whales, there is always the characteristic outline—in front either bluntly rounded or with the greatest thickness at or well forward of the middle, in combination with a more finely tapered rear body sloping back in reverse curves to a pointed or thin-edged tail.

The bodies of all birds present similar contours, and, as with the denizens of the deep, there is the same notable principle from which there is no deviation. For, regardless of variations in the heads of the different creatures, which present the greatest and most complex dissimi-

larity, there is never material departure from the apparently inescapable necessity for placing the greatest thickness forward of the center, and for providing the after portion of the body always with the finely tapered stream outline.

The type of body that offers a minimum resistance to movement through a fluid is that of the general streamline form illustrated in Fig. 1.

As has been previously explained, there is no novelty in the fact that such an object offers a minimum resistance to movement through a fluid, but the writer believes that the *reason* for this difference has not heretofore been understood, besides which he believes that the extent to which the streamline form is superior—the quantitative value of the differences between it and other forms—has been too little appreciated.

From the most casual analysis of the difference between the best aeroplanes and nature's flying devices it must appear, on the face of it, that something is wrong.

Modern aeroplanes fly with propeller thrusts in no case lower than one-fifth of the weight of the machine, making them literally constitute "horizontal helicopters." An extreme example is the Santos-Dumont "Demoiselle," in which the propeller thrust is 300

lb., with a total weight of machine and operator of only 400 lb.

All birds, absolutely without exception, are enormously more efficient. In no case that the writer has observed, with the most careful measurements that it has been possible to make, is the ratio between the weight



Fig. 1—Streamline Form Best Adapted to Movement through a Fluid with a Minimum Resistance

and the forward resistances in any bird higher than 1 to 320.

Of most pertinent interest, in this connection, are certain investigations by Sir Hiram Maxim, made about 15 years ago, into the resistances of different types of strut surfaces.

The illustrations and the caption in Fig. 2 present the forms involved in and the figures that resulted from Maxim's research, which he seems to have dropped when on the verge of most important discoveries—had he but sought for reasons as well as for data.

Before undertaking an analysis of the Maxim results, it will be well to digress briefly from the main subject, to consider some incidental matters of importance.

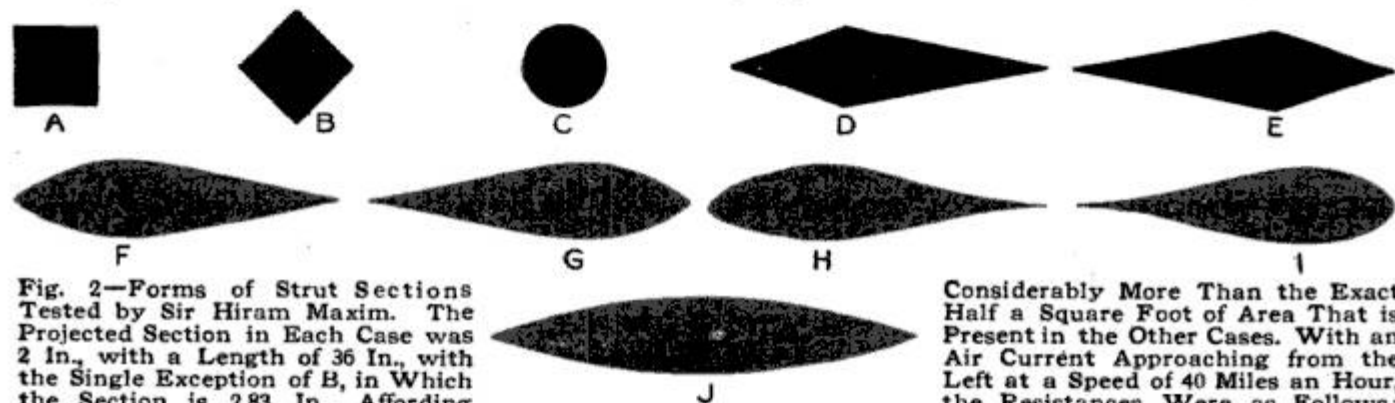


Fig. 2—Forms of Strut Sections Tested by Sir Hiram Maxim. The Projected Section in Each Case was 2 In., with a Length of 36 In., with the Single Exception of B, in Which the Section is 2.83 In., Affording

Considerably More Than the Exact Half a Square Foot of Area That is Present in the Other Cases. With an Air Current Approaching from the Left at a Speed of 40 Miles an Hour, the Resistances Were as Follows:

A, 4.56 lb. — B, 5.10 lb. — C, 2.80 lb. — D, 0.78 lb. — E, 1.22 lb. — F, 0.28 lb. — G, 0.42 lb. — H, 0.23 lb. — I, 0.59 lb. — J, 0.19 lb.

The resistances that aeroplane wings—and the other elements of an aeroplane structure—oppose to movement through the air constitute, of course, the measure of the power required to maintain the machine in operation. The accepted term to describe this type of resistance is "drift."

In its original sense, as employed by Chanute, who coined this use of the word, drift was understood to mean only what, for the sake of more accurate characterization, the writer prefers to distinguish as "aerodynamic drift"—the backward-acting element of the sustaining pressure under an aeroplane surface.

There are, however, two other ways in which a flow of air may tend to drift an object along with it, a condi-

tion that has led to confusion by complicating analysis as well as by confusing observation.

Thus, as an element in the total drift, there is the "frictional drift," due to the grip of the air by skin friction on the wings and other surfaces.

And in addition to the foregoing there is always the direct pressure of the air against the edges of wings, and the other elements involved in an aeroplane. This pressure is commonly figured as "head resistance," calculated in accordance with the accepted tables of wind pressure on the basis of the total projected area of the machine.

So it is seen that the total forward resistance, or drift, of the usual aeroplane, which must be overcome by the propeller thrust, is a composite of

three sub-types of resistance—"aerodynamic drift," "frictional drift," and "head resistance."

While the foregoing is a correct classification as applied to present aeroplanes, it is so only because these are ill-designed, and in the course of this article the writer will undertake to show that it becomes a loose and incorrect classification with well-designed machines.

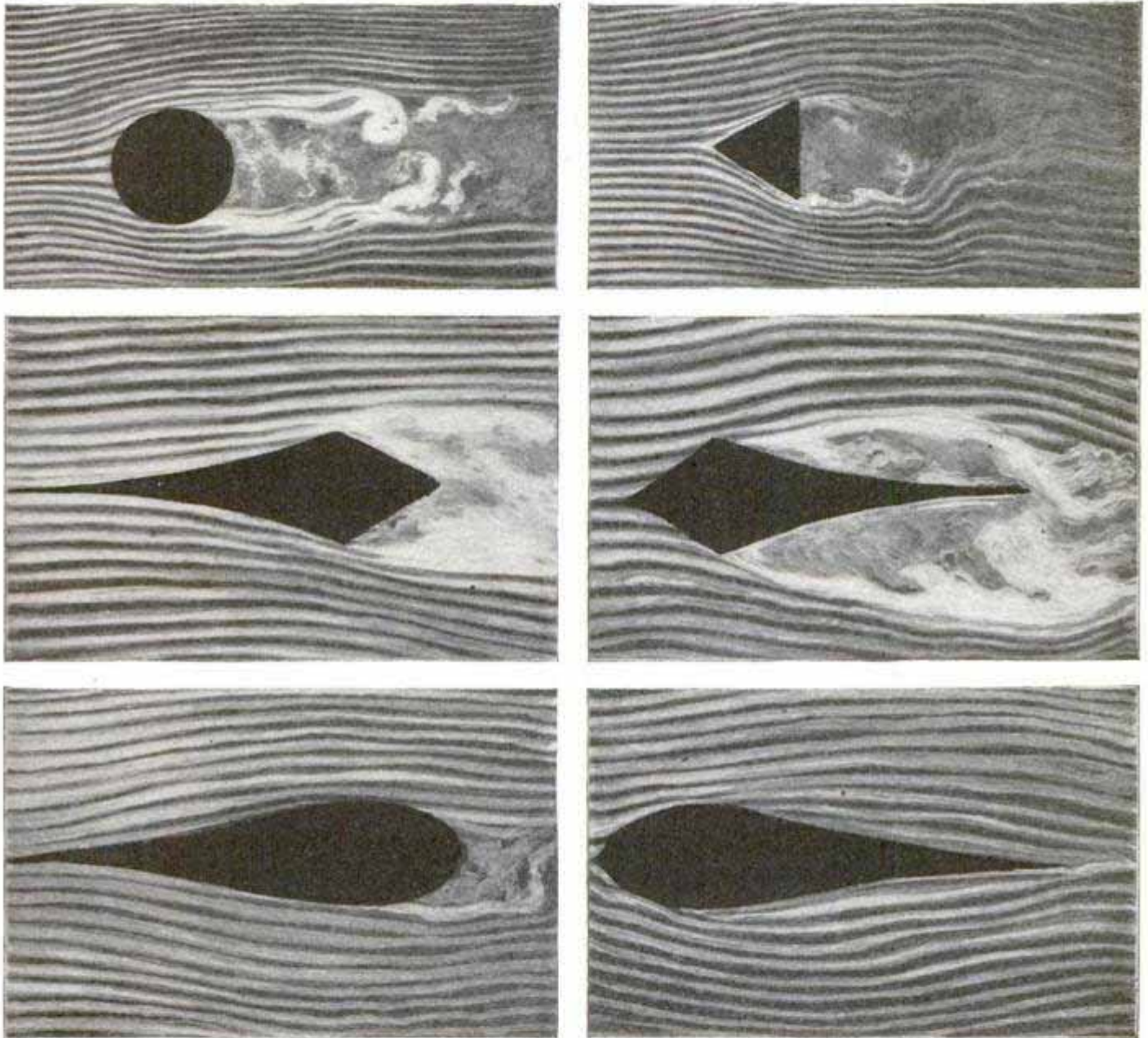
To consider first the aerodynamic drift, this has been reduced in at least a few fast modern machines to so small a proportion as one-twentieth of the lift, requiring for the purpose of overcoming it, for example, only 50 lb. propeller thrust to fly a 1000-lb. machine.

In the matter of the skin friction,

this, at most, does not exceed 15 or 20 lb. in an average aeroplane, at usual speeds of operation.

But when it is found that the total projected area of the average aeroplane will range from 20 to 35 sq. ft., against which the pressure will

ers, seeing no deeper than these obvious facts, have sought to reduce the aerodynamic drift, while at the same time paying some attention to the skin friction, but in the matter of head resistance have proved able to do no more than to cut down as much as



Courtesy L'Aerophile

Fig. 3—Flow of Air Streams around Various Solid Forms. Note That the Difference in the Width of the Tract of Air Disturbed in the Cases of the Forms that Afford Poor Results is Nowhere Nearly Sufficient to Account for the Difference in Resistances. These Photographs were Secured through the Top of a Glass-Roofed Wind Tunnel, into One End of Which Smoke was Admitted through a Comb-Like Screen

average over 10 lb. to the square foot at 60 miles an hour, it becomes at once evident that there can be no other adequate explanation than that of excessive head resistance to account for the 300 and 400-lb. thrusts necessary to fly present aeroplanes, which range from 35 to 80 miles an hour in speed.

The generality of aeroplane design-

possible, not the head resistance, but the projected area occasioning it.

And, since the head resistance constitutes by far the greatest portion of the total resistances, it is obvious that without definitely reducing it no great progress can be made toward the ultimate ideal of flight with little power.

It will be now in order to return to a consideration of Fig. 2. To an

investigation of the phenomena observed with these, the writer has, recently devoted considerable time.

The result has been the discovery of a heretofore overlooked aerodynamic phenomenon of the utmost importance in its relation to the energy requirement, and which, by means of application of its principles, is destined beyond question to contribute the essential basis to a new era of airplane progress.

In the Maxim experiments, it is first to be noted that all of the ten different struts, A to J, inclusive, Fig. 2, are of the same thickness of projected section—exactly 2 in., with the single exception of the strut B, which is the same as A except that it is turned so that it stands cornerwise instead of flatwise to the air flow.

In a tabulation of the effects secured with these different figures, the results seem at first most paradoxical, but subsequently reveal themselves as possessed of the most astonishing significances. Briefly to consider them, it is first to be noted that, though the projected area of B is increased by 41½ per cent over the projected area of A, the pressure acting against it is increased less than 12 per cent.

Second is the observation that, in the case of a 22½-per-cent increase in the speed of the air current applied to A and C, the pressure acting against the square bar increased over 13 per cent while that against the round bar increased only 6 per cent. Had the increase been with the square of the speed, as the armchair experts have it, the pressure against both bars should have increased 48.8 per cent.

Most extraordinary, of course, is the remarkable lowering of the resistances in the elongated sections from D to J, inclusive, as compared with the resistances of A, B and C. For the most extreme example, it is to be noted that the

resistance of J is only $\frac{1}{24}$ of that of A, so that, if 24 hp. were required to move a number of struts like A through the air, by changing their section to that of J one horsepower would suffice—an elimination of $\frac{23}{24}$, or nearly 96 per cent of that originally demanded.

This enormous variation in resistance, in the face of the fact that most experimenters have been wont to assume, probably correctly, that the actual head resistance of an object moved through the air is not affected so much by the form of its front portion as by its projected area, is obviously worthy of the profoundest study.

That the form of the front portion of a streamline body does not greatly affect the head resistance is probably correct, it having been repeatedly observed in automobile races at extremely high speeds that cars with pointed fronts are not materially faster than those with square fronts. Further evidence is found in many wind-tunnel experiments, and presumably the fact behind the effect is that, if a form is other than that best adapted to penetrate the air with a minimum resistance, inert air massed against it will automatically assume such form, and thus in large measure supply the lack.

A common hypothesis to account for the greater resistances of such forms as A, B and C, as compared with those from D to J, has been premised upon a supposition that the air in some manner banks up against the front or eddies along the sides of the

bad forms in such a manner that with these the width of the disturbed tract in the air is greatly increased over the projected section

of the object. But reference to Fig. 3 will show that this conclusion must be abandoned, now that wind-tunnel experiments, accompanied by methods of rendering photographically visible

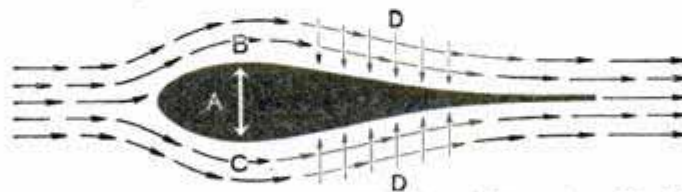


Fig. 4—Streamline Form A Passing Through a Fluid. The Energy Expended in Parting of the Fluid Streams to the Projected Distance BC is in Large Measure Recovered by the Reaction Pressures DD'

the disturbance and separation of the air streams flowing around solid objects immersed in them, prove the separation of the parted air currents to be not, after all, materially greater in the case of the shapes that offer high resistances than they are in the cases of properly formed streamline bodies.

The conclusion is forced that some other explanation than that of greatly differing head resistances is necessary to account for the extraordinary superiority of streamline forms, as compared with others.

And this explanation, by scientific analysis and deduction, as well as by processes of experimental elimination and demonstration, has been found to exist solely in a heretofore unsuspected effect exerted on the rearward portion of a streamline form—and lacking in the cases of other forms—whereby *the elements of the parted body of air spring together again after they have passed the point of maximum separation, and thus nullify the head resistance almost completely by a definite propelling pressure exerted against the tapered rear of the body as it escapes from between the wedged-apart masses of the surrounding atmosphere.*

This action is found to be so extraordinarily efficient that it certainly renders totally unnecessary and definitely wrong the use of thin wing surfaces and other elements in aeroplane structures now that it has become evident that the reduction of head resistance is of only the slightest importance as compared with the importance of utilizing the wonderful means available for recovering almost the whole of the energy expended in overcoming the head resistance.

This beautifully simple, though heretofore profoundly obscure and unrecognized example of the marvelous interrelation of aerodynamic laws, is illustrated in Fig. 4, in which, after the

parting of the air streams by the streamline form A to a maximum separation of the projected distance BC, there follows the closing together under pressure of the adjacent masses of the atmosphere, as is indicated by the short arrows at DD.

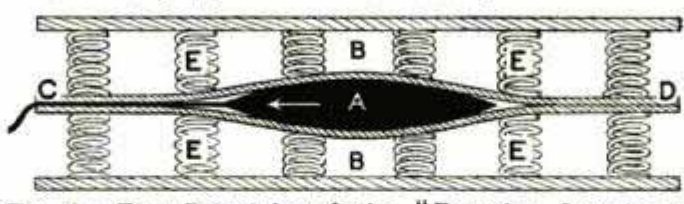


Fig. 5—The Principle of the "Reaction Impulse." Streamline Form A Moved in Direction of Arrow between Well-Lubricated Flexible Belts BB. Springs behind Belts Represent Elastic Fluid and Return a Large Proportion of the Energy Expended by Forward Motion of Streamline Form.

The condition is perhaps more lucidly explained in Fig. 5, in which the object A is to be considered as being drawn along in the direction of the arrow between the two flexible belts BB, which normally are held together, as at C and D, by the series of springs EE. With the form A and the belts well lubricated, it is obvious that the energy required to move A would have to be sufficient to compress the springs EE, if the rear end of A, instead of being wedge-like as shown, were squared off. This is because the springs would simply snap back after passing the points of maximum compression, with practically no recovery of the energy expended in compressing them.

But with the finely tapered rear outline it is clear that the pressure of the springs against the belt must tend to propel A in the direction of the arrow, for all the world like a watermelon seed projected from between the moistened fingers of a small boy. There is the difference, however, that, as compared with the most perfectly-lubricated solid surfaces, in the case of the air the friction is so low, the air so perfectly elastic, and the pressure so advantageously applied, that with good design the action is probably one of the most efficient known in engineering—96 per cent efficient in the case of the section J, Fig. 2, and undoubtedly well over 99 per cent in the case of the bird.

To the January issue of Popular Mechanics Magazine, Mr. Loughed will contribute an article, in which he will discuss more in detail effects of these new discoveries upon the practical design of aeroplanes.

GROWING TREE LIFTS MILLSTONE

This millstone, discarded by a mill at South Dover, N. Y., many years ago, has been a subject of surmise for years, and, seemingly, none of the surmises were fulfilled. After the stone had been discarded some time, a seedling popped its head through the eye, and, as the seedling grew into a tree, people began to watch and prophesy as to what would happen when it at last filled the stone. Some insisted that it would burst the stone just as a wedge of wood will split a slab, and others believed the tree would simply expand above its stone collar and reach its natural proportions. What has actually happened up to the present time is shown in the illustration, the tree lifting the stone from the ground and carrying it suspended.



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TUBULAR RADIATOR FOR AUTOMOBILES

A new radiator for automobiles, which consists of a series of tubes, that are run horizontally for machines using a pump and vertically for those using a siphon system, has been invented by a French motorist. The tubes are about half an inch in diameter and are pierced by tubes about one fourth of an inch in diameter. The smaller tubes are open at both ends to permit the free circulation of air while the water goes through the larger tubes. In this way the water is continually running over the air tubes and is thus kept cool. The

total weight of the radiator for a 12 or 14-hp. engine is about 28 lb. Each tube is mounted separately and, in case of accident, one or more of them can be taken out and replaced by a new one.

HIGH-SPEED ALTERNATORS

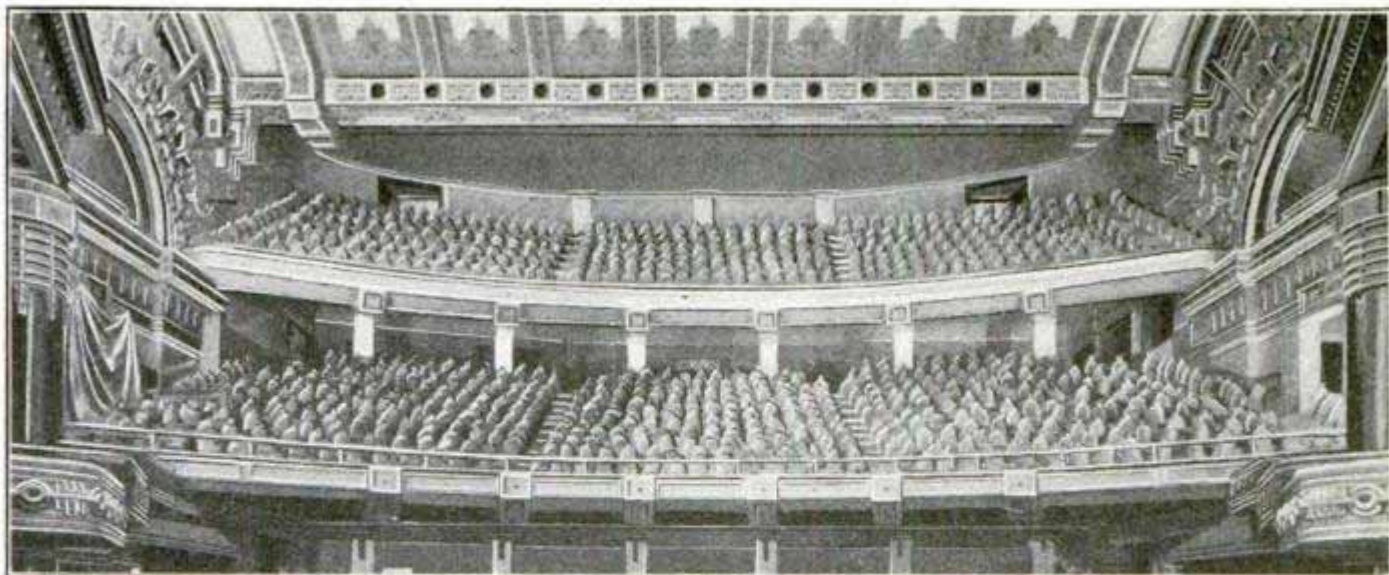
The difficulty to be overcome in the construction of high-frequency alternators, seeing that the frequency depends on the rotary speed and the number of poles, is that the peripheral speed of any rotating machine is restricted by mechanical limitations. Alternators of as high frequency as 100,000 per second have been constructed, but the output is very small on account of the reduced size necessary in obtaining high speed.

A German inventor, however, has constructed an alternator, at present operated in the wireless station at Eberswalde, Prussia, which gives 12 kilowatts for 30,000 frequencies, and 8 kilowatts for 60,000 frequencies. Its efficiency is 80 per cent, and the constructor calculates that it will be possible to build machines of the same type giving from 60 to 80 kilowatts for frequencies up to 100,000 and over.

M. Deperdussin, the well-known French aeroplane builder, plans to ship four of his flying machines to America with the intention of opening an aviation school here.



A tank train as it appears from the roof of the caboose at the tail end, is shown in the accompanying illustration. The tank cars contain water hauled from Willard, New Mexico, to Vaughn for railroad use.



Bags of Sand and Cement in Place of People: Testing the Balconies of a New Theater in Colorado Springs

TESTING THE BALCONIES OF A THEATER

A novel and thorough test of the carrying capacity of the balconies of a new theater in Colorado Springs, Colo., was made in September. Sacks of sand and cement having a total weight of 212,000 lb. were placed in the positions of the seats in both the first balcony and the gallery at one time, each balcony seat being tested

to 420 lb., and each gallery seat to 200 lb. The weight was four times that required by the city ordinance and far in excess of that which the theater could possibly accommodate in people, yet it resulted in a deflection of less than $\frac{1}{8}$ in. in the center.

Both the first balcony and the gallery have a span of 85 ft. and are of cantilever construction, having no intermediate supports. The theater cost \$300,000.

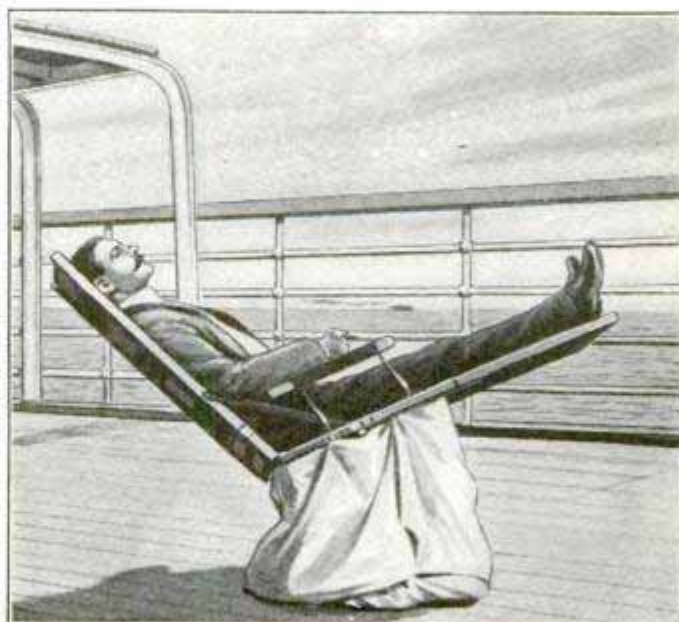
RADIUM BUILDING FOR PARIS UNIVERSITY

A specially constructed building has been erected for the University of Paris, at Sorbonne, for use as a radium laboratory. The walls of the building are lined on the inside with heavy plates of lead, which metal is almost entirely impervious to the radium emanations. Madame Curie will be the head of the radium department. As a coincidence, probably intentional, the building is located on the Rue (street) Pierre Curie, so named after her deceased husband and co-discoverer of radium.

ANTI-SEASICK CHAIR

An Englishman has invented an anti-seasick chair for use on shipboard. Instead of legs it is supported on pivots, so that the user remains undisturbed,

no matter how violently the vessel may roll or pitch. It is claimed that exhaustive trials have proved its practicability.



This Chair, Designed to Do Away with Seasickness, is Mounted on Pivots Instead of Legs

SAN FRANCISCO HAS GIANT WINDMILL

The Dutch windmill recently completed in Golden Gate Park, San Fran-



The Giant Dutch Windmill in Golden Gate Park, San Francisco

cisco, is said to be the largest windmill of its kind in the world, not even excepting those in Holland. Its height is 86 ft., the giant wings have a radius of 57 ft., and its capacity in a 30-mile breeze is 70,000 gal. of water per hour, pumped through a 12-in. pipe line to a distance of two miles and a height of 200 ft.

The cost of the mill was \$25,000, all of which was donated by leading citizens of San Francisco.

CALCUTTA HAS "HOLY PERFUME" BOX

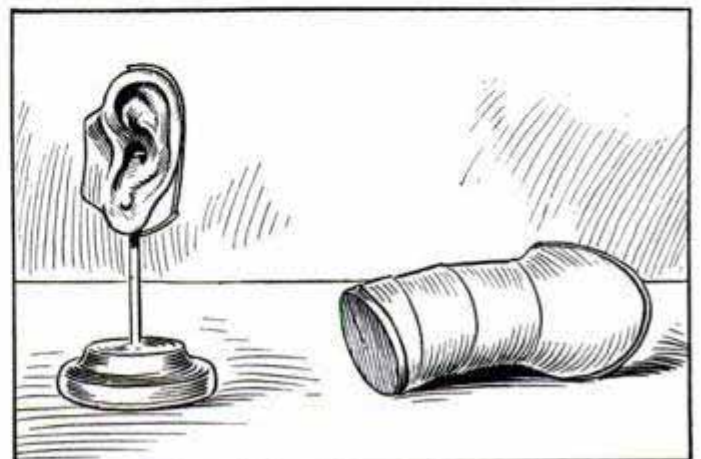
Reports from Calcutta tell of one of the most extraordinary religious hoaxes ever recorded in India. It seems that a pool of stagnant water in the northern part of Calcutta, formed from the accumulation of sewage from

roadside drains, suddenly began to emit a perfume which had a lemon flavor. Many people visited the pool, and the rumor spread that the pool was holy and that a new redeemer of the world would soon rise from it. According to reports, the pool became a place of pilgrimage. Diseased people bathed in it and drank it, and those of uneasy conscience washed away their sins in it. The water was carried away in all kinds of small vessels, and a brisk trade sprang up.

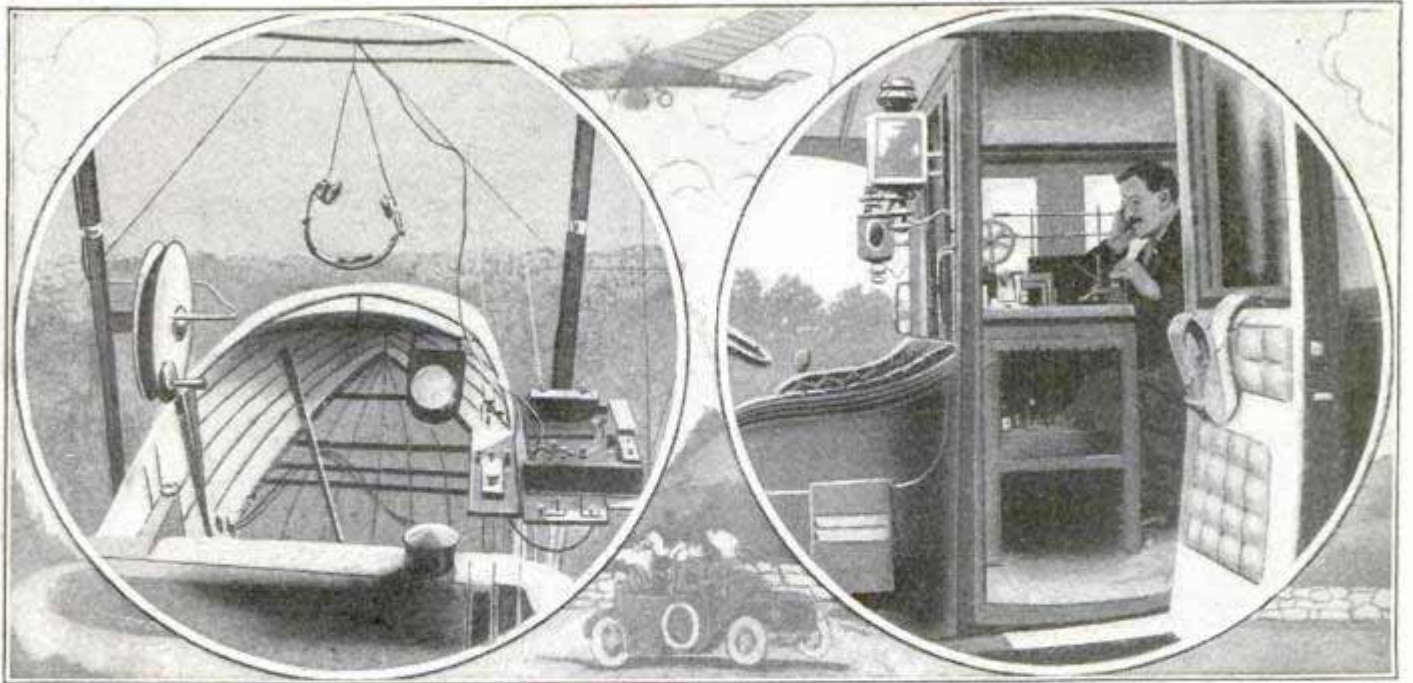
News of the holy perfume at last came to the ears of a firm of scent manufacturers, who took a professional interest in the matter and sent experts to investigate. These experts, so the story goes, soon discovered in the perfumed pool a clew to the mysterious disappearance of several cases of essential oils belonging to the scent manufacturers. Further examination showed that broken bottles of the oils had been thrown into the pool, and a young Bengalee, who had prospered through selling the holy water, suddenly disappeared.

THE FIRST TELEPHONE

Although Alexander Bell is generally accepted as the inventor of the telephone, 1876, records show that the idea of talking at a distance by means of electricity was worked upon by Philip Reis in 1861. This scientist made his receiver in the form of the human ear, and the mouthpiece had an end covered with gold-beater's skin.



Telephone Receiver and Mouthpiece Invented in 1861



The Wireless Equipment of One of the French Army Aeroplanes

Automobile Fitted with Wireless Receiving Apparatus

WIRELESS FROM AEROPLANE TO MOTOR CAR

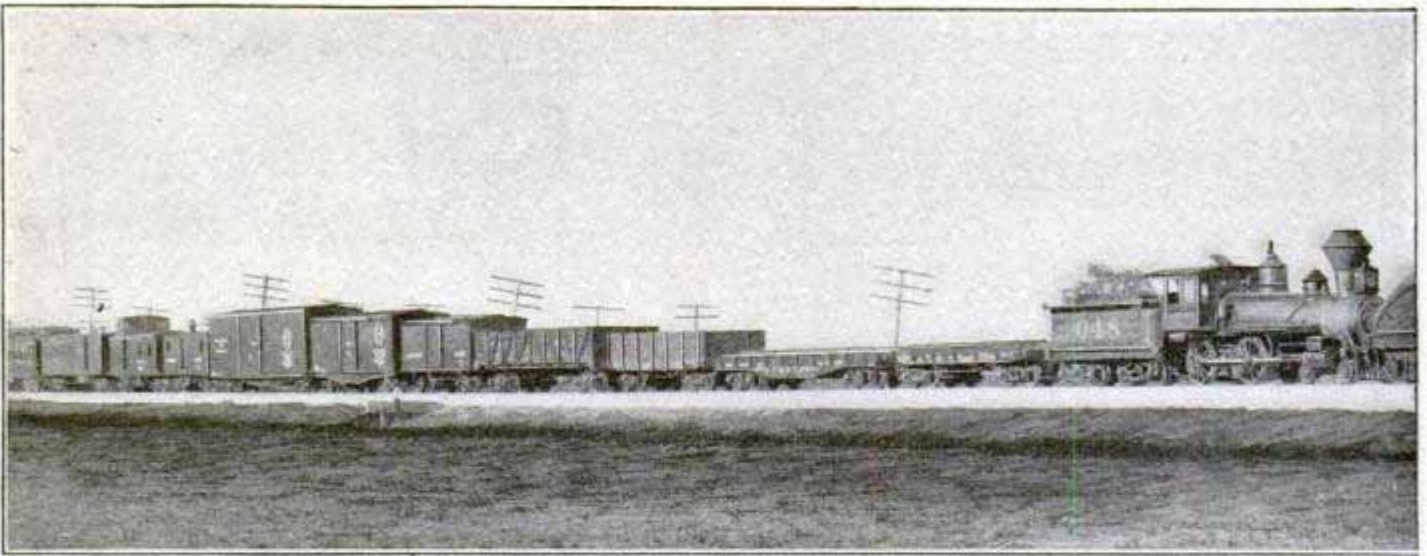
French aeroplane officers have succeeded in maintaining wireless communication between an aeroplane in flight and a motor car in motion, as well as with the Eiffel-tower wireless station. The greatest distance covered

by the messages sent from the aeroplane while traveling at a high rate of speed was 35 miles. The installation on the aeroplane weighs 45 lb., a 130-yd. coil of wire on a revolving drum acting as the antenna. No difficulty is experienced in getting a powerful spark. Messages were sent when the aeroplane was flying 1,500 ft. high.



THE HORSE, LIKE THE BUFFALO, IS DISAPPEARING FROM THE PLAINS

This photograph shows how the auto is superseding the horse and the mule on the prairies of the West. At the left is a traction freight wagon which is largely used for the transportation of merchandise across the prairies. Next to it is a passenger car. It has almost supplanted the livery rig, and garages are taking the place of the livery stables in plains towns. At the right is a traction engine, hauling a gang plow and a cook shack.



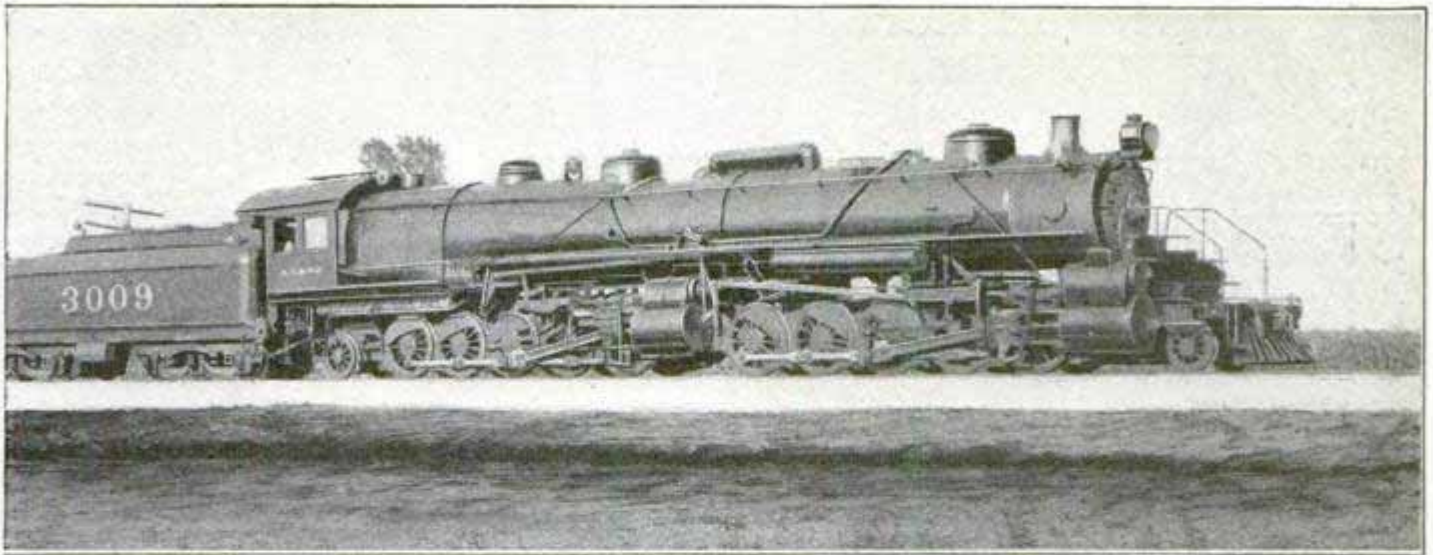
A Train Consisting of Pairs of Locomotives, Flat Cars, Coal Cars, Box Cars, Way Cars, Smokers

THIRTY YEARS' PROGRESS IN RAILROAD TRAINS

One of the most unique railway trains in the world is now making a tour of the western section of the United States for the purpose of showing people interested in transportation the great progress that has been made in rolling stock and appliances during the past 30 years. The officials of the railway system engaged in this educational work reached the conclusion that practical demonstration was a much better means of illustrating progress than literature and lectures. With this idea in view they have made up a train that includes representative types of locomotives, flat cars, box cars, coaches, etc., of 1881 and 1911. To add interest to the spectacle, for it is a spectacle, the men who operate the train, the conductor and engineer, have both been in the service of the railroad more than 30 years. They started to work when the ancient locomotive and obsolete cars on their new train represented the highest development of mechanical and engineering progress. The train is pulled from town to town along the main lines and branches of one of the biggest systems in the country and is sidetracked and exhibited to the townspeople. Representatives of the railroad explain to visitors the new

improvements and their superiority over the old.

The train is made up with one of the powerfulallet-type locomotives, the largest in the world, in front. This is followed by a locomotive of the best type known in 1881. Behind the engines are grouped the cars, in pairs, representing the two periods. The old locomotive has a weight of 133,000 lb., a relative capacity of 14,000 lb. drawbar pull, and cost \$7,740, while the weight of the new is 850,000 lb., relative capacity 110,000 lb. drawbar pull, and cost \$43,880. The old flat car weighs 19,200 lb.; its relative capacity is 40,000 lb., and its cost \$300, while the new weighs 32,110 lb., has a capacity of 80,000 lb., and cost \$943. The old coal car weighs 22,000 lb., has a capacity of 50,000 lb., and cost \$338; the new, a weight of 36,500 lb., a capacity of 80,000 lb., and cost \$1,036. The old box car weighs 22,600 lb., has a capacity of 40,000 lb., and cost \$475; the new, a weight of 46,900 lb., a capacity of 80,000 lb., and cost \$1,265. The old way car weighs 23,800 lb., and cost \$620; the new weighs 38,000 lb., and cost \$1,282. The old smoker has a weight of 49,400 lb., a capacity of 28 passengers, and cost \$3,000; the new, a weight of 119,100 lb., a capacity of



and Coaches of the Newest Type, and Showing Improvements in the Kinds Used 30 Years Ago

86 passengers, and a cost of \$12,124. The old coach weighs 50,300 lb., has a capacity of 48 passengers, and cost

\$3,605; the new weighs 123,100 lb., has a capacity of 75 passengers, and cost \$12,820.

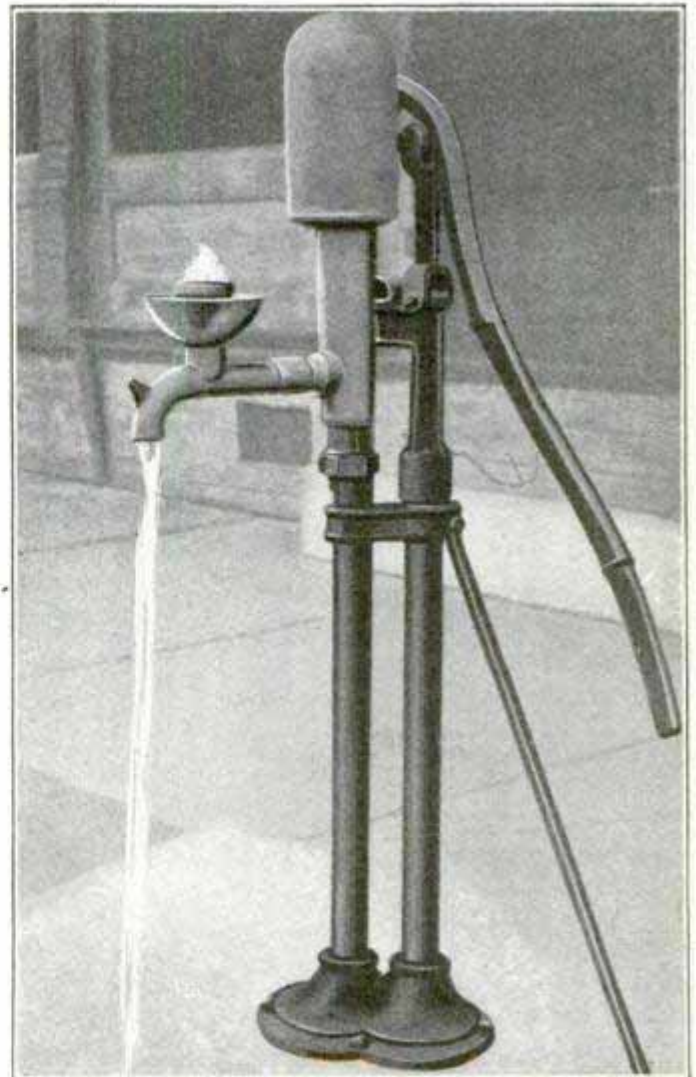
INGENIOUS METHOD OF ADVERTISEMENT

A fair given for the benefit of a fresh-air mission in Indianapolis, Ind., was ingeniously advertised by placing a specially constructed spring-actuated cannon on a motor truck and discharging advertising cards from it while the truck was being driven through the streets. The spring was sufficiently powerful to throw the packages of cards a considerable distance, and the cards, scattered by the winds, fell in showers over the people in the streets.

SANITARY DRINKING PUMP

An ingenious adaptation of the sanitary drinking idea to the old-fashioned country pump receiving its supply of water from a well, has been made by a rural mail carrier and inventor of Oblong, Ill. Working the pump handle up and down three or four times fills the cylinder at the top. This cylinder holds a gallon of water, which flows out through the spigot and overflows the bubbling bowl. The amount of water pumped into the cylinder by the few strokes of the

handle is sufficient to keep the bowl bubbling long enough for three or four persons to drink.



Bubbling Bowl and Cylinder Convert Pump into Sanitary Fountain

ILLUMINATED BALLOONS AS AIR-WAY GUIDES

The rapidity with which flying is becoming general leads to the question



Courtesy Illustrated London News

ILLUMINATED BALLOONS FLOWN TO INDICATE THE PATH
AIRMEN SHOULD TAKE

of aerial sign posts or guides by means of which the airmen may find their way about and be warned of particular dangers at night. One suggestion is the placing of captive balloons, illuminated from the interior by means of electric lights. This idea is being experimented with in England, the captive balloons being about 8 ft. in circumference. Inside each is a 100-cp. electric lamp, receiving current through the wire holding it captive, or, as in some experiments, carrying its own accumulator. It is suggested that these illuminated balloons be used along the English coast to warn airmen that they are approaching the water, and also as aerial sign posts indicating overland routes. Different combinations of colors in the lights and in the manner of grouping the

balloons could be utilized to designate the different cities and towns and to draw the airmen's attention to special dangers.

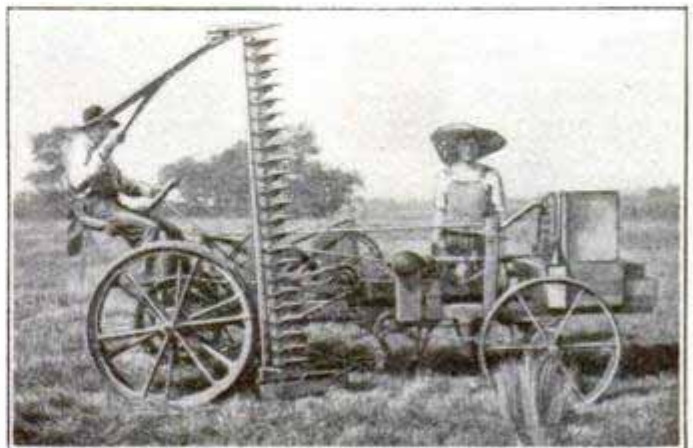
QUESTION OF STABILITY IN AIR

Two members of the British Association for the Advancement of Science announced at a recent meeting of the association their belief that the obtaining of automatic stability of aeroplanes is practically impossible. Professor Petavel, in fact, went so far as to state that he does not think automatic stability necessary or even desirable. The tricycle, for instance, is stable, and the bicycle unstable, but almost all riders prefer the latter, and he believes that mechanism for assuring automatic stability in the air would probably be dangerous in other ways. Sir William White declared he had an instinctive distrust in automatic appliances.

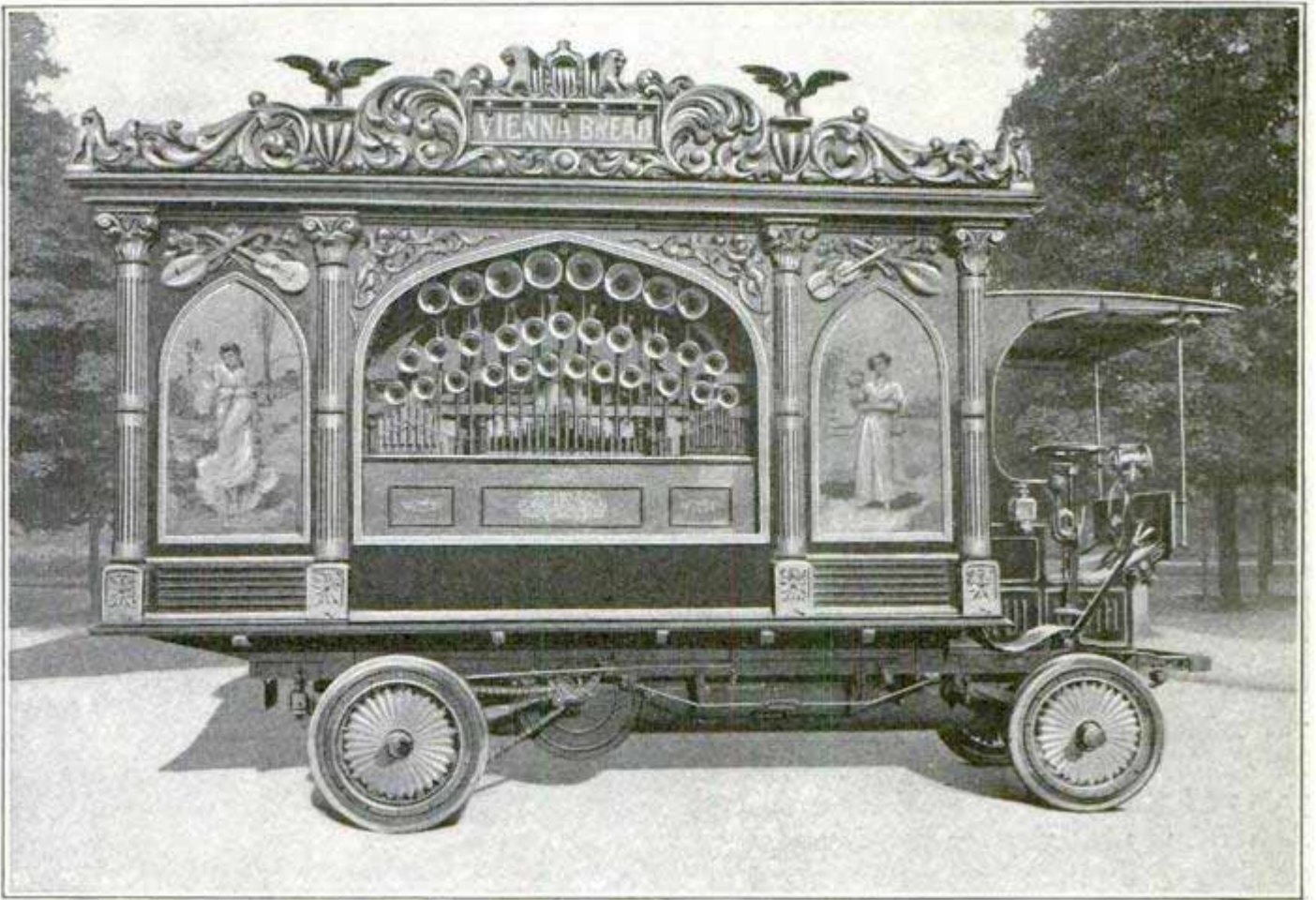
HOME-MADE MOTOR MOWER

A farmer near Antioch, Tenn., is using a motor mowing machine constructed by himself out of old machines, the only new part being a 2-cylinder, 8-hp. gasoline engine of the marine type. Sprockets, chains, etc., were taken from old wheat and corn binders.

The mower is driven by a 13-year-old boy, and at ordinary speed cuts a little faster than a team of horses.



MOTOR MOWING MACHINE MADE OF OLD MOWER, AN 8-HP. MARINE MOTOR, AND VARIOUS PARTS TAKEN FROM OLD WHEAT AND CORN BINDERS



A Motor-Truck Which Dispenses Organ Music as It Glides along the Streets

AN AUTOMOBILE ORGAN

This unique automobile street organ is now being operated by a Philadelphia bread concern as an advertisement. The organ, which is operated by the engine that drives the truck,

is played while the machine runs at a slow rate of speed up and down the streets. A large number of colored incandescent lamps make the machine an attractive display at night.

TRAINING THE OSTRICH TO RACE

Racing ostriches against horses is not by any means a new sport, but to go into it as a business is a little un-

usual. A breeder of ostriches in Florida makes a specialty of training the big birds to trot in sulkies, and makes



A Race between Two Ostriches at a County Fair; the Big Birds are Usually Raced Against Horses

numerous engagements to race them against trotters at county fairs, having several racing ostriches in different

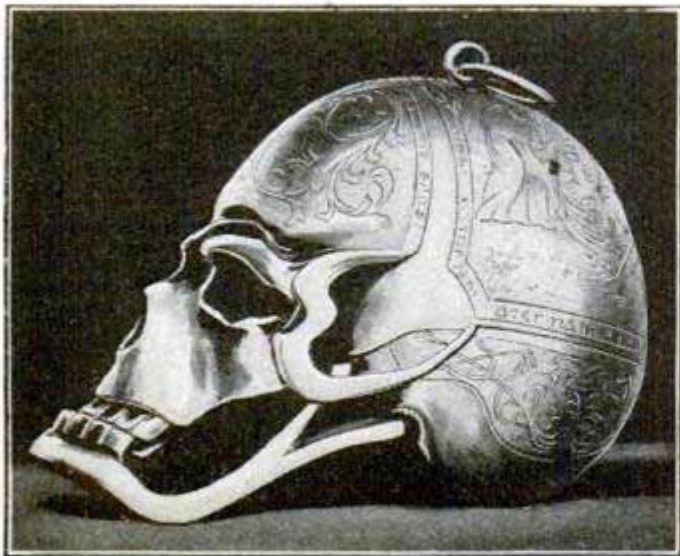


The Ostriches are Kept Hooded until the Moment of the Race

parts of the country at the same time. A hood is placed over the head of the ostrich while it is being harnessed and it is not taken off until everything is completed and ready.

GRUESOME SIXTEENTH-CENTURY WATCH

This ancient watch, the case of which was made in the form of a skull, is credited to the workmanship of Sieur Mayse, a watchmaker who



Gruesome Watch of Four Hundred Years Ago

did much work for Queen Mary of Scotland. It is elaborately engraved with various symbolic figures and

biblical scenes. On the forehead is Death, with the scythe and hour-glass. On the left side is a scene in which Eve is smiling and offering the apple to Adam, who is represented as rather hesitating, while the serpent seems to whisper into his ear. The creation of Eve is depicted on the left side, the Deity, in the guise of an earthly king, presenting her to Adam. In order to read the time it is necessary to open the jaws, within which the dial is placed.

BRITISH DRILL WHET

A new and effective tool by means of which drills may be easily and accurately ground has recently been introduced in England. The device is used on any flat whetstone or on an emery board, and is said to produce an absolute pair of fine cutting lips on any drill from $\frac{1}{12}$ to $\frac{5}{16}$ -in. diameter.

The operation of the device is simple, the drill being clamped in the holder, with the point projecting about half an inch. The holder is then inserted in the carriage, with the feed-screw point in one of the slots, lowered until the drill rests on the stone, and then grinding is commenced by rolling the carriage back and forth on the stone, the feed screw being turned as required. To grind the second edge, it is only necessary to lift and reverse the holder, taking care not to lift the feed screw, then grind until contact finishes.



Electric power is utilized almost entirely for sheep shearing and milking cows in New Zealand where the development of the use of current in the home and on the farm has outstripped its adoption in the wider fields of mechanical power.



Bringing Down a Balloon with New Rifle

A Rifle Designed to Fire Balloons

The Flaming Gas Bag Brought to Ground

RIFLE DESIGNED TO FIRE DIRIGIBLES

The fact that the ordinary rifle bullet will pierce the bags or gas envelopes of ordinary spherical balloons and dirigibles and pass through without doing much damage has resulted in a rifle whose projectile will ignite the

gas and bring the balloons flaming to earth. The projectile is a bullet of special construction.

The accompanying illustrations show the manner of using the rifle and the result.

ARMORED MOTORBOATS FOR TURKEY

A motorboat concern in England is building 22 armored motorboats which Turkey will use as patrol boats on the Red Sea, Persian Gulf and Mediterranean. They are 60 ft. long, have a breadth of 11 ft., and a draft of only 2½ ft., making shallow river work

possible. The speed is about 13 miles an hour. The hulls are protected against rifle bullets by means of a belt of bullet-proof nickel steel extending from the aft end of the after cabin to the forward end of the motor room, and from the water line to the deck.



One of the 22 Armored Motorboats Ordered by the Turkish Government

The wheel house is provided with circular brass-framed deadlights with armored plugs having sight holes. The cabins are covered with nickel steel,

bullet-proof at 60 deg. Two quick-firing guns are carried by each boat, one on the forward and the other on the after deck.

BUDAPEST BANK HAS SLOT-MACHINE DEPOSITORIES

Slot machines as depositories for savings have been found by a Budapest banking concern to be an excel-



Banking Savings through the Medium of Slot Machines, Which Deliver Receipts That may be Collected or Exchanged Against a Bank Book

lent means of increasing the amount of money handled by its savings department. The slot machines are placed in the street, and the persons placing money in them are automatically given a receipt, which may be exchanged against a bank book, or kept until such time as the receiver is desirous of withdrawing the deposit from the bank.

The idea is that people will deposit small amounts, if relieved of the necessity of going to the bank to do so, and also that the sight of the machines will cause them to deposit coins within

instead of spending them. It is said that the deposits of the bank have shown a remarkable increase since the idea was instituted.

KNOWLEDGE OF ORE MOUNTAIN TRADED FOR DOG

The contemplated purchase by an American corporation of a copper mountain on Prince of Wales Island, Alaska, for \$2,250,000, recalls the story of how the knowledge of this mountain, said to be one of the largest single bodies of copper ore in the world, was bought for a yellow dog.

A number of years ago a representative of English capitalists was "stalled" for the winter at Fort Yukon, and there met an old Alaskan prospector who was seeking a "grubstake," and particularly a dog. When this prospector learned that the representative of English capital was looking for iron and copper he bargained to show him a great mountain of the ore in consideration for one good dog. The mountain, according to the prospector, had been worked by Russians in the days when the flag of that country flew over Alaska, and several shiploads of ore had been carried away. The prospector got the desired dog, but lost his life while hunting for game. The English representative, however, did not forget the story and later induced his backers to invest sufficient money to pay the expense of finding it. A search of old Russian records revealed an account of the voyages of the Russian ship and the latitude and longitude of the mountain.

(Sarah Bernhardt, the great French actress, has appeared in a moving-picture play made up from her arrangement of the play "Camille."

The Secret Experiments

of the Wright Brothers

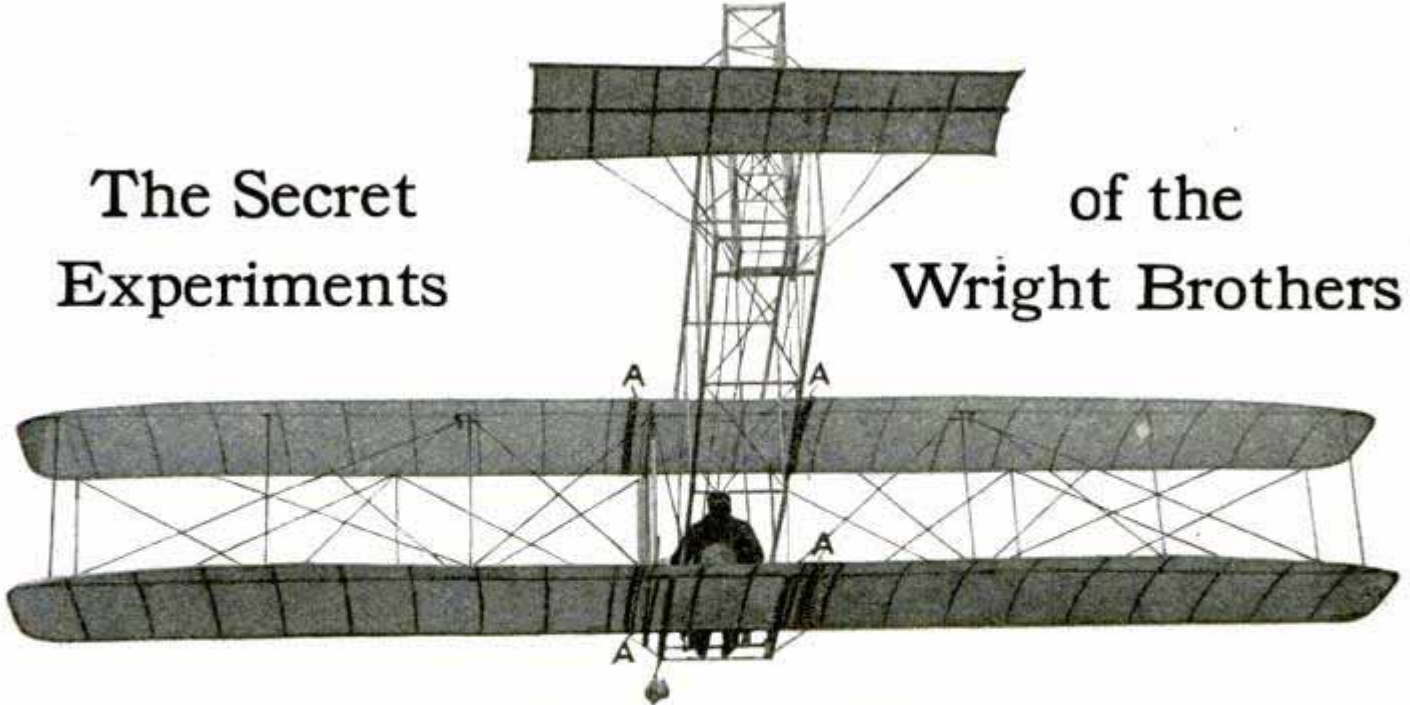


Fig. 1—View of Wright Glider from Below

SO many extravagant stories have been printed concerning the interesting experiments with a new glider, which the Wright brothers have been making of late at Kill Devil Hills, N. C., that Popular Mechanics Magazine sent an acknowledged authority on aviation to North Carolina to write an accurate and complete description of the machine and of results secured, together with an expert analysis of the technical significance of the work.

DESPITE the wild tales that have been filling the newspapers of late, to the effect that the new Wright machine was a flapping-wing device, that it was a solution of the problem of flight without power, that it was capable of hovering indefinitely over a selected spot, and that it was capable of imitating the soaring flight of the larger birds, it proves upon first-hand investigation to be only slightly different in appearance and performance from previous Wright gliders and power machines—over which it discloses improvement only in immaterial and minor degree, if at all. Probably the Wrights themselves would claim little more for it, though their customary reticence has been in this case, as before, taken as evidence of mysterious and marvelous achievements—by newspaper writers with more interest and enthusiasm than technical competence.

Undoubtedly this attitude on the part of press and public has been inspired largely by the vague but not ill-founded idea that soaring flight with aeroplanes, with use of power only occasionally, if at all, is an im-

pending development in this field of engineering. And while it is not the fact that the Wrights have really achieved such flight in the present experiments, they have unquestionably made a greater or less step toward it; and that still greater progress will be made in the near future by them or by others is not to be doubted.

To those who were so fortunate as to see the flights with the new glider, even to the technical experts who have some idea how they are accomplished, it was nevertheless little short of miraculous to observe the Wright structure of wood, wire and canvas, apparently under the absolute control of the operator, with no visible source of power, perform its amazing feats. To see it poise itself for seconds, even minutes, at a time, apparently in defiance of the law of gravitation, then advance steadily into the teeth of a driving gale, which by all that seemed reasonable, should have driven it backward; again, finally, to see it lose ground, back up, and settle with hardly a tremor, at the starting point, had all the seeming of something miraculous.



Orville Wright Making Observations during the Trials with the New Glider

At other times in the course of the trials, a most pretty sight was the extreme manipulation of the wing warping to balance the frail craft as it hung suspended in the invisible medium that so securely supported it. And, again, there were graceful, swooping maneuvers and hair-raising dives, by which the younger Wright brother exhibited his seemingly complete mastery over the element that from the beginning of time has been regarded as the particular realm of the creatures of the air, with whose dominion of the atmospheric ocean it was so long supposed mankind could not hope to dispute.

The crux of the problem, as hereinafter suggested, is the utmost possible flattening of the gliding angle together with the greatest possible development of the "tangential," as the obvious means of preventing loss of height even when only very slight rising currents are available. Using this condition as a test of the newest

Wright experiments, there can be no question but what in their new glider they have secured a somewhat greater flattening of the gliding angle than has been achieved by any other constructor. But that it is very materially flatter in the case of the new Wright glider, or anywhere near as flat as in the birds, is a claim that does not appear tenable. Nevertheless, it is, in a sense, of all the greater significance that, with so slight a degree of improvement, it should become possible to make such remarkable hovering and rising flights into strong winds as have been made by the Wrights with their new machine.

The Kill Devil Hills were made famous by the classic original gliding experiments of the Wright brothers, which culminated in a short but successful flight with a power machine late in 1903. In many respects the place is ideal for the purpose, its remoteness and inaccessibility precluding all possibility of spectators numerous enough to be troublesome, while the high sand dunes and the sandy flats afford excellent places for starting and safe places for landing. In addition to these requisites, the prevalence of steady winds of ample velocity throughout considerable portions of the year peculiarly adapt the locality to gliding experiments of the character under consideration. It is said that the Kill Devil Hills were originally recommended to the Wrights by Langley, and were promptly chosen as the site of their first work, after a brief correspondence with the nearest postmaster.

The Hills are a group of shifting sand dunes, ranging up to a possible maximum of 100 ft. in height, rising from the almost uniformly barren surface of a long, low, and narrow sand spit that extends southward along the North Carolina coast from Cape Henry to the entrance of Albemarle Sound. The island is nowhere more than about a mile and a half wide. The nearest point on a railway is Elizabeth City, N. C. From here a daily

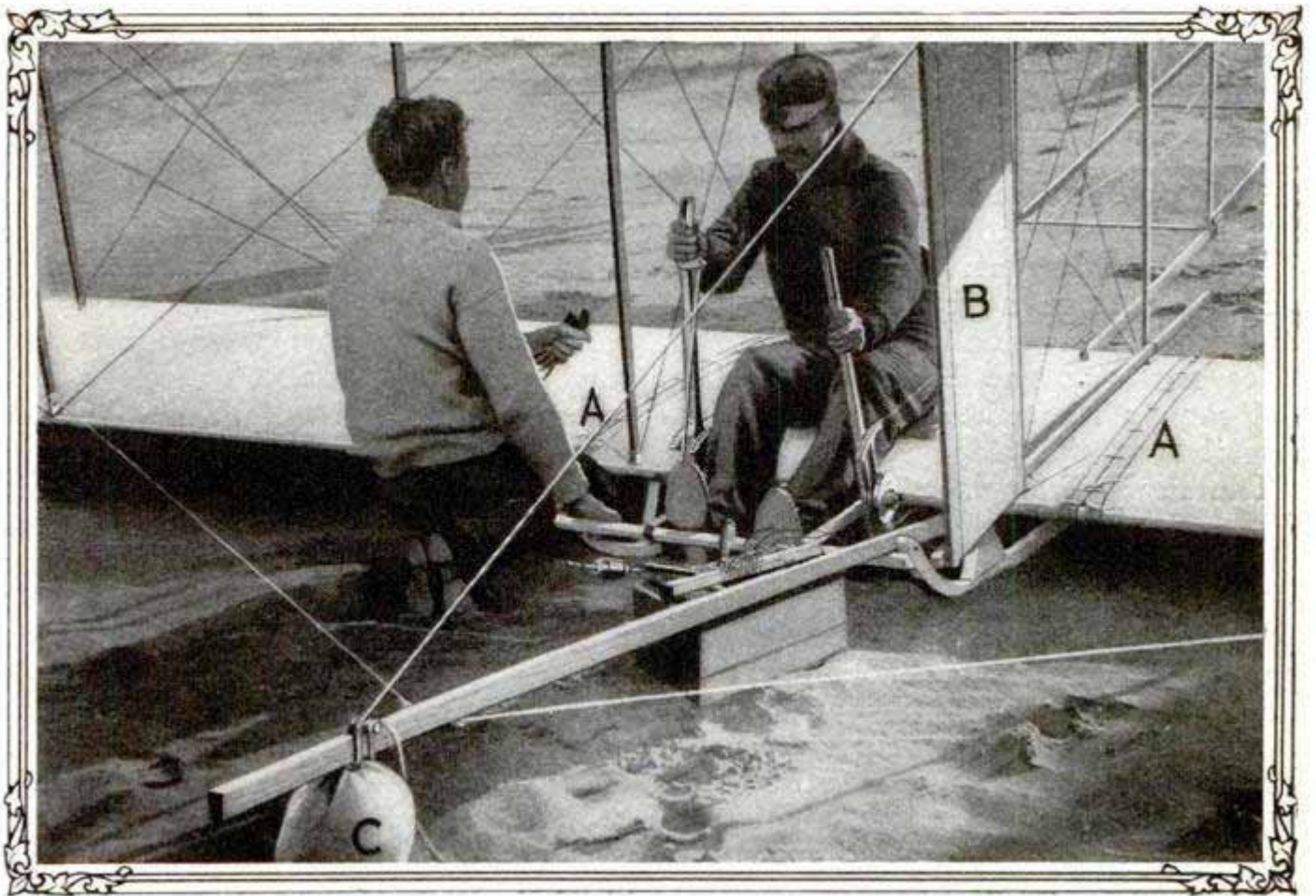


Fig. 2—Orville Wright Seated in the Glider—A, Joints in Wing Surfaces; B, Vertical Fin; C, Adjustable Weight for Balancing

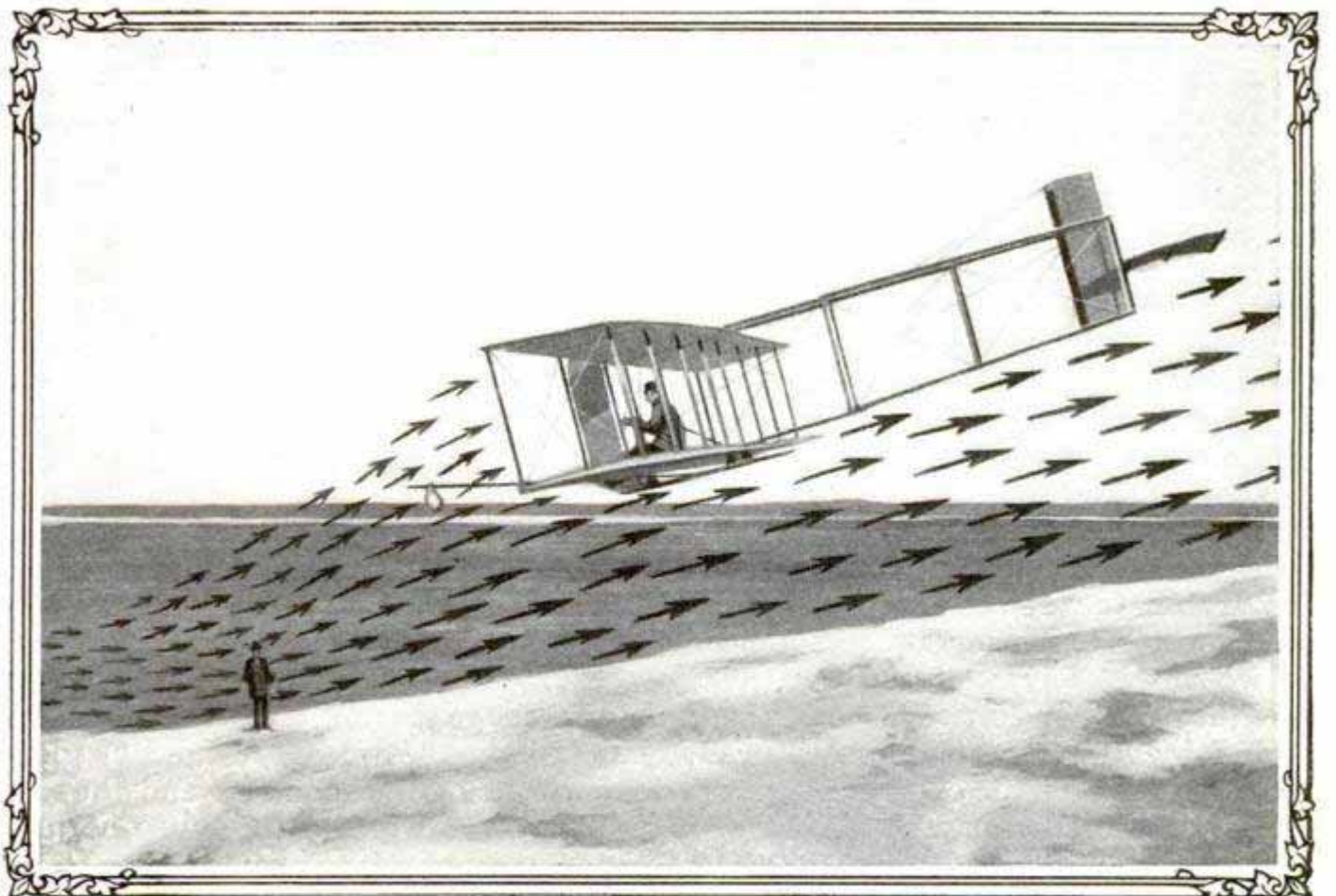


Fig. 3—Arrows Indicate 50-Mile Wind, Showing How Machine Was Sustained in a Stationary Position

boat covers in five or six hours the 50 miles to Nag's Head, a fishing settlement some 5 miles south of the Kill Devil Hills, and to Manteo, a village of 500 population across the sound on Roanoke Island—noted for its important part in the early settlement of the North American continent. Kitty Hawk, another small village, is six miles north of the Kill Devil Hills, and can be intermittently reached by a mail boat.

The new glider is a characteristic Wright biplane, with a span of 32 and a chord of $5\frac{1}{2}$ ft. Its weight is about 145 lb. The wings are said, and appear, to be identical with those of one of the standard Wright power machines, and are correspondingly thin, and flat in curvature. The two surfaces are separated by eight pairs of vertical struts, no different from those long employed in Wright aeroplanes, which space off the total span into seven sections. As heretofore, the center section is made narrower than the others, and for convenience in shipping is made readily separable from the portions on either side of it. The junctures in the wing surfaces are very apparent at AAAA, Figs. 1 and 2. The operator is seated directly in the middle of the machine, on the forward edge of the lower plane.

The center section and the two first sections on either side of it are rigidly trussed in all directions by diagonal bracing wires, leaving the first two sections from each wing tip free to undergo the distortion involved in the wing warping. This is accomplished, as is clearly shown in Fig. 2, by identically the same elements that have been employed for the same purposes in all Wright aeroplanes for at least a year or two past. Thus the wing warping and the double vertical rudder are worked by a lever with a jointed head, placed at the right of the operator, while the elevator is worked by the lever at the left.

Unlike previous Wright gliders, but like all recent Wright power machines, the single flexible elevator surface is

placed at the rear. A square-ended tail surface is illustrated only because one of standard form that was available became broken in an accident.

Both vertical and horizontal tail surfaces are carried on a light skeleton box girder similar to that used on the power machine.

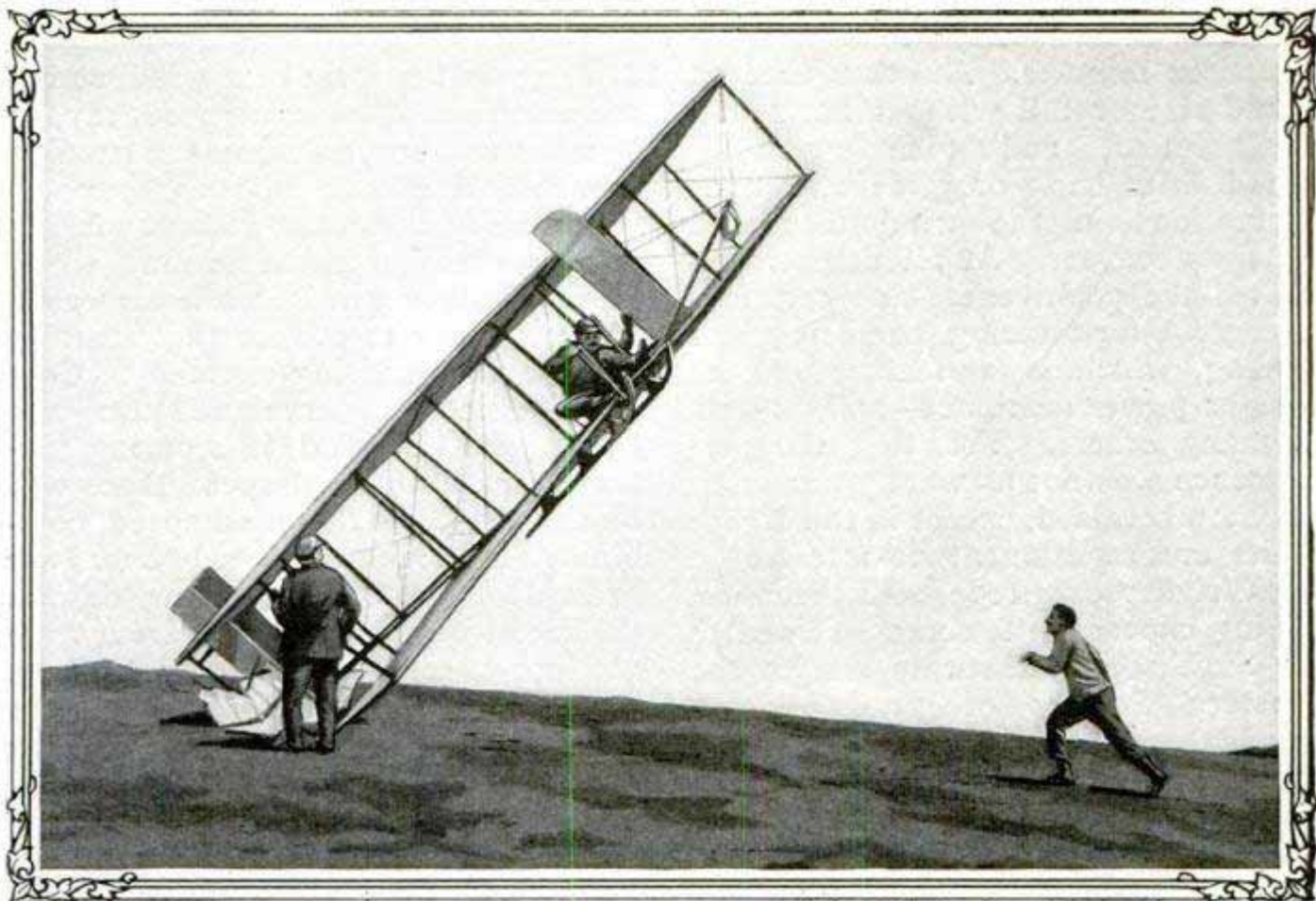
A curious-appearing feature is the single vertical fin, about a foot wide, which extends the entire height of the machine just in front of the main planes, and to the left of the operator. This is, however, simply an equivalent of the fin-like "blinkers," similarly present in all but the very earliest Wright biplanes.

The runners resemble those on early gliders, being much lower than are now used on the power machines. They are, indeed, barely sufficient to keep the lower plane off the ground. Presumably the design of this detail is dictated by a desire to secure the utmost minimization of the head resistance.

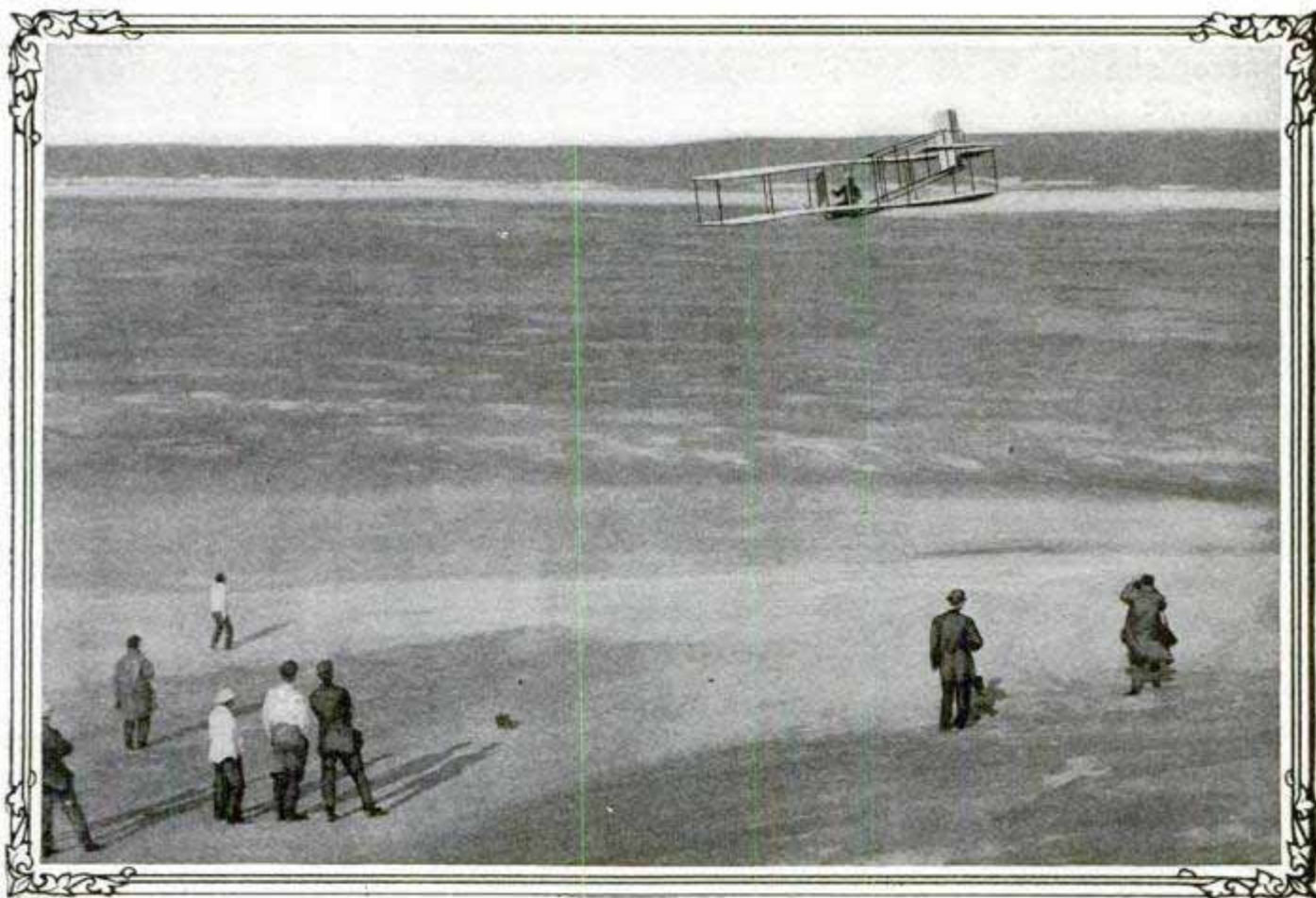
For securing very exact adjustment of the longitudinal balance of this experimental glider, there is outriggered in front a boom (C, Fig. 2), to which there is attached a weight that can be conveniently varied in quantity or shifted in position.

The glider has been tested by releasing it from a hilltop into winds ranging up to 50 miles an hour, in the manner sketched in Fig. 3, every condition being especially selected to secure the utmost possible advantage from the strongly-rising wind, as it is deflected upward by the slope of the hill, in the manner indicated by the arrows. It is a well-understood effect of sloping ground that it upwardly deflects wind flowing over it.

The results secured were quite what would be expected. At times, when the balance between the normal gliding speed of the machine and the velocity of the wind happened to be just right, the aeroplane would poise itself in a maintained position over the ground, without advancing or receding. On one occasion it thus hovered for



An Accident Which Broke the Rudder—Warping of Wings in Attempt to Control Glider is Noticeable



The Aeroplane Hovering in a Wind. Note How the Coats of the Spectators are Blown Back, and the Clearly Evident Distortion Due to the Wing Warping

about ten minutes. At other times it would rise or fall without horizontal displacement, and then again it would drift back or glide ahead, as fluctuations in the wind facilitated these maneuvers. At all times it exhibited the positiveness and certainty of control, for steering, balancing, and landing, which is a feature of the Wright power machines—and, indeed, of many others. Yet, that the performance was not as wholly new as it has been heralded, except in the degree of its accomplishment, is attested in the Wrights' own reports of their first gliding experiments, communicated to the Smithsonian Institute and to the Western Society of Engineers, in which there is mention of brief hovering and gain of height in winds blowing up sloping ground.

It is a curious feature of these experiments, and of the many misstatements that have been made concerning them—wholly without the approval of the Wrights, of course—that the average mind finds it so difficult to visualize the phenomena that affect an aeroplane in a wind. To begin with, there is not the distinction that is commonly assumed between gliding with a motorless aeroplane and gliding with a motor aeroplane with the motor stopped—the latter the "*vol plane*" of accepted aviation terminology. Wherefore the record for gliding flight logically belongs, in all reasonableness, to whomsoever has accomplished the longest *vol plane*, rather than to some one who may have made a shorter glide with no motor in his machine instead of with the motor merely stopped.

About the matter of hovering other misconceptions are rife. It is well understood that to secure sustentation from the air, an aeroplane must be in continuous lateral* movement, but what seems not to be so well understood is the fact that this lateral movement requires only to be *through the air*, and sustains only a most incidental relation to the ground. The consequence is that if the whole body of the air is

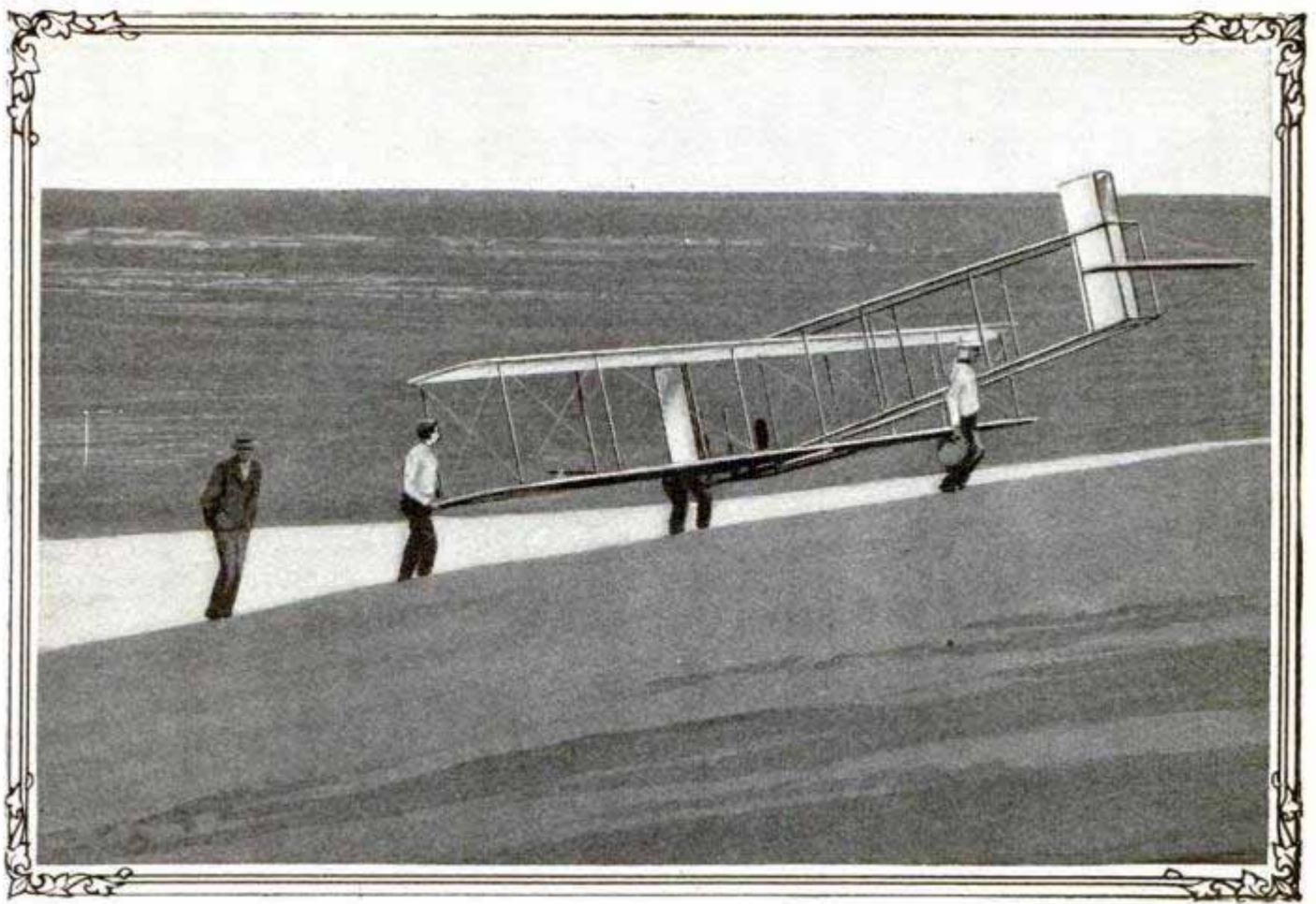
drifting, in the form of a wind, across the earth's surface at a speed, say, of 50 miles an hour, an aeroplane running into this wind at 50 miles an hour will be normally sustained without making any progress over the ground whatever—in other words, while hovering. But relatively to the air that sustains it, it will be moving normally. Conversely, if the aeroplane turn and travel *with* the wind, in securing sustentation at its normal speed there will be added to this the wind speed, combining to make a speed over the ground of 100 miles an hour, despite the fact that it is moving *through the air* just 50 miles an hour, as before. The condition may be likened to that of a fly in a railway coach, moving about unconscious of the fact that the body of air in which he flies is moving rapidly over the earth's surface. Another analogy is the case of a steamer forging against a rapid river current, and making speed in respect to the water, but little or none with reference to the banks of the stream.

Of course the extreme conditions, of complete doubling or nullification by wind of an aeroplane's speed, are unusual, but less extreme conditions, involving the same principle, are common to all aeroplane flights not undertaken in a dead calm, and in which there are all degrees of minor additions to or subtractions from the actual speed of the vehicle by the effect of winds. And in at least one recent instance, which was observed at an English flying ground, a power-driven aeroplane was seen to hover for some seconds when its own speed and that of the wind happened for a moment to coincide.

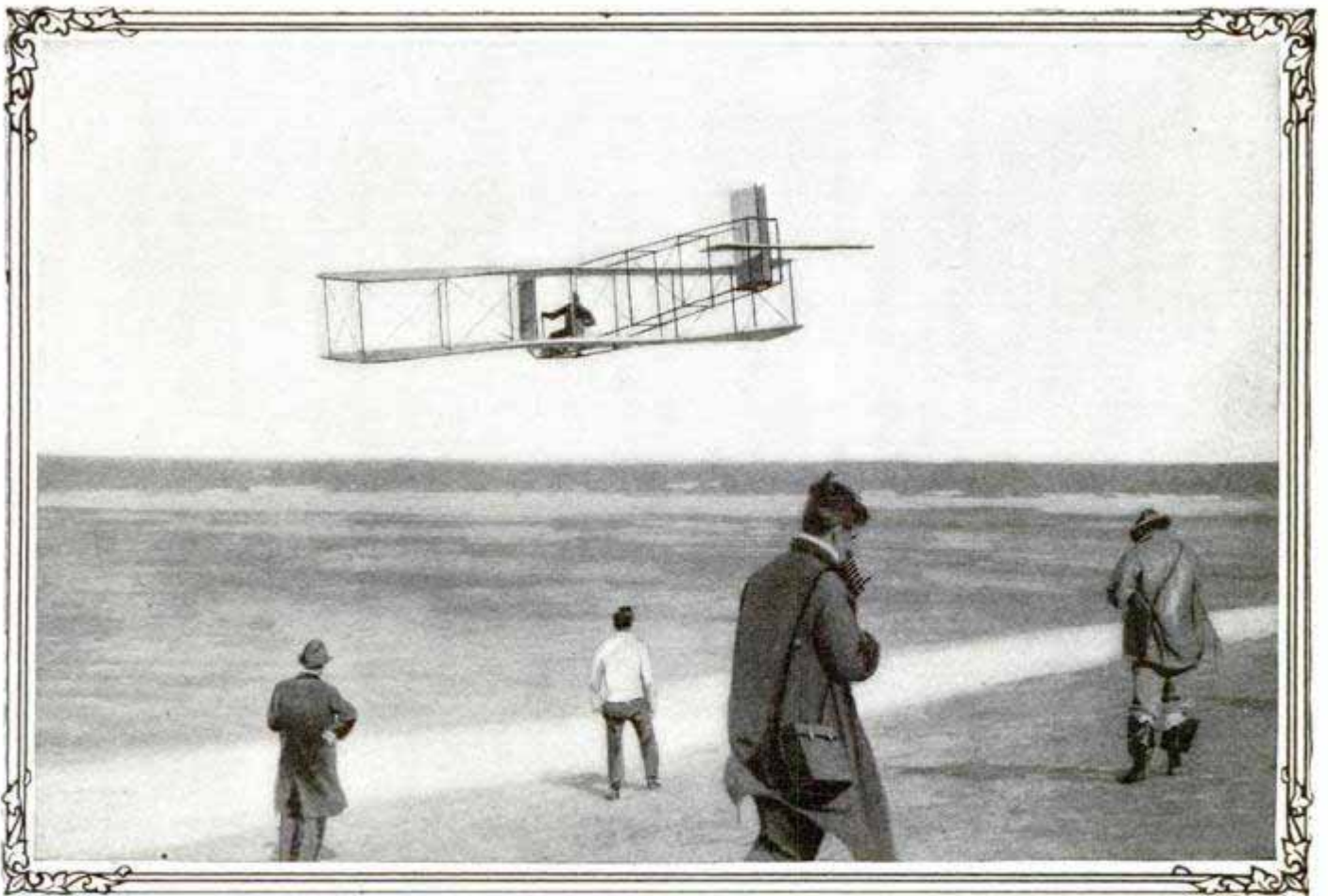
In ordinary gliding, as distinguished from flight with a motor, some source of power is just as necessary as in the other case, the only essential difference being that gravity now supplies the energy by the simple process of compelling the machine to lose height. An automobile does not need a motor to coast down hill.

Further to clarify these explana-

* The word "lateral" is now being used by aeronautic writers in the sense of horizontal movement forward.



The Glider being Carried Up the Hill for Another Trial



Another View of the Machine Hovering. Note the Extreme Use of the Wing Warping

tions, it may be well to emphasize a few points that are more obscure. First is the fact that any wing surface, at a fixed angle and with a constant loading, has a certain critical speed at which it is normal for it to travel, and at which the resistances it opposes to movement through the air are a certain fixed percentage of its weight—the "lift and drift ratio" of the engineers. To overcome the drift resistances, it is necessary either to provide propeller thrust of corresponding magnitude or else to resolve the weight of the machine itself into a propelling component, by coasting it downhill in the air, so to speak.

With an understanding of the foregoing, several matters become clear. At once it is evident that a most important field for aeroplane development lies in the direction of improving the lift-to-drift ratio—in a glider, flattening the angle of coasting necessary to sustain the craft, and in a power machine, reducing the measure of propeller thrust and horsepower required. A less evident, but not less real advantage of flattening the gliding angle inheres in the possibility it opens up of taking extensive advantage of rising currents in the atmosphere as means of propelling aeroplanes, for such currents, while common, are not ordinarily of sufficient magnitude to sustain machines of such excessively abrupt gliding angles as are now almost universal.

In thus taking advantage of rising

currents, after much the same manner that is probably employed by the soaring birds, the particular essential always must be a gliding angle so flat that the machine loses altitude slower than the air rises, thus continuing indefinitely to coast down an invisible hill that rises faster than the vehicle slides down it.

Despite their unwillingness to make premature announcement of their opinions or plans, it is safe to infer that something of the foregoing is what the Wrights have had in view. To secure results, however, they have seen fit to commence by working in exceptionally vigorous rising winds, in preference to depending upon any prospect of securing exceedingly flat gliding angles.

The "automatic balancing," concerning which the daily newspapers had much to say, was not tried out. It is understood, however, to have contemplated only a test of the long-patented but little-exploited pneumatic and other devices the Wrights have proposed for this purpose. It is also asserted that the present plan is to balance automatically by ailerons hinged to the wings, so that the normal hand control by warping will not be interfered with. Presumably the policy in this is to avoid depriving the operator of the normal manual safeguards while the automatic device is tried out, rather than to substitute permanently the ailerons for the, in every respect, more effective wing warping.

ASHEVILLE, N. C., AS A HEALTH RESORT

In the ninth of the series of articles on "The Kingdom of Dust," which appeared in the October issue, the following statement was made:

"Unfortunately, the chosen places of the earth, climatically speaking, such as Denver, and Asheville, where the natural conditions are most favorable for patients suffering from tuberculosis, have become hotbeds for the growth and dissemination of the disease."

Dr. L. B. McBrayer, Health Officer of Asheville, N. C., takes issue with the author of the article. He declares that Asheville takes every known precaution to prevent the dissemination of tuberculosis. While it is undoubtedly true that the congregation of persons afflicted with a communicable disease will spread that disease unless rigid sanitary precautions are taken, and while a few

years ago a theory was held by physicians which would have warranted the assertion made in the article, it is recognized that most well-established sanitariums and resorts are now actually freer from bacilli than the ordinary factory or home where an unsuspected case may exist or where a careless patient works or lives.

The Asheville Health Department is active and efficient in carrying out its laws for the prevention of tuberculosis. A recent bulletin of the department begins with the following statement:

"Asheville opens wide her doors to the sick and well from every clime, but she demands that the sick shall so comport themselves that they shall not become a menace to the health of her citizens or the stranger within her gates."

COMMENT AND REVIEW

Climate as an Asset

ON no other continent, under no other sun, in no other zone, in all this world, can be found the same extent of fertile, available agricultural land, as in these United States. And in no other equally large tract as that stretching from the Atlantic to the Pacific, and between the Great Lakes and the Gulf, can be duplicated the same amount of normally good weather, as Nature has bestowed on this favored land. Our rain and sunshine are so proportioned the one to the other as to produce the best yearly conditions on earth. Africa has its jungle, Australia its vast desert, Siberia its endless wastes. For weeks or months at a time the inhabitants of other countries must be content simply to wait until the passing of the inclement period before resuming anything like their full measure of activities. In one place it is the long winter with deep snow and short daylight; in another, a season of unhealthful heat or rain, from each of which the people emerge with mental and physical powers at a low ebb. But here our North is not so cold, nor our South so hot, as to preclude a continuous season of activity. In every part of the land our railroads are running throughout the year; our children can reach their schools; our stores and banks and factories and mines are in operation every week day; we are a continuously busy and employed people.

And all this is possible because we have a maximum of good weather. Our climate is an asset we seldom reckon.



English Post Office Profitable

THE report of the post office department for the United Kingdom for the fiscal year, shows a profit of \$21,000,000, and this moreover after paying a loss of \$5,500,000 for telegraph deficit, and another loss of \$200,000 on its telephone department. In Great Britain all the commercial telegraph business, and most of the telephone service is operated by the government. While it is true that the wages of postal employes there are very much lower than here, and the average distance a letter is carried is less than in the United States, yet the domestic letter rate is but one cent of our money. Moreover, a large parcel-post business is handled, amounting to over five billion pieces, while there were only three billion letters. Over one billion packages were carried for a half-penny, or one cent of our money, each.

In view of the fact that the English are not as voluminous letter writers for business and social purposes as the Americans, and that the parcel rate is low there and high here, it would seem as if our own postal department might be able to so manage its affairs as to avoid any loss without increasing the rate of postage on any class of matter, and to establish a parcel-post rate which would serve the people without involving any loss in doing so. Thousands of small shop keepers in London, for example, have no other means of delivering purchases. You step into a store on the Strand and buy a book, a hairbrush, a box of cigars, and the parcels post gets it out to your residence six or eight

miles distant almost as quickly as you get there yourself. It is the salvation of the shop keeper in the small towns, who can order goods he cannot afford to "stock" and get what his customer wants, quickly and at the cost of one or two cents, or less, for postage. The country dealer in fighting the parcels post, especially as proposed as local on rural routes only, is fighting his own best friend, although he does not know it. He has not made its acquaintance, and fails to comprehend his own possible opportunities.

Not a hundred miles from Chicago is a town of about 3,500 people. Ten years ago many of its merchants bitterly opposed the construction of an electric line between that place and a little hamlet of perhaps 100 people, 10 miles distant. It was argued the new road would build up another town and all the farmer trade in that section would be lost. The line was built, the little hamlet has grown to a town of more than 1,000 inhabitants, with waterworks, electric lights, telephone exchange, fire department and all that; and the trade from that section with the old and large town never was, and never would have been, anything like what it is today, but for the road. Transportation facilities, —and facility includes a reasonable cost of service—create business. A parcels post will do the same.



IN his dedication of the Naval Training School at Lake Bluff recently, the President took occasion to emphasize the radically changed conditions which in the modern fighting ship have replaced such characters as the "Brave Old Salt," with educated engineers and mechanics. This explains the location of the finest naval training plant in the world on the shore of an unfortified, fresh-water lake, a thousand miles from salt water. Heretofore the young men went to the Atlantic or Pacific coast to train: Now the school has come to them, for fully 46 per cent of the naval recruits come from inland states. President Taft said:

*Industrial
Character
of Navy*

"The men who serve in the navy today are serving an apprenticeship of an industrial character that will fit them to serve well, after they have left the navy, in trades where knowledge of mechanics and electricity and other trades are necessary.

"The management of a warship today and its conduct is like the conductor of a great machine shop, and the men are required to have a higher degree of intelligence, greater manual dexterity, than the sailors of old."



ALTHOUGH the recent accident to the "Olympic" is unlikely to occur again either to itself or other ship of equal size, and while the incident was expensive, the demonstration affords a valuable test which would never have been deliberately undertaken. In the first place the lesson has been learned of the necessity of maintaining a safe distance between two vessels of such unequal size as the "Olympic" and the "Hawke"; and second, the strength of construction and consequent safety of the huge liners. The "Hawke" which struck the "Olympic" bow on, was a naval ram, with a cruel sharp-pointed bow like the pilot of a locomotive, extending many feet below the water line. This was the instrument which really did the damage and punched a hole 30 feet in diameter, below the water

*The
"Olympic"
Accident*

line. The extent of this blow is appreciated when it is known the cost of repairing the "Olympic" will amount to approximately \$750,000. Damage to a big thing usually runs into big money, but on the other hand, had the "Olympic" been, say, a 20,000-ton boat and struck as she was, she would doubtless have been cut in two and proved a total loss. While the occurrence has been an expensive one to the owners, who in addition to the cost of repairs, lost several trips at a busy time of the year, there is a certain compensating value in the feeling of security which the ocean traveler will feel; for the ship was able the following day to proceed under her own steam to Belfast where her passengers were discharged and the ship put in dry dock.

The accident has proved an argument in favor of the large hull, and a lesson to small craft to give the big ones a wide berth.



ONE would hesitate to use the word "cowardly" in connection with the operation of an aeroplane: At the present progress of the art every flight is attended with peril and every airman knows it. But the man who has

***Airmen's
Greatest
Fear***

kept his head and nerve in moments of great danger, thousands of feet in air, loses his backbone and finds himself unable to face the ridicule of an unreasonable crowd who have paid their admission and insist on their pound of flesh. How often, unfortunately, the past season have these modern Shylocks won their case. A number of deaths have been unquestionably due to the aviator going up to appease the clamor of a relentless mob, when he knew he was going to almost certain death. The same men and women, the day before, had assembled at a baseball park, when the game was postponed on account of rain. Disappointed, but in an orderly manner they filed out, each accepting without expressed blame for anyone, the refund of their gate money. The same crowd would cry out in righteous indignation against the attempted racing of an obviously sick horse; many of them would climb a tall pole or tree to rescue a frightened, helpless kitten. But when they are bent on seeing an aviator in flight these same people seem to lose the last atom of compassion; and after he reaches earth, a bleeding mass, lose all sense of shame in an orgy of frenzy to secure a collar button, or a fragment of his clothes. None but barbarians would ravage even a foe fallen in battle thus. Just what are the psychological forces that produce these disgraceful cyclones of inhumanity is hard to explain, but as the officer of the law does not hesitate to use force to save the life of a would-be suicide, so some legal power will be required to protect an airman from himself, if this condition continues.

H. H. WINDSOR

IMPRESSIVE MOBILIZATION OF AMERICA'S NAVAL POWER

Practical demonstration of the preparedness of the United States navy for active service was given, Oct. 31 and Nov. 1 and 2, by the mobilization of the fleets of the Atlantic and Pacific at New York and Los Angeles, respectively. For the first time in the history of the United States, every available vessel assigned, theoretically at least, to the protection of the two long coast lines of the country were assembled and inspected by the highest officers of the land. The President and the Secretary of the Navy reviewed the Atlantic fleet at New York, and the commander-in-chief of the Pacific fleet, Rear Admiral Chauncey Thomas, was in supreme command at Los Angeles. The two reviews constituted a remarkable achievement, not alone because of the large number of vessels brought together, but because the reviews were not the result of a premeditated scheme and the officers in command of the various divisions of the two fleets were not given much time in which to prepare their vessels to the rendezvous.

The review in New York, Nov. 2, when President Taft passed through the seven-mile line of battleships, cruisers, destroyers, torpedo boats, submarines and auxiliaries, was the greatest ever held in the history of the United States navy in time of peace, and the vessels assembled probably constituted the strongest battle fleet ever seen in American waters. The review of the English navy and foreign warships at the time of the coronation of King George, last June, is the only naval event of like character that approached it in point of number of ships.

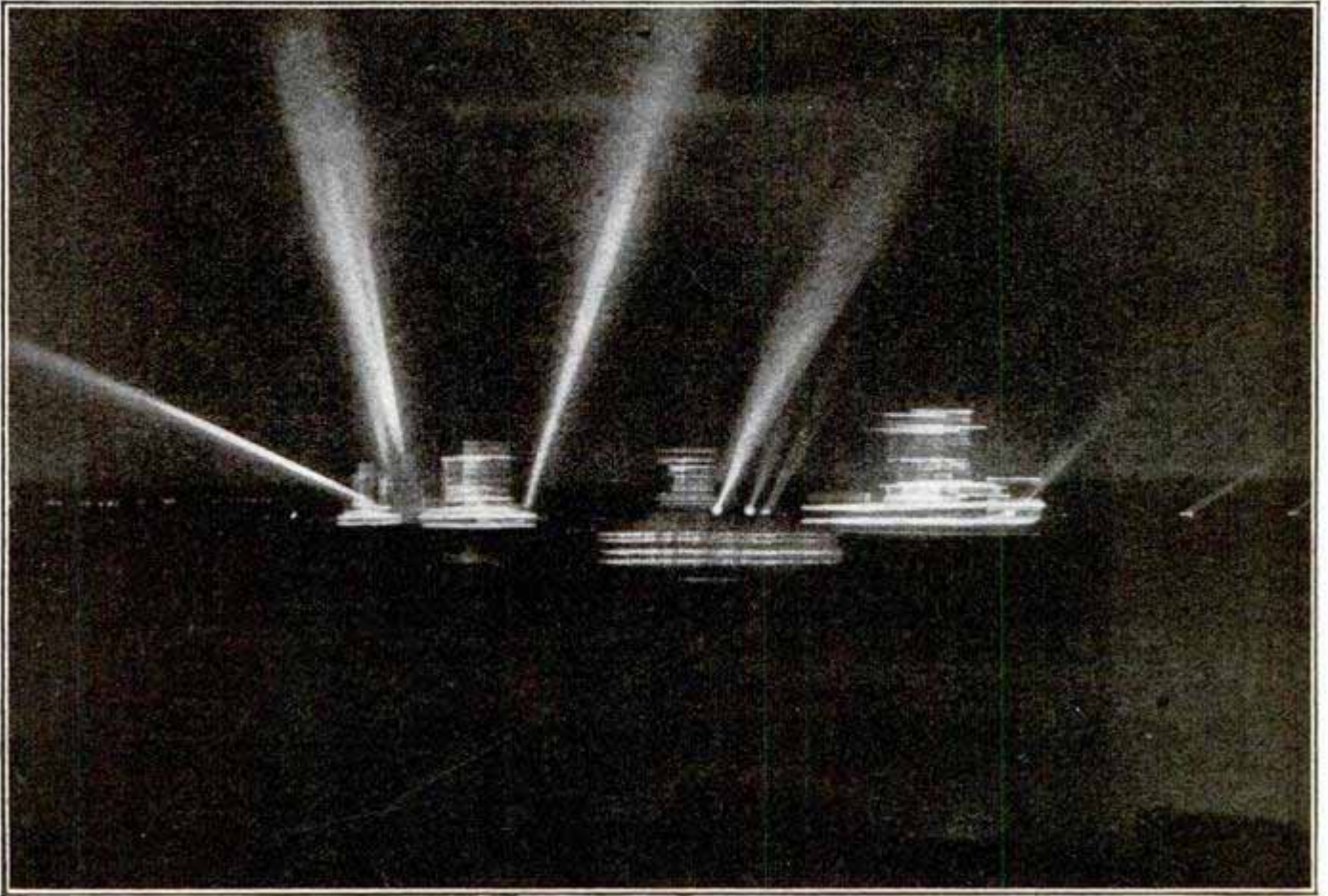
For two days the waters of the Hudson River adjacent the city of New York were filled with men-of-war of all types and sizes. Twenty-six of the battleships of the United States navy were at the head of the first of the four lines of ships, the longest of

which extended from 57th Street to Spuyten Devil, a distance of 7 miles, the entire formation including 102 ships of all classes. Every ship of the dreadnought type in commission, as well as the "Iowa," "Indiana" and "Massachusetts" of Spanish war fame, were in line, and the metropolis was shaken to its foundations by the thunder of guns as salute after salute was fired. More than 5,000 guns were fired in greeting President Taft. Secretary Meyer was honored by the discharging of some 2,000 guns, and the various division commanders received salutes from time to time as they visited the ships of the different sections of the fleet. One of the regulations regarding honors accorded persons of dignity by the military and naval services places the President of the United States in a class by himself and requires that his flag shall be saluted every time it comes in sight of a vessel or fort. The result is that every ship in the fleet provided with a saluting battery fired 21 guns in honor of Mr. Taft when he passed along the lines on the Presidential yacht "Mayflower" in the morning and then saluted again in the afternoon, when the entire fleet passed in review before the "Mayflower," which was then anchored off Tompkinsville.

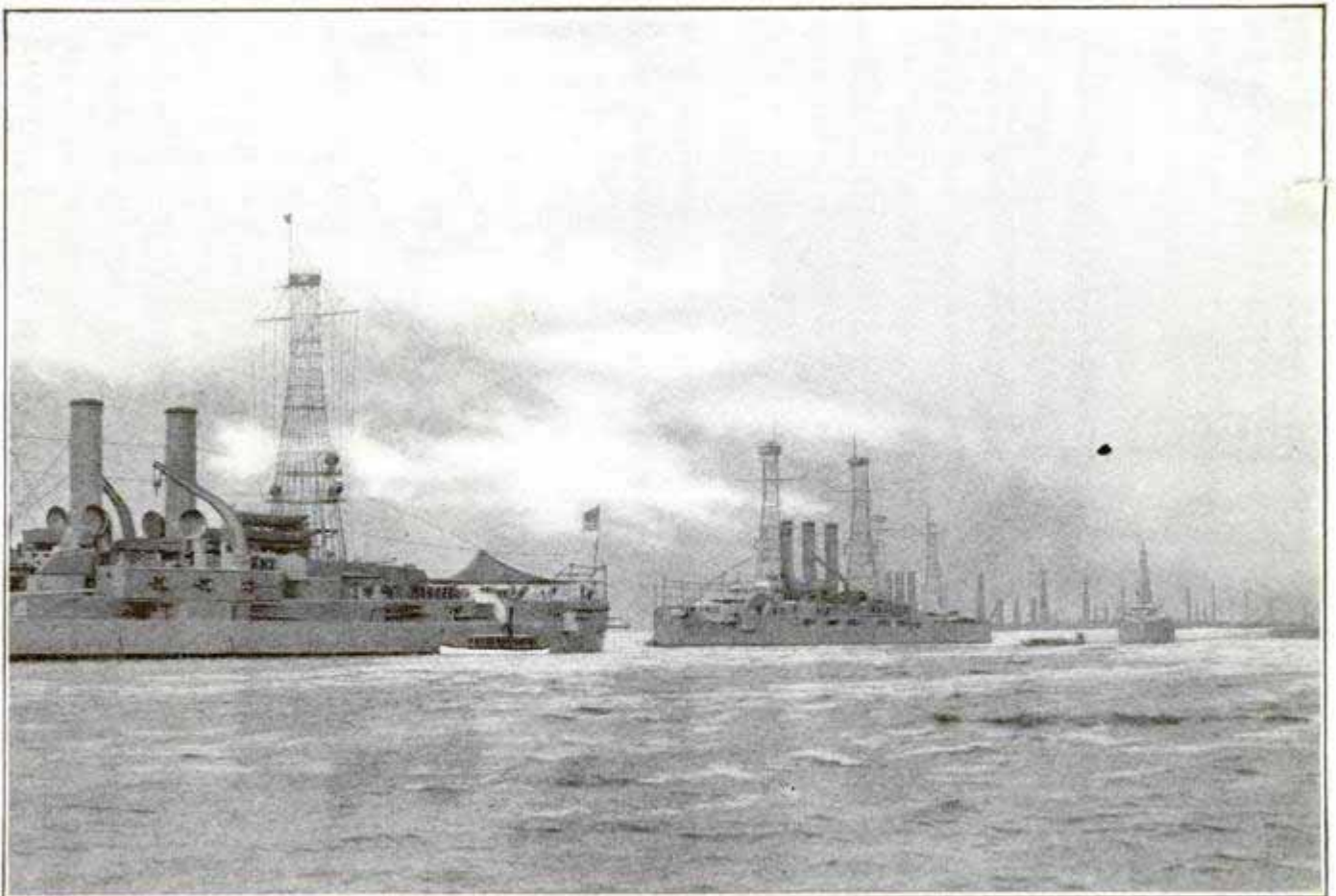
ELECTRIC LIGHTING FOR AEROPLANES

A concern in Boston, manufacturing electric-lighting systems for automobiles, have announced the completion of a system designed for aeroplanes. On the biplane type of machine the headlight is placed immediately in front of the airman and is controlled by foot mechanism on the frame upon which the feet rest. The switch is attached to one of the uprights within easy reach of the airman's hands. The dynamo, which weighs 19½ lb., is placed close to the motor and is operated by either a chain or a belt.

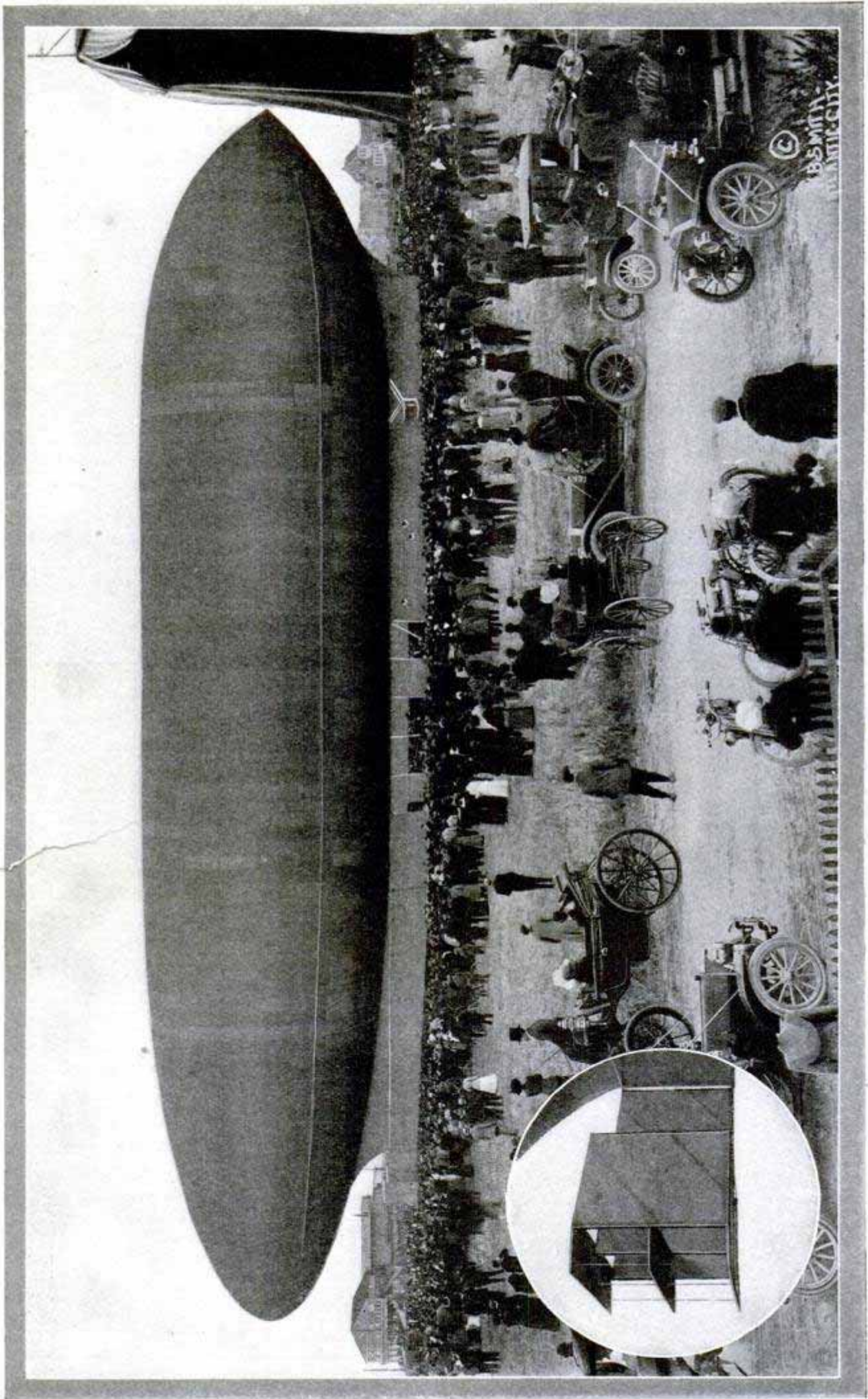
THE LONG LINE OF STEEL-CLADS AT NEW YORK



Pillars of Fire by Night



Towers of Strength by Day



THE VANIMAN BALLOON WHICH WILL ATTEMPT TO CROSS THE ATLANTIC

Views of the Huge Airship Outside Its Shed at Atlantic City and of the Box-Like Rudder

RAILROADS GUIDE AIRMEN BY NIGHT AS WELL AS DAY—EVENTS OF THE MONTH

A PECULIAR feature of the progress of aviation in the United States developed during the past few months in the more or less absolute dependence of the airmen essaying trans-continental flights on the railroads. This refers not alone to the necessary transportation of supplies and spare parts from place to place, but to the usefulness of the tracks as guides to the men in the air. The value of following the railroad tracks to get proper direction of flight was apparent at the start of the great coast-to-coast contest early in September when one of the starters selected the wrong line of trackage and was led a hundred or more miles out of the direct line he had laid out for himself. The usefulness of the locomotive as a night pilot to illuminate the way with its headlight, was developed by Airman G. P. Rodgers when he essayed to complete a day's journey at Hammond, Ind., Oct. 5. Rodgers found himself still some distance from his destination when darkness enveloped him. The headlight of the locomotive on the special train which carried the airman's supplies so lighted up the course, however, that he had no difficulty in completing his trip.

Although the time limit set for the winning of the prize of \$50,000 offered the first man to complete the coast-to-coast trip expired Oct. 10, G. P. Rodgers continued his journey and on Oct. 31 was expected to arrive in Tucson, Arizona, having started from New York, Sept. 17, and broken all records for cross-country flight. Robert G. Fowler, who started, Sept. 11, from San Francisco, and subsequently withdrew from the race, made another start, Oct. 18, from Los Angeles and was expected to meet Rodgers in Tucson. Earle Ovington, who announced he would start across the continent Oct. 11, carrying a sack of mail from New York, smashed his monoplane in

a preliminary flight on the day set for the start and postponed the trip until his machine could again be placed in shape for the journey. A north-to-south flight was started by Hugh Robinson with a hydro-aeroplane, at Minneapolis, October 17. His objective was New Orleans, and he followed the Mississippi River, his frequent landing upon the surface of which made the flight noteworthy, though the trip was given up at Davenport, Ia., because certain cities failed to pay bonuses promised.

An important event from the balloonist's standpoint was the winning of the international race during October by the German balloon "Berlin II," Lieut. Hans Gericke pilot, which traveled a distance of 468 miles, starting from Kansas City, Mo., Oct. 5, to Ladysmith, Wis. Lieut. Gericke's time in the air was 12 hr. 28 min. 20 sec. The "Buckeye," piloted by Lieut. Frank P. Lahm, U. S. A., finished second, with a distance of 370 miles, and the "Berlin," Lieut. L. Vogt, of the German army, was third, with a distance of 350 miles.

The experiments of the United States navy aviation corps at Annapolis, Md., have developed more or less interesting results. Lieut. Gordon G. Ellyson and Lieut. J. H. Towers, in a Curtiss hydro-aeroplane of the dual-control type, made a cross-country flight of 148 miles, Oct. 25, from Annapolis to Buckroe Beach, Va., near Fort Monroe, the officers guiding the machine alternately, thus relieving one another of the strain of the work of piloting and demonstrating this possibility for the first time. They believe this will mean longer continuous flights hereafter.

Two new records were set during the month, in addition to the cross-country record made by Rodgers. Lieut. Bier, of the Austrian army, reached an altitude of 4,000 ft., with two passengers, thus breaking the in-

ternational record for altitude with two passengers. Howard Gill, at St. Louis, Oct. 19, established a new American endurance record, flying 4 hr. 16 min. 35 sec.

The science of aerial navigation lost one of its most earnest students and earliest investigators in the death of Prof. J. J. Montgomery, of the Santa Clara College, at San Jose, California, Oct. 31, from injuries received in falling with a glider he was using in experiments. Professor Montgomery was 50 years of age and for many years had been absorbed with investigations tending toward the solution of the problem of flight. He was the originator of many of the early theories that have been found to be correct and his work resulted in much practical good to those who have achieved fame in aviation since the building of the first actual flying machine. At the time of his unfortunate accident he was experimenting with a glider. He was 120 ft. from the ground when he seemed to lose control of the machine, which fell, turning over as it dropped and burying him beneath the wreckage. His skull was fractured and he died a few hours after the accident.

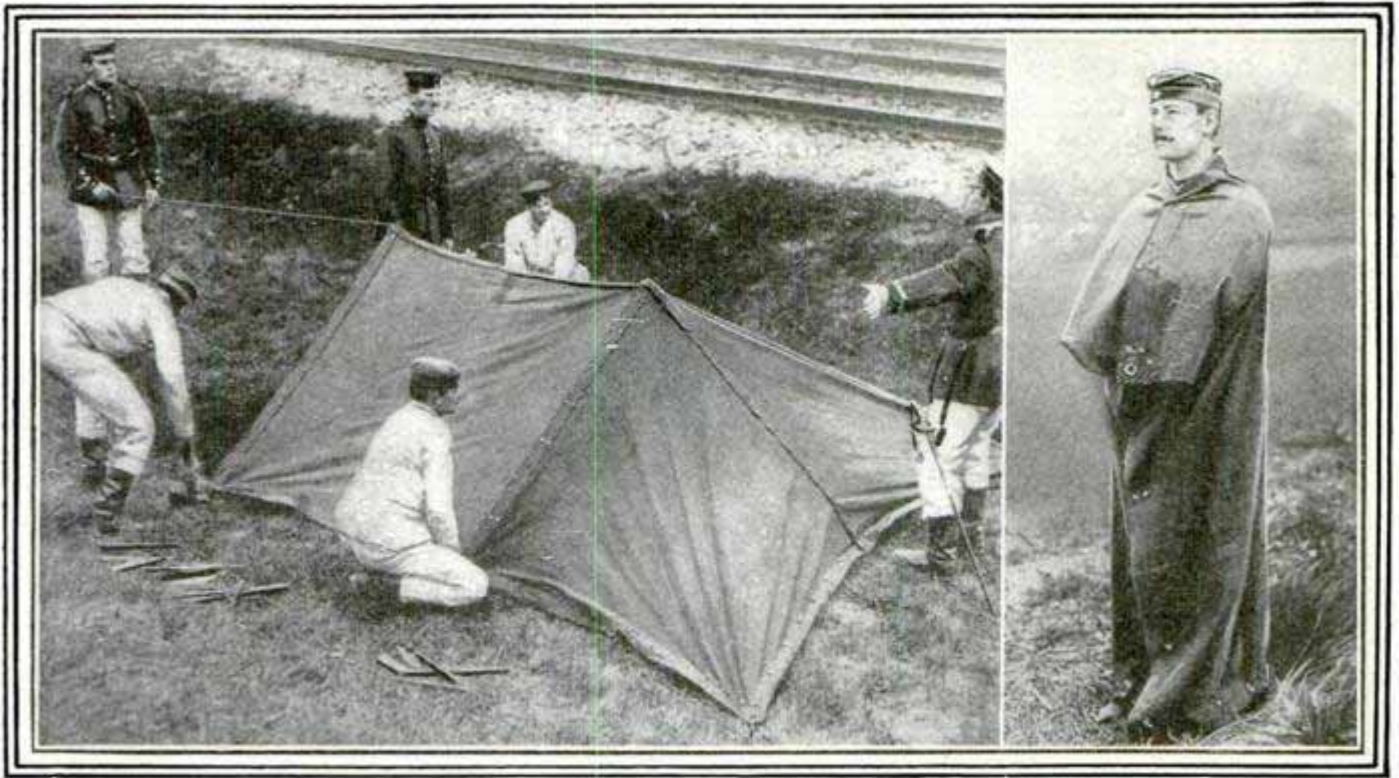
Several other names have been added to the list of airmen who have sacrificed their lives to their devotion to their work. Eugene Ely, one of the most careful and competent of the Curtiss group, like his comrade Frisbie attempted a flight at Macon, Ga., Oct. 19, in a defective machine to escape the sneers and jibes of a country-fair crowd and died from the result of injuries following a fall.

Ely was one of the men who have done much for real progress in aviation. It was he who flew from the deck of the scout cruiser "Birmingham" at Hampton Roads last fall, and again flew from the shore to the deck of the cruiser "Pennsylvania" in San Francisco Bay last winter, to demonstrate the usefulness of the aeroplane to the navy. He was regarded as one of the most skillful and cautious of the airmen and until a short time be-

fore his ill-advised flight at Macon, was known as a man who declined to take unnecessary chances or put his machine through the dips and glides that have become so popular with the patrons of the county-fair aviation exhibitions. Ely changed his methods, however, a short time before his fatal flight and his vol planes became so low that once or twice his mechanics were forced to throw themselves on the ground to prevent their being struck by the machine as it came down. It was at the end of an especially steep glide from a high altitude that the accident happened. Ely failed to elevate his planes quickly enough to ease off the strain on the machine. When he did elevate he was not more than 15 ft. from the ground and the machine broke from the strain. Ely was thrown out and his neck broken. There were 10,000 people at the fair grounds on the day of the accident and after the airman had fallen they bore off bits of his clothing, gloves, splinters of wood from the aeroplane and other ghastly "souvenirs" of the occasion.

Cromwell Dixon, a boy not out of his teens, died from injuries received Oct. 2, at Spokane, Wash., during an exhibition flight at the fair grounds. Dixon attracted attention to himself a few days before by flying over the Continental Divide in the Rocky Mountains. At Joplin, Mo., Oct. 11, James Kinney, a spectator, was struck and killed by a biplane that was just starting on a flight. Kinney ran across the path of the machine and was hit on the back of the neck by one of the lower planes. His neck was broken and he died almost instantly. Capt. John Brodie, a balloonist, fell at Tifton, Ga., Oct. 5, from a height of 700 ft. and was instantly killed.

In Europe two airmen died as the result of injuries received in flight. October 11, M. Level fell from his machine near Rheims and received injuries from which he died Oct. 13. On Oct. 14, Capt. Jean Schmidt, of the Swiss army, fell at Berne and was instantly killed.



Military Tent Composed of Waterproof Capes

New German Army Waterproof Cape Worn as Such

COMBINED ARMY TENT AND WATERPROOF CAPE

One of the latest combinations devised for German soldiers is an infantryman's waterproof cape or coat, which, combined with those worn by his immediate companions in the company, forms a military tent. German

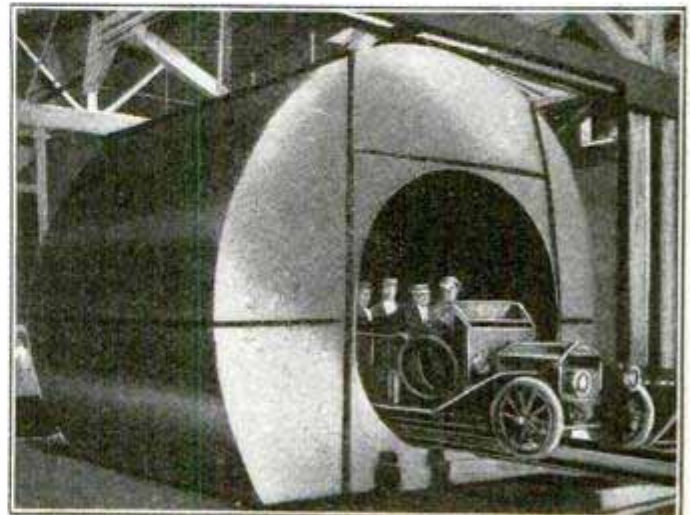
military experts are noted for the knack of working out composite ideas of this nature, which are advantageous in that they lessen the equipment to be carried, or at least add another comfort without adding to the load.

VENTILATING FANS OF GREAT SIZE

The two ventilating fans just installed by the Pennsylvania Railroad in a 4,963-ft. tunnel under Baltimore are of great size, as may be seen in the illustration, which shows an automobile passing through one of the inlets, 11½ ft. in diameter. Both of the fans have outlets 8½ by 14 ft., which discharge downward into a chamber surrounding the upper part of the tunnel, the air issuing from this chamber through a long tapering nozzle, carried around the entire perimeter of the tunnel above the tracks in such a way as to direct the flow of air forward.

Only one fan will be run at a time, the second being held in reserve for use in case of accident. The tunnel requires 450,000 cu. ft. of air per minute, and this volume will produce a ve-

locity of 1,040 ft. per minute. When a train is passing through the tunnel in the same direction as the air currents, the air will travel faster than the train,

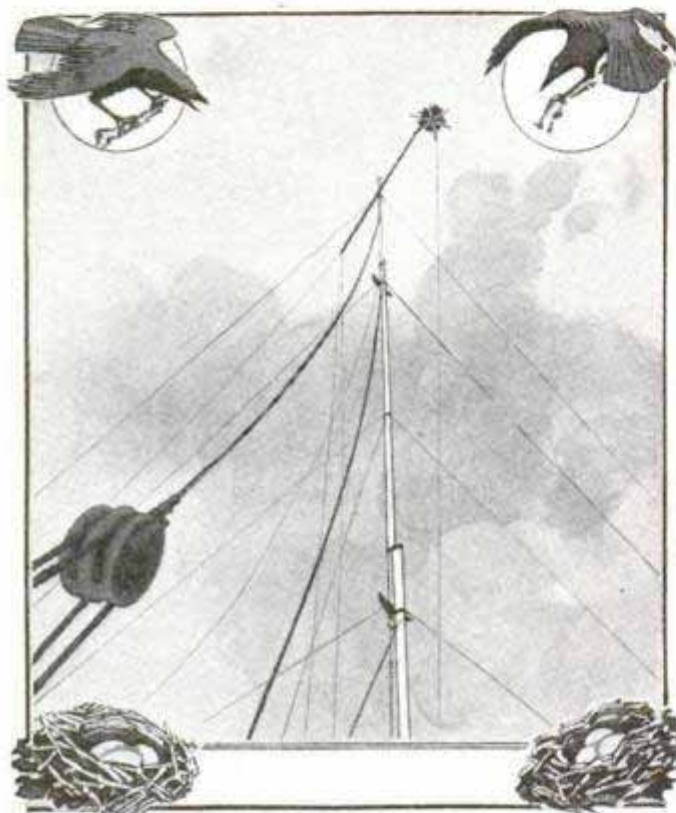


Automobile being Driven Through One of the Inlets of Fan for Baltimore Tunnel

due to the available area for the passing of air being so greatly reduced. Consequently, the smoke from the locomotive is expected to be driven along so far in advance that the engineer will have a clear view of the tracks.

CROW'S NEST ON WIRELESS-TOWER ANTENNÆ

Although a wireless installation is one of the least likely places in the world for a bird to select as a nest



A Crow Selected the Antennæ at the Top of a 160-Ft. Wireless Tower in Tientsin as a Site for Its Nest

site, a crow of the variety common to China built its nest on top of the antennæ of a wireless tower in Tientsin. The height of the nest from the ground is about 160 ft. It is clearly seen in the illustration.

AN AUSTRALIAN STONE-DRESSING MACHINE

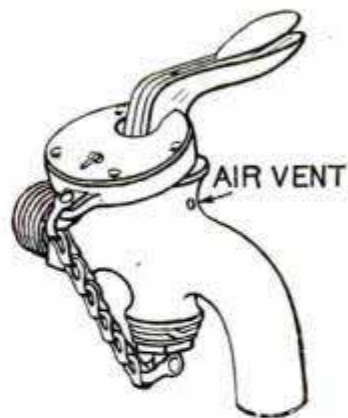
The dressing of granite, marble, Stawell freestone, and other kinds of building stones quarried in Australia, was found so costly with the appliances at hand that several Victorian engineers have constructed a dressing machine of new design.

Its principle is the rapid abrasive action of a carborundum wheel rotated at a high speed. The device consists of a bridge carrying the actuating mechanism of the revolving wheel and supported by a column on either side of a track, on which an automatically operated trolley car runs back and forth. The stone being dressed is secured to this car and thus brought in contact with the grindstone, which speedily smooths or polishes a 9-in. width of its rough surface, according to the degree of fineness of the grinder. As the trolley advances and retraces, the revolving grinder is slowly moved in a lateral direction across the whole surface of the block.

The complete plant, consisting of a tubular boiler, marine-type engine, the necessary winches, driving and reversing gear, overhead trolley cranes, etc., requires the attendance of only two operatives. The abrasive wheel is absolutely automatic in its operation, and all that is required of the men is to run the actuating machinery.

LOCKING FAUCET FOR TANKS

A latching and locking faucet, designed particularly for gasoline and oil tanks and liquor barrels, has been placed on the market by a Pennsylvania manufacturing company. When the lock is inserted in the handle the chain locks the screw at the end of the plug. This prevents the vertical movement or lifting of the plug, thus making it impossible to draw the contents of the tank or barrel.

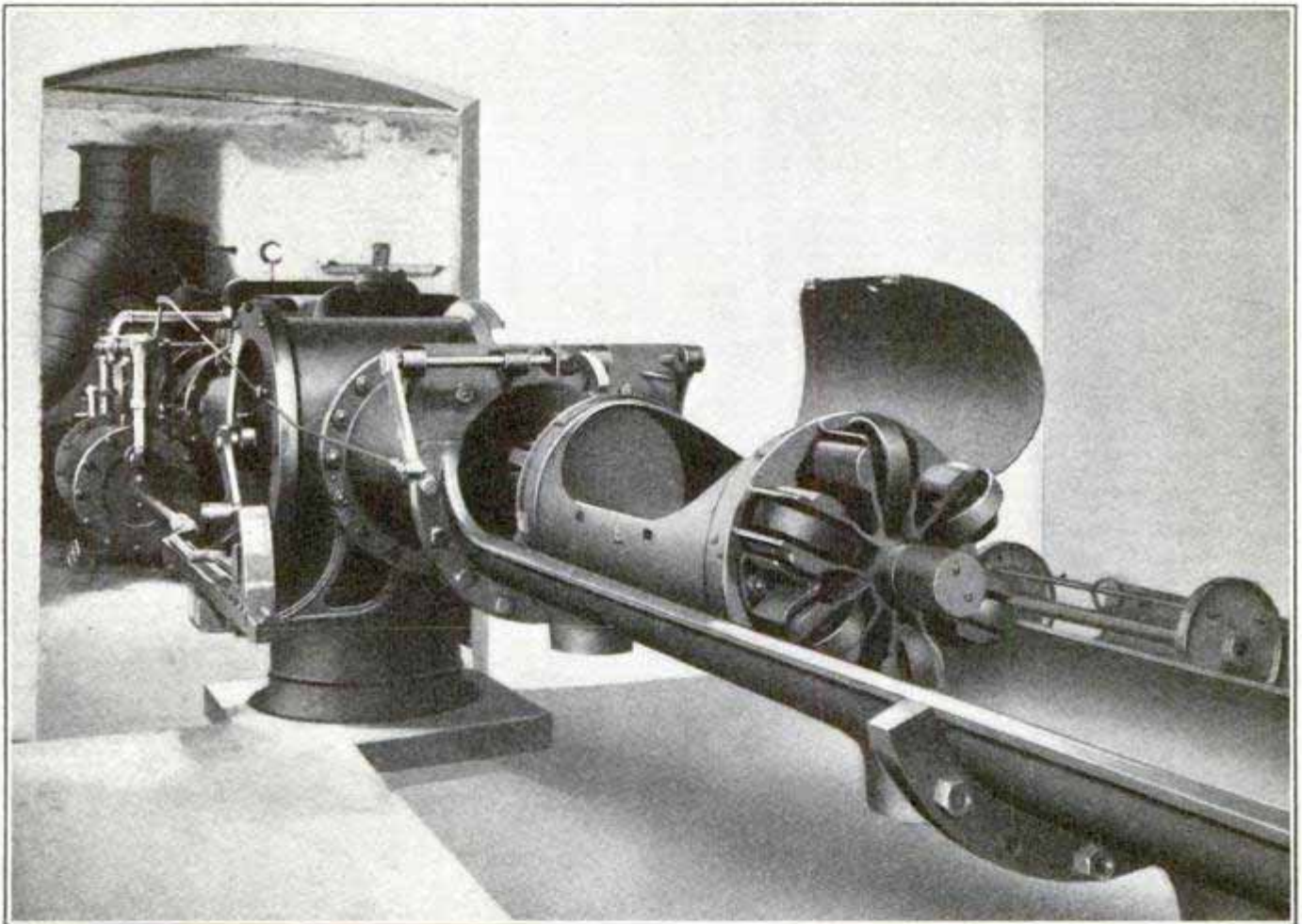


ⒸAn eastern railroad recently, on test, ran a locomotive over one of its branches a total distance of 446 miles without re-coaling.

NEW PNEUMATIC-TUBE SYSTEM

A postal employe, who has for the past 15 years been an expert in the pneumatic-tube system of the Post-office Department, has invented a mail tube which may revolutionize the present system of pneumatic delivery. Unlike other systems, this one is operated by vacuum instead of compressed air. Trial tests were recently made of the invention in the subways between the Capitol and House and

travels at a velocity ranging from 30 to 125 miles per hour. The sending mechanism consists of an exhauster, which provides the suction, and two valves, which are operated by a piston. In sending, the cartridge containing the mail bag is put between the two valves with the inside valve closed. With the cartridge in this position, and the exhauster working, the outside valve is closed and the inside valve



Terminal of Postoffice Pneumatic-Tube Service, Showing Valves, and Cartridge for Holding Mail Bags

Senate office buildings, with the result that the government has concluded to install a network of tubes which will connect all of the executive departments, the Capitol, House and Senate office buildings, as well as the new Washington city postoffice, soon to be erected adjacent to the union railroad station.

The carrier of the new pneumatic-tube system is propelled by a vacuum of $\frac{1}{8}$ to $\frac{3}{4}$ lb. per square inch, and

opened, which allows the exhaust to act on the cartridge, carrying it to the other end.

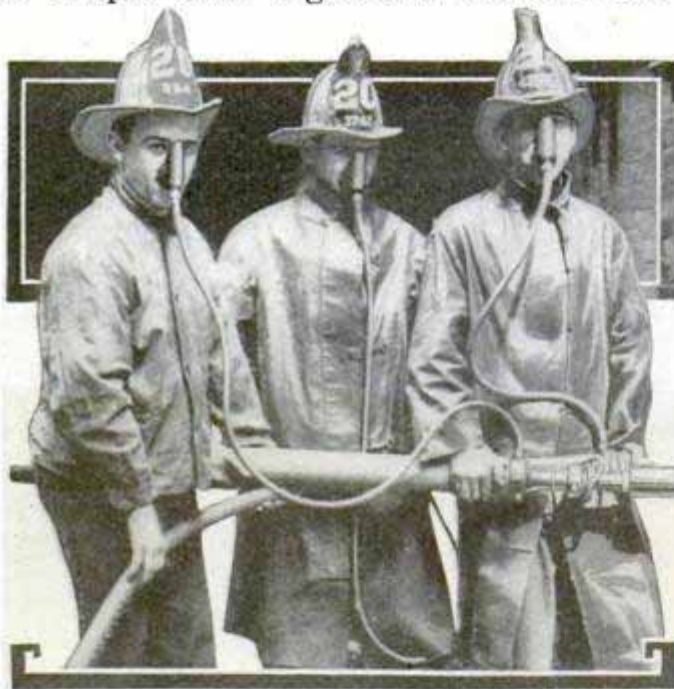
At the other end these same two valves aid to check the cartridge. When the cartridge is being sent, the outside valve is closed and the inside valve open. After the carrier has passed the inside valve, it strikes a tripper, which, by means of an automatic piston, closes the inside valve. The air between the valves acts as a

cushion to stop the carrier, and when the inside valve has been fully closed, the outside valve opens, allowing the carrier to slide forth with enough velocity to take it all the way out of the tube.

The carrier, or cartridge, is a cylinder, 18 in. inside diameter, with six ball-bearing wheels on either end. There is about one-fourth inch clearance between the carrier and the tube. One of these tubes will accommodate a mail bag.

FRESH AIR FOR FIREMEN

One of the firemen of Engine Company No. 20, New York, has invented a simple and ingenious smoke-mask



Copyright by Underwood & Underwood, N. Y.

Equipped with Smoke-Masks Which are Provided with Air through Suction in a Garden Hose Generated by the Water Rushing through the Fire Hose

which has been given several tests under trying conditions, and, according to the users, is very effective.

The apparatus comprises a branch pipe fixed to the side of the ordinary fire nozzle, a line of heavily-wired garden hose connected to the branch pipe, and three flexible tubes and masks running from the branch pipe. The rubber garden hose trails along beside the fire hose when the firemen enter a smoke-filled building, the outer end of the hose being in the

street. As the stream of water rushes through the fire hose it sucks a current of air through the garden hose, and this air is distributed by means of the flexible tubes to the smoke-masks. These masks are similar in appearance to football masks.

It is stated that with an 18-in. tube line about 5 miles could be operated with but one exhausting station, but by putting in boosters or substations, it would be possible to operate the tube any distance. For a line between Washington and New York, about three sub-stations, with a number of auxiliary stations, would be necessary to make the system successful.

The pneumatic-tube mail service is costing the government \$960,800 a year.

TARRED ROADS DESTROY BROOK TROUT

Much complaint is being made by anglers in England because the practice of tarring roads is destroying the trout fishing. A recent flood in Westmorland, for instance, carried so much tar into the River Eden that large numbers of trout were found dead in its waters. It is claimed that other small rivers and streams in England have been ruined as fishing preserves because of the tar washed off the roads by the rains.

GOLF COMPETITION ON SHIPBOARD

What is regarded by the players as the first organized golf competition ever played from aboard ship took place recently on the Steamship "Vasari," en route from Buenos Ayres to New York. One day a passenger was driving balls from the deck out to sea in order to test a certain driver, and the question arose as to how far the balls were driven. The result was the stationing of an observer at each end of the ship, with the teeing-ground between them, each recording



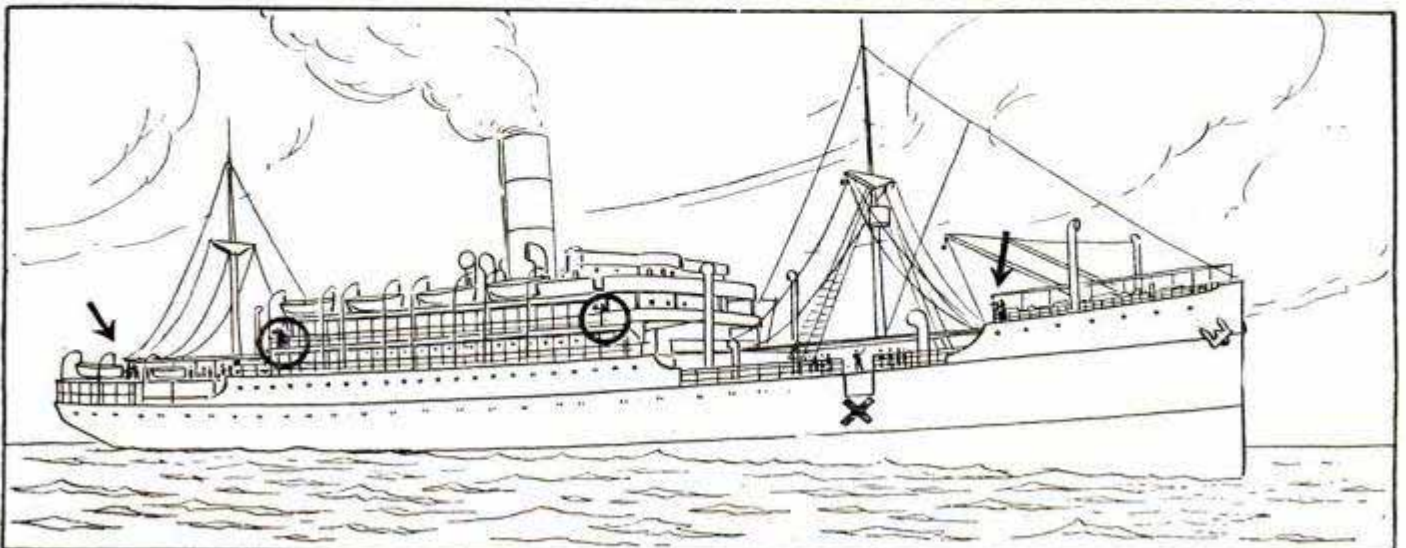
Driving Off in a Golf Contest on Board an Atlantic Liner Plying between New York and South America

the angle at which, from his station of observation, the ball struck the water. The known distance apart of the observers thus formed the base of a triangle, making it a simple matter to measure the length of the ball's flight.

With a method of measurement available, the next requirement was a sufficient number of golf balls, since every drive meant a lost ball. A stock of balls was obtained at Trinidad, the two observers were placed at each end of the base line, 438 ft. apart, and the tournament was held. The mechanism for recording the angle consisted of scales and movable pointers arranged on tables in front of the observ-

ers. A cocoanut-fiber mat served as the teeing-off place, and a section of the ship's rail was removed to allow the balls a free flight. As the forward observing station was close to the tee, the observer at this point could see when a drive was made, but the tee was hidden from the aft observer by the intervening portion of the ship. Therefore, two signalmen with flags stood at each end of the promenade deck and wig-wagged when the balls were driven off.

The winning drive of this unique tournament was one of 530 ft., made by W. B. Price of the Audobon Golf Club, Louisville, Kentucky.



The X Shows the Tee, the Arrows Indicate the Position of the Observers Who Determine the Length of the Drive, and the Circles Indicate the Position of the Signalmen

A PORTRAIT WITH EVERY HAT

Customers of some of the leading milliners of Paris have been intensely surprised recently, on receiving the



The Hidden Artist Makes a Portrait while the Customer is Trying on the Hats, and This is Later Pasted onto the Box Bearing the Purchase

latest creation in hats selected by them, to find a portrait of themselves painted on the hat box. Having no remembrance of sitting for a portrait, these women have, naturally, inquired how the seemingly impossible was accomplished, and this has given publicity to the newest novelty evolved by a few of the milliners as a compliment to their best customers and an ingenious method of advertisement.

While the customer is intent on selecting the hat, a fascinating proceeding usually requiring at least half an

hour, an artist seated behind a screen swiftly transfers the features of his unconscious subject to paper. The next day the hat is delivered, and on the box is pasted the original drawing of the buyer as she appeared while trying the hat on.

HUMAN ORGANS RADIOACTIVE

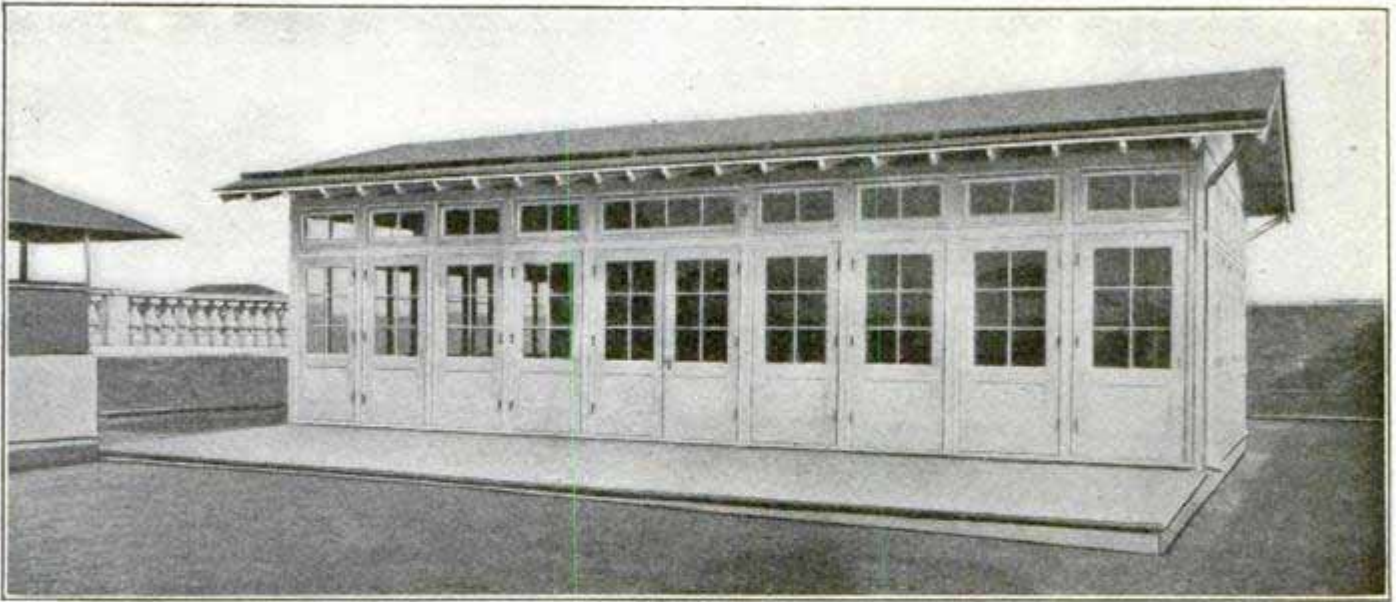
It has been known for some time that the normal tissues of the human body, especially the brain, emit slight radiations which are chemically active, and now a professor of Heidelberg University announces that the human organs are radioactive as well. The brain substance is most active, the heart and liver to a lesser degree, and the spleen and kidneys but very slightly radioactive. The social position or occupation of the individual seems to have no influence on this activity, but, on the other hand, it seems to increase with age.

The Heidelberg professor suggests as the cause of the radioactivity the presence of mineral substances absorbed by the body from food and drink, which would seem to explain its increase with age. He does not commit himself on the question as to whether or not these radiations have any relation to vital phenomena.

CINCINNATI'S ROOF-GARDEN SCHOOLROOM

This roof-garden schoolroom, erected on the roof of one of Cincinnati's public school buildings, and said to be the first of its kind in the United States, is used by 30 children whose health requires much pure air and sunshine. If the idea proves itself of worth, it will be extended to other Cincinnati schools.

The roof-garden room is nearly 170 ft. from the noisy streets, and is equipped on three sides with glass-paneled swinging doors. On clear, warm days the three sides are thrown wide open, thus making it practically



Schoolroom on Roof of One of Cincinnati's School Buildings Where Unhealthy Children May Have More Fresh Air and Sunshine

an outdoor schoolroom, but in cold, stormy weather the room is kept warm by means of steam pipes connected with the main plant in the big building underneath.

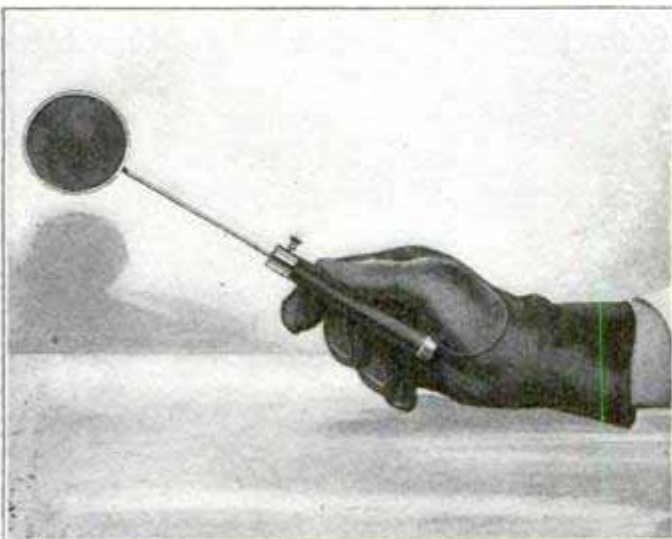
FOR THE HANDLING OF RADIUM

Magnificently equipped with about half a teaspoonful of radium, the Radium Institute of Great Britain opened its doors in London recently for the exploitation and storage of the substance whose curative powers are considered so wonderful. It would seem that not much of an institution were required for the handling of half a teaspoonful of material, yet this amount is considered a great, priceless treas-

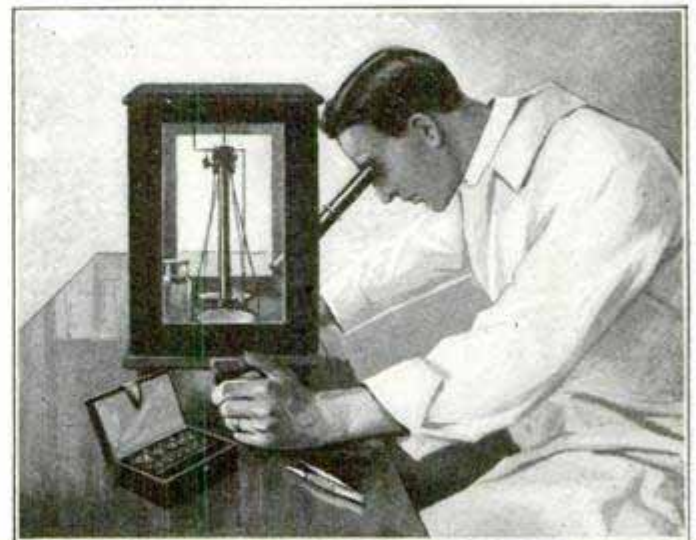
ure. The disk shown in one of the illustrations, for instance, holds a quantity so small as to be almost invisible to the naked eye, yet this amount, about 40 milligrams, has a value of \$4,000.

The other illustration shows a device by means of which as small an amount as a millionth part of a pound of radium can be weighed. The weighing has to be done under a powerful microscope, as the operation is far too delicate to be seen and recorded otherwise.

¶The electric-sign privilege on the roof of one of the buildings in Times Square, New York, has been leased for \$25,000 a year.



This Disc Holds \$4,000 Worth of Radium, a Quantity Almost Too Small to be Visible to the Naked Eye



Balance on Which as Small a Quantity of Radium as One Millionth of a Pound Can be Weighed

TELEPHONING ACROSS THE ATLANTIC



By GEORGE E. CLARKE

As in all other fields of human endeavor, the engineer is always setting for himself a great task, beyond his powers today probably, but toward which he can bend his energies and direct his increasing store of knowledge. Today telephonic communication between the United States and Europe is a dream, just as the Panama Canal at one time was a dream. But telephone engineers have established communication between England and France by laying a cable under the English Channel and others have made it possible for a man in New York to talk to a friend in Denver.

TWICE within comparatively recent times has the feat of telephoning across the Atlantic Ocean been pronounced not only feasible but within the probability of almost immediate accomplishment. The first prophecy was made about 35 years ago by Dr. Alexander Graham Bell, soon after he had invented the telephone. But in a recent letter to *Popular Mechanics Magazine*, Dr. Bell said: "I may say I am a little more skeptical now . . . I have no doubt, however, that it will be done some day." The second prediction was made by a former president of the American Institute of Electrical Engineers in an article on the important researches of Prof. M. I. Pupin, of Columbia University, by which the problem of long-distance telephony over land lines of hundreds of miles in extent was made practical and many other authorities also concurred in this view. Now, as Dr. Bell has said in his case, they are more skeptical.

But, after all, the difficulties in the way are only of a practical nature and probably will soon be overcome. Only a few months ago the telephone engineers succeeded in adapting Pupin's invention to a submarine telephone cable across the English Channel, between England and France, so that telephone conversation can now be

carried on successfully between the two countries. And this was in the face of hostile criticisms by eminent European and American telephone engineers, that the practical difficulties in the way of this accomplishment could not possibly be overcome. Yet the thing was done in spite of the doubting Thomases of the telephone profession. Then why not a transatlantic submarine telephone? It is, of course, a much more difficult proposition, but the obstacle is one only of degree, and as the problem is theoretically possible, it is quite likely that eventually a solution will be found.

Major W. A. J. O'Meara, engineer-in-chief of the work of connecting England and France by telephone, is confident that transatlantic telephony will come with continued advancement in the means of increasing the range of telephonic speech. In a letter to *Popular Mechanics Magazine* he says:

"As to my views on the possibility and value of establishing a telephone across the Atlantic, I may say that such a service would of course be of considerable value, but such a desirable consummation does not at present appear to be in immediate sight.

"Existing means or devices for increasing the range of speech both in submarine and subterranean conductors

may be very considerably improved in the near future, and further improvements may be made both in transmitting and receiving apparatus.

"In view of the enormous strides made in recent years in the direction of increasing the range of telephonic speech, I think the prospect of transatlantic telephony is full of hope, and I confess that I have great faith in the ability of engineers to provide eventually the means for closer intercourse of peoples separated by obstacles which may be considered insurmountable nowadays."

At first blush the layman will point out that transatlantic submarine-cable telegraphy has been in successful operation for many years; so why not transatlantic telephony? The answer is that while telegraphy is possible as long as the receiving station is able to discern the difference between a short and a long electrical impulse, the impulse that constitutes an electrical telephonic message must be transmitted and received with little or no alteration in order to be recognized as articulate speech at the receiving station.

Cable telegraphy differs from land telegraphy on account of the fact that a submarine cable possesses in a high degree what is known as "capacity;" that is, before it will transmit electrical impulses in measurable amounts, it must be electrically charged in a manner similar to a Leyden jar. In a way a submarine cable may be likened to a great pipe through which one desires to pass water in stated amounts at predetermined intervals of time. First, of course, it would be necessary to fill the pipe with water. So, with the cable, one would have to "fill" it with a certain amount of electricity. Then, in the case of the water pipe, a certain amount of water pumped in at one end would cause an equal amount to be pushed out at the other end. But the effort to set in motion the huge amount of water in the pipe, and to overcome the resistance to movement of the water, on account of friction, would take time and the motion at the far end

of the pipe would be slow. The analogy is not quite a perfect one, but it will serve to illustrate that even after a submarine cable is sufficiently charged with electricity, a transmitted impulse is very feeble and long drawn out. The late Lord Kelvin—then plain William Thomson—devised the siphon recorder in connection with the first Atlantic cable (1857-1866), which solved the difficulty of receiving and recording the feeble impulses transmitted through a submarine telegraph cable, and the time-lagging element was obviated by slower speed in sending. Subsequent inventions have since enabled the sending speed to be increased.

In the case of the telephone this enfeebling of the sending impulse, and more especially its attenuation, are absolutely fatal to successful transmission. In the original Bell telephone, the transmitter was, in fact, a dynamo, a device for converting the mechanical energy of a vibrating diaphragm (set in motion by the sound waves produced by the human voice) into electrical current, which current was transmitted along a wire and converted back again into vibration of another diaphragm, thus reproducing the sound. Such a current was extremely feeble. Indeed, it has been calculated that the work done in raising a weight of one pound through a vertical distance of one foot would, if transformed into electrical energy, serve to keep an audible sound in a Bell telephone for over 340,000 years! Of course the original telephone has since been improved so as to admit of its acting as a relay by which the current from an electric battery can be controlled by the transmitter to send messages through considerable distances. But still the fact remains that telephone currents are necessarily small, and that when they are transmitted through long distances, especially when "capacity" is introduced into the line, the impulses lose enough of their primary characteristics to destroy the articulation at the receiving station.

Professor Pupin, after a long mathematical investigation and much practical experimentation, succeeded in eliminating or counteracting much of the disturbances that cause the electrical telephonic impulse to be distorted in passing through a long wire. This he did by introducing so-called "loading coils" in the line at certain intervals. These "loading coils" are coils of wire of small resistance and many turns, so that the current, in passing through each turn of wire, acts inductively on itself, that is, on the current passing through the other turns.

While this has a choking or throttling effect on the current, impeding the rate of transmission to a certain extent, it tends to preserve the original characteristics of the telephonic impulse so as to enable it to be transformed at the receiving station into articulate speech. The effect has been likened to the problem of transmitting energy by snapping a string so as to produce undulations or waves. When the string is loaded with weights at intervals, more energy can be transmitted in this way. Pupin's "loading coils" are analogous in action to these weights.

By this means, long-distance telephoning on land has been made practical, the best instance being the line between Denver and New York. It is only a matter of time, say the experts, perhaps only a year or two, when New York will be able to talk to San Francisco, clear across the continent. This is about the same distance as that between America and Europe, so

that when the bugbear of "capacity" can be overcome, practically and commercially, the lesson in optimism given to the telephone pessimists by Major O'Meara and his associates, in successfully installing a submarine telephone cable between England and France, may be repeated on a bigger scale, and a New York long-distance operator may some day think nothing of calling over the telephone cable, "Hello, London, give me St. Petersburg!"

There are those who believe that if the problem of transatlantic telephony is solved at all it will be by wireless. So far wireless telephony has not progressed sufficiently to threaten the existence of the present method, if indeed it ever will, but enough has already been done with it to indicate great possibilities for it in the future, probably in fields peculiarly its own and not encroaching on the other spheres of electrical communication. Perhaps one of these fields will be transwater telephony. It remains only for some one to discover a means of controlling sufficiently intense electrical radiations through space by the feeble energy of the sound vibrations of the human voice, and possibly also of limiting the direction of these radiations. Then if some as yet undiscovered William Thomson can devise a sensitive receiver to pick up these radiations and translate them into speech, the problem will be solved. These, indeed, are difficult nuts to crack. But in the light of past achievements the thing does not seem impossible.

A 20,000-CORD PILE OF PULP WOOD

A great pile of pulp wood, located at Covington, Va., of which the accompanying illustrations show part, contains upward of 20,000 cords, and is the product of about 650 acres of spruce timber. This amount of spruce, when mixed with the required amount of soda pulp, which amount requires about 10,000 cords of poplar wood, will

make approximately 48 to 50 million pounds of paper.

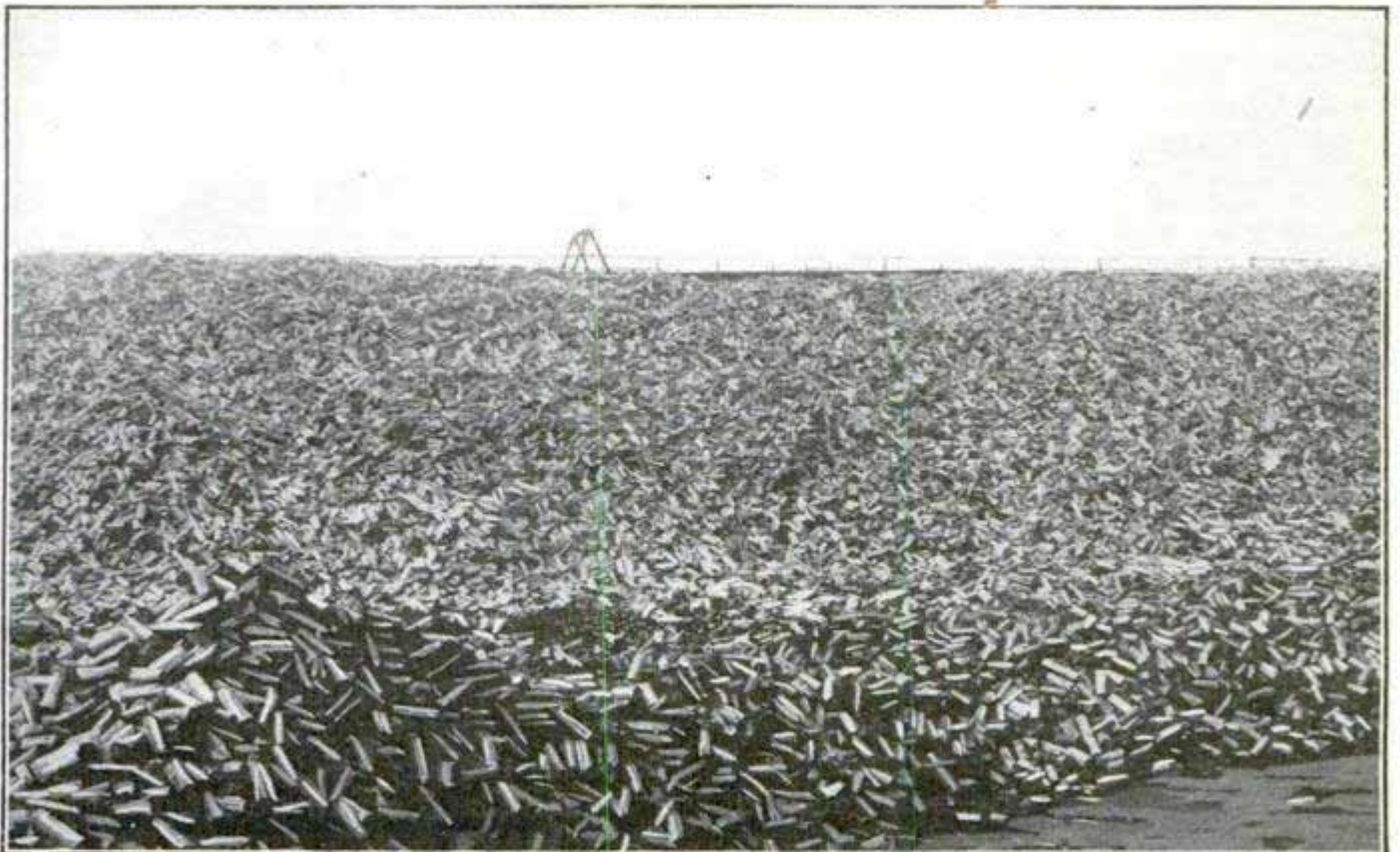
The wood is all cut into 2-ft. lengths and is split so that it will go through a 12-in. ring. The pile has a height of about 75 ft. It is interesting to note that the paper company using this spruce plants three trees for every one cut. Approximately two out of every



The Pile of Wood of Which This Illustration Shows a Section Will, Mixed with Soda Pulp, Make About 50,000,000 Lb. of Paper

three trees thrive, according to the officials of the company, so that in the course of about 20 years the company's available wood supply will be much greater than it is now.

To illustrate what 50,000,000 lb. of paper means, it may be mentioned that the individual copies of the November issue of this magazine weighed 19 ounces, so that such a quantity of



Portion of a Pile of Pulp Wood That Covered About 650 Acres as Standing Timber

paper would be sufficient for the printing of 42,105,263 copies. If the sheets of paper used in that many Popular Mechanics magazines, about 10 by 7 in. each, were spread out they would make a blanket covering an area of 110 square miles. If their leaves were placed end to end they would form a continuous band extending for 996,810 miles, or about 40 times the circumference of the earth at the equator.



Inset Section of Roadway to Prevent Obstruction of Traffic by Vehicles Stopped before Houses

STREETS HAVE CONCRETE INSETS

In front of several residences of Independence, Kan., are concrete insets, designed to provide room for a standing team or automobile. Through the adoption of this idea, vehicles may be pulled up in front of a house without

obstructing the street. The insets have a slope to the curb line to provide for drainage.

ELECTRIC SHOCKS FOR BALKY MULE

The usual way of getting action out of a balky mule is to beat him with a whip until the whip wears out and then give up the job. Sometimes a balky mule is started by means of a bonfire built beneath him, in which case, if he is attached to a wagon, the mule is quite apt to move forward just enough so that the wagon is over the bonfire. An Arkansas man now comes forward with an improvement over any other method yet tried, says Engineering and Contracting. He uses a small electric battery in the wagon with a switch convenient to the driver's hand. An insulated wire runs from the battery to the headstall of the bridle; thence to the ring on the bit and then back to the mule's tail. When the animal gets stuck in his tracks the driver turns on the current and results follow immediately. It is not stated whether the mule starts with his hind feet first or not.

"LEST YE FORGET"

Probably the commonest reminder adopted by the good wife when she desires to make absolutely sure that her "forgetful half" will not forget, is the tying of a piece of string around his finger, but there are many more subtle reminders now in use.

One man's wife, for instance, pins the letter she wishes her husband to post in his pocket with other things which he is sure to require during the day, while another sticks a piece of paper, on which a request is written, over the face of his watch. It might

be an improvement, however, to make the piece of paper small enough so that the watch could still tell time.

Business men who are in the habit of forgetting little things sometimes jog their memories by sending themselves a post card to the place where the work is to be done. Another good method of stimulating the memory is to place a ring usually worn on the finger onto the key ring, while one man, knowing that he will go frequently to his tobacco pouch during the day, places a note therein.



This Wife Pins Her Letter to Articles He is Sure to Require During the Day



Placing Finger Ring on the Key Ring is Also a More or Less Time-Worn Reminder



Sending Himself a Post Card as a Reminder of Little Things Requiring Attention



A Reminder Stuck on a Watch Case



A Note in the Tobacco Pouch is Certain of Being Remembered



A Piece of String is a Time-Honored Form of Reminder

A FEW METHODS OF AIDING THE MEMORY

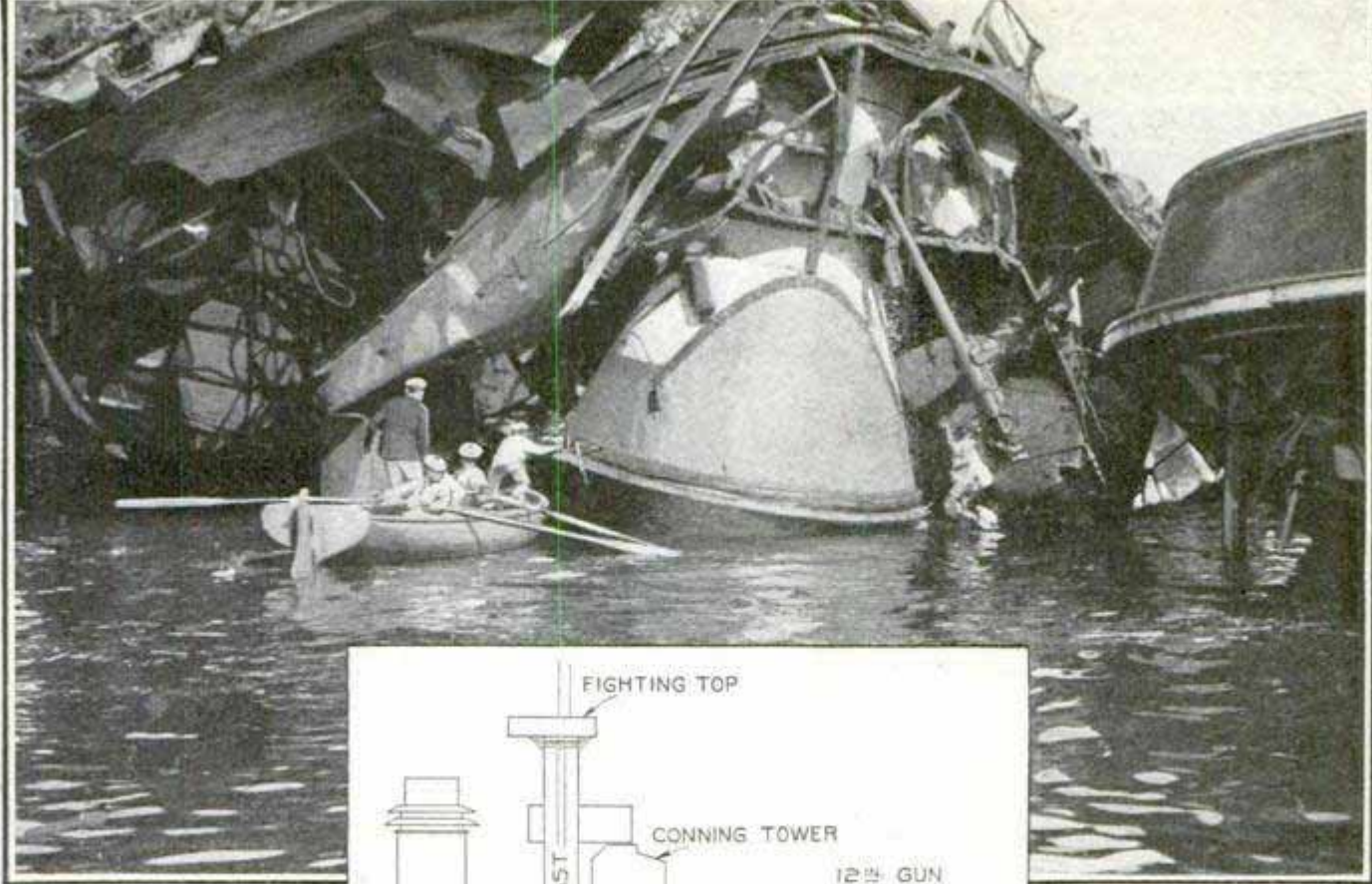


Armorplate from Fore Part of the "Liberte," Weighing Nearly 10 Tons, Thrown against Side of the "Republique" 1,000 Ft. Distant

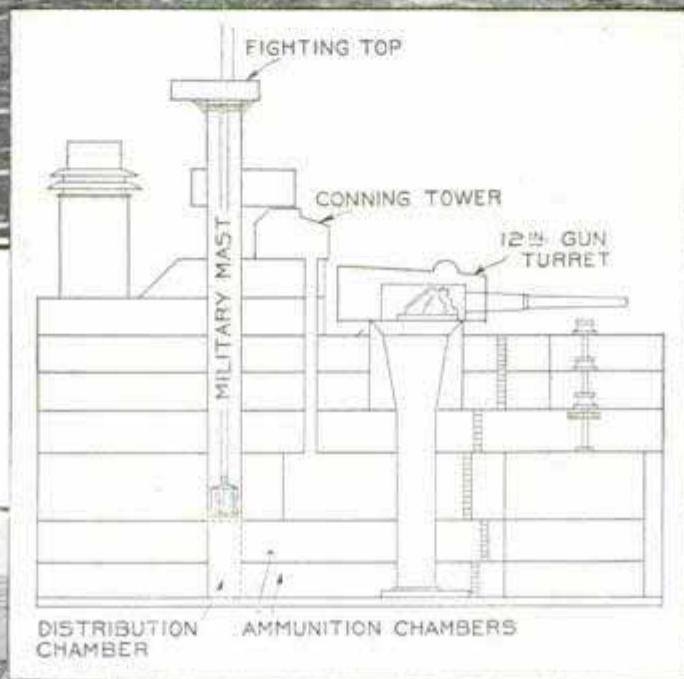


All That Remained Visible Above Water of the "Liberte" after Explosion

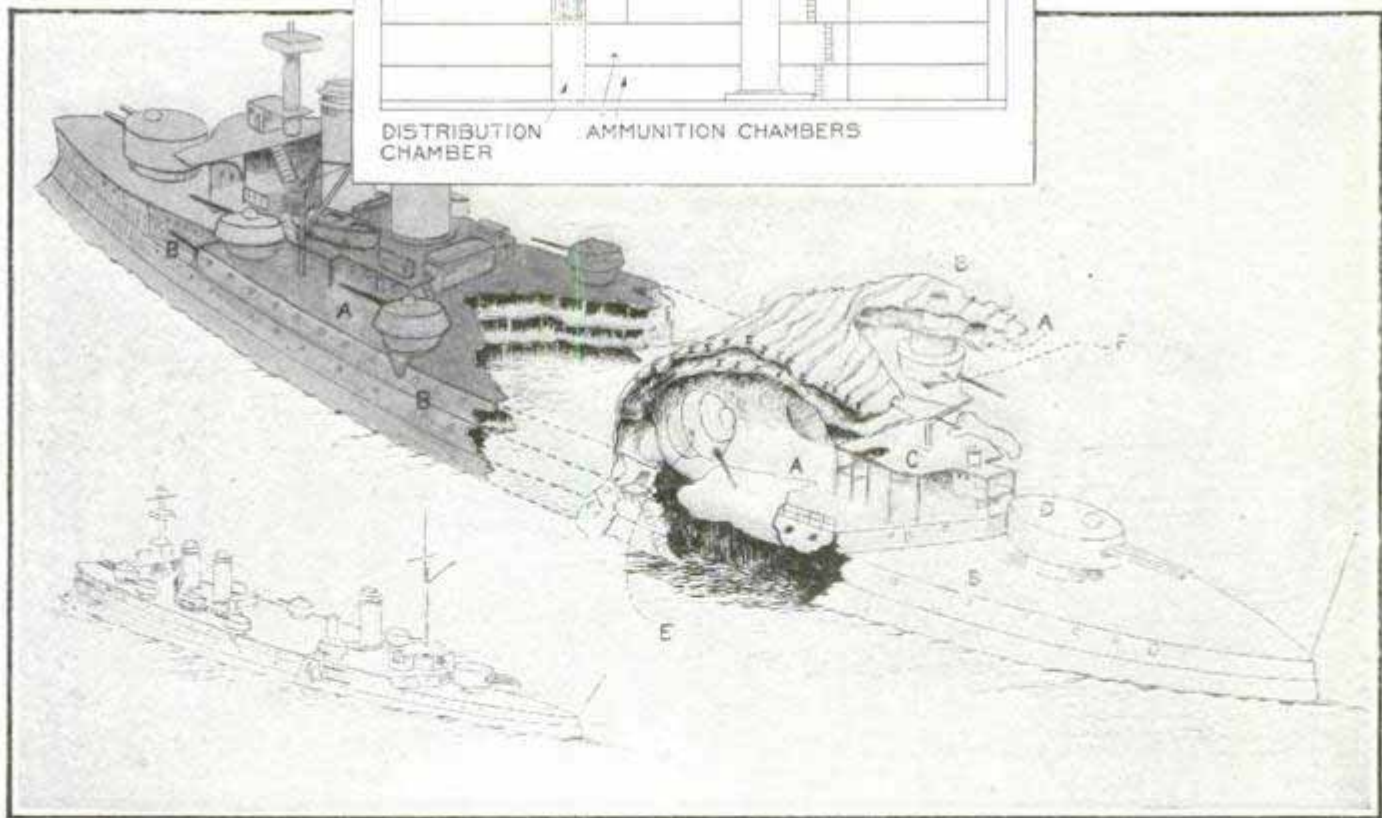
Experts appear to be convinced that the explosion on the French battleship "Liberte" was caused by the spontaneous combustion of the "B" powder used in the French navy, although the officials at Paris have as yet reserved their judgment. It was developed during the course of the investigation of the accident that the fumes from the burning powder made it impossible for the men to flood the



Rescuers Approaching Wreck. Note in Center One of the 7.5-In. Gun Turrets Turned Completely Upside Down



Ammunition Chambers at Foot of Military Mast. Flames Were Seen Issuing at Fighting Top Immediately after First Explosion



Effects of Explosion: Vessel Split about Midships; Fore Part (Shaded) Sunk or Completely Shattered, Two Upper Decks with Gun Turrets Bent Back Over After Part. A, Upper Deck; B, Main Deck; C Bridge; D, 12-In. Gun Turret; E and F, 7.5-In. Gun Turrets

magazines and the poisonous nature of these fumes were noted as similar to that in other explosions for which the "B" powder has been blamed. Those familiar with the ordnance stores of the French navy believe that too little attention has been paid by the experts to the safety in handling and storing of explosives.



Burgess Swimming across the English Channel

BURGESS SWIMS ENGLISH CHANNEL

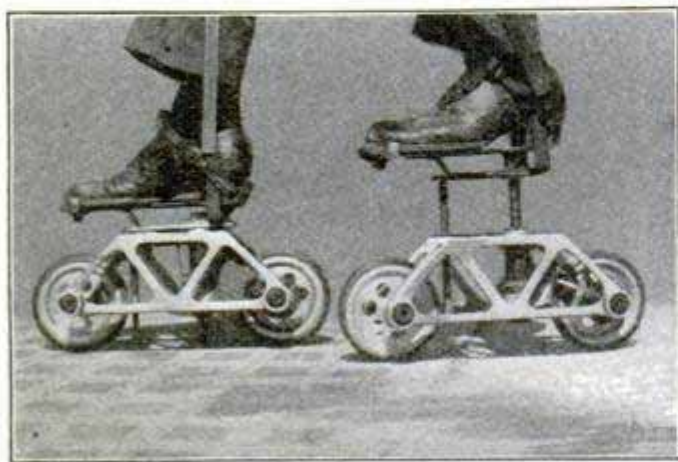
William Burgess succeeded in swimming across the English Channel in September, after many unsuccessful attempts covering several years. In one or two of these attempts he was

compelled to give up when only a short distance from the coveted goal. Burgess is the second man to swim the Channel, Matthew Webb having done so in 1875.

PEDOCYCLE INVENTED BY CALIFORNIAN

A pedocycle, propelled by the aid of mechanism somewhat different from that adopted for other types of pedocycles, has been invented by a mechanic and electrician of Los Angeles

and tried out by one of the members of the police force of that city. The skates consist of a frame for the wheels, a foundation or platform for the foot, a set of gears, and a spiral shaft. When the weight of the wearer is applied to one of the skates, the platform and shaft are forced downward, and the shaft passing through the gears works like a worm gear, thus driving the rear wheel, which is connected through a ratchet gear with the gears driven by the spiral shaft. The ratchet also forms a coaster brake, allowing the skate to speed along the pavement with the foot still bearing upon the platform and spiral shaft. The wheels are 6 in. in diameter and rubber tired. The speed obtained is about 20 miles an hour.



Mounted on a New Type of Pedocycles, the Gears of Which are Driven by the Weight of the Body Descending on the Spiral Shaft

WASHINGTON MONUMENT ATTACKED BY "GEOLOGICAL TUBERCULOSIS"

By JOHN S. MOSBY, Jr.

The Washington Monument, at the national capital, highest of stone structures, and designed by its builders to stand as long as the pyramids, is suffering from a disintegration that, while not immediately fatal, will materially shorten its life.

This great shaft, 555 ft. in height, consists of walls 15 ft. thick, at the base. These walls are made up of an outer facing of marble blocks and a 4-ft. inner wall made of granite and other hard stone. Between these two walls there is a filling of heterogeneous stone, held together by a cement. This describes the first 190 ft., which is the part now affected. This part was built continuously from the beginning of the structure. Then, for years, the construction halted at that height. It is the interior filling between these walls that is now, through the deadly effect of heat and cold and dryness and dampness attacking it alternately, beginning to disintegrate and ooze out between the joints of the outer wall and the crevices made by the action of the elements. Says Mr. Bernard Green, superintendent of the monument

grounds, who knows more about its history than anyone living:

"When this lower 190 ft. was built, a great portion of the vacant space between the two walls was filled in with all manner of rubble, held together with such manner of cement as was used in the '40's."



instead of being set with solid-built masonry. On this conglomeration, the weather is now beginning to act. The lime substances in this mass are especially disintegrating under the action of water, and oozing out between the joints in the outer masonry, again solidify and form, as it were, scales or barnacles on the white marble of the outer facing." Just how long this process (which a tourist defined as "geological tuberculosis") will have to continue before the sufficient weakening of the lower part of the monument to destroy it, neither Mr. Green, nor any government scientist will venture to declare.

Prof. G. P. Merrill, head curator of geology at the National Museum, and one of the government experts on matters geological, however, frankly gives as his opinion that the monument, through these internal agencies, coupled with fundamental errors in the construction of the great pile, will bring about its total ruin long before other world buildings of the same character of structure will decay—and very long before the age to which its designers had fondly hoped it to live. Professor Merrill thinks it is a bad job, literally, from top to bottom. This is what he has to say about its construction:

"This gigantic pile, designed as a monument to the Father of his Country, and which stands upon the banks of the Potomac River in



Filling Oozing through Outer Wall



Deposit of Structural Material near Base

the city of his name, is, so far as quality of material is concerned, not only wrong side up, but wrong side out as well! The very best and most endur-



Cracks in Washington Monument Caused by Action of Alternating Heat and Cold, Dampness and Dryness

ing material of the entire structure lies in the inner courses of the upper portion of the work."

That is the part where the elevator

lands, and which is subjected to merely the trifling burden of the apex.

"The poorest and weakest of the material," continued Professor Merrill, "is comprised in the outer portion of the first 190 ft., which has to bear the weight of the superincumbent 350 ft. and more, and has to receive, besides, the wash from all the rain that falls upon the portion above."

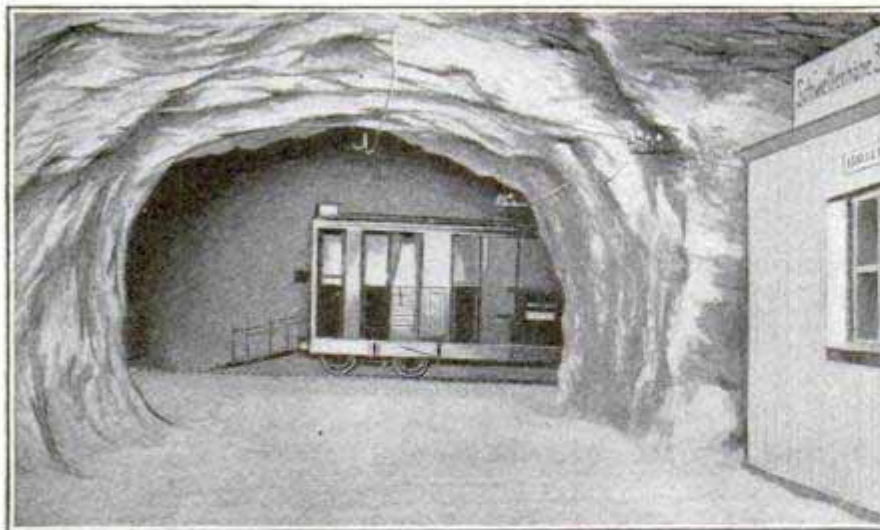
Professor Merrill went on to say that, as regards this present "tuberculous" ailment, it could be cured. That is, by building shoring and supports, the entire outer facing and the rubble filling for the first 190 ft. could be removed and replaced with solid granite masonry.

At the request of a representative of Popular Mechanics Magazine, he analyzed some of the deposit left on the outer facing from the interior disintegration and found it to consist of just the same material as that inside—thus confirming the aptness of the tourist's definition!

ALPINE CLIMBING BY RAILROAD

The days when only the adventurous could reach great heights in the Alps and perfectly realize the grandeur of the ice and snow-capped peaks are

laborious task, can ride in comfort to heights only accessible a few years ago by arduous climbing and the facing of many dangers.

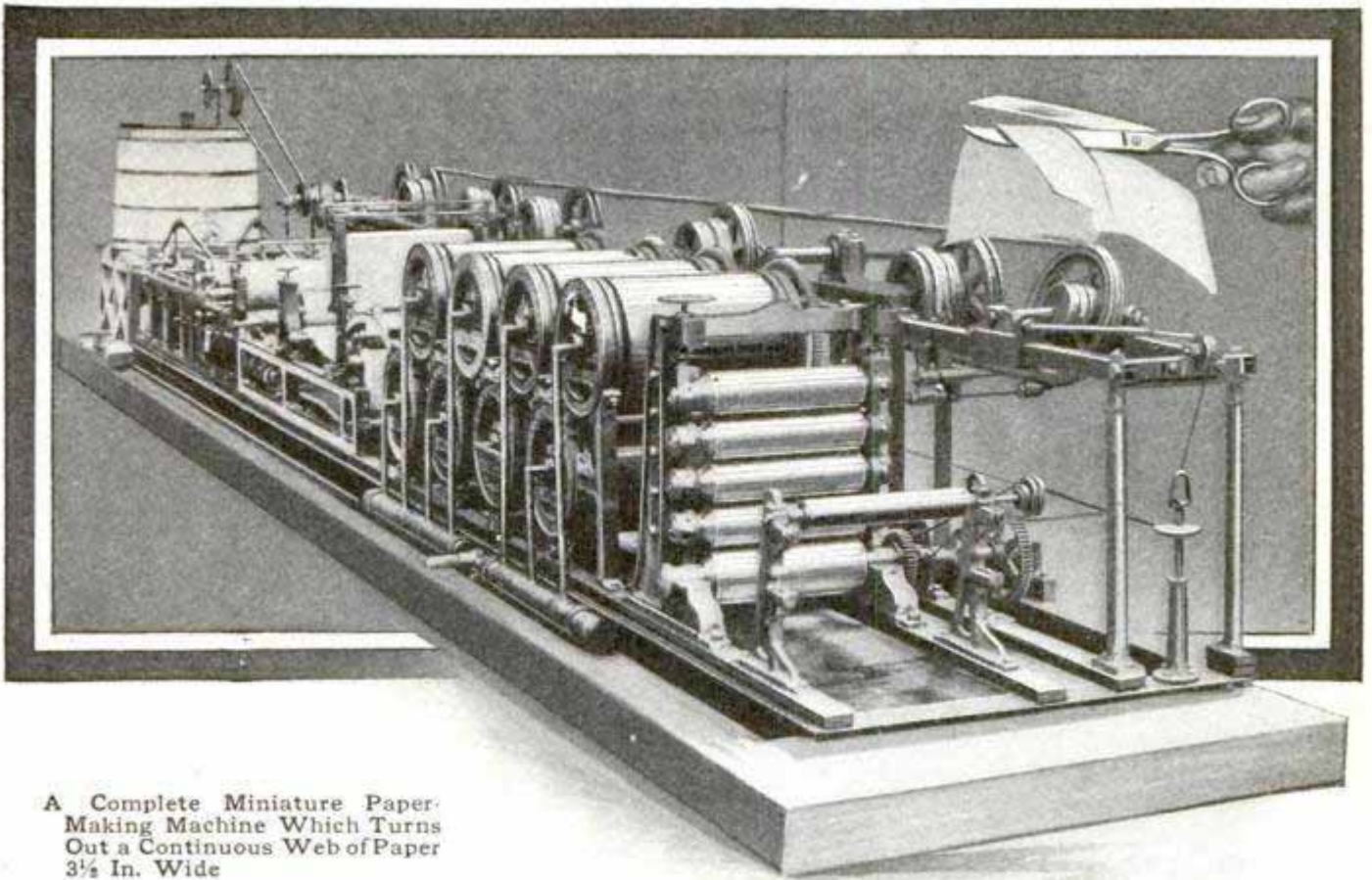


The Unique Opening of the Jungfrau Tunnel Which Looks Out on the Guggi Glacier at an Altitude of 11,090 Ft.

past. Now the vast number of tourists who are too timid or physically unfit for mountain climbing, or those who do not care to undertake such a

stretch the tunnel lies not only under perennial snow but so near to the outer wall of the mountain that the temperature drops below freezing point. So

How the Jungfrau Railway is making the snowy heights accessible is a remarkable example of modern engineering. The present terminus is Eismeer, which is at an altitude of 10,100 ft., but the last stage of the tunnel between Eismeer and Jungfrau Joch is now practically completed. Jungfrau Joch station will be 11,316 ft. above sea level, close to the magnificent snow and ice fields of the south face of the Jungfrau glaciers. On one



A Complete Miniature Paper-Making Machine Which Turns Out a Continuous Web of Paper 3½ In. Wide

near, in fact, that at one place a tunnel window has been cut, to overlook the Guggi Glacier. This window is at an altitude of 11,090 ft.

In the construction of this railway electricity is utilized for everything. It drives and heats the trains, operates the drills, fires the dynamite, melts the ice, and even bakes the bread required to feed the construction men.

NOVEL MINIATURE PAPER-MAKING MACHINE

The smallest paper-making machine in the world actually producing a continuous web of paper is shown in the accompanying illustration. It is 8 ft. long by 1 ft. wide, and manufactures paper having a width of 3½ in. The drying cylinders, of which there are eight, are heated by gas, which is a new method giving excellent results in this instance. The machine requires the attention of but one person.

This miniature paper plant was designed as a means of demonstrating in a practical way the entire process involved in converting paper pulp into

the finished product. It has fulfilled this task so well that the original model has been duplicated several times, several technical institutions now being equipped with them.

TO TUNNEL UNDER CANALS OF VENICE

Tunnels are so common that such construction is hardly more thought of at the present time than the building of a road, but that Venice, whose thoroughfares are canals, should contemplate an electric railway operating in a tunnel, as a means of communication between points, is considered by the foreign press as sufficiently incongruous to arouse interest. The plan is to connect the Piazza di San Marco with the little island of Lido, a fashionable resort of the Venetians during the warm season, by means of such a tunnel and electric railway. The tunnel would be about two miles long.

It is estimated that the wine production in France this year will amount to 1,227,236,000 gal.

NEW TYPE OF TEA STRAINER

The ordinary tea strainer has the disadvantage of retaining a small quantity of tea in the mesh which then



The Non-Dripping Tea Strainer and the Method of Using It

drips on the tablecloth. This fault is claimed to be overcome in a new type of strainer placed on the market in France. It is a rod of twisted wire with a tuft of finer wire at its lower end. The method of inserting it in the spout of the pot is clearly shown.

The reason tea does not drip from the wire, as in the old type of strainer, is said to be because of the fineness and close proximity of the wires, the tea remaining in the tuft after pouring being drawn back into the spout by capillary action.

THE FRENCH DIRIGIBLES

Although the dirigibles of other nations are receiving more notice than those of France, due to the disasters that are repeatedly overtaking the former, the French airships are not by any means being neglected by the army. The military dirigible "Adjutant-Vincenot," for instance, recently made a continuous flight of 16 $\frac{1}{4}$ hours with eight passengers. It flew a distance of 400 miles at an altitude of 3,200 to 4,900 ft., without the slightest mishap. Later, the "Adjutant-Reau," carrying nine passengers besides the crew, flew for 21 hr. 21 min., covering 600 miles. During this flight the weather was far from favorable, violent contrary winds being encountered.

GREAT GUNS CLIP WAR'S FINE FEATHERS

The application of science and mechanics to the art of war has resulted in depriving the field of battle of most of its spectacular features. No more can a picture of battle show a gaily uniformed mass of horsemen dashing madly at a crouching foe. The horsemen may dash madly, but the color scheme has been spoiled by clothing the men in subdued raiment, the intent of which is to make them as nearly invisible as possible. The flash and glitter has also been taken from the battle picture by the substitution of dull-finished metal for the highly polished steel of former generations.

In the gun pits of the seacoast fortifications, the picturesqueness has all departed. War here will be carried on by machinists, electricians and chem-

ists. And they will dress for their part just as they dress for work in the shop, the power house and the laboratory. Overalls and jumpers have taken the place of gold lace and broadcloth. The average crew of a big 12-in. gun is totally devoid of military appearance. The men wear dirty, grease-covered brown canvas trousers and jumpers—that is those men who are not wearing brown or blue overalls without jumpers. Some of them have campaign hats, some of them little round canvas hats and some are in caps, and they do not seem to preserve any formation or have any regularity of movement in loading and firing. Of course there are regulations as to firing and loading and conveying ammunition that are all carefully observed—just as there are



War in the Gun Pits of the Seacoast Fortifications is Now Carried on by Machinists, Electricians and Chemists

regulations for running any other big engine, dynamo, derrick, steam shovel, etc. The same is true on board the ships. The highest physical efficiency is the object sought, not daintiness of dress or the formation of a pretty picture. It would have to be a lengthy

canvas indeed that would show the bombardment of a fort by a fleet with a distance of from 7 to 10 miles separating the combatants and none of the men operating the guns being capable of seeing the target toward which he is directing his aim.



Courtesy of The Brooklyn Eagle

Overalls and Jumpers have Replaced Gold Lace and Broadcloth—A Group of Modern Artillery Officers "Uniformed" as for War

CHICAGO CHINESE HAVE OWN TELEPHONE DIRECTORY

The company operating an automatic telephone system in Chicago has

定江接裝來去水喉自來火管
卡勒街門牌 2114
啓者弟向裝來往水喉自來火管業已十八年
務求精工價錢真實如常為友光顧仰
祈留心是所厚望焉
DANIEL GUNN 喊線壓到物的公司 2114
639 S. Clark Street

善人埠卡勒街喊線號數

2114	和禎隆唐山雜貨門牌	2118
2114	安良堂樓上二層門牌	2110
	致中和唐山雜貨門牌	2112
2111	廣利源唐山雜貨門牌	2112
2112	源源號唐山雜貨門牌	2112
2113	泰和號唐山雜貨門牌	2112
2114	三隆號唐山雜貨門牌	2112
2114	廣和盛中日玩器門牌	2112

輔列芝勞士承接木工
卡勒街門牌 2112
啓者弟向蒙善人賜顧已二十餘年矣
凡所作工夫快捷無誤工價相宜倘
蒙貴客垂盼或喊線或親到無
不招置妥當也
FRED J. LOWES 喊線壓到物的公司 2112
639 South Clark Street

Special Directory Furnished for the Chinese Subscribers of the Automatic Telephone System in Chicago

provided its Chinese subscribers with a special telephone directory in the Chinese language. The accompanying

drawing is a reproduction of one of the pages, bearing the telephone list and two of the advertisements with which the book is plentifully sprinkled.

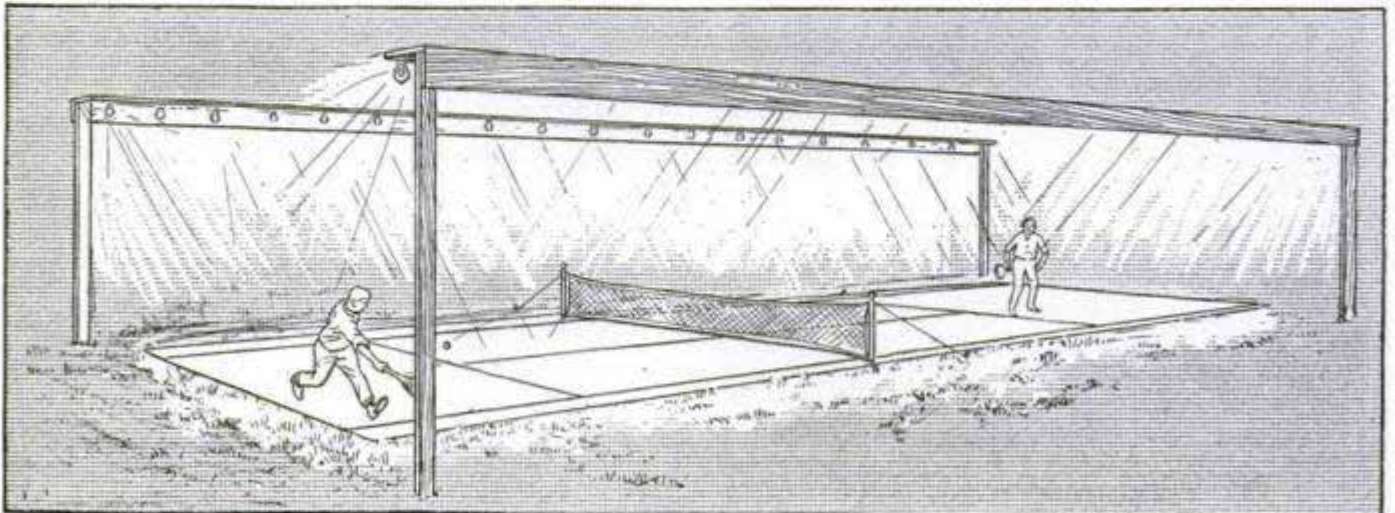
It is said that the Chinese are enthusiastic over the automatic system of telephoning, because it makes communication possible without the trouble which usually arises when a Chinaman tries to make an American telephone girl understand what number he wants.

ALUMINUM FUMES DESTRUCTIVE

A French physician has called the attention of the health authorities to the advisability of inspecting and regulating aluminum factories, of which there are a great number in his locality. His researches have shown that the gases from these factories are not only destructive to vegetation, but that the men employed in the factories are subject to a peculiar form of diabetes, which he believes is due to the same cause.

AN ILLUMINATED TENNIS COURT

By means of electric lights arranged along the sides of a tennis court, members of a Buffalo tennis club are enabled to continue their games into the night. Considerable experimenting was necessary before a satisfactory method of distributing the lights and



Playing Tennis at Night on Illuminated Court

arranging the reflectors was found. So satisfactory has this court proven, however, that a number of other Buffalo clubs intend to duplicate it next season.

vacuum distilling apparatus. The vacuum is maintained by means of a suitable air pump, and the heating is accomplished by means of two electrodes



The French Aerial Corps' Traveling Machine Shop for Aeroplane-Construction Repair Work

FRANCE HAS AERO-REPAIR MOTOR TRUCK

The aeroplane having advanced to a point where its adoption for war purposes is assured, the devising of an aeroplane tender with proper appliances is in order. The French army has recently tested out such a vehicle in the form of a huge motor truck which carries all the machinery necessary to make repairs to broken planes. The truck also carries spare parts and is so equipped that it can rebuild a broken airship and construct a new one if necessary. Expert machinists are attached to the aerial corps for the purpose of taking charge of this work.

DISTILLING METALS IN A VACUUM

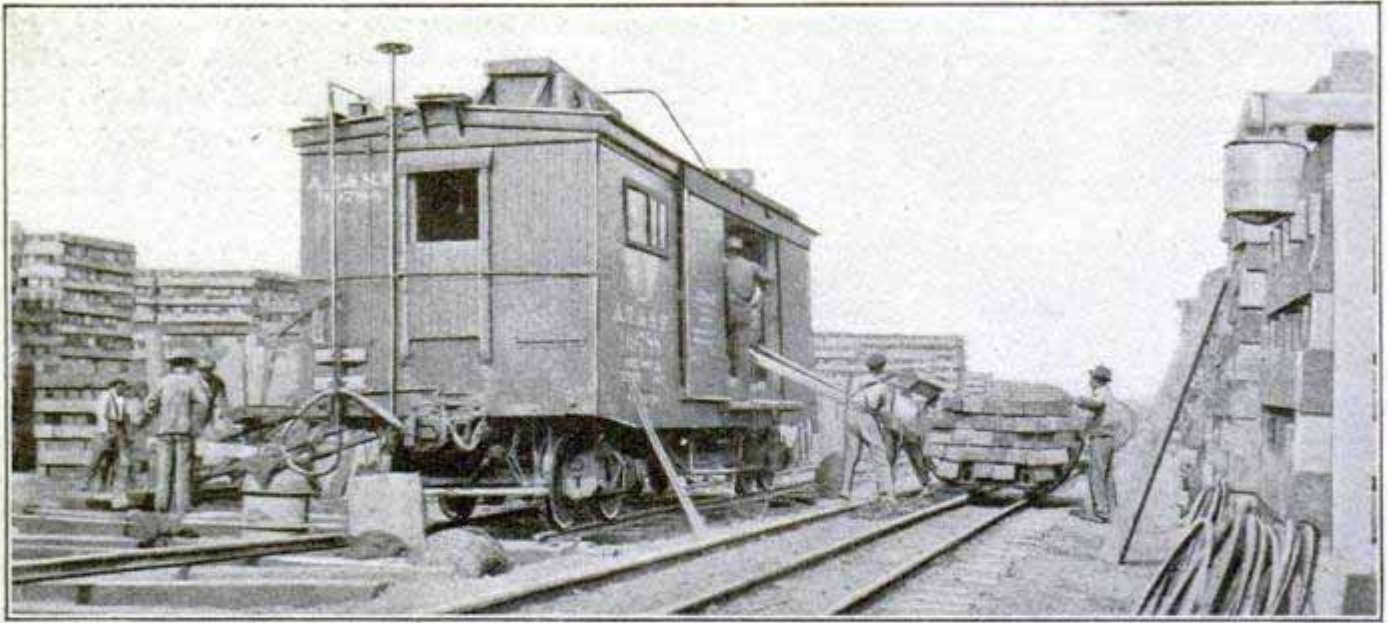
Arsenic, antimony and other volatile metals may readily be separated from other metals without any oxidation whatever, according to a Schenectady, N. Y., engineer who has invented a

through which an electric current is passed. The metals distill into a receiver in the same manner that a volatile liquid would do.

FEATHER HEADDRESS SIX FEET HIGH

A remarkable example of savage headdress is shown in the accompanying illustration. It is 6 ft. in height, composed of a number and variety of feathers which must have taken considerable time and trouble to collect and arrange. It looks far more like a large and curious plant than an arrangement of feathers.

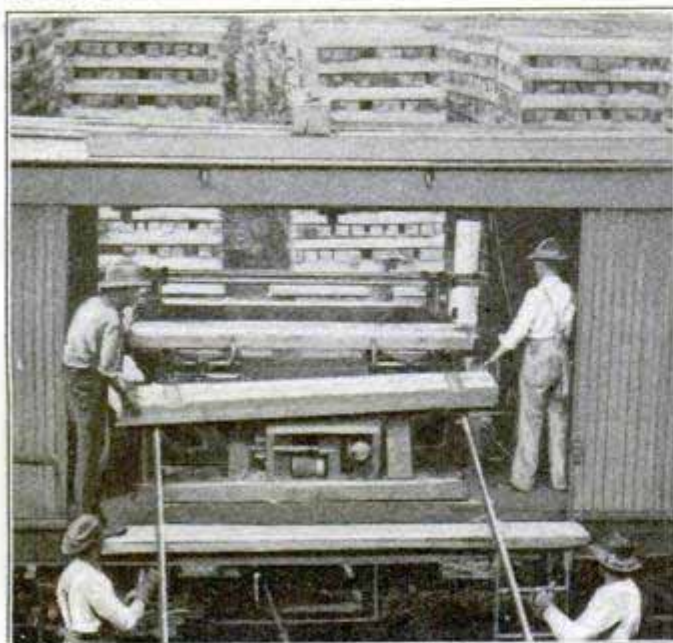




Ties Pass through the Machines at the Rate of Six per Minute and are Delivered to Truck on Adjoining Track

MACHINE FOR ADZING AND BORING RAILROAD TIES

The rapidly increasing use of creosoted softwood ties for railroad construction has stimulated the adoption of screw spikes as a substitute for spikes. To derive the greatest benefit from the creosote treatment, the ties should not be cut or chipped in any manner after having passed through the creosoting cylinders. Therefore, the ties are usually bored for the screw spikes and adzed for the tie plates before being treated, and an automatic machine has recently been invented to do this work.



Feeding Ties to the Automatic Adzing and Boring Machine

This machine prepares the tie at both rail seats for the tie plates and bores two, three or four screw holes at each end. It consists of a heavy rectangular frame, 6 ft. by 8 ft., at one end of which is mounted a long arbor carrying the two adzing heads. These are regularly spaced 4 ft. 8½ in. from center to center, but may be adjusted for any gauge of track. The cutting heads are 16 in. in diameter and of any width of face to fit standard tie plates, and the arbor is carried on an adjustable frame which is gibbed to the frame of the machine and arranged to be raised to give any depth of cut, or may be lowered to permit the ties to pass over the heads without contact.

The boring spindles, four, six or eight, depending upon the number of spikes to be used in each tie, are mounted behind the arbor carrying the adzing heads, arranged in groups of two, three or four at each end of the tie. Automatic feed is provided for the spindles, and holes up to 8 in. may be bored. The capacity is about six ties per minute.

The machine is mounted in the center of an ordinary freight car, the ties being fed to it through the door on one side and delivered out the other.

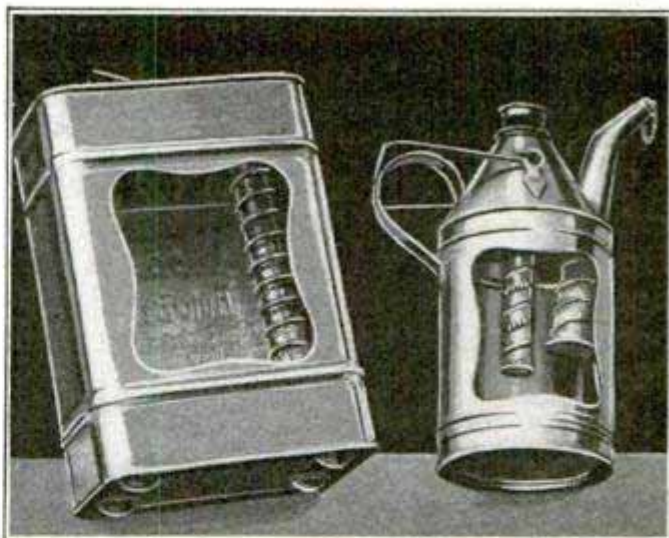
NON-EXPLOSIVE TANKS AND CANS FOR GASOLINE

By means of a new device, now being used in Europe, the explosion of tanks and cans containing gasoline, benzine, and similar explosive liquids, is said to be made impossible. The device is constructed on the principle of the Davy mining lamp, but the wire gauze of the lamp gives way to a metal tube, especially adapted for use in cans and tanks. The device is formed of corrugated and smooth strips of metal, wound spirally into a tube, as shown in the illustration, the corrugations forming openings for the flow of the liquid. These tubes are attached, within the tank or can, to the openings, and receptacles having both a spout and a filling opening are provided with two tubes, as is shown in the illustration of this type of can. The liquid stands at the same level in the tubes as in the receptacles, and, in being poured into or out of the receptacle, has to pass through them.

The principle that makes the tubes effective preventives of explosions is, as above stated, the same that makes the Davy lamp so valuable. The exceptional efficiency of the tube is due to the fact that the narrow passages acting as inlets and outlets are formed by heavy metal strips, which cool the burning gases to such an extent that the transmission of the flame from the tube into the vessel containing the liquid is impossible.

As a provision against explosion when there is a general fire in a building, the screw caps of the tubes are composed of soft solder. It is claimed that if fire should reach a storehouse containing tanks or cans of gasoline fitted with these devices, the tops would melt away before the vessels were greatly heated, exposing the gasoline in the tubes to the flames. This gasoline would burn until the tanks were empty, but the bulk of the liquid in each can would be protected and its vapors would fail to explode.

Among the tests of the device re-



Device to Prevent Explosion of Gasoline in Tanks or Cans

cently made in New York was one in which burning gasoline was poured from one can into another, also containing burning gasoline. The gases continued to burn but there was no explosion, the flame being retained in the tubes.

REMEMBERING THE WHALEMEN

In a dusty garret, on the third floor of an old cracker factory in New Bedford, Mass., Charles E. Alden, of Boston, and a former student under St. Gaudens, is putting the finishing touches upon a model which is to be reproduced in bronze and placed in



Monument Designed as Memorial to Men Who Hunt Whales

front of the public library in the old whaling town, a memorial to the men who in their pursuit of the cachelot have made the city famous.

The statue represents an old whaleman sitting upon a bitt of a whaleship. He has just picked up an iron of a harpoon and, while he gazes away, is apparently telling to a lad a story of life afloat.

A score or more real whalemen were

used by the sculptor to obtain the idea for the old whaleman's face. While it is not the face of any particular person, being rather a composite, it represents a type well known along the shores of New England.

The statue is to be exactly twice life-size. The man, if standing, would be 11 ft. tall. The accompanying photograph is from the clay model which weighs $2\frac{1}{2}$ tons.

SOLDIERS OF THE ORIENT EXPERTS IN CLIMBING

While wall scaling is a regular practice among the soldiers of all nations, it is probable that the men in the Japanese army are given the highest walls to climb. The Mikado's troopers are so well trained that the scaling of a wall 30 ft. high is no unusual task for them. A photograph was recently made of a squad of men going over such a wall. They looked like so many ants or flies as they climbed quickly to the top. While this feat is unusual,

the Japanese do not hold all the records for wall climbing. A company of Philippine Scouts of the United States army is believed to have set a mark that has never yet been equaled, when the entire organization of 108 officers and men scaled the 23-ft. city wall of Manila at a point where it was perfectly smooth, without foothold of any kind, in 1 min. 49 sec. Not satisfied with this, the same company dropped to the ground and again scaled the wall in the same place, this time taking with them the six guns of a mountain battery and going into action with the artillery on the ground on the far side of the wall in a trifle under four minutes.



Squad of Japanese Soldiers Scaling a Wall More Than 30 Ft. High

200,000,000 TONS OF SODA IN AFRICAN "SODA LAKE"

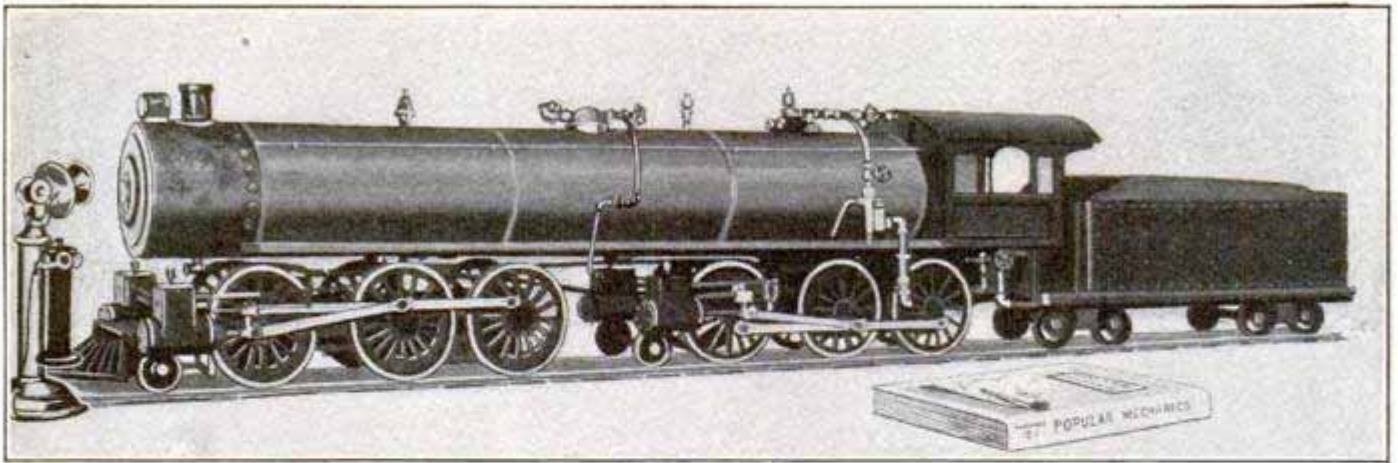
"Soda Lake," situated at Magadi, British East Africa, is one of the richest soda deposits in the world, covering an area of more than 18 square miles, and containing a quantity of soda estimated at 200,000,000 tons. As fast as the blocks of soda are removed from the surface the places fill again, and the natives claim it is possible to continually work the same position for several consecutive years. With the primitive tools at hand, the lake has been sounded to a depth of about 9 ft., and nothing but crystallized soda found.

An English company, with a capital of \$5,000,000, will begin to exploit the deposit as soon as the Uganda Railway reaches the district.



JERUSALEM IN STRANGE GARB

As one would naturally imagine in so generally genial a climate, snow in Jerusalem is as rare as a heat wave in Iceland. For Jerusalem itself, to be covered in a white mantle, as seen in the accompanying photographs, is regarded as quite a notable event. This particular snowstorm visited the Holy City in March last. The entire city was buried two to three feet deep in soft snow. So anxious were the inhabitants to take full advantage of such an exceptional occasion that primitive sleighs were requisitioned, and the sport indulged in on the Mount of Olives.



Model Locomotive 5 $\frac{3}{4}$ Ft. Long and 1 Ft. Wide—Operated on Gasoline Fuel

WORKING-MODEL LOCOMOTIVE BURNS GASOLINE

A working model of a Mallet-principle compound locomotive, built by Dr. D. N. Jones, of Gaylord, Minn., is shown in the accompanying illustration. All work such as boring cylinders, making the truck frames, turning the wheels, etc., was done personally by the physician, the task taking five years of spare time. The engine is complete in detail and is run on gasoline as fuel, the gasoline being burned in a brazier.

The physician's idea of building a working model, which he conceived some 12 years ago, was to demonstrate that an engine could be built with a boiler capacity of any size desired, that the cylinders could be placed on truck frames with either six or eight drivers and guide wheels, and that such a locomotive could take any curve or siding any ordinary switch engine can make. The trucks are pivoted and the engine will make the shortest curve allowable with the rigid wheel base of one set of drivers.

The boiler of the working-model locomotive is made of high-pressure steam pipe, 8 in. in diameter, with ends and flue of ordinary construction. The total length of locomotive and tender is 8 $\frac{3}{4}$ ft.; the length of the boiler, 5 $\frac{1}{2}$ ft. Other dimensions are: Gauge, 5 $\frac{3}{4}$ in.; drivewheels, 8 in. in diameter; width of cab and tender, 1 ft.; weight of locomotive and tender, 400 lb.; boiler capacity, 8 gal. of water; steam pressure, 225 lb.

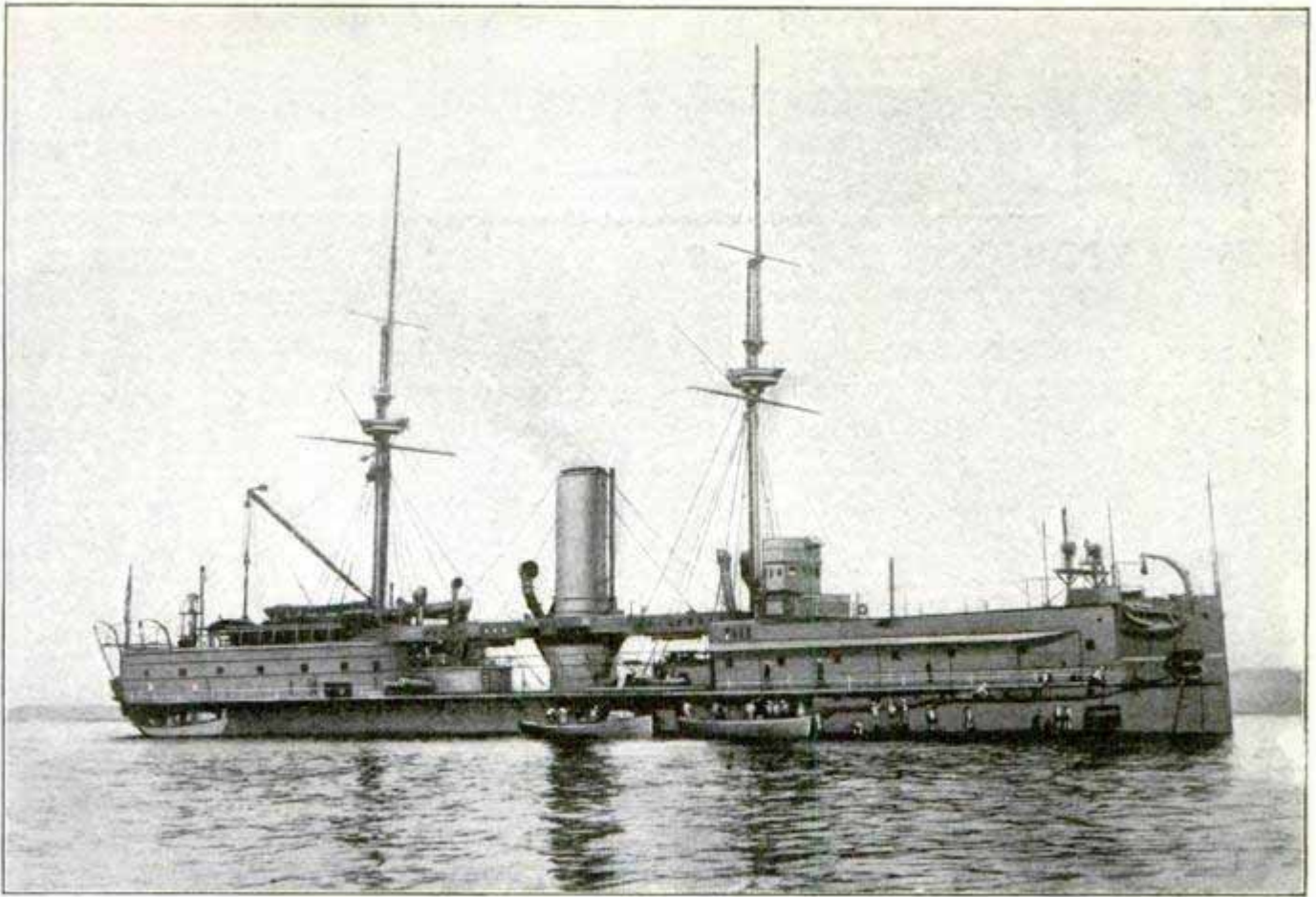
SPECIAL TRANSFORMER FOR PHYSICIANS

A French inventor has designed a dynamo transformer which is capable of turning out, simultaneously if desired, currents of various tensions and strengths. In its present form it is adapted for the use of physicians, is simple in principle and construction, and self-regulating under varying loads.

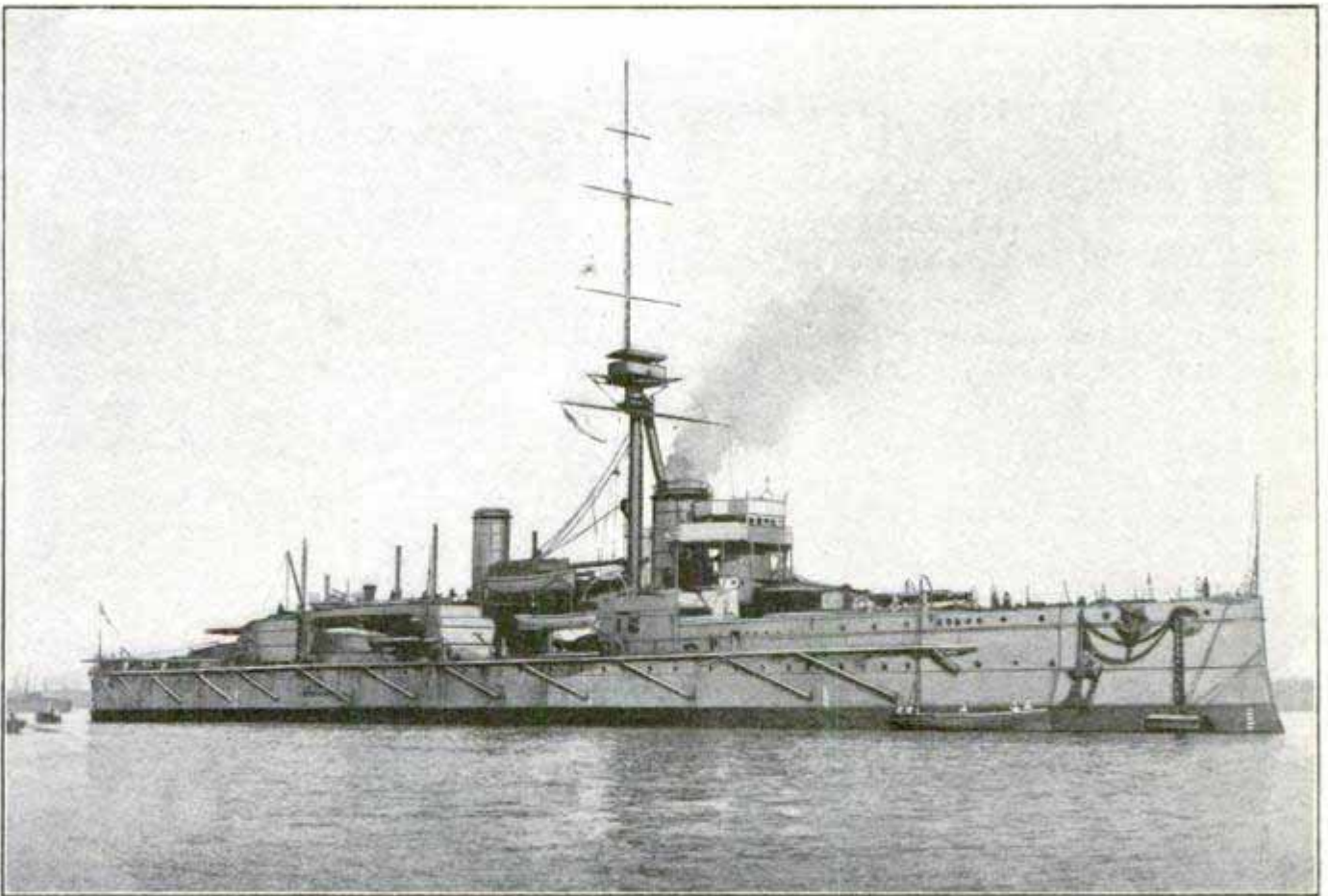
Fed by a 110 to 220-volt current, it can give, all at the same time, direct currents of 25 volts at 9 amperes, for charging accumulators; 12 volts at 7 amperes, for lighting purposes of various instruments; 14 volts at 40 amperes, for cauterizing instruments; and alternating current for hydroelectric baths. Being self-regulating under varying loads, it gives the same intensity whether, for instance, one or more cauterizers be used, or whether providing current for one or several of the purposes mentioned.

NEW BIG-GUN ARRANGEMENT LIKE OLD

It is interesting to note in these two battleships how naval architects of today are going back to old ideas in gun arrangement, etc. One of these ships is the old British battleship "Colossus," and the other is the new "Colossus," one of Great Britain's latest dreadnoughts. In examining the new ship it will be noted that the designers have gone back to the "Colossus" of 1882 in the arrangement of



H. M. S. "Colossus" of 1882



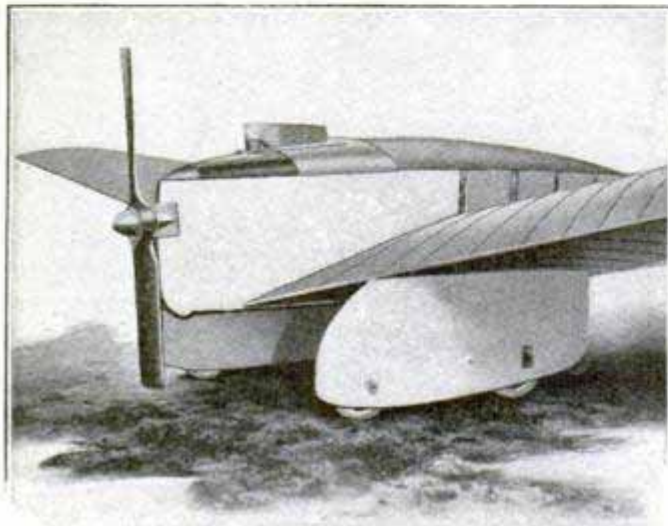
New "Colossus" Has Four Big Guns Arranged in Same Manner as on Predecessor

AN ODD SIMILARITY OF BIG-GUN ARRANGEMENT ON BRITISH BATTLESHIPS
OF TWO GENERATIONS

four of the 12-in. guns, they being placed "en echelon" on port and starboard beam.

NEW ANTOINETTE AROUSES INTEREST

A new monoplane just completed by the designers of the Antoinette aeroplane is arousing great interest in Europe. The most remarkable features



Front View of the Antoinette; Even the Wheels are Inclosed as Much as Possible

of the new machine are the complete elimination of all exposed stay wires, and the covering-in of all elements in the structure to produce streamline forms, adapted to pass through the air with minimum resistance.

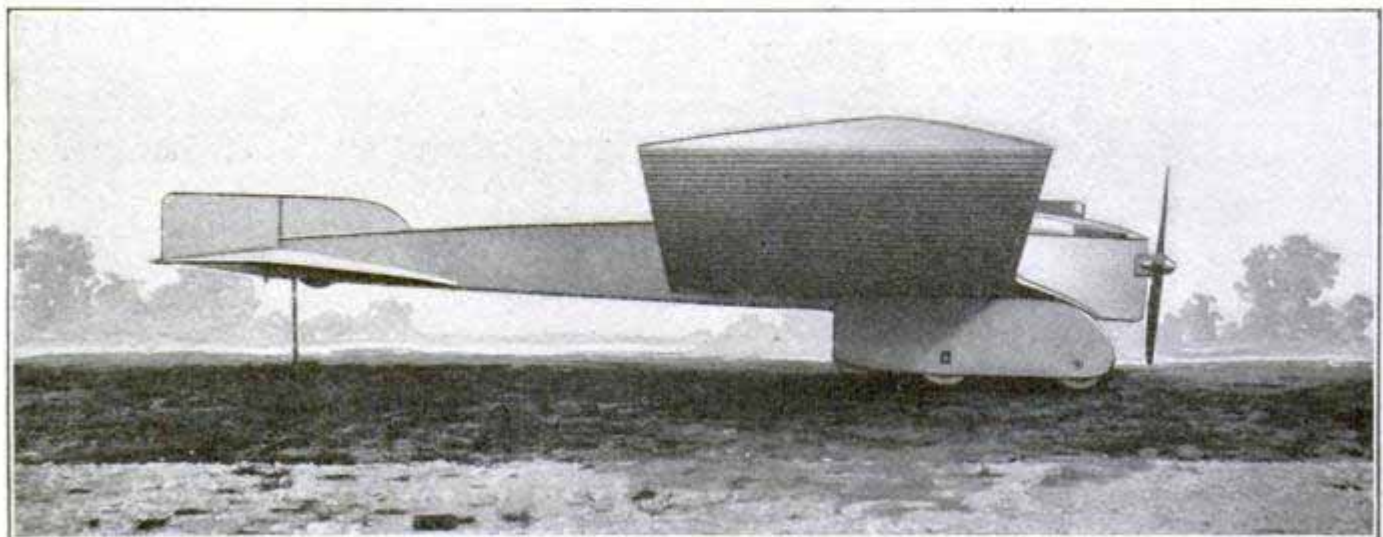
The span of this machine is over 52 ft. and the chord of the wings from 10 to 13 ft. It weighs 2,500 lb. The motor is of 100 hp. This is the largest and heaviest successful aeroplane yet

constructed, and is most suggestive of what many believe to be the coming type.

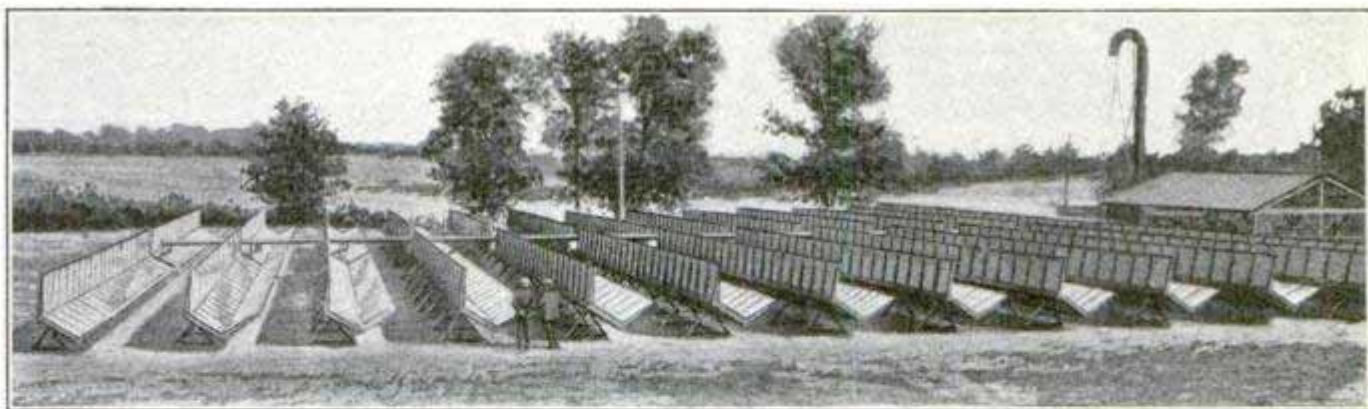
BRIGHT LIGHTS ATTRACT THE SHOPPERS

Shoppers buy their goods from merchants living on the best lighted side of the street. This peculiar item of business philosophy has recently been announced by an illuminating engineer after an exhaustive study of the matter, which included observations extending over a number of cities. It is stated that in a certain Canadian city the fact that one side of the street was better lighted than the other caused the increase of rentals on that side to as high as 50 per cent greater than on the poorly lighted side. The fact that the lighting had something to do with it was proved to the satisfaction of the investigator when some of the merchants on the darker side caused the installation of special lighting facilities near their places of business with the result that their business increased to an extent that enabled them to pay for the installation out of the extra profits.

☞ The people of Australia are building a Federal capital, which, if present plans are realized, will be one of the most magnificent cities in the world in point of architectural and landscape decoration.



Side View of the New Antoinette Monoplane, Showing Form of Planes and Inclosed Body



Side View of the Absorber, Showing the Arrangement of the Water-Feed and Steam Pipes

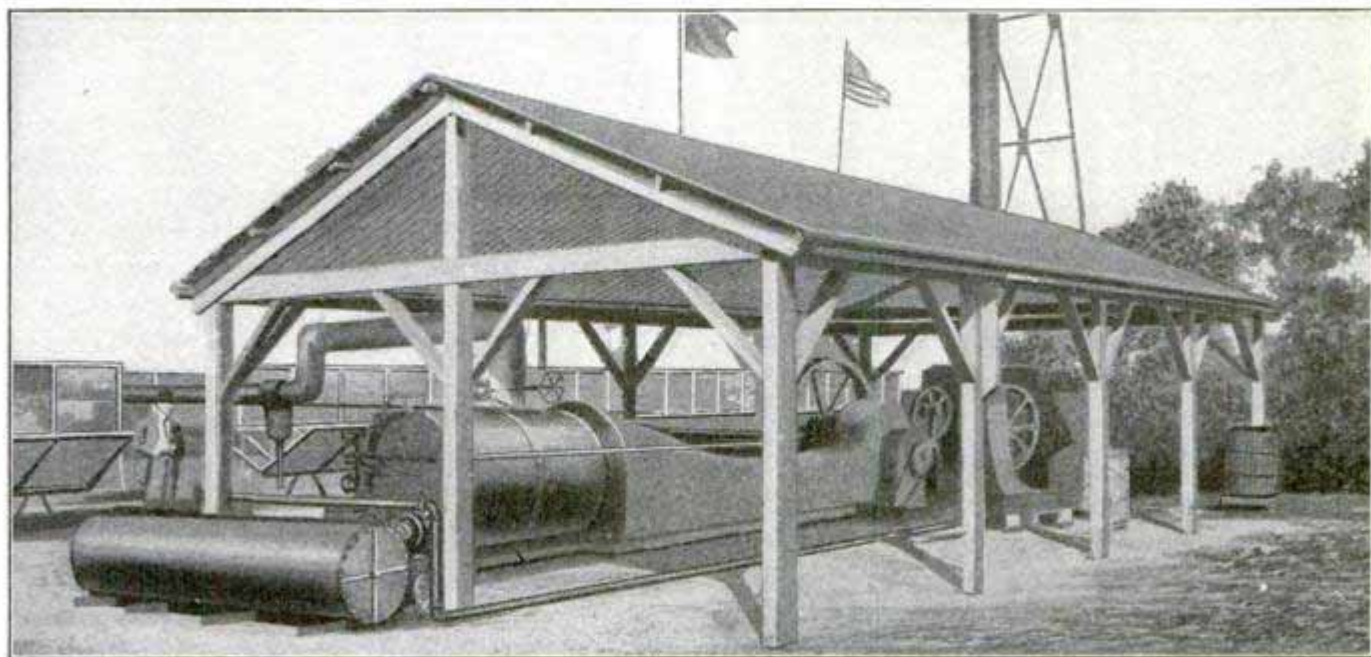
SUN'S POWER OPERATES PUMPING PLANT

After many years of experiments and failures, an American inventor of apparatus designed to utilize directly the sun's power has perfected an apparatus which has been in operation in Philadelphia. The machine was kept running steadily for several weeks, and during that time pumped several millions of gallons of water by power obtained from the sun's rays alone.

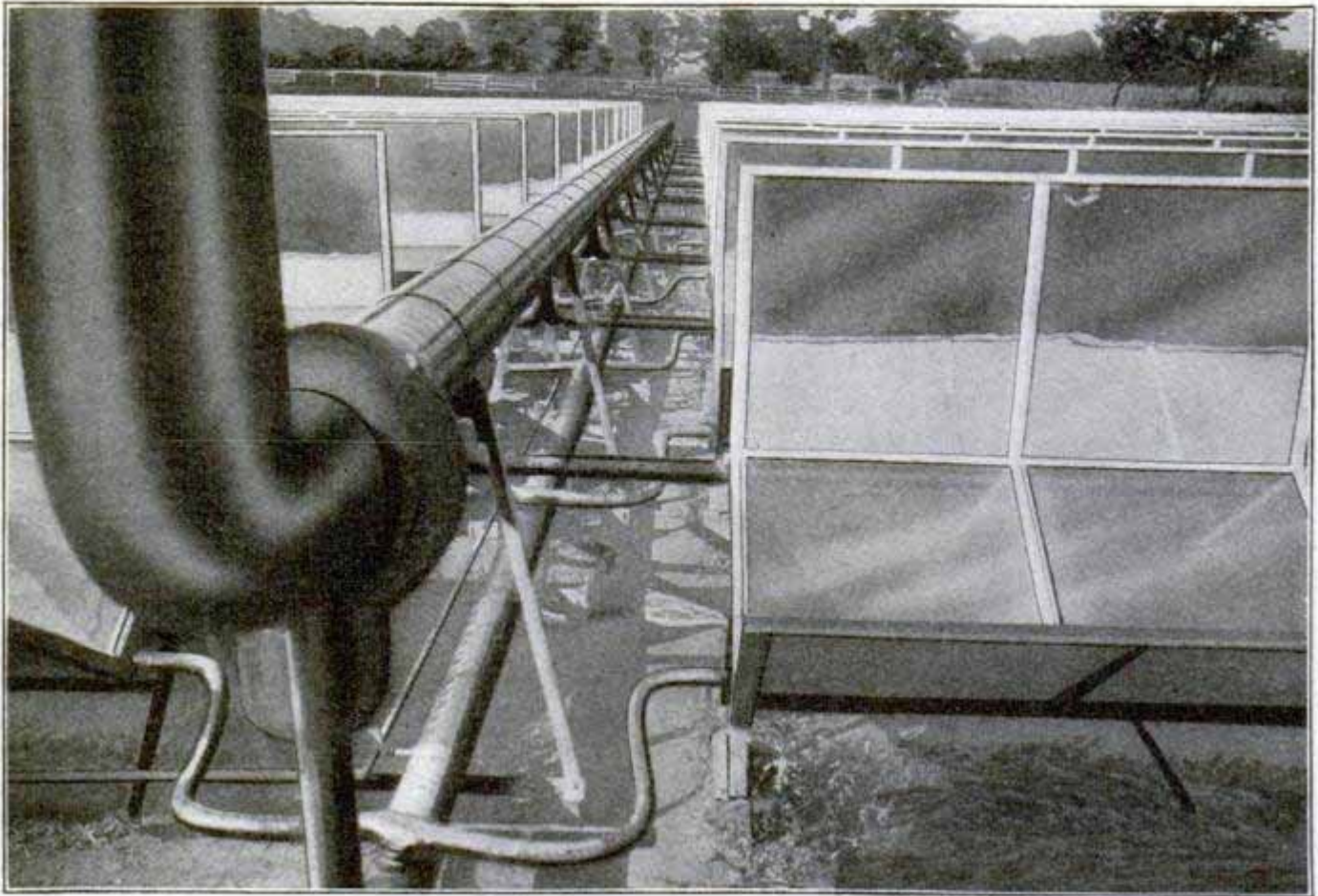
The plant at its present stage of development consists of an absorber, a low-pressure steam engine, condenser and auxiliaries. The absorber is composed of a series of units, each containing a flat metal honeycomb water vessel, rectangular in shape and closely resembling a large waffle. This vessel is inclosed in a flat wooden box

covered with two layers of glass having a 1-in. air space between them. The under side of the box is insulated against heat loss downward by a 2-in. layer of cork and two layers of water-proofed cardboard. The boxes are mounted on supports which elevate them about 30 in. above the ground, and permit of their being inclined perpendicularly to the sun at noon. The adjustments of inclination have only to be made once in three weeks.

Mirrors of cheap construction are mounted on two sides of the boxes so that more rays may be caught, reflected upon the surface of the water vessel, and absorbed. The water vessels are connected at one end to a feed pipe from the water supply, and at the other



The Pumping Plant Operated by Steam Generated by the Rays of the Sun



View Showing Glass Absorbers and Mirrors and Well Insulated Pipes to Retain Heat

end to a steam pipe. The steam pipes from the various units are connected together and empty into an 8-in. main which conveys the steam to the pumping engine.

The pumping engine is a new type, low-pressure, reciprocating engine of great steam economy. Connected with it is a surface condenser of ordinary type and auxiliaries such as may be found in any condensing plant. The water from the condenser is pumped back into the absorber. The pumping capacity of the plant in the latitude in which it is at present located is 3,000 gal. per minute lifted to a height of 33 ft., or approximately 25 hp. The apparatus is to be taken to Egypt and tried out as an irrigation engine.

☞The people of Germany are the greatest users of the post card for inland correspondence in the world, 1,548,500,000 cards having been used in the Empire last year, while Japan used 860,000,000, the United States 855,579,000 and Great Britain 838,500,000.

NEW METHOD OF SEALING CANAL DIKES

A new method of utilizing concrete to seal canal dikes against leakage, without necessitating the drawing of the water from the section of canal being repaired, has been successfully adopted in Europe. It consists of the building up of a thin concrete cut-off wall in the dike, sheet-piling being used to make the narrow trench or slot for the concrete. A short section of sheet-piling is first driven to a depth of about 8 ft., and then the piles are drawn one at a time, great care being taken to prevent soil from being knocked into the hole thus formed. A steel funnel, shaped to enter the hole, protecting the sides and edges, is next inserted and fed with concrete mixed quite dry. The concrete is tamped in place with a long-handled ram, the form is redrawn, and the process is repeated with the next pile. The redrawn piles are cleaned and moved ahead to be used again.

The Kingdom of Dust

By J. Gordon Ogden, Ph. D.

THIS is the tenth and last of a series of articles by Dr. Ogden, 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.

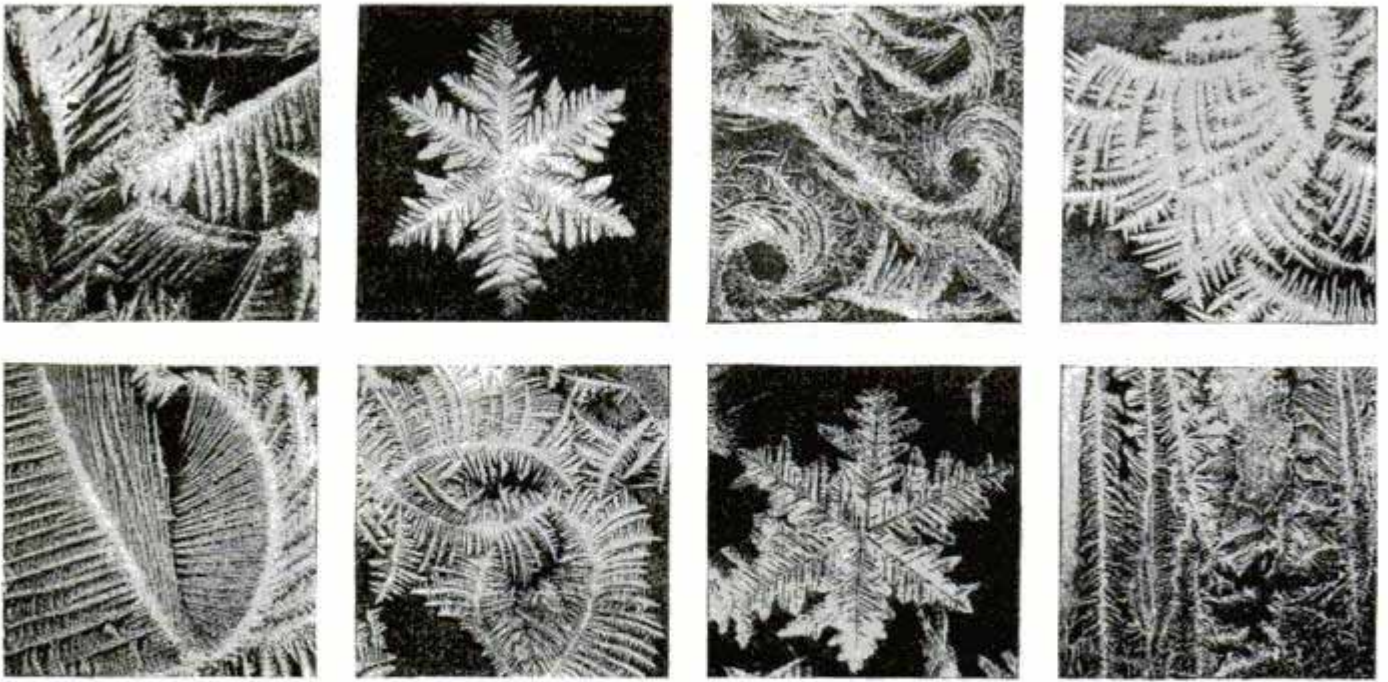
X—The Wonders in the Dust

WE ARE more or less familiar with the great natural wonders of the earth on which we dwell. We have seen mighty oceans, thundering Niagaras, stupendous glaciers, magnificent rivers, tremendous volcanoes with their lakes of molten rock, immense caverns hung with snow-white stalactites, great cañons cut out of the living rock, lofty mountains crowned with eternal snow, and beautiful valleys decked with the myriad forms of plant life. Aided by the magic of the telescope, we have looked far into the abysses of space, and have seen the shining glories of sun, and star, and planet. Spellbound, we have watched the birth and death of worlds and solar systems similar to our own. We have gazed upon the faintly glowing nebulae far away in the infinite realms of the starry heavens, and have been impressed with their grandeur and our own insignificance.

And yet, after all, these marvelous things are but a few of the wonders of the universe. The microscope, with its wonderful eye of crystal, rivals the telescope in its power of revelation. A handful of dust is as wonderful as a solar system if we rightly interpret the evidence it presents of use, perfection of design, and the working out of laws that are as stupendous and eternal as those that brought forth a Sirius or a Pole Star. As a matter of fact, a continent is simply a combination of certain subjects of the Kingdom of Dust, while the sun itself is naught else than a glorified multiplication of dust units.

Let us, then, pick up a handful of dust, here and there, place a few particles under the objective of a powerful microscope, and become familiar with some of the "Wonders in the Dust."

The first handful we take from the ooze at the bottom of mid-ocean. It is a slimy, disagreeable mass of mud, when viewed with the naked eye. Under the microscope these deep-sea dredgings resolve into the most beautiful forms imaginable. They are really the shells of minute organisms, vegetable and animal, and are made up of tiny bits of lime or silica woven into forms of exquisite beauty and coloring. Millions and millions of these fairy-like creations have been determined in a single cubic inch of ooze! Each of these mites of creation is as perfect, complete, and individual as an oak or an elephant. Delicate domes are here, more wonderful than Michael Angelo's famous dome of St. Peter's. Windows and door-ways, made from sand or lime, far more beautiful than those of any cathedral wrought by the hand of man. Palaces rich in ornament and tracery, formed from the dust in the water, by animals and plants without a vestige of brain, lie desolate upon the bottom of the sea, abandoned ages ago by the tiny inhabitants. Structures more marvelous in their sculptured witchery than the famed Colosseum, the Pantheon, or the Taj Mahal, are buried in the ooze and slime at the bottom of every sea. Exquisite creations, infinitely more graceful in de-



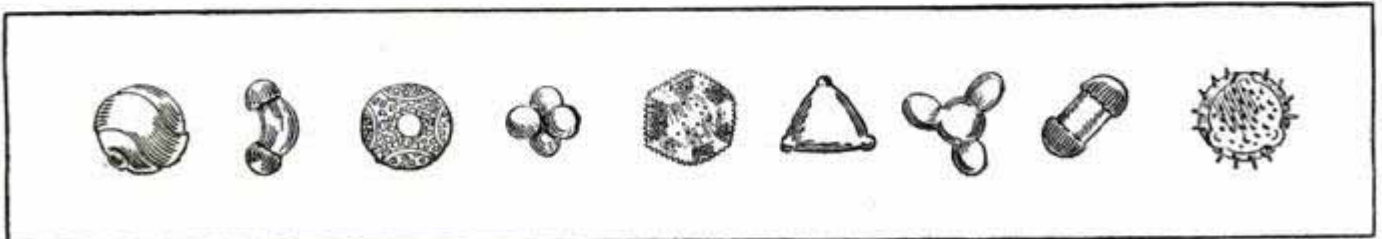
Photomicrographs of Frost and Ice Crystals

sign than the storied marble of a Phidias or a Praxiteles, lie in wanton waste in the foul mud of the ocean depths.

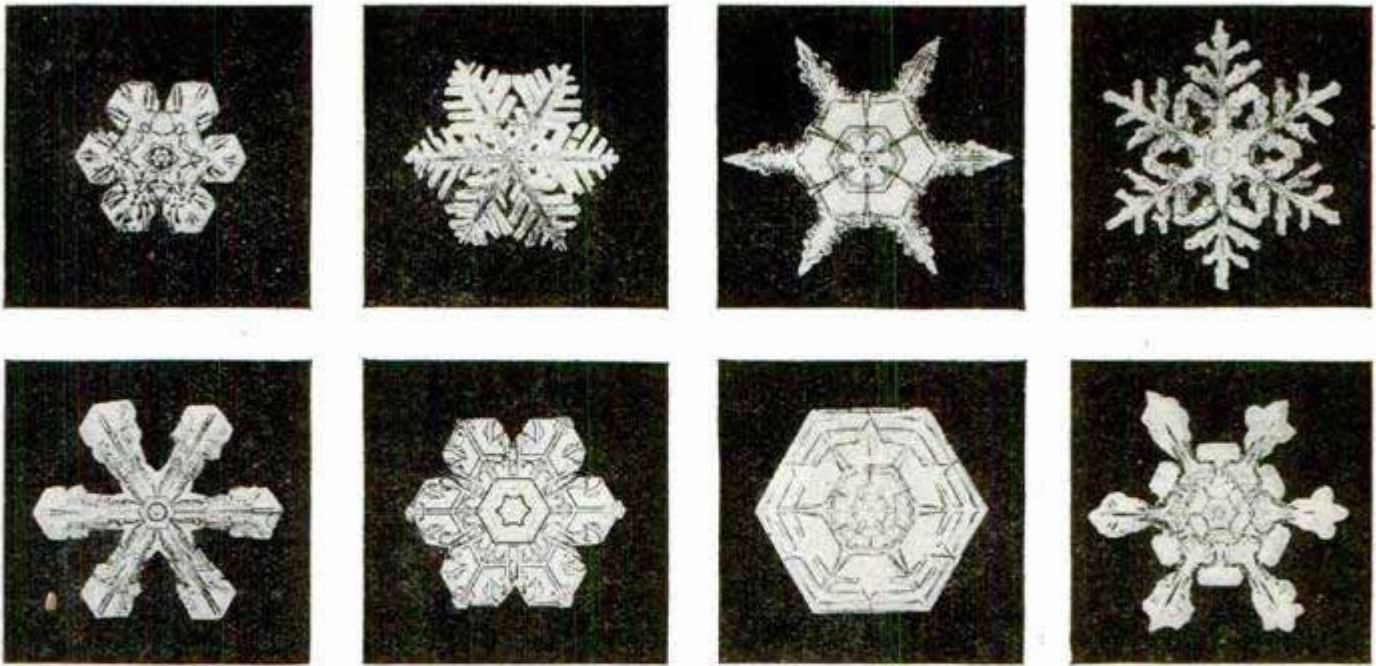
Let us take another handful of dust from garden and meadow. Under the microscope we find this to contain thousands of curious forms known as pollen grains. It is a well-known fact that practically all the flowering plants emit from their anthers a powdery dust that is of vital importance in the life history of the vegetable kingdom. These pollen grains are carried either by insects or by the wind to the stigmas of other plants, or of the same plant. Here they at once proceed to send long tubes down to the ovules hidden away in the lower part of the pistil, and fertilize them into true seeds. While the whole process is wonderful, it is the variety and beauty of form displayed by the various pollen grains to which we would especially ask attention. The illustration shows a few of the many different

kinds. Some of the grains are perfect globules, others are cubes or ovals. Some are wonderfully lobed or have bladder-like appendages to assist in the transportation of the pollen by the wind. Some are covered with bristly points like diminutive spearheads. Others have delicately wrought smooth bands or spiral groovings. So specific are these markings that it is possible to recognize many plants by the pollen alone. They are as characteristic and individual as human beings themselves, and yet, they are after all but insignificant motes of dust.

For our next handful, let us scrape off a few bits of the weathered granite, limestone, and sandstone of any mountain side. Let us take them to the laboratory and grind the tiny fragments so thin that we may see through them. Under the microscope, these paper-thin rocks tell us all about themselves, and their story is wonderfully interesting. Even the mountains, so say the rock sections, are subjects of the



Pollen Grains (Greatly Magnified) Assume a Wonderful Variety and Beauty of Form



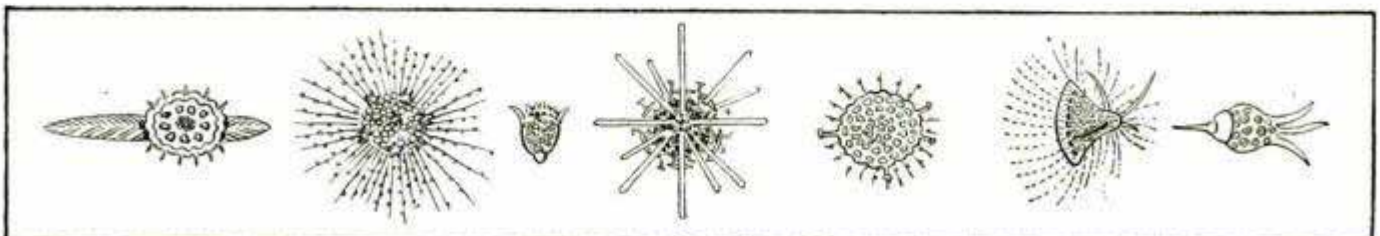
Photomicrographs of Snow Crystals

Kingdom of Dust. These delicate films of rock enable us to look directly into one of nature's private laboratories, and we see the various particles of quartz, mica, feldspar, limestone, hornblende, and other rock material summoned from the disorder and chaos of the dust heap and marshaled into the beautiful and symmetrical forms that are known to us as crystals.

And now we must digress a little from the main subject in order that we may review our knowledge of the wonderful process known as crystallization. If we place a few grains of sugar in a small quantity of water, and let the mixture stand undisturbed for a few days, a queer thing takes place. Slowly but surely each tiny particle of sugar, moving about in the solution, makes overtures to the other particles looking to a combination. If a thread be placed in the concentrated liquid, the process of crystallization goes on apace. Little by little the opaque sugar, particle by particle,

takes hold of the life line thus thrown to it, and attaches itself either to the thread or to other particles that have already gained a hold upon it, and forms crystals, beautifully symmetrical and transparent.

Imagine a mob of men running wild over a vast field. Suppose that these men were suddenly to fall into line like well-trained soldiers. Suppose that these individual men were to form, at the word of command, into the most perfect geometrical figures, star-shapes, pyramids, squares, hexagons, octagons, or even cubes, bounded by lines and angles that are mathematically perfect. Suppose, also, that some of these men, wonderful to relate, should become perfectly transparent or translucent, either colorless or tinted a beautiful violet, blue, green, lavender, orange, pink, or brown, and that others should remain opaque. Would not all this be ridiculed as an impossibility or the dream of a poet? Nevertheless it is precisely what hap-



Minute Shells, Microscopic in Size, Dredged from the Ocean Bottom

pens when certain substances are permitted to dissolve and to follow the unerring laws of a sovereign of which they are the liege men.

Anyone may readily become familiar with the many curious facts that are associated with the phenomenon of crystallization. Practically all of the household chemicals, such as sugar, salt, baking-soda, washing-soda, cop-peras, cream of tartar, etc., will answer the purpose. Dissolve any of these substances in a small quantity of boiling water, and let the mixture cool and slowly evaporate. In a few hours or at most, in a few days, characteristic crystals will form, more beautiful than any illustration that could be put on printed page. If all the substances are mixed and dissolved, crystallization will go on just the same. Each of the salts will form separate communities of crystals. Each sort will seek its own kind with something that is marvelously akin to intelligence. If we enlist the chemist's aid in our search for crystal material, and secure other chemicals, such as blue vitriol, bichromate of potassium, alum, hyposulphite of sodium, and nitrate of silver, we shall add greatly to the beauty and completeness of our home-grown collection of crystal treasures.

In all this wonderful world of ours there is surely no process more wonderful than that of crystallization. If architecture is "frozen music," as Madame De Staël so aptly said, then crystals must be frozen thought. Their study opens up an enchanted realm wherein fairy princes, gnomes, and dwarfs work their will, building beautiful things out of the lowly dust. In many respects a crystal in its life history resembles a human being. As Ruskin pointed out, long ago, there are crystal virtues, crystal faults, crystal quarrels, crystal joy, and crystal sorrow, if we read aright the messages the crystals have left for prying mankind to interpret and understand. They tell us of ambition, emulation, caprice, activity, rest, weakness, strength, pride, success, and failure.

Do we find much more than this in the life story of the average man or woman?

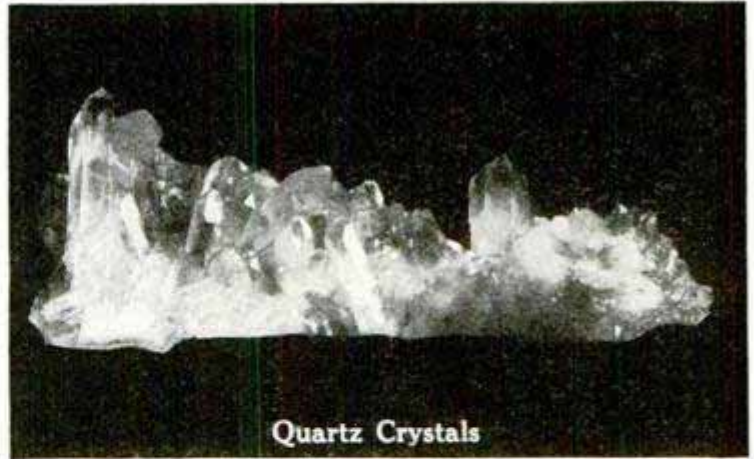
Let us take our next handful of dust from the black muck and slime of a swamp or bog. Surely nothing else could be more uninviting. Instinctively we associate it with death and decay, forgetting the ancient delights of mud-pie days in the long ago. And yet, this muck and slime has a story to tell, just as marvelous as that told by the deep-sea dredgings. Besides the water present, there are at least four different materials in this handful of "filth" from the bog. The surprising part of it all is that no one would ever imagine that these substances were there, after we have sorted them out and told the story of their possibilities.

The mud contains tiny particles of iron, clay, sand, and soot, or carbon. How did the iron get there? Have you ever noticed an iridescent film shining on a pool of stagnant water in a woods? Undoubtedly you have, and thought it to be a scum of oil. On the contrary, this film has nothing whatever to do with oil, but owes its presence to tiny particles of iron oxide that were leached out of the surrounding soil, carried by little threads of water trickling through the forest floor, and deposited in a pool where it eventually was laid down as bog iron ore. Billions of tons of iron ore have been deposited in this manner throughout the earth's crust. Therefore, the first of the wonderful things that we are to notice in this handful of muck is iron with all its potentialities of steel steamships, skyscrapers, bridges, boilers, and rails that will one day crisscross a continent.

Let us now consider the next ingredient in our handful of mud,—the clay. The clay is the plastic substance that we readily detect by kneading the mass with the fingers. Crystallization will work wonders with this sticky, coherent substance. Obeying the wonderful law of unity, as Ruskin has told us, the clay particles will sepa-



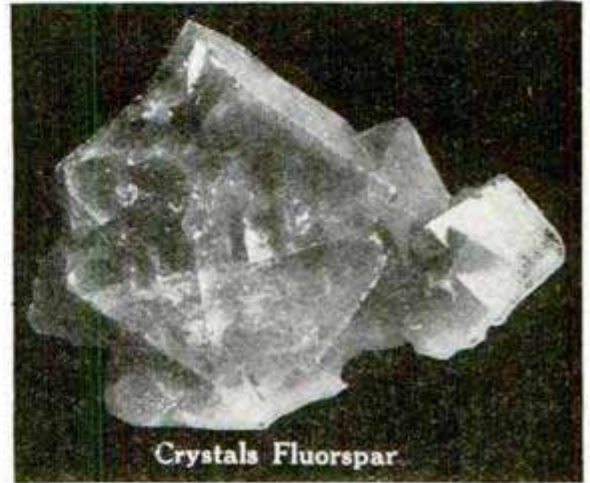
Crystals—Black Tourmaline in Quartz



Quartz Crystals



Crystallized Sugar—Rock Candy



Crystals Fluorspar

Various Crystals Built from the Dust

rate from the other constituents and form the beautiful white material from which our finest porcelain and china-ware are made. More than that, if left to itself, the clay may crystallize into a substance that is harder than flint, and of a beautiful red, green, or blue color—a ruby, emerald, or sapphire.

The gritty substance in the mud is sand, and when this substance likewise enters the mystical crystal kingdom it forms the precious opal. The carbon, not to be outdone by the clay and sand, casts aside its mantle of sooty darkness, and through the magic power of old Mother Nature, may become a diamond. This handful of dust, then, has turned out very well, in that it has given us iron, the most useful of all the metals, and a handful of the rarest gems—and all from the mud we are so careful to avoid lest we soil our shoes or clothing with it!

Let us take one more handful of dust and "tell its fortune." This time let it be water-dust—snow is its ordi-

nary name. Everyone, surely, is familiar with the exquisite beauty of the snowflake. Formed as they are on the general plan of a hexagon, no one ever saw two snow crystals precisely alike. Nature sends out billions and billions of her snow handiwork, but every copy is an individual and peculiar one. She delights in variety, and truly the snowflakes are not the least of the "Wonders in the Dust." Even in a cake of solid ice one may see the delicate, beautiful snow flowers packed closely together, for the ice is simply one mass of these marvelous products of nature's art gallery.

Floating lazily in the clear blue reaches of the sky are other examples of the wonders of water-dust. The glorious clouds, like fabled castles filled with dream folk, are either tiny drops of water, or minute crystals of ice soaring far above the busy world below. Sometimes these ice crystals cover trees, window sills, and grass with their beautiful spicules of hoarfrost, and everyone knows what a fa-

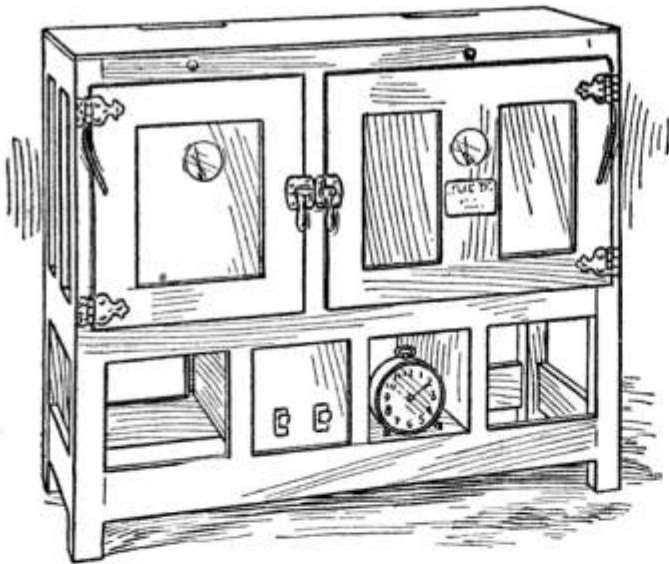
mous artist Jack Frost is in the matter of window ornamentation.

One other thought, and then we are done with the Kingdom of Dust. The problem of food supply is becoming a serious one for mankind. We have been lavishly using the guano, phosphates, and other fertilizers that nature has given us, along with other priceless heritages such as wood and coal. The time is fast approaching when we shall either have to face starvation or else evolve some new source of food supply. Every day the problem becomes more insistent. What is the solution? Clearly we must wrest from nature one of her

simplest and yet most carefully guarded secrets. We must go down into the dust, study the ultimate atoms that compose it, and learn how nature combines a bit of soot and a few raindrops, thereby giving us that wonderful substance, sugar. We must learn how she manufactures that life-sustaining compound, albumen, from carbon, hydrogen, oxygen, nitrogen, and a trace of sulphur. Her chemical magic, her marvelous constructions of complex molecules from simple atoms, her power to change the stone into bread, are secrets that lie hidden somewhere within the mighty Kingdom of Dust.

AUTOMATIC ELECTRIC FIRELESS COOKER

A new automatically operated electric cook stove, manufactured by a concern in Flint, Mich., employs the fireless principle of operation, the heating elements of which are inclosed in ther-



An Electric Fireless Cooker Whose Operations, Both in the Throwing On and Off of the Heat, are Automatically Controlled

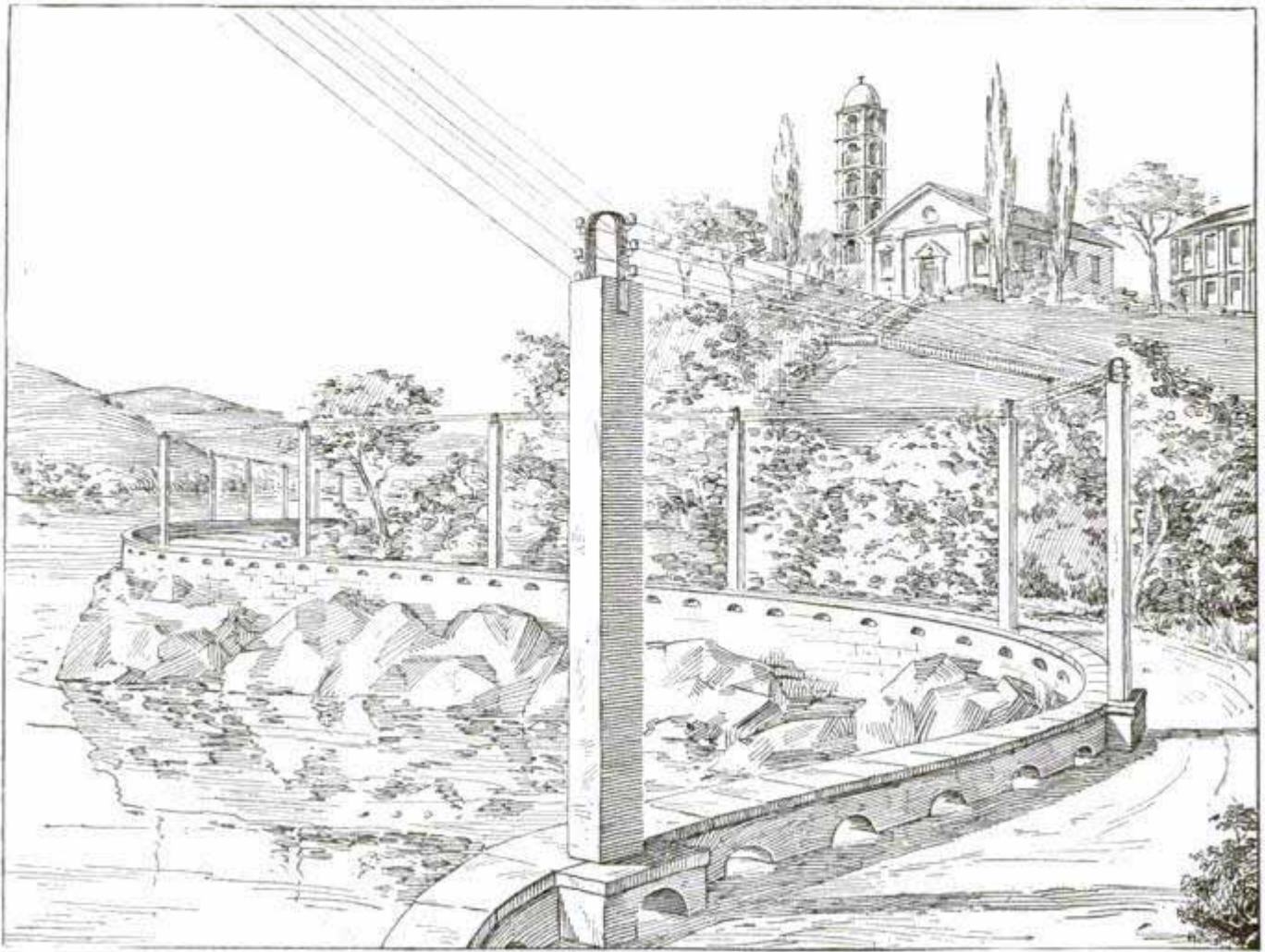
mally insulated compartments, and cut off automatically when the ovens have reached the predetermined temperatures for the cooking operations required.

The installation comprises two separate cooker ovens, one for boiling and the other for baking and roasting. Each oven is fitted with a dial-type thermometer, the pointer of which, upon making contact with an adjust-

able hand, momentarily closes an auxiliary circuit, tripping out the heater switch. The temperature at which the heating element is thus disconnected can be set at any desired point by means of the thumb-controlled contact pointer. For the boiler the cutting-out point is ordinarily set at 212 deg. F., and for the roasting oven, at 375 deg. After the temperature required to operate the cut-out has been reached, the cooking proceeds with the heat already stored in the oven, the stove thus becoming a fireless cooker.

By reason of the alarm clock provided, the housewife may place the articles to be boiled, baked or roasted in the stove, and go away for the afternoon, knowing that the oven will begin heating at the time she has set the alarm. When the alarm operates, a lever on the winding key throws a switch closing the circuit to the heating elements. Later, when the predetermined temperatures have been reached in the ovens, the circuit is broken, and the ovens go on cooking with the heat they have stored up.

☞Australia is rapidly coming to the front as a wheat-producing country, there having been a yield of 24,344,740 bu. during the past season from 2,104,717 acres of land, an average of 11.57 bu. per acre.



Old Swiss Road, Built by the Romans, Lined with Granite Telegraph Poles

GRANITE TELEGRAPH POLES IN SWITZERLAND

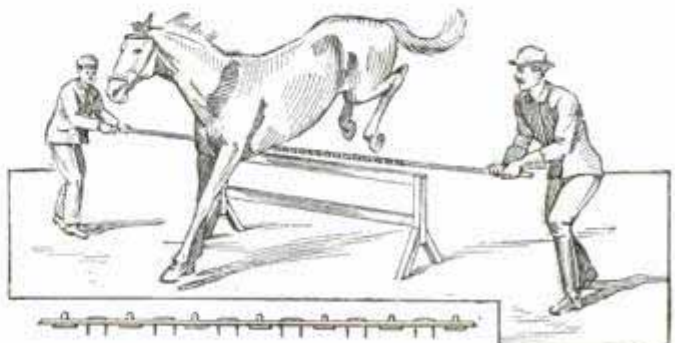
The great abundance of granite rocks and the lack of timber in the southern part of Switzerland has led to the employment of the former for purposes usually filled by the latter. Thus, in many sections of the southern country, the fences are of granite instead of wood, the supports for the

grapevines are granite posts, and pavements, etc., are of granite. Perhaps the most striking departure from the ordinary, however, is the use of granite pillars in place of the usual wooden telegraph, telephone and electric-power transmission poles. Near Lake Como and Lake Maggiore the old highroads originally constructed by the Romans are fringed with granite pillars 18 ft. high carrying telegraph wires.

RAPPING BAR USED TO TRAIN JUMPERS

The device shown in the drawing, called a rapping bar, is used successfully in the Russian army in schooling horses to jump obstacles without brushing or tipping them with the hoof. Two attendants hold the bar at the same height and about six inches or a foot beyond the obstacle to be jumped. If the horse ridden over the jump touches with fore or hind feet,

the attendants quickly raise the rapping bar six or seven inches and the



The Rapping Bar in Use

animal gets a sharp rap on the legs from the short blunt points of the copper rivets and from the bar itself.

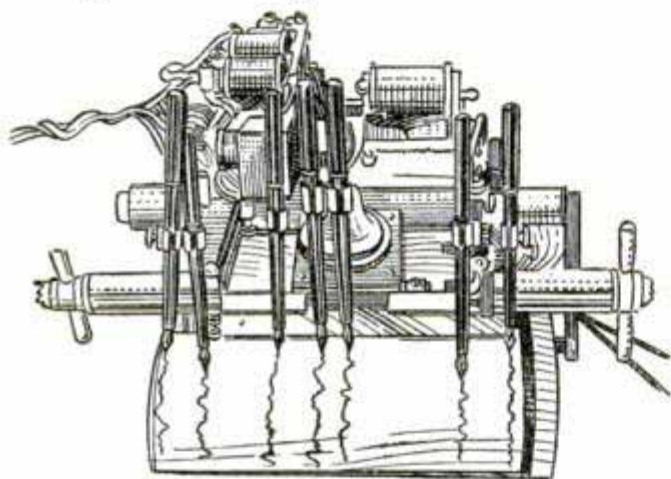
The rapping bar is a light pole, 10 ft. long, 2 in. in diameter, wound with leather straps studded with $\frac{3}{8}$ -in. copper rivets. When the bar is raised and struck by the horse, it should be let go by the attendants, the punishment then being about equivalent to

striking a stiff hedge; enough to make the horse jump clear next time, but involving no injury or cruelty.

At the recent horse shows in Europe, the honors in the jumping contests were practically monopolized by the French, the Russians, and Belgians, who consistently and systematically school their horses to the jumps by various methods.

CHRONOGRAPH FITTED WITH FOUNTAIN PENS

Fountain pens are used in connection with the recording apparatus of a dynamometer car used for brake tests by a large Pittsburg manufacturer of air



The Seven Fountain Pens of This Chronograph Make a Continuous Record of Various Performances of Interest in Train Operation and Air-Brake Control

brakes. The chronograph, or recording apparatus, consists of an electric motor and a series of gearings through which is driven a roll of paper 9 in. wide. Upon this roll of paper is automatically recorded the various performances of interest in train operation and brake control, including the speed in miles per hour, the revolution of wheels under the dynamometer car, time movements at half-second intervals, position of reverse and throttle levers, train-line air pressure, brake applications, etc.

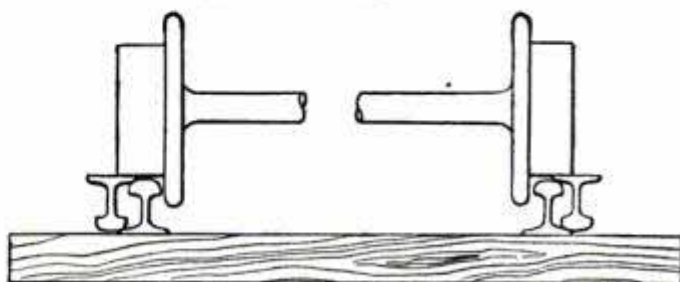
The recording apparatus can be so adjusted as to record any or all of the events enumerated to meet the requirements of the test desired, the records of the various events being registered through means of indicators and mag-

nets, and a permanent continuous record inscribed on the roll of paper by means of the fountain pens. Seven fountain pens and the manner of mounting them are shown in the accompanying illustration.

EXTENDING CONSTRUCTION TRACK WITHOUT RAILS

In extending the temporary or working track in tunnel construction, short lengths of rail are usually employed, and the track layers are apt to put the ties in carelessly with the intention of fixing them properly when the permanent rails are placed.

By the method shown in the illustration, the ties are placed permanently the first time and full-length, regular rails are used. The ties are laid as near the face of the cut as advisable, and two full-length rails are placed on the outside of the last set of regular rails. Then a track spike is driven in at both ends of the lap of each pair of overlapping rails to keep the new rail against the old, and the track is ready for the car. As the heading advances the rails are slid forward, and when the ends are reached they are turned over and spiked in place.



Courtesy Engineering and Contracting
Sectional View Showing Method of Extending Tunnel Track

PNEUMATIC-TUBE SERVICE TO CARRY MONEY

The Secretary of the Treasury proposes to establish in the near future a pneumatic-tube service between the Bureau of Engraving and Printing and the Treasury Department, a distance of six city blocks, for the transportation of millions of dollars of paper currency, stamps and securities. The transportation is now accomplished by means of big steel vans, guarded by half a dozen armed men and a number of mounted guards. No attempt has ever been made to hold up these vans, but the underground tube is considered advisable more for economic reasons than as a precaution against robbery.

COMBINED TELEPHONE AND LAMP STANDARD

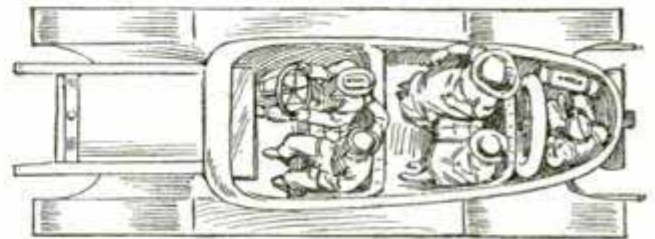
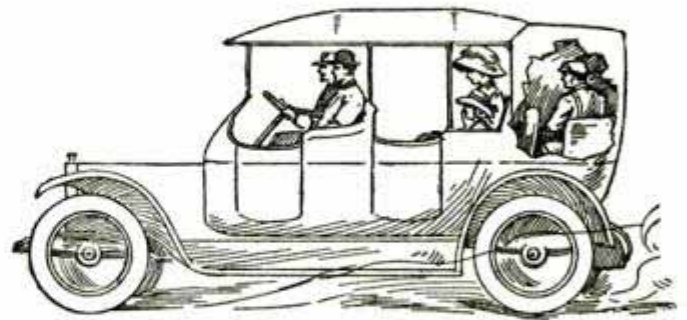
A desk telephone and lamp standard in one is shown in the accompanying illustration. The unique feature lies in the fact that the transmitter is located in the top of the shade, the shade also serving to gather up the sound of the voice and concentrate it upon the transmitter. The idea has been patented. The shade would have to be tilted rather close to the face to make transmission of the voice at all clear, and this would throw the direct glare of the light on the person using the instrument.



Telephone Transmitter and Electric-Light Shade Combined

ENGLISH SUGGESTION FOR DIS- POSAL OF CHAUFFEUR

The problem of what to do with the chauffeur or mechanic when the owner wishes to drive his own machine



Courtesy Motor, London

Closet-Like Space at Rear of Open and Closed Type of Automobile for Luggage and for the Chauffeur When the Latter is Not Driving

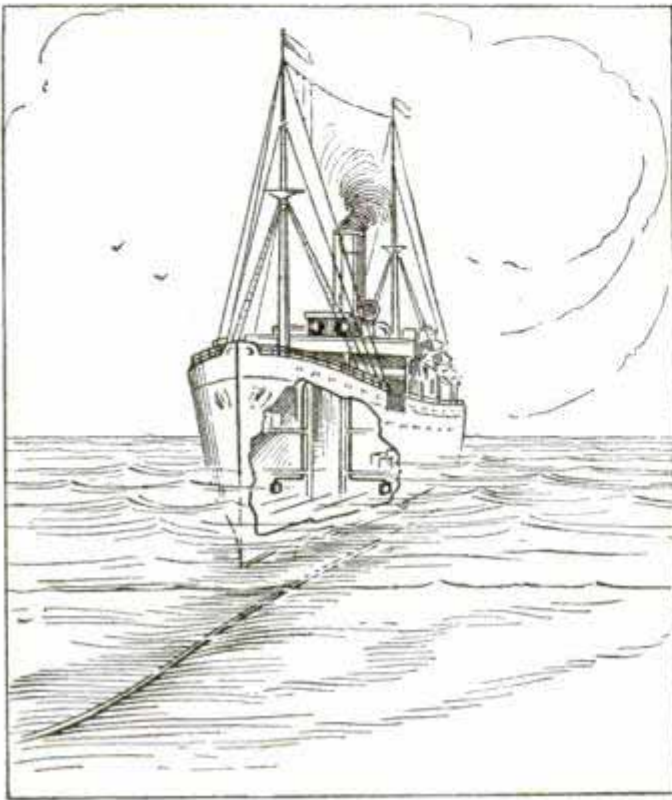
has not yet been successfully solved, although the demand that a type be evolved in which the best part of the car is not turned over to the chauffeur grows more persistent. In the accompanying drawings, however, is shown a British suggestion for the disposal of the spare wheel, the baggage, and the chauffeur that can be applied to either an open or a closed car. This idea embodies the continuation of the streamline type of the body to form a closet-like space at the back of the car sufficiently large for a mechanic's seat and small luggage.

RELATIVE ENERGY OF RADIUM

At a recent meeting of scientific men in England, Sir William Ramsay made the statement that if the energy of a ton of radium could be accumulated and used, it would suffice to propel a ship of 15,000 tons with engines of 15,000 hp. at the rate of 15 miles an hour for 30 years. At the present day such a ship would require 1,500,000 tons of coal.

GUIDING VESSELS BY ELECTRIC IMPULSES

Two or three years ago a marine engineer proposed to string a line of electric lights along the channel of a



Vessel Equipped with New Submarine-Signal System

river, sound or other marine passage-way as a means of guiding vessels through fog or darkness. Nothing more has been heard of this scheme, but now comes the idea of laying an electric cable to guide ships by means of electric impulses instead of electric light. In this plan each vessel is to be equipped with two receiving instruments, one at each side of the hull. Both instruments are tuned to respond easily to the impulses sent through the cable. If the vessel is directly over the cable, the sound of both instruments would be equally loud, but, if off to one side, the instrument nearest the cable would be stronger, thus notifying the officer in command that the vessel has swerved from the correct course.

CA cloth is made from raw silk in China which can be buried underground a year without deteriorating in the least.

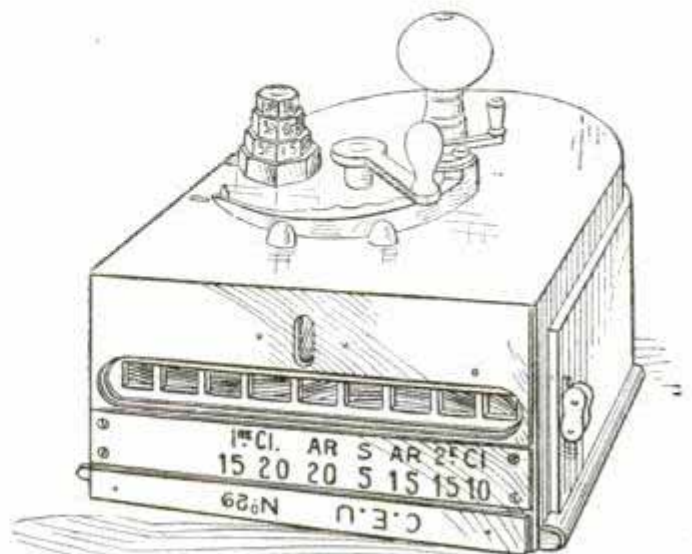
ELECTRICITY TO DESTROY THE CODLING MOTH

Electrocution of the codling moth is the latest method adopted to protect the trees by the apple orchardists in Spokane valley and the various parts of eastern Washington. A demonstration of the practicability of the idea was made last August in a 6-year-old orchard at Opportunity, Washington, and great numbers of second-brood moths and green aphids were killed in a few minutes.

In this test the current was provided by storage batteries, but where electric-light wires are extended to the orchard tracts, as in Spokane valley, the expense of batteries is saved. The electrocution weapon consisted of incandescent light globes of 6 cp., netted with fine steel wires, coated alternately with copper and tin. Attracted by the bright lights in the trees, the moths flew against the network, completed the electric circuit, and were instantly electrocuted.

FRENCH AUTOMATIC TICKET-DISTRIBUTOR

One of the omnibus companies of Paris has adopted a small portable fare-registering machine which delivers tickets or receipts when the fare is paid. It stamps the various first and second-class tickets for the single sec-

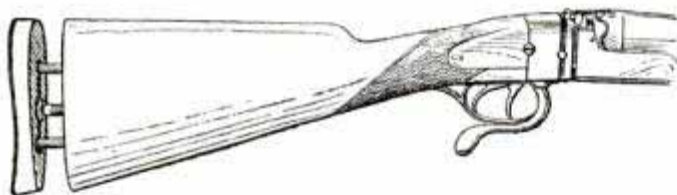


Fare Register and Ticket Distributor Adopted by Paris Omnibus Company

tions or the whole distance, and also indicates the route on which the ticket is used, the section at which the passenger entered the omnibus, the hour and the minute, the date, the number of the ticket, and the number of the apparatus which delivered the ticket. Counters automatically give the exact number and the total price of the tickets delivered for the whole day.

"TAILOR-MADE" GUNS

The best British-made sporting guns, designed to last a lifetime, and costing anything from \$250 to \$500, are usually built to fit the buyer, and in this respect resemble tailor-made clothes. The correct fit, however, is not obtained by intricate measuring of the person of the buyer, but by means of a "try gun" of the type shown in the accompanying illustration. This gun can be twisted and altered to practically any shape and length, yet can be fired in

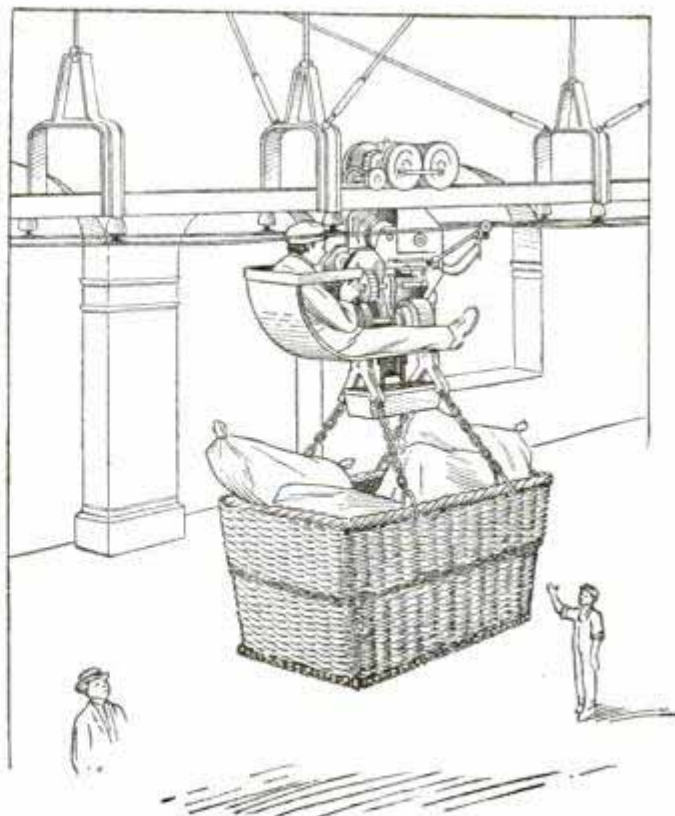


A Gun Which can be Twisted and Altered as to Shape and Length, Used for the Purpose of Obtaining the Correct Fit When Making a Gun for a Customer

exactly the same manner as an ordinary weapon. The purchaser desiring a made-to-order gun is provided with the "try-gun" and taken to the testing range, where he twists and alters it until he is satisfied with the way it fits.

ELECTRIC BAGGAGE TROLLEY IN RAILWAY STATION

An electric trolley or telpherage system has been installed in the Victoria station in Manchester, Eng., for the transportation of light baggage and parcels between the parcel office and the train platforms. The elevated runway consists of a pair of flat steel bars, 12 in. apart, and forms a continuous loop, 2,448 ft. long. The traveling hoist is suspended from the runway

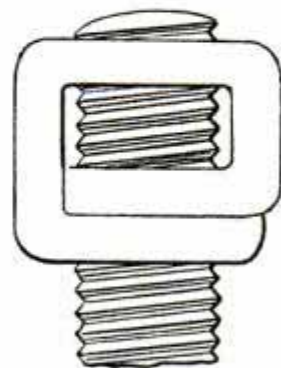


Electric Traveling Hoist Handles Light Baggage in English Railway Station

by a four-wheeled truck, and the operator rides in a hammock seat suspended just back of the motor. The carrying basket is 5½ ft. long by 3 ft. wide and 3 ft. deep, and is fitted with small wheels so that it can be moved easily in the parcels office or along the platform. The carrying capacity is 1,100 lb.

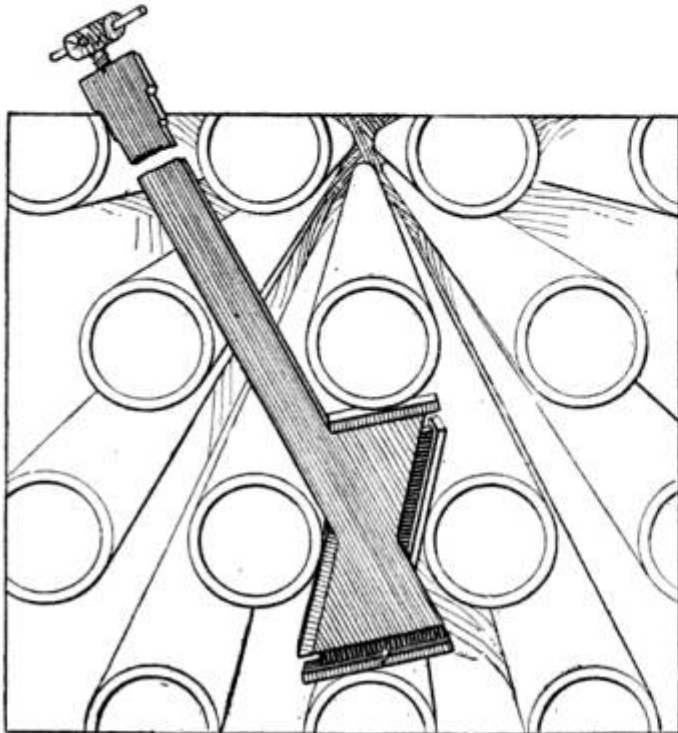
A LOOP NUT

Various devices are used for locking nuts to keep them in place, and, while many of them are of value, there are few good ways to lock a small nut without a cumbersome attachment which requires considerable time to adjust it in place. The loop nut illustrated is applicable to any size bolt, yet it is especially adapted for use on batteries, typewriters and small machines. The nut is formed so that it will bind on the threads sufficiently to keep it in place wherever it is set.



A SPREADER FOR BOILER TUBES

A tool for spreading the tubes of certain types of boilers has been placed on the market by a New York tool concern. It is made with an adjustable



Showing the Operation of a New Boiler-Tube Spreading Tool

spreader head, the movable part being operated by a threaded stem which screws into a nut on the inside of the handle and is controlled by the rod on the end. The working ends of the spreader have large faces, which prevent possible injury to the tubes. Its most useful purpose is to spread the tubes when it becomes necessary to replace the fire brick forming the baffle walls.

DISINFECTION IN THE XVII AND XVIII CENTURIES

In a medical work, published in Dresden, in 1711, the author gives the following rules to avoid plague contagion:

"In order to protect ourselves against the plague, we must first of all lead a clean life morally. Never open the windows if they face east or west, or when the weather is not fair, when there is a fog or rainstorm, especially if plague-victims live opposite or nearby. If the windows are opened at all,

this should be done between 8 and 10 in the morning. Living and sleeping rooms should be liberally fumigated with sulphur, saltpeter, incense, juniper, oak leaves, mastic, myrrh, birch bark, storax, or tar. From time to time, it is also well to burn nails, hoofs and horns of animals. Vinegar poured on hot slabs of stone is also to be recommended. As all kinds of foul odors and vapors must be avoided, it is necessary to remove at once from the house all decaying animal or other matter, offal and waste, to be burned."

Another author of the same period gives specific directions how to treat articles of dress, bed clothes, linen, furniture, utensils and even books, all involving washing in hot and cold water, fumigating and thorough airing, which should be repeated from time to time. Strict supervision was recommended that no diseased person might take part in these operations, and taken as a whole, and considering that the strong disinfectants we now have, as well as sewerage and ventilation were then unknown, the rules do not differ much from those of our day.

When a plague-stricken person had died in a house or when the disease had left a village or city, heroic treatment was resorted to. The city of Monaco was thus purified in 1631 after it had been ravaged by the plague, and a contemporary writer describes the treatment as follows: "All the inhabitants left their houses. These were then fumigated by burning hay moistened with vinegar or cheap wine, the smoke being left in the house until evening when the windows were opened. The following day another fumigation with aromatic plants such as leaves of rosemary or lavender, and on the third day a final fumigation with sulphur, to which mercury and arsenic had been added, is made. On the fourth day the house was perfumed by burning juniper, myrrh and the like."

But this was not considered enough to make the house again inhabitable, for the building was closed by the authorities and kept so for a certain length of time.

Of the house furnishings, books, etc., all that was considered of small value was burned—as for books, the physician was to judge which should be burned or not—and all the rest subjected to the most careful and minute cleaning processes.

In the meantime the survivors of the plague had also to undergo treatment in order to make sure that all disease germs would be destroyed. In solemn procession, chanting litanies, they marched to the sea, where all, men, women and children, undressed, were examined by physicians and then washed themselves first in hot water and then in the sea. While waiting, naked, on the shore, all their clothing was inclosed for one hour and a half in a nearby cave, where it was fumigated with a special strong perfume. After having dressed again, they marched as solemnly back to the churches and from there to their homes.

CRINOLINE AND AUTOMOBILES

If the style in feminine dress is to take the other extreme, and the circumference of the skirt becomes as large as it is now small, as European dress designers prophesy, the body design of automobiles may have to undergo change to fit the new require-

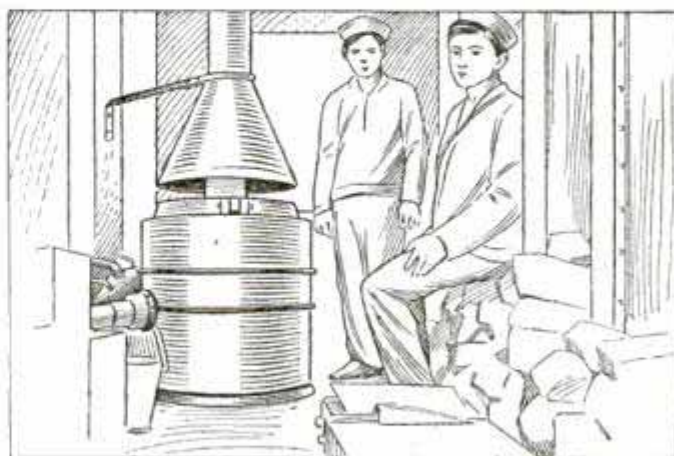


What May Happen in Automobile Construction if Crinoline Comes in Again

ments. This change, according to an artist of Motor, London, will take the form of doors so wide as to utilize almost the entire side of the car.

BRASS FOUNDRY ON BATTLESHIP

Included in the necessary equipment for making nearly all kinds of repairs, the U. S. S. "Georgia" has a brass foundry situated in a small deckhouse



The Brass Foundry on the U. S. S. "Georgia"

abaft the after smokestack on the upper deck. This deckhouse contains a combined blacksmith's forge and melting furnace capable of taking a No. 70 crucible, a bin having a capacity of 2,000 lb. of Albany sand, several flasks, iron and wood, and other foundry accessories such as tongs, shanks, clamps, etc. Since its installation about a year ago it has turned out 800 castings, the largest of which weighed 175 lb.

RAW FOOD SAID TO MAKE WHITE CORPUSCLES

Two French physiologists have recently demonstrated that a raw-food diet develops, under certain conditions, a considerable increase of the white blood corpuscles which play such an important part in the fight against invading bacteria. Cooked food, even in double doses, has no similar effect, according to these scientists. They accredit the value of the raw-food diet to the juices extracted from it in the process of digestion.

CA school superintendent of Lake Forest, Ill., recently made a trolley journey from that town to Boston, Mass., in 78 hours, the distance being 1,542 miles. The fares totaled \$24.59.

TWO-PURPOSE TUNGSTEN FIXTURE

A tungsten fixture recently placed on the market permits the operating of an electric fan, toaster, or chafing dish from a socket being used at the same time for lighting. A specially designed plug taps into the socket of the tungsten as shown in the illustration.



Up to date the United States has expended \$59,580,000 on 28 reclamation projects, during which time 5,967 miles of canals, 19 miles of tunnels, 2,193 bridges and 24,235 buildings, of various kinds, have been built; 73,666,000 cu. yd. of earth and rock have been excavated; three of the highest dams in the world have been built; 1,245,682 barrels of cement have been used and as a result water is now available for 1,086,000 acres of land valued at \$105,800,000, which produced crops valued at \$20,000,000 in 1910 and supported 14,000 families. In addition to this, it is estimated that the population of cities, towns and villages contiguous to the government work has increased by at least 25,000.

LONG FLATCAR HAS CABLE TRUSSES

In addition to its exceptional length, which is 83 ft. over buffers, this flatcar, built for the North Belgium Railway, embodies several features of construction entirely different from those

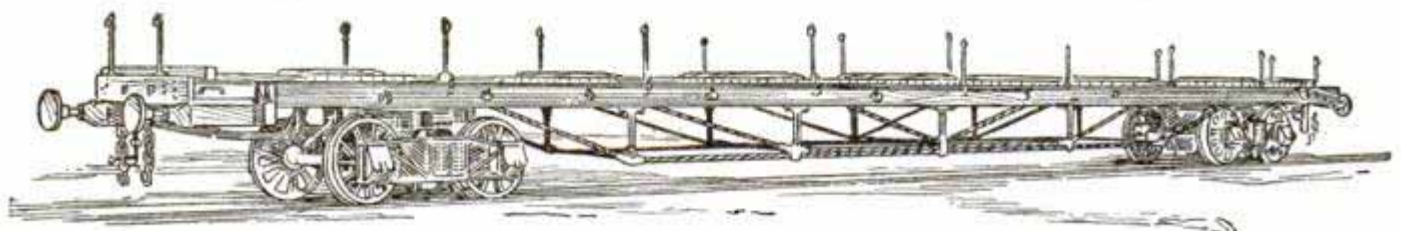
adopted in American railroad practice. The longitudinal sills or girders are extremely light, and, if the usual construction were followed, would be inadequate, but these girders constitute the compression members of the truss only, the tension members consisting wholly of the steel-wire cables, which constitute the most novel feature of the construction.

EARTH'S MAGNETISM SWINGS TRANSMISSION LINES

It seems that the breakage of electric power-transmission lines is often due to a peculiar swinging motion which such lines spontaneously assume when traversed by the current. What causes this swinging is not definitely known, but it is believed to be an electromagnetic phenomenon due to the magnetism of the earth. In experiments made in France it was found that a wire 60 ft. long began swinging with an amplitude of 24 in. when carrying a current of 20,000 volts.

According to a French scientific magazine, the geographical direction of the transmission lines has much to do with the seriousness and frequency of disturbances due to atmospheric causes, the lines running north and south being most frequently subjected to trouble. Also, that in hilly country, lines suspended so as to form a vertical zigzag line are much affected.

According to a census of the Union of South Africa, which has just been completed, the white people number 1,278,025 and the natives 4,061,082 out of a total of 5,958,499, the remainder of the inhabitants being blacks who are not natives of the countries included in the Union.



An Exceptionally Long Belgian Flatcar, Having Steel-Wire Cables as Truss Rods

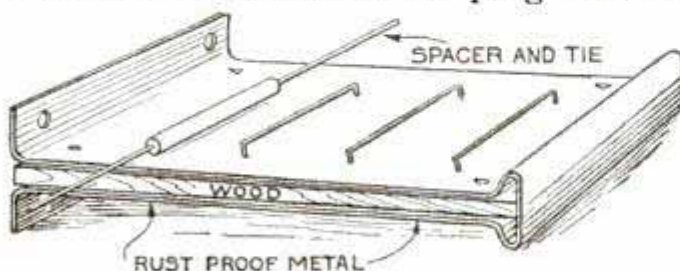
THE FUSION OF CARBON

The Italian scientist, La Rosa, who some time ago found that sugar carbon, formed on one of the electrodes of an arc produced by high-frequency alternating currents, showed a drop-like formation which indicated a partly fused state, has recently succeeded in obtaining the same result with an ordinary current. The maximum of this current was 80 amperes at 150 volts. He suspended a slender carbon filament between two carbon electrodes, and by gradually increasing the intensity of the current, so as to prevent sudden breaking of the carbon thread, it lengthened and sagged under its own weight just as a flexible wire. After the current was shut off, the whole surface of the filament showed little round congealed drops, but no trace of crystallization, proving that fusion had taken place.

According to "Cosmos," it seems probable, therefore, that science will soon find a means of completely melting carbon, and that the intermediate state between ordinary carbon and the diamond will thus be found.

NEW WALL PLUG AND SPACER

A new wall plug and spacer having a core of wood has recently made its appearance on the market. The wooden core greatly facilitates the driving of nails and screws into finished walls of concrete, brick, stone or tile, and holds them firmly in place. The wire attached to the plug acts as



This Wall Plug and Spacer has a Wooden Core to Hold Nails and Screws

both a spacer and tie-wire. When used in reinforced-concrete construction, the plugs are simply nailed to the forms before pouring the concrete.

AN INGENUOUS ROOFING NAIL

A new design of roofing nail has just appeared on the market. One of the greatest troubles encountered in

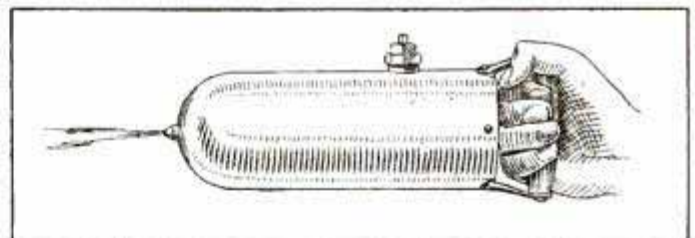


Manner of Using New Roofing Nail

the laying of prepared roofs has been the necessity for puncturing the roofing material in order to nail it. Rain water readily follows the course of the nail and the roof leaks. The nail shown does not pierce the layer exposed to the weather and at the same time does hold it rigidly in place.

GASOLINE GUN CLEANS AUTO MACHINERY

A gasoline gun, operated by compressed air pumped into it, and designed especially for cleaning grease,



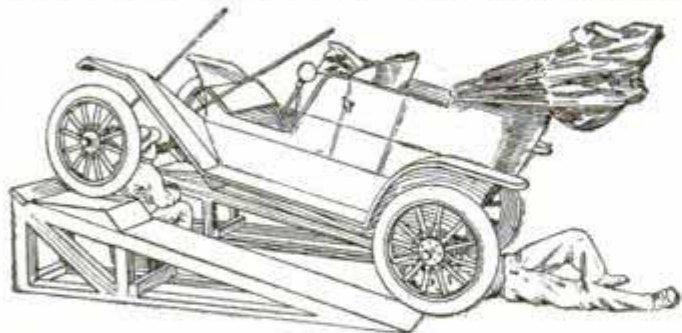
The Gasoline Wash-Gun in Use

grit, and other dirt from the machinery and parts of an automobile difficult to reach by ordinary methods of cleaning, is being placed on the market by a western concern. The gun holds a quart of gasoline, and, when pumped to a pressure of 100 lb., will instantly cut and wash the dirt away. It is used by holding down the nozzle so as to flush it with gasoline, and then pumping an air pressure of from 50 to 100 lb. into it. A small trigger arrangement controls the spray.

ⒸThe Transvaal section of the Union of South Africa is reported to be the largest consumer of explosives in the world, approximately \$7,000,000 annually being spent for this purpose.

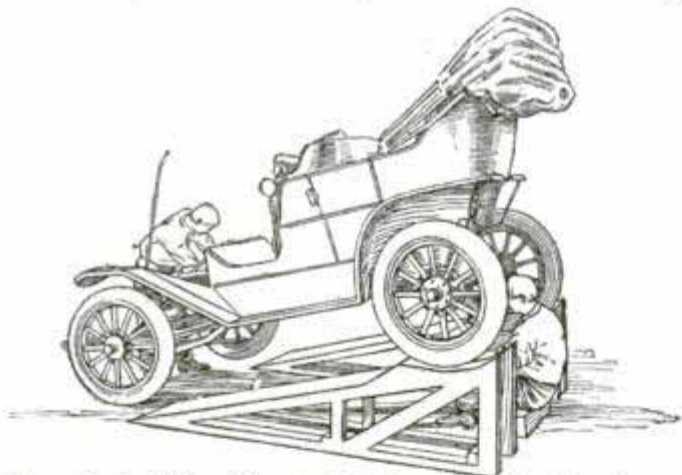
ELEVATING RUNNERS FOR AUTOMOBILE REPAIR

The foreman of the repair department of an automobile concern in New York has devised a very simple and



Elevating Device Provides Plenty of Space for Working under Car

practical device to aid in repair work under a car. It consists of a light elevating runway upon which the car is run. When the repair work is forward, the front end of the car is pushed up onto the elevation, thus providing



Rear End of Car Elevated to Provide Working Space under Rear Axle

plenty of room to work under the front axle. When the work is at the rear the car is reversed and pushed up the incline backward.

WEARING QUALITIES OF LINOLEUM

The wearing qualities of linoleum are said by the "Cosmos," a French scientific magazine, to be greater than either wooden or tile floors. According to this authority a perfect linoleum carpet has twice the resistance of a tile floor against wear, and more than four times that of a wooden floor. In actual use, however, this is far from the case, but this is said to be due to

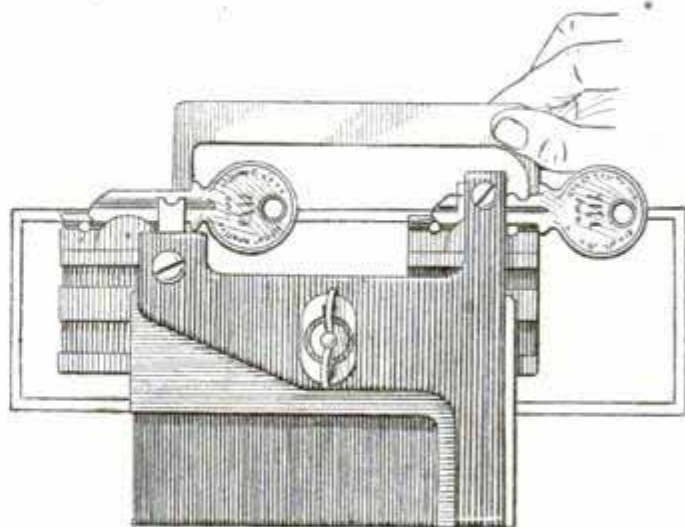
faulty and uneven laying of the linoleum, and also to the fact that the industrial product is always more or less defective.

ARTIFICIAL MARBLE FROM CINDERS

By a process which is being kept secret until the patents are allowed, a Berlin engineer is claimed to have succeeded in producing an artificial marble of extraordinary hardness from cinders combined with a binding material and coloring matter. With the aid of apparatus consisting simply of iron pots, a gas furnace and an old copying press, he is said to obtain, in a half hour's time, a slab resembling marble and as hard as iron.

A KEY-FILING JIG

Keys for a pin-tumbler lock must be made accurately and when a new key for an old lock is wanted, it is not advisable to file it over an old key as a pattern. The file is liable to remove some material from the pattern key and neither one will then turn the lock. The only safe way is to use a jig, and the one illustrated is especially made for this purpose. In using this jig the filer cannot cut into the pattern key.



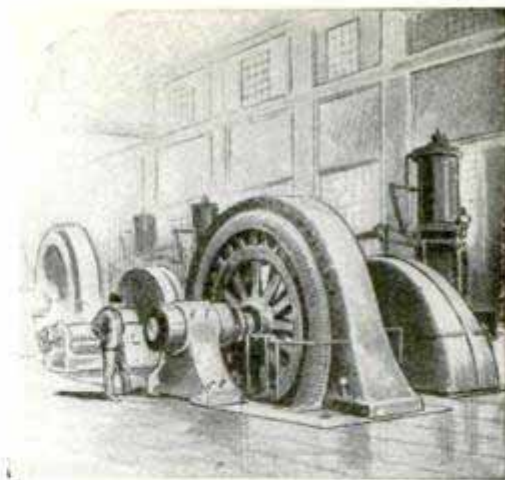
Device for Accurately Reproducing Keys for Pin-Tumbler Locks

The pattern key is clamped in on one side and the blank on the other and the pin guides the file.

An Answer to the Servant Question

The Second of Two Articles on the Cost of Electricity in the Home

By HENRY TARKINGTON



ELECTRICITY, the silent, mysterious handmaiden of modern scientific and mechanical progress is knocking at the door of every home. She is mute. She has no followers. She wants no "afternoon off." She lets you fix her wages. The children do not bother her. So long as there is a trolley line from which she can obtain necessary encouragement when her spirits are low, she works just as well in the country as in the city. She is never ill, never tired. She does not sleep. She always works at a maximum speed which you fix yourself. As she has upset all laws and customs of the industrial world, so she is prepared to silence forever that domestic cynic whose religion is summed up in the creed—"woman's work is never done," and to make possible an emphatic affirmative answer to the long-discussed question of whether or not "two can live as cheaply as one."

While it may be a national trait of the American people to take no short cuts to leisure and to scorn the man who would live without labor, this condition does not apply to the home. The work of scientists and mechanics in general industry for the past hundred years has been toward securing an increase of output in the same hours of labor.

The amount of work in the home has a fixed maximum. There are meals to prepare and serve; rooms to clean and air; dishes, clothes and linen to wash. There has been very little variation in the amount of work required to do this, except in proportion to the financial condition of the person doing the work.

As an abstract proposition, the labor required is about the same everywhere. And the trend of domestic science has been to lessen the labor of doing all this, to curtail the drudgery and to give the housewife more time for other things. For many years the woman who worked in domestic service has been a forlorn figure before a sympathetic public. The gratuitous sympathizers did not eat any less, get less mud on their boots, wear fewer clothes or keep them in better condition. Having expressed their sympathy they let it go at that. And the housekeeper was left just as forlorn.

But the day of her emancipation has come. Electricity has been put forward as the answer to the servant question. You have been informed that electricity will do all sorts of things for you if you will let it, but that the expense of apparatus and operation are prohibitive. And it does appear to be a fact at first glance. Go over the question and see just how cheaply it can be done. Understand first and foremost what you are paying for your current and then figure out what it would cost you to utilize more of it. Do you know that the more current you use the less you pay for it per unit? Few people do. And yet it is a fact.

It is probable that it now costs more than it will ever cost again. The more you use the current the less it will cost you per unit, and the more people using it the less it will cost them individually. There is a very good reason for this. It costs just as much, requires just as elaborate a plant, pro-

portionately, to furnish 10,000 homes with current for lighting, three hours an evening, as it would to furnish current for cooking, washing and ironing five times that number of hours out of the remainder of the same day. The difficulty is that the power plants must be prepared to put out a maximum amount of energy during one short period of the 24 hours. Their plant goes on just the same, perhaps with a slightly reduced output at the times the maximum is not needed.

At the present time it is not exaggeration to state that the work of the household can be done by electricity as cheaply in many cities and in thousands of small towns, as it can be done with gas, coal or woman power. In some cities the monthly bill will be found to average more.

This refers entirely to doing the work in the home. It has no reference to heating because until that happy time arrives when current reaches its lowest cost, or at least until it is considerably lower than it averages throughout the country today, there will be no economy in attempting to heat the home by electricity.

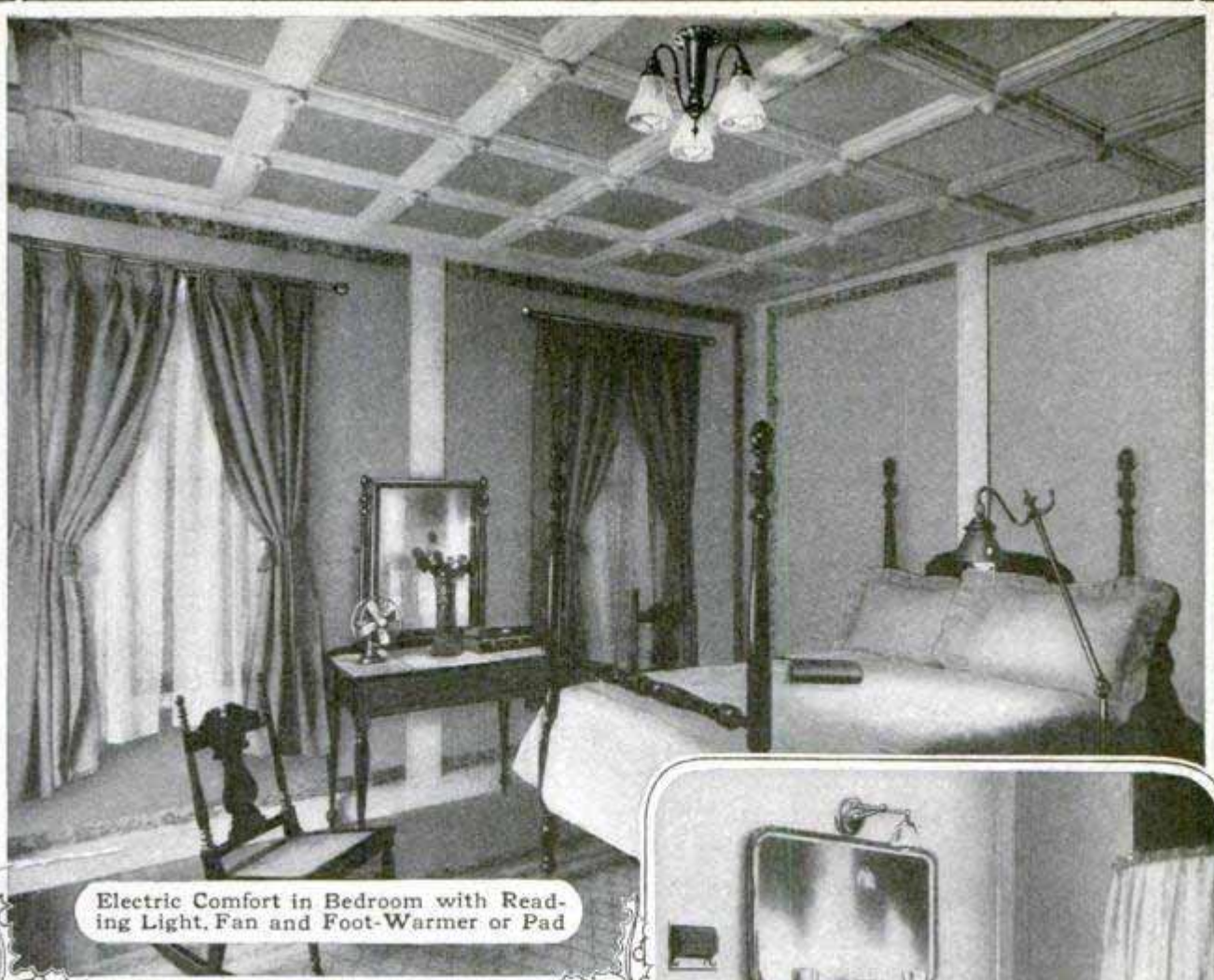
The question that naturally presents itself to the consumer of electric current is—"How much will it cost to do my cooking and how much will the apparatus cost?" No man or woman can tell absolutely how much current another man or woman will use in doing a certain thing. The rate for current varies a cent or two a kilowatt-hour in various sections of the country, but valuable information can be obtained from what current is actually consumed in certain domestic operations. And that is the purpose of this article. In the previous installment instruction was given as to how to calculate the cost of current. With this information the cost of operation of various household utensils can be readily deduced, the local rate for current being used as a basis for calculation.

The housewife unfamiliar with the use of electric current will probably lose the gist of these calculations if she

does not remember that the maximum heat is on tap at all times. She would naturally allow some time in her sum for the heating of the apparatus. This is an error. The writer has an electric iron provided with a stand so that it can be used as a stove. This iron is ready for use as an iron within one minute after the current is turned into it. It will retain its heat as long as an ordinary flatiron. When used as a stove, the amount of current consumed is calculated on the basis of the amount of time necessary to boil water. Every housekeeper knows just how long water will take to boil. That is all she will find necessary to calculate. In using a percolator it is not necessary to keep the current turned on after the coffee has been made. Many persons using such apparatus turn off the current the minute the coffee begins to percolate. The heat that is retained in the utensil is sufficient to continue the operation. And that is the economy of electric cooking. There is no fire to burn out. The minute its work is done the current is turned off and the expense stops the instant the switch is turned.

The electric iron is without a doubt the most popular electrical appliance for the home. It is without a peer for relieving the drudgery and distress of the middle-class housewife who does her own work, and to the hardworking laundress it is a veritable godsend. A good electric iron can be bought for \$4.50, and on the average consumes about 500 watts. Thus in one hour's continuous use it would take 500 watt-hours of electrical energy. In two hours it would use 1,000 watt-hours, or 1 kilowatt-hour, which in an average case would cost 10 cents for current. An electrical statistician estimates that the average cost per month of using an electric iron in a large city is \$0.60, which is a small price to pay for the relief from the heat of a coal or gas stove and the economy in time saved for changing the irons. Probably the gas would cost this much anyway.

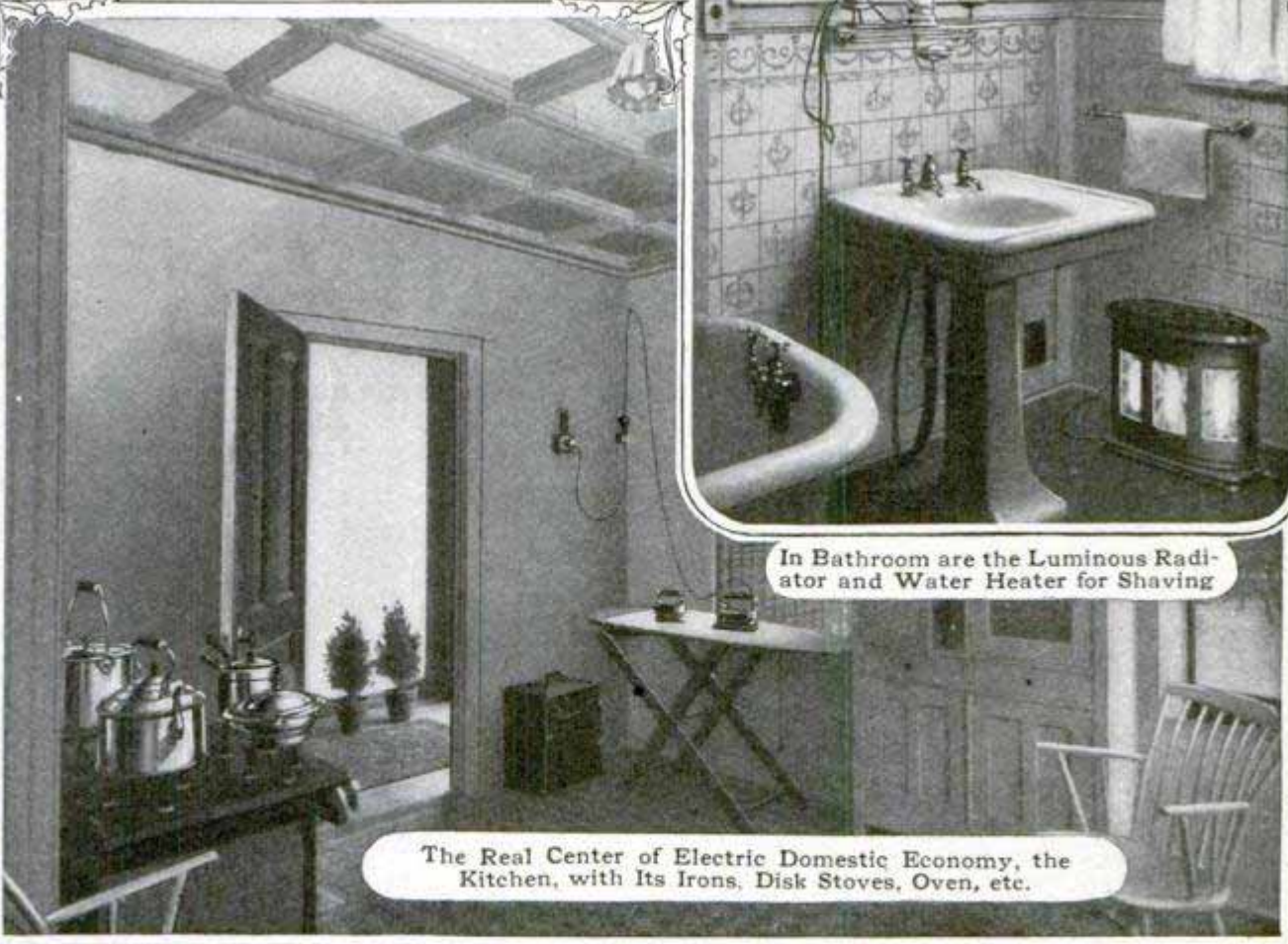
The electric toaster is another con-



Electric Comfort in Bedroom with Reading Light, Fan and Foot-Warmer or Pad



In Bathroom are the Luminous Radiator and Water Heater for Shaving



The Real Center of Electric Domestic Economy, the Kitchen, with Its Irons, Disk Stoves, Oven, etc.

COMFORTS IN EVERY ROOM IN THE ELECTRIC HOUSE

venience which is very popular. The average price is \$4.50, and the current consumed is about the same as with the electric iron, although the total time it is in use is less. The average cost for current to operate a toaster in a large city is not more than \$0.20 a month.

The coffee percolator averages \$13 in price and 500 watts in electric power to run it. Based on 15 minutes a day, and 10 cents a kilowatt-hour, such a device would cost for current \$0.37½ a month. The calculation is as follows: Fifteen minutes a day is 7½ hours a month. Multiply the number of hours a month by the number of watts (7½x500) to obtain the number of watt-hours a month. The answer is 3,750 watt-hours. Divide by 1,000 to get the number of kilowatt-hours. This is 3¾. And at 10 cents a kilowatt-hour the monthly charge for current is \$0.37½.

An electric chafing dish may be bought for about \$12.50. It uses 500 watts. Disk stoves vary greatly in price and current required, but most of them take in the neighborhood of 500 watts. A 2-lamp, luminous, electric radiator for the bathroom or bedroom will cost about \$8. It uses 500 watts. A 3-lamp radiator, costing \$13.50, takes 750 watts. A \$25 electric vibrator requires only 50 watts, and an electric sewing-machine motor costing \$25 uses so little current that its operating cost is inappreciable. The electric washer and the electric mangle, at \$85 and \$65 respectively (prices vary), take only about 125 watts each, and a \$125 electric vacuum cleaner with a 185-watt (¼-hp.) motor may be run 2 hours a week at a cost of only 15 cents a month for electricity, with current at \$0.10 a kilowatt-hour.

The small 8-in. electric fan is quite big enough for the average room. Its price is about \$9 and at 10 cents a kilowatt-hour it costs only about one-fourth of a cent an hour to run it on the high speed (24 watts), one-fifth of a cent an hour on the medium speed (18 watts), and one-seventh of a cent

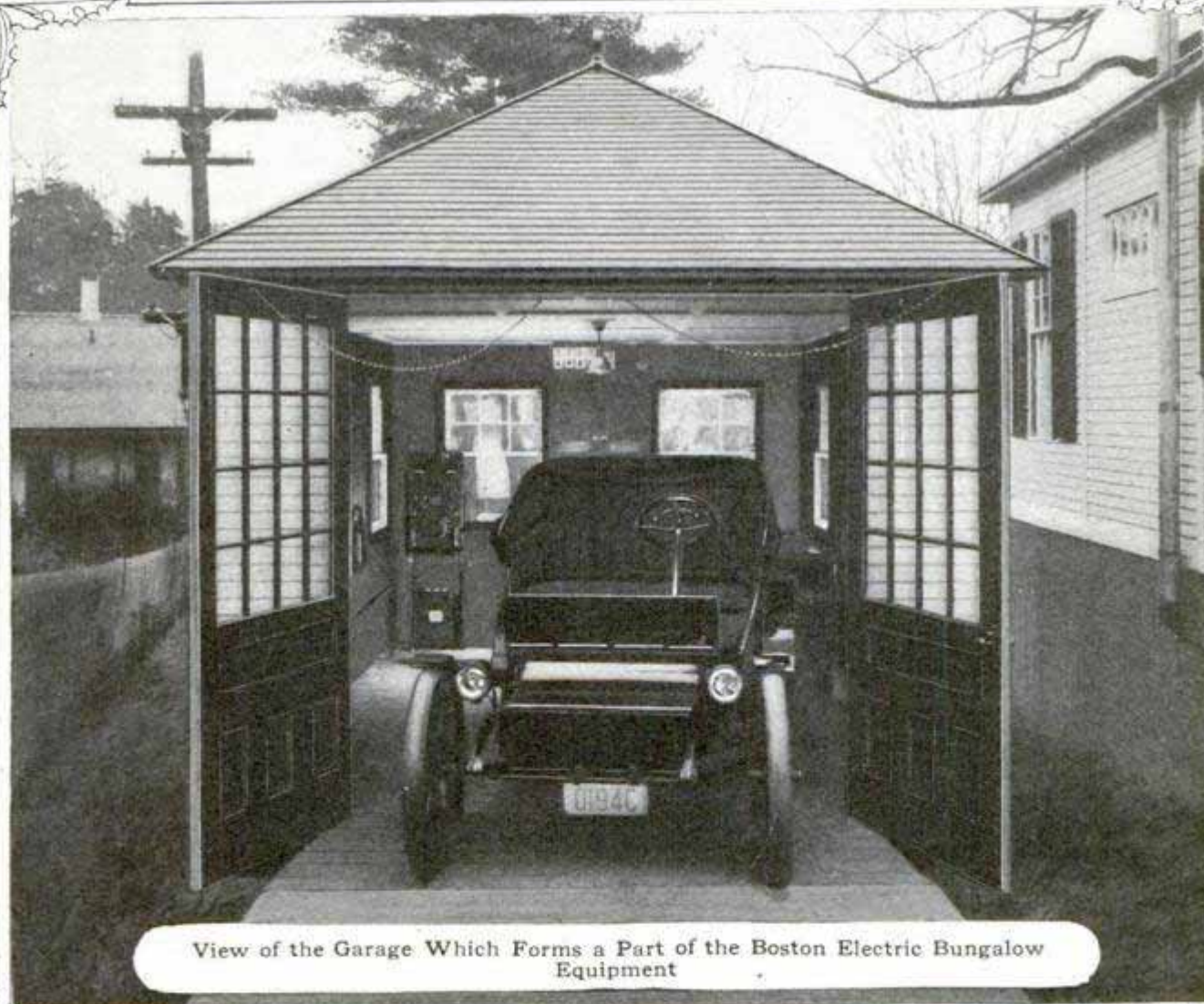
an hour on the low speed (14 watts). At this rate one could run such a fan all night (7 or 8 hours) in the bedroom, on the low speed, for about one cent, surely a small price for a comfortable rest on a hot summer night!

Besides the devices already mentioned, there is the electric hair dryer which sells for about \$25 and consumes 350 watts, thus costing about 1 cent to operate for from 15 to 20 minutes; there is the 1/20-hp. (37.3-watt) general-utility motor, costing about \$21, and displacing the kitchenmaid in many of her chores at the rate of less than two-fifths of a cent an hour for electric power; and then of course there are the more pretentious electric kitchen cabinets and "automatic kitchens," the operating costs of which can be figured out if one knows the power of the motor in watts or in fractional parts of a horsepower, remembering that in order to convert horsepowers into watts it is necessary to multiply by 746.

So far the calculation of the cost for electric service has been very simple. For, at 10 cents a kilowatt-hour (1,000 watt-hours), the electricity costs 1 cent for 100 watt-hours, so that if one multiplies the wattage of a lamp or piece of apparatus by the number of hours it is in use, and divides the result by 100, the answer gives the number of cents the electricity will cost. But few electric companies charge a straight rate for current. Many people have puzzled over this. For instance, one month a person may have a bill for 50 kilowatt-hours, for 40 of which he is charged at the high rate of, say, 12 cents a kilowatt-hour (\$4.80), and the other 10 at the low rate of 7 cents a kilowatt-hour (\$0.70), making a total of \$5.50. (These are the rates in Chicago.) The next month he may use the same amount of current and be charged for only 30 kilowatt-hours at the high rate, reducing his bill to \$5. Of course he will wonder why this is, and perhaps put it down to the fact that the electric-light company has made a mistake, if the bill is reduced, or that it



Modern Bungalow Built in Boston, Every Room of Which is Equipped with Electric Appliances



View of the Garage Which Forms a Part of the Boston Electric Bungalow Equipment

HOUSE AND GARAGE IN WHICH ELECTRICITY DOES ALL THE WORK

is trying to reimburse itself at the consumers' expense for some political lobbying or for an increase in its taxable value, if the bill is increased. And he would be wrong. There is a reason, and a very just one, as will presently be shown, and by taking advantage of this reason to his own profit, the consumer can reduce his total bills very materially.

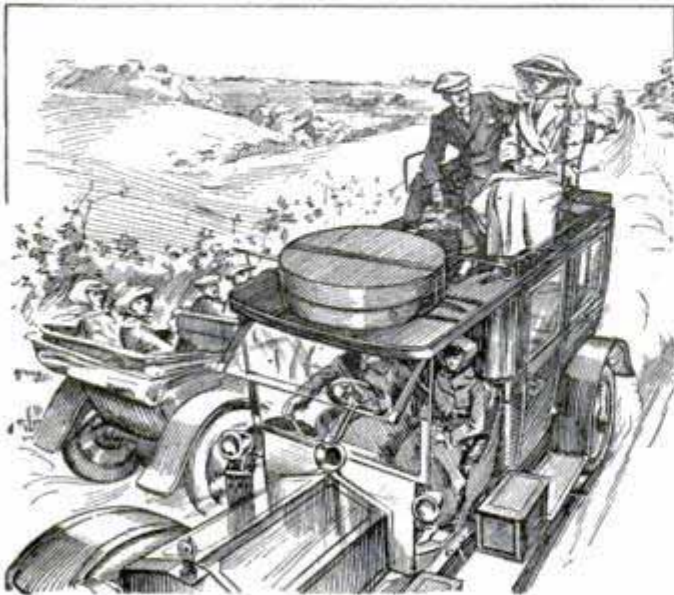
The high rate is due to what is called "the readiness to serve" of the company. It must be remembered that at the electric central station there must be enough electric generating equipment to be able to supply the maximum amount of current that will be used at any one particular time. Now suppose there are 20 lamps of 50 watts each in a house, and that these are all turned on at once. And at the same time suppose the servant is using a 500-watt electric iron. If the fuse does not blow with all this current being used at once, the house would require 1,500 watts, or $1\frac{1}{2}$ kilowatts, of power at once. Now it is obvious that if a large number of people made

a habit of putting such a big total load on the station, the electric generating capacity would have to be much greater than if the demand were distributed over a longer time. And naturally the charge for current would be greater. The electric company has a way of keeping track of the greatest demand for current by its consumers, for in all but the small apartments there is an instrument somewhat like a barometer and called a "maximum-demand indicator" which automatically registers the maximum demand made by a customer for current during the month. This is in addition to the regular meter which measures the current actually consumed. And the high rate applies to a certain number of hours' (usually 30) use of the customers' maximum demand during any one month. So that to cut down the bill it is necessary to use as little current at any one time as possible. Do not leave all the lights burning at once, and instead of using the percolator and toaster at the same time, make the coffee first and the toast afterward.

EXTRA SEAT ON AUTO TOP

Although the idea of using the top of the limousine as extra seating space has not yet been entertained seriously by automobile manufacturers in this country or abroad, such an arrangement exists on one car, at least, in

England. The owner of a car that is often seen near Canterbury placed a light double seat in the light luggage and spare-tire space on the limousine top, placing the spare tires forward of the luggage rack.



A Limousine with Seat on Roof for Viewing Country while Touring

ANCIENT TUNNELS OF JERUSALEM

The ancient tunnels, conduits and cisterns under Jerusalem offer interesting exploration for the archæologists of the present time. About three years ago a party of British archæologists began a systematic exploration, and so far have examined the famous tunnel leading from the Virgin's Well to the Pool of Siloam, running 1,700 ft. under the rock of Mount Sion. The tunnel was made by the Jewish King, Hezekiah.

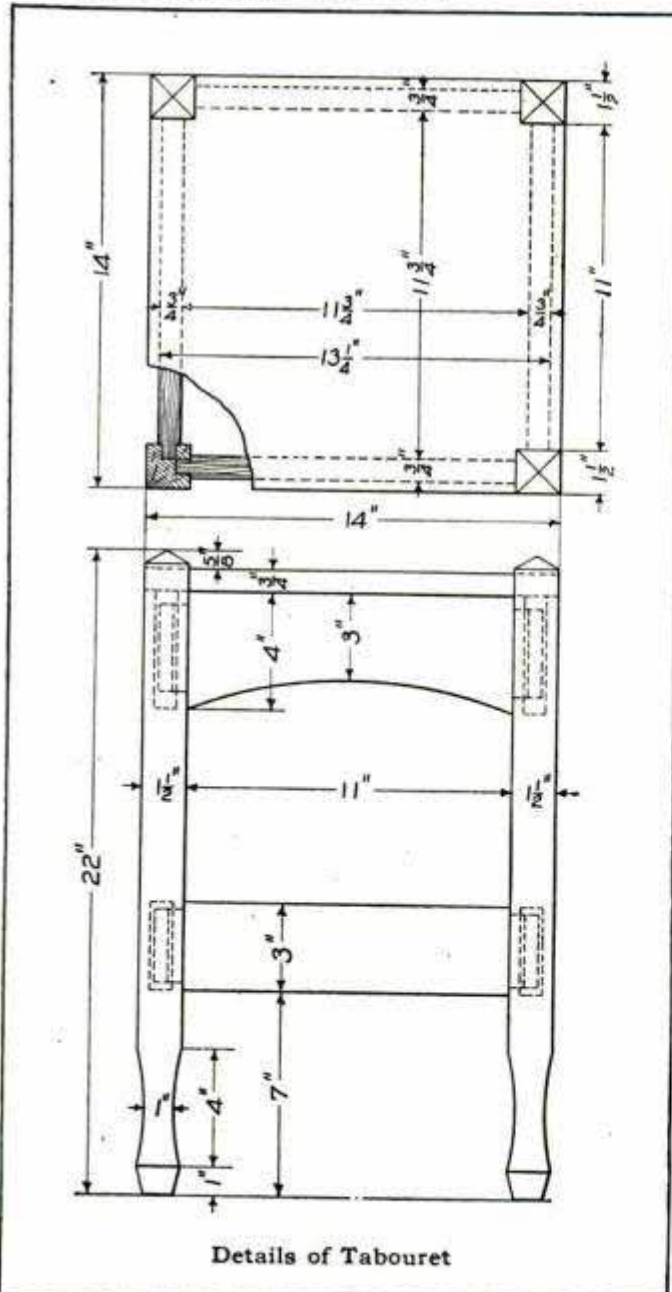
Among the things of interest found by these investigators was pottery

which dated earlier than the ninth century B. C. Included in this find was an Israelite lamp of the eleventh century B. C. Evidence gathered during the investigation seems to prove that Jerusalem was a Jebusite city 2,000 years before David.

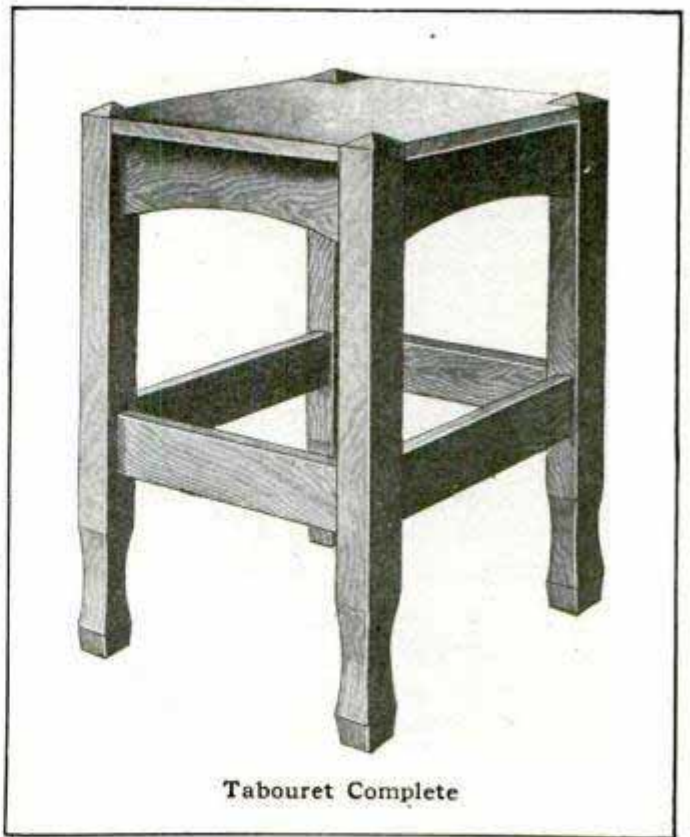
HOW TO MAKE A TABOURET

The stock necessary to make a tabouret of craftsman design as shown in the accompanying illustration can be purchased from the mill ready cut to length, squared and sanded. Quarter-sawed oak is the best wood to use and it is also the easiest to secure. Order the following pieces:

- 4 legs, $1\frac{1}{2}$ in. square by 22 in. long.
- 1 top, $\frac{3}{4}$ in. thick by 14 in. square.
- 4 top rails, $\frac{3}{4}$ by 4 by 12 in.
- 4 lower rails, $\frac{3}{4}$ by 3 by 12 in.



Details of Tabouret



Tabouret Complete

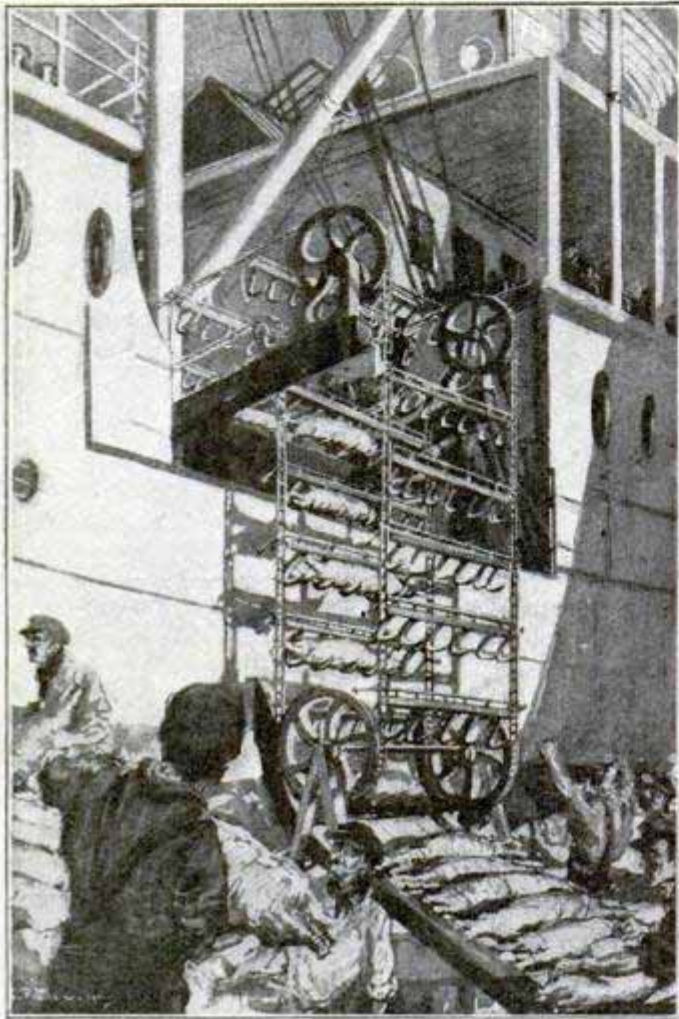
First square up the four legs. Bevel the tops at an angle of 30 deg. and hollow out the lower part of the legs as shown in the detail sketch. Clamp them together with the ends square and lay out the mortises all at once. Cut the tenons on the rails to fit these mortises. Lay them out in the same manner as the posts, so as to get them all the same distance between shoulders. The upper rails should be cut out underneath as shown.

The rails and posts can now be glued together. Be careful to get them joined perfectly square. When they are dry, cut and fit the top as shown. This is fastened to the top rails by means of screws from the inside. Remove all surplus glue from about the joints, as the finish will not take where there is any glue. Go over the whole with fine sandpaper and remove all rough spots, then apply the finish you like best.

☞ An English inventor has perfected a machine for treating old hardwood paving blocks so that the life of the block can be indefinitely extended at an extremely small cost, the machine having a capacity of more than 1,000 blocks per hour.

MEAT UNLOADER FOR PROVISION SHIPS

An endless-chain unloader, designed for the handling of frozen meat carcasses, is being used in unloading pro-



Unloading Frozen Sheep Carcasses by Means of an Endless-Chain Unloader at the Port of London

vision ships in English ports. Each crosspiece of the endless chain is provided with six hanging hooks on which the frozen carcasses are placed by the men working in the hold. Two or three men in the hold are all that are required to feed the unloader, and it automatically discharges its load into a barge or onto the wharf alongside the ship. It is said that a whole cargo can be discharged by means of this arrangement in about a third of the time usually taken by hand.

George A. Burns, the oldest track-walker, in point of service, on an eastern railroad, has walked 177,900 miles in the course of his duties.

POPULATION OF EUROPE IS DENSER THAN CHINA'S

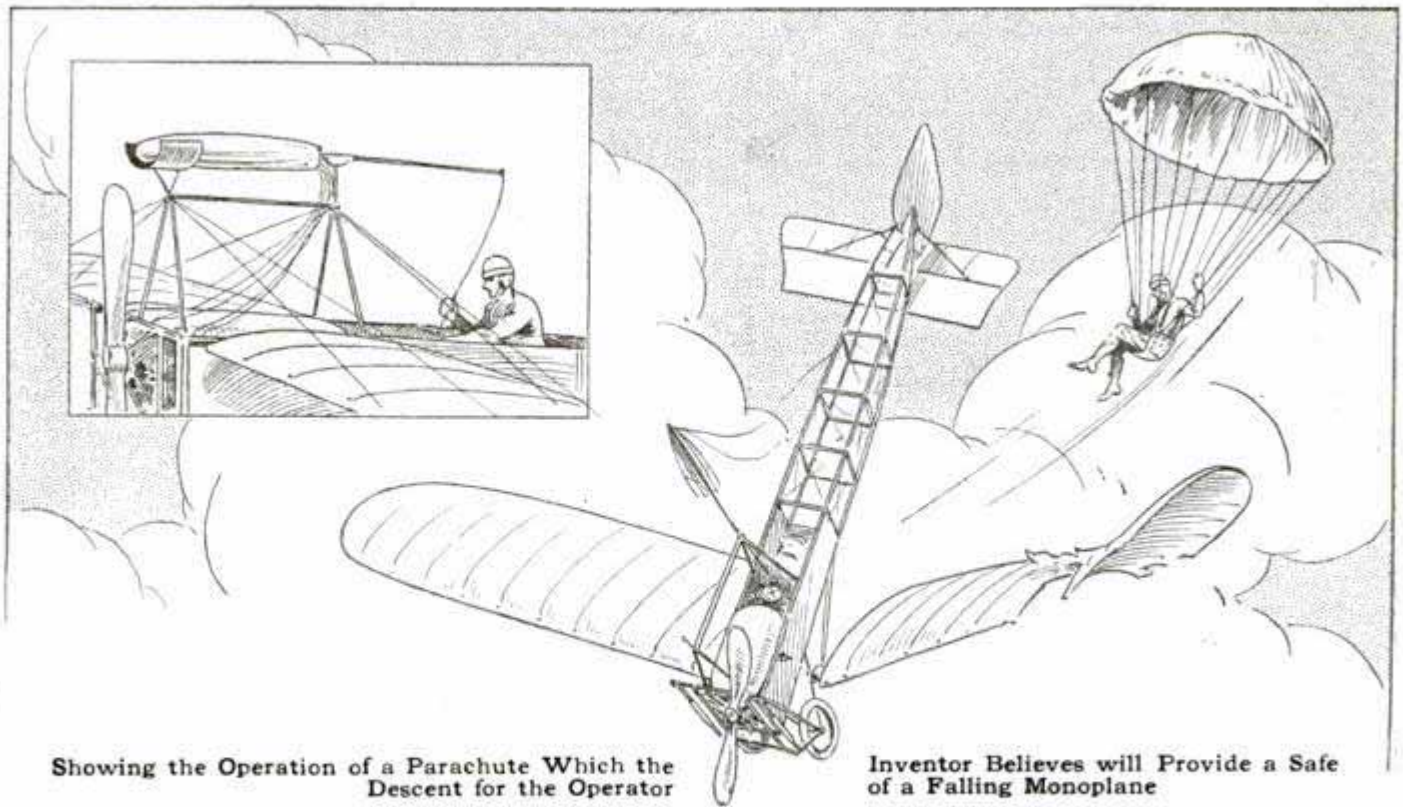
The enormous losses of life which usually attend floods and similar disasters in China help to maintain the popular idea that this country is the most densely populated in the world, and most people would probably take exception to the statement that Europe's population is slightly denser than that of China.

According to the latest census, the inhabitants of China number 439,214,000, while Europe has a population of about 430,000,000. As China is about one-tenth larger than Europe, the density of population of the two will therefore be found to slightly favor Europe.

PARACHUTE ATTACHMENT FOR MONOPLANES

An aeroplane parachute, designed for monoplanes or any type of aeroplane in which the operator rides above the planes, has been invented by two Italian engineers living in New York. The idea worked out by these inventors has several novel features, the most interesting of which is the arrangement by which the parachute is expected to provide a gentle descent for the airman and his seat while allowing the aeroplane to fall sheer.

In its inoperative or folded position, the parachute is horizontally disposed above the central line of the machine in the vicinity of the planes and just forward of the seat, in which position it resembles a skyrocket in appearance. When an emergency occurs which makes it advisable for the airman to leave his machine, he pulls a releasing cord, which causes the parachute to assume a vertical position, and, at the same time, releases the binding cords which hold a cover around it. So long as the cover is fastened around the parachute, the springs, which tend all the time to open it up, are held down like the wires in a folded umbrella. When the parachute is in its vertical



Showing the Operation of a Parachute Which the Descent for the Operator

Inventor Believes will Provide a Safe of a Falling Monoplane

position, and the cover loosened, the springs open it, and, upon the downward movement of the aeroplane, it fills and lifts itself free from the standard upon which it is mounted. All this occurs automatically after the operator pulls the cord. It is obvious that the parachute would have to be very large to act as a practical check for the entire machine in its fall, so this parachute is attached to the seat alone, which rests loosely on its bearings. When a fall occurs, therefore, the inventors of this novel idea expect that the parachute will gradually bear the airman and his seat to the ground, while permitting the rest of the machine to drop.

PERSPIRATION-PROOF SHOE LINING

By means of a new method of tanning, one of the large shoe-supply houses is producing perspiration-proof sheepskins for shoe linings. The new product is said to be no more expensive than other tannages of sheepskin, and is made in all colors. The deterioration of leather shoe linings because of perspiration is a frequent cause of complaint.

A SIMPLE FLOWER STEMMER

This little stemmer for florists is claimed to do away with 50 per cent of the labor usually required in constructing flower designs. It sets the leaves and flowers gracefully but firmly. The nature of the device and the manner of utilizing it are shown in the drawings.

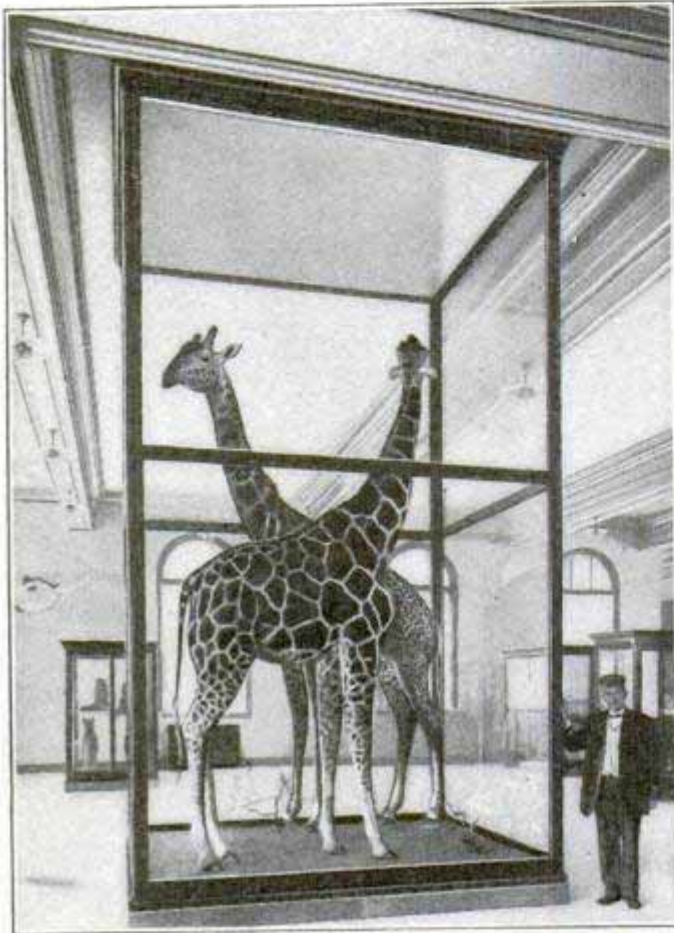


Simple Stemmer for Florists

ⒸAn old Indian emerald mine of the Andes in Columbia, lost for nearly a century, was recently discovered by a native, guided by a few hints contained in ancient Spanish parchment maps. For several years he wandered far and wide looking for this lost mine of Somondoco, which was operated centuries before the Spanish took it over in 1555.

MOUNTED GIRAFFES IN MONSTER SHOWCASE

The Childs-Frick exhibit of mounted animals, recently donated to the Pittsburg Carnegie Institute, is now on ex-



Monster Showcase Erected in the Pittsburg Carnegie Institute Museum for Protection of Mounted Giraffes

hibition there, protected by glass showcases. The showcase constructed to house the monster giraffes reaches from the floor to the ceiling, and consists of eight lights of plate glass. It is 18½ ft. high.

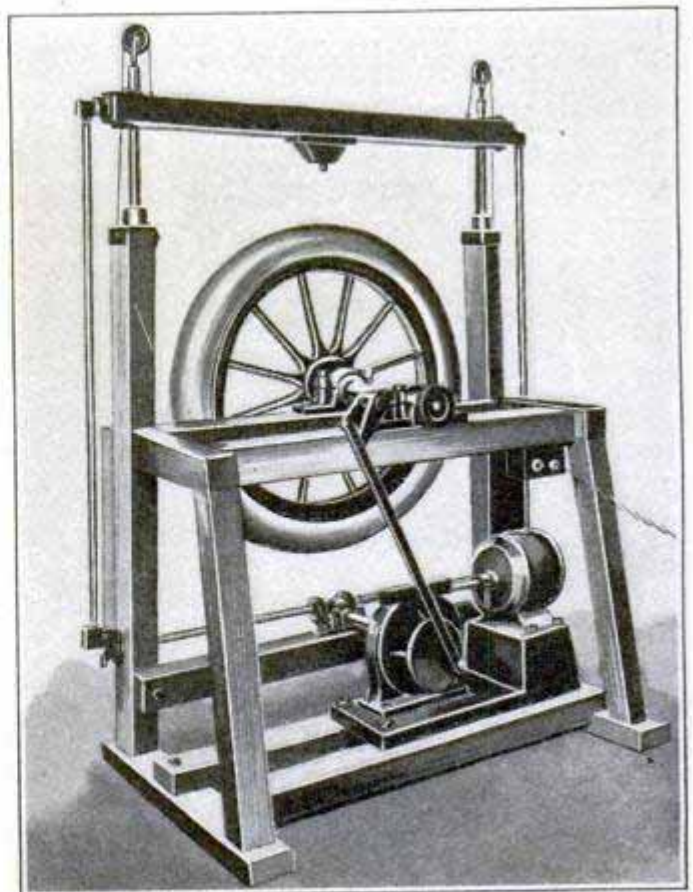
MAGNETISM CAUSES DRILL HOLES TO DEVIATE

It has been observed in British South Africa that the majority of drill holes of from 500 to 1,000 ft. in depth, produced by rotating drills, have a pronounced deviation from the perpendicular, and generally toward the north. This, according to the French scientific magazine "Cosmos," is due to the rotation of the magnetic field of the earth, the drill being strongly magnetized, with its south pole near the upper end and its north pole near the

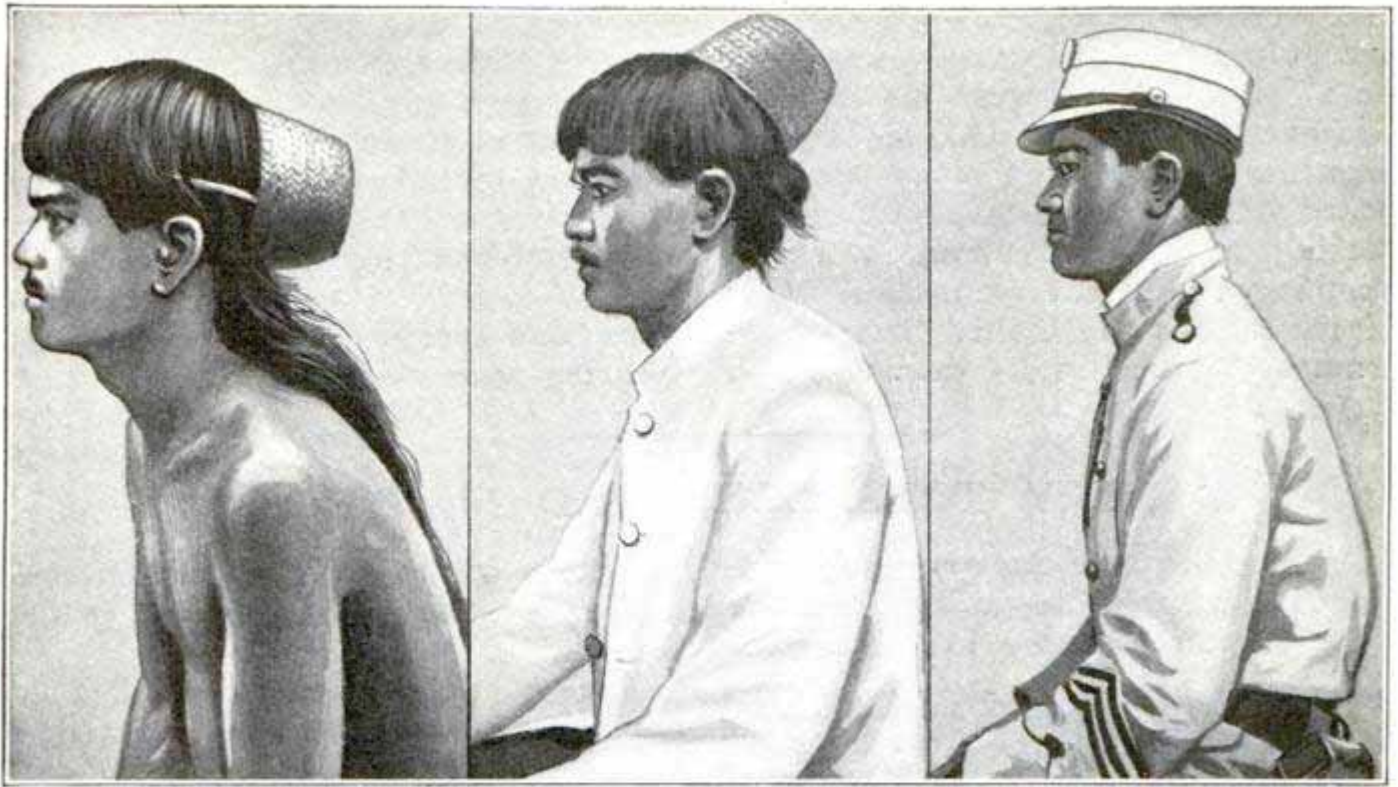
lower. The intensity of the magnetism varies with the nature of the pierced strata. The attraction of the earth's magnetic field on the north pole of the drill rod manifests itself by a curving of the rod in such manner that its convex side is bent toward the south, thus causing the tool at the end of the rod to make a bore deviating toward the north. When this deviation has once begun it becomes more and more pronounced.

NON-PUNCTURE TIRE-TESTING MACHINE

The means adopted by a British manufacturer of non-puncture tires to prove the practicability of such tires is remarkable. As the wheel is revolved, the upper part of the framework of the testing device descends with great force, but the sharp instrument mounted on its under side fails, it is claimed, to puncture the tire. A 2-in. board mounted in the position occupied by the tire is easily penetrated at each descent.



Testing a Non-Puncture Tire by Plunging a Sharp Implement upon It



Evolution of the Bontoc Igorot

MAKING A GOOD CITIZEN OUT OF A SAVAGE

When Prof. Dean C. Worcester, Secretary of the Interior of the Philippine government, is asked about the progress of the American idea in the Philippines, being a man of few words he simply digs into his colossal collection of photographs and presents his visitor with three prints that answer the question conclusively and in a much clearer manner than an hour of descriptive conversation could do. The three pictures are portraits of the same man taken in "before and after taking" fashion. They present the features of a man of what is known as the Bontoc Igorot tribe, a people who inhabit the mountains of northern Luzon and whose principal occupation, before Prof. Worcester took them in hand, was head hunting and dog eating. The first photograph shows the man in his "native" costume—native in every sense of the word. A longer picture would show him wearing a "Geestring" about his waist, this and the basket-like cap on the back of his head being the only species of clothing this particular man had ever worn in his life up to 1901. The second picture

shows the same man after he had been sufficiently impressed with the doctrines of civilization to cover his nakedness with a coat. He was then enlisted in the Philippine constabulary, a military-civil body of troops that occupies a place in the Philippines that would only have a duplicate in the United States if the county sheriffs and their deputies, the United States marshals and their deputies, the United States secret service, the state militia and the regular army were all combined in one organization. The third picture shows the denizen of Bontoc after he had been a year in the constabulary and shows as great a change in the intelligence of the man as in his costume. That's all!

At least that is all that the picture shows. Again the observer loses something because only the upper part of the Igorot's body is shown. If this picture, too, were full length, a most amazing sort of soldier would be exhibited, for while the Igorot admits the decorative and dignified office of a coat, even if he will not grant its usefulness, he positively declines to be

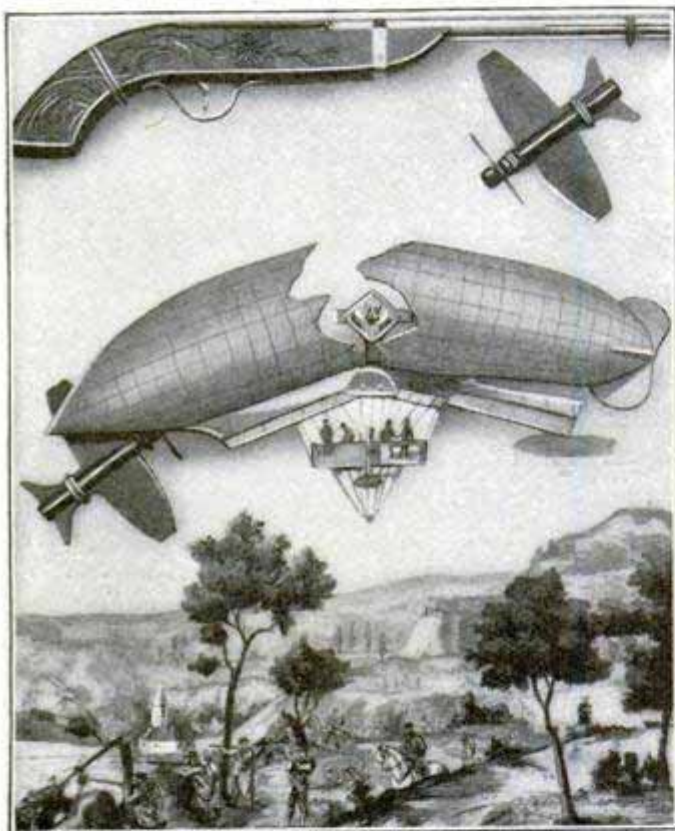
hampered with such things as trousers except under great stress. Therefore he is permitted to wear his uniform without "pants," so that his strong, muscular legs will be in no wise impeded in the heart-breaking, nerve-racking and back-straining work of climbing his native mountains. One of the lessons the United States government learned in its dealings with

the Indians was that certain concessions to native customs and costumes were exceedingly beneficial, and this is one that is made in the Philippines. Thus we find the Igorot constabulary trouserless and the Moro section of the same body wearing fezzes, like Turks, but no shoes. They are Mohammedans and prefer going barefoot to wearing army brogans.

NEW TOYS EXHIBITED IN PARIS

Among the new toys recently displayed at a special toy exhibit in Paris were the three shown in the accom-

panying illustrations, two of which are related to aerial flight. One of them, called "Modern War," represents an attack on an airship, which carries a target consisting of two crossed flags. The projectile is a small aeroplane made of wood and celluloid, with a screw propeller attached at the stern. It is launched by means of a pistol, the barrel of which has a longitudinal slot for the reception of the wings, and when the target is

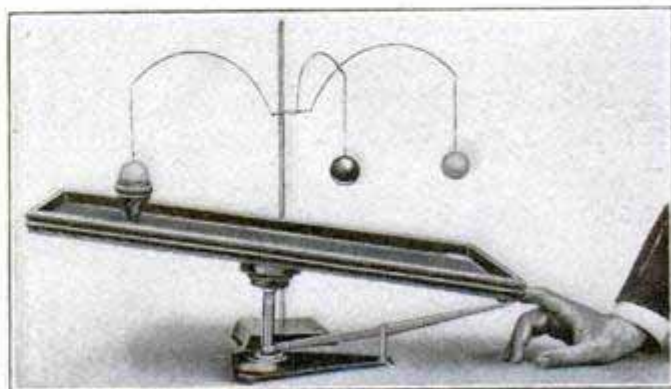


The Modern War Toy is a Game in Which an Aeroplane is Shot from a Pistol at a Dirigible Balloon

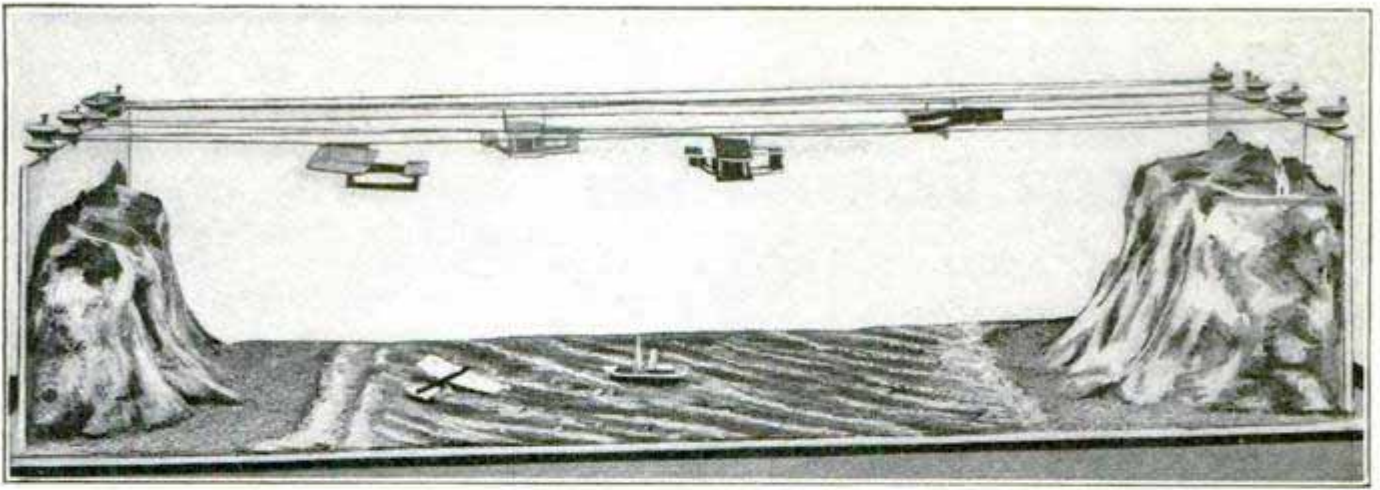
struck by it the dirigible balloon separates into two parts as shown in the illustration.

The other aerial game is called "a race across the channel." Starting from the French coast as Blériot did, the toy airmen endeavor to reach the cliffs of England. The aeroplanes are attached to elastic cords, which are stretched between pulleys on the two coasts. Each player, by turning his pulley, causes his aeroplane to advance, but also produces vibrations which frequently result in a fall into the sea, which for the sake of realism, is dotted with little vessels.

The third toy illustrated is a little billiard table mounted upon a spherical joint, which allows it to be turned and tipped in every direction. By the side of the table is a vertical support, on which slide three wires terminating in hooks, supporting three balls at a determined height above the table. The game is played by means of a top, the upper part of which is hollowed out to form a hemispherical cup



An Ingenious Game in Which the Hollow Top Receives One of the Balls and Spins Away with It



One of the Newest Aerial Toys is an Aeroplane Race across the English Channel

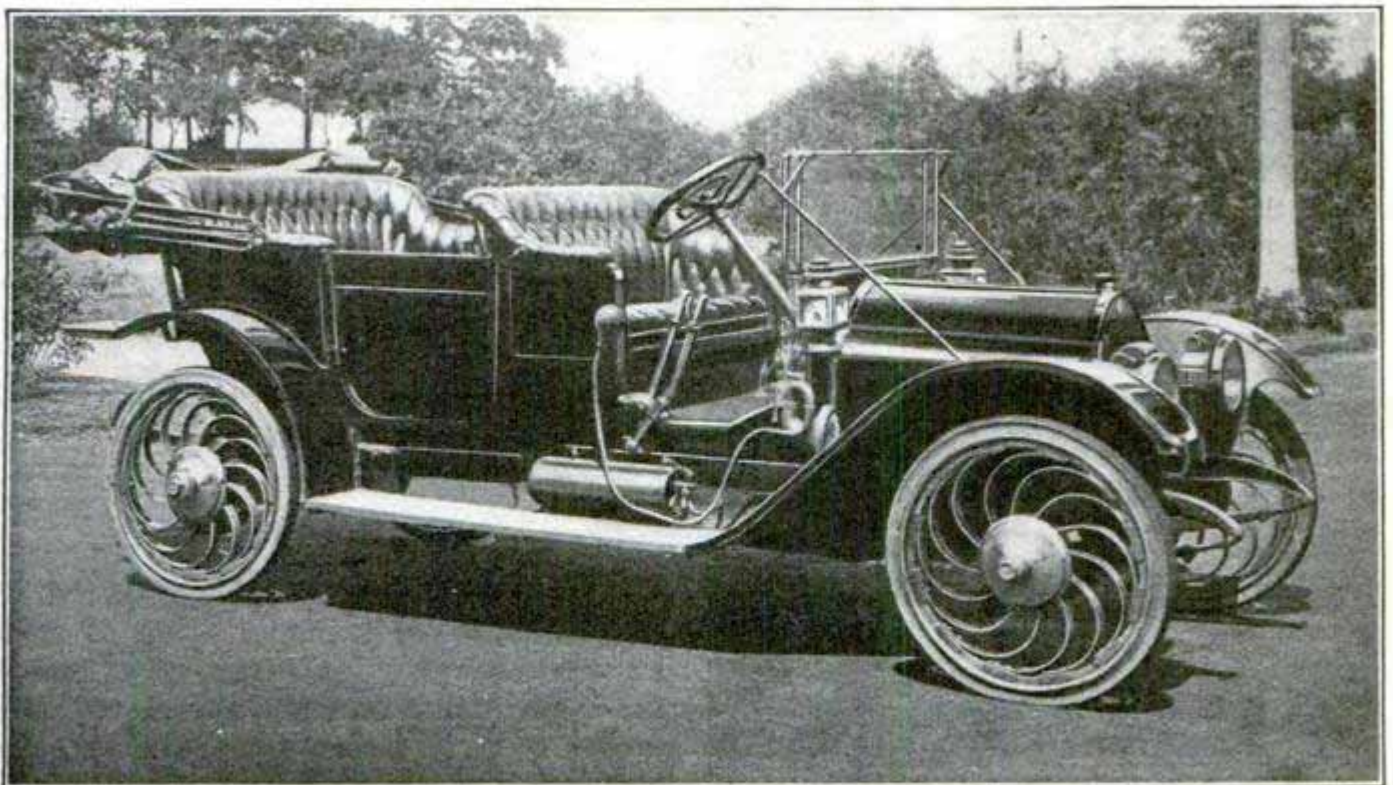
of a diameter equal to that of the balls. The player winds the top and sets it spinning on the table, which he then moves in such a manner as to bring the top directly under one of the three

suspended balls. He then tips the table so as to catch the ball in the cup, which raises the ball from its support and allows the top to go spinning away with its load.

SPRING WHEEL FOR AUTOMOBILES

Many spring wheels have been invented to take the place of a pneumatic tire, but the same resiliency secured by compressed air is hard to produce with springs. One of the recent patented spring wheels which has proven quite successful is shown in the accompanying illustration. The spokes of the

wheels are composed of flat springs formed into a helix, each one being bolted in the hub and adjusted for tension by a cam near the center of the helix. The outer ends of the springs have a shoe that fits neatly over the felloe of the wheel and slides as the pressure comes upon it.



Automobile Equipped with New Spring Wheels

Xmas and New Year Presents.

Cheap Sale

For a few days only

Album view and custom of north china.
 Album photo and post card. Bronze land brushes wares.
 Chinese wooden works ornament and Figures.
 Cloisonnees wares Vase, stamp case etc
 Fancy metal fleam and cigarettes box etc. — Fan (silk and paper)
 Kimono silk and cotton, Nikko carved works teable.
 Old postal stamps. Paper flag and flower chain.
 Renaissance teable cover and pillow Shaum.
 Satsuma (porcelains) incensers and vase etc.
 Silk handkercheef, shawle, cushion, teable, cover,
 Screens silk and cotton with embroiders.
 Tea service contains 42 p. e. and 21 p. e. etc.

T. Moriya

Japanese Store

62 Taku Road next of Tientsin Tobacco Co.

No 2772—Tientsin, 14. XII. 10 — Gedruckt von dem „Taipian“ in Nord-China, G. n. 5 H

An interesting example of English as it is often written by Orientals is shown in this advertisement of a Japanese curio shop located in Tientsin, China.

“ARK” BUILT BY ILLINOIS RELIGIOUS FANATIC

In a barnyard a mile south of the quaint old village of Grand Detour, Ill., lies a curious “ark,” built by a religious fanatic in expectation of a second flood. For many years it was kept ready for the deluge that did not come, and now that its builder lies in a nearby churchyard, it is slowly falling to pieces.



Queer Ark Built by Religious Fanatic of Grand Detour, Ill.

Local tradition is hazy as to the year it was constructed, but its Noah-like builder and his queer notion are remembered by the oldest inhabitants. The ark is about 20 ft. long, 8 ft. wide, and 4 ft. in depth, indicating by its limited size that its constructor intended saving only himself and family, leaving the luckless “animals two by two” to sink or swim. Unbarked trees from the nearby forest served as the framework for the craft, and onto this were nailed short, thin boards. Painted canvas was utilized to keep the upper part of the hull watertight, while below the estimated waterline are nailed battered squares of tin.

Because of this boat and its builder, a nearby hill, the highest land for miles around, is known locally as “Mount Ararat.”

FRENCH BOTTLE COVERING PREVENTS BREAKAGE

A bottle covering that not only protects the fragile glass but is also a non-conductor of heat, has just been perfected by a French manufacturer. The character of the new covering is not known except that its principal ingredient is granulated cork formed in solid mass by a binding material. The covering is so successful in protecting the bottle from breakage that the French railroad authorities and postal officials accept bottles covered with it without requiring other wrapping or boxing. For such shipments the bottle is provided with a patent stopper which prevents leakage. The covering is molded around the bottle. Motorists and sportsmen have found the new covered bottles very useful.

Automobiles are being introduced in England for the transportation of mail between towns as a result of successful experiments recently completed, the motor vehicle being found more economical and, in some districts, more rapid than the railroads.



METAL WORK AND ETCHING

By JOHN D. ADAMS

Part III—Stationery Rack and Paper Knives

BESIDES being employed for the purpose indicated by its name, the stationery rack also serves to hold the unanswered letters and other papers that are to be attended to in a few days.

Our illustration shows three ways of constructing this article, and the line drawing gives all necessary dimensions, except the gauge of the metal, which should be No. 18. The left-hand rack is composed of three pieces—front, back and base—all securely riveted together.

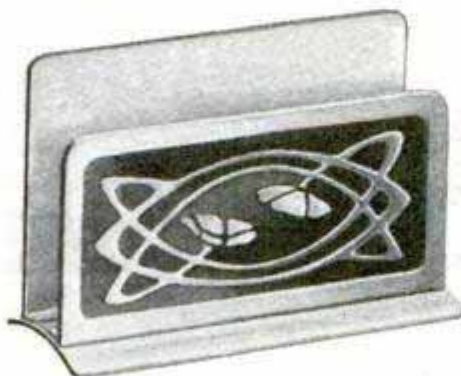
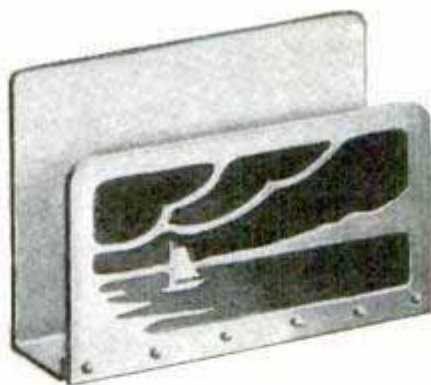
This type is preferable where only a narrow rack is required, as the separate base provides the necessary stability. In bending the base, take due care to have it of uniform shape along its entire length, and then round off the corners. The front and back should now be squared up, allowing about a half inch for bending over to connect with the base. Do this bending over the sharp edge of a table while the sheet is held down with a block of wood. The design for the front should now be taken into consideration and when decided upon is to be neatly drawn full

size upon paper. After thoroughly cleaning the surface of the metal, transfer the design thereto by means

of the carbon transfer paper, and then proceed with the painting out of the parts that are to remain unetched, using the asphaltum, thinned to the

proper working consistency with turpentine. When dry, immerse in the etching solution (nitric acid one and water two parts) and during the progress of the work carefully avoid the inhalation of the fumes, which to some are peculiarly irritating. In the meantime rivet the back

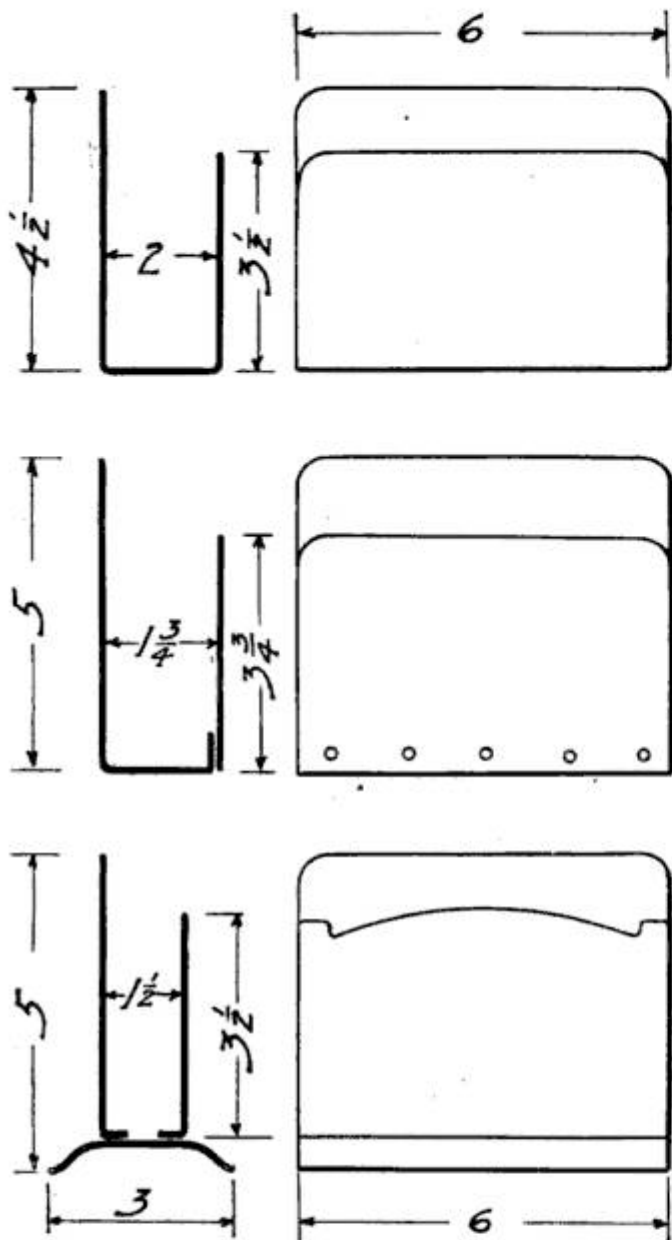
and base together. After three or four hours, when the etching will have been completed, remove the paint with kerosene and thoroughly clean the metal. In either brass or copper a very fine verdigris effect may be obtained by an application of the following solution: Dissolve about 50 gr. each of copper nitrate, ammonia chloride and calcium chloride in 3 oz. water. The unetched portions may be rubbed up bright with a little pumice or very fine emery cloth, after which an application of lacquer will preserve the effect indefinitely. In trying a new solution, the



Three Styles and Designs of Stationery Rack

size upon paper. After thoroughly cleaning the surface of the metal, transfer the design thereto by means of the carbon transfer paper, and then proceed with the painting out of the parts that are to remain unetched, using the asphaltum, thinned to the proper working consistency with turpentine. When dry, immerse in the etching solution (nitric acid one and water two parts) and during the progress of the work carefully avoid the inhalation of the fumes, which to some are peculiarly irritating. In the meantime rivet the back and base together. After three or four hours, when the etching will have been completed, remove the paint with kerosene and thoroughly clean the metal. In either brass or copper a very fine verdigris effect may be obtained by an application of the following solution: Dissolve about 50 gr. each of copper nitrate, ammonia chloride and calcium chloride in 3 oz. water. The unetched portions may be rubbed up bright with a little pumice or very fine emery cloth, after which an application of lacquer will preserve the effect indefinitely. In trying a new solution, the

reader will, of course, appreciate the advisability of trying it on a small



Details of Stationery-Rack Construction

scrap before undertaking to finish such a piece as our rack.

The center design of the illustration is composed of but two pieces; viz., the back, which is bent under to form the bottom, and the front, which is riveted to the forward edge of the bottom. From what has already been said, the reader will have no difficulty in working out this rack. The making of the rivet holes in these racks will necessitate the use of a small hand drill, a tool that may be purchased for less than a dollar and one that will be found very useful in almost any kind of arts-and-crafts work.

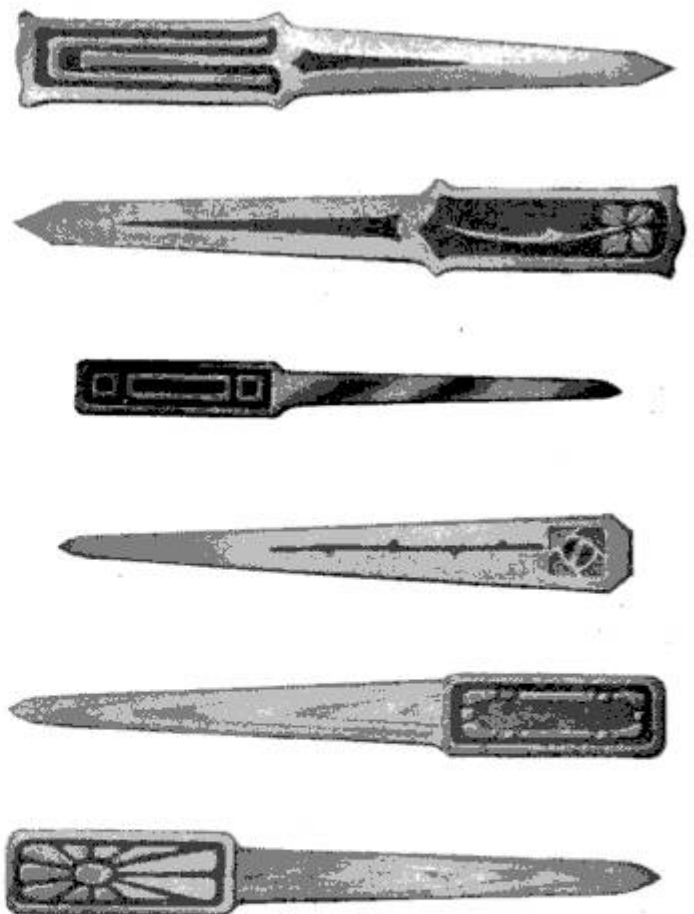
The right-hand design is made from

one piece of metal. In making the first bend, no difficulty will be encountered, but in the second one, some little care will be necessary in order to have the base perfectly flat. Other than this, the work will proceed as in the two previous racks.

Paper Knives and Letter Openers

Paper knives and letter openers may be made in lengths varying from 5 to 10 in. Where the opening of letters is the principal duty, a rather short implement will answer every purpose, but where the uncut leaves of books and magazines are to be dealt with, a longer knife is desirable.

The simplest type to make is illustrated in the fourth one from the top in the set of six, and consists of nothing more than a tapering strip of 16-gauge metal, on both sides of which an appropriate design is etched. The first two knives are made from quite heavy metal, which is filed thinner and



Designs for Paper Knives and Letter Openers

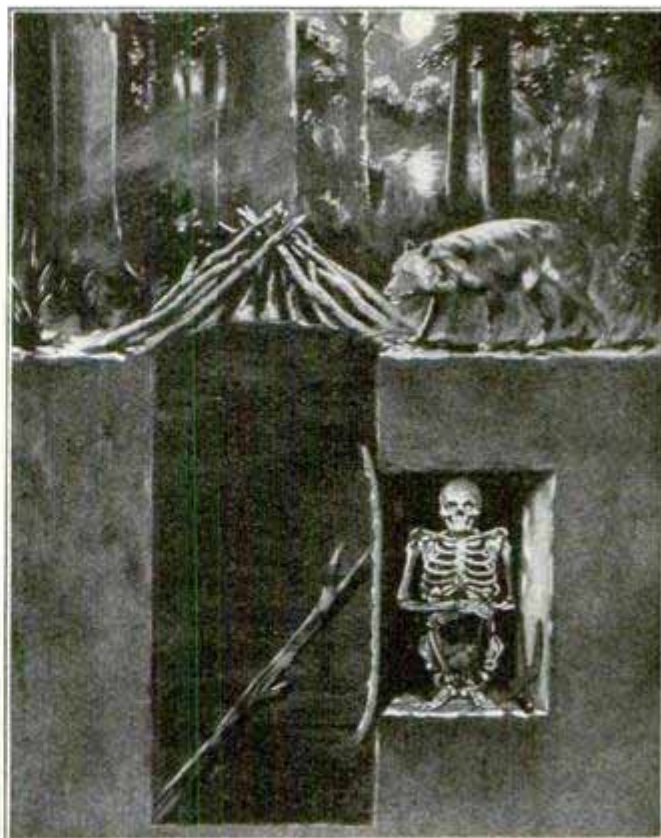
slightly rounding for the blade portion. This is not so tedious a process

as one might suppose, provided a good sharp file is used. The piece should then be smoothed up with a fine-tooth file and finished with emery cloth. The lower two knives are made from hard wood and have a small etched plate on each side of the handle. The wood should, if possible, be the same as that of the desk top on which it is to be used, and similarly finished. When this has been made ready, prepare the two small plates from No. 20 gauge brass or copper and thoroughly scour them, after which the design should be drawn out on paper and then transferred to the metal, which in the meantime must be kept clean from grease. With the asphaltum, paint out all those parts that are to remain unetched, including the backs; and, when thoroughly dry, immerse in the two-to-one nitric-acid solution. In the case of the all-metal knives, the paint need not be applied all over, unless the whole is to be dipped.

In coloring copper, many beautiful effects may be obtained, after a little experience, by simply heating over a gas flame. Iridescent effects, purples and chestnut browns will all show up one after another, and when the desired result has been secured, withdraw the metal from above the flame and set aside to cool. The high lights should then be rubbed up and the result made permanent by a coat of lacquer.

AUSTRALIAN BLACKS SHOW BURIAL CUNNING

The graves made by certain of the Australian blacks are so designed that the "Evil Spirit" coming to claim a victim may imagine it untenanted. The graves are dug wide and deep, and to one side is excavated a little unobtrusive shelf on which the corpse is seated in a huddled posture, hands clasped around the knees. A boomerang and a nulla-nulla are placed where he can easily reach them for defense, and a sheet of bark serves as a wall



Courtesy Illustrated London News

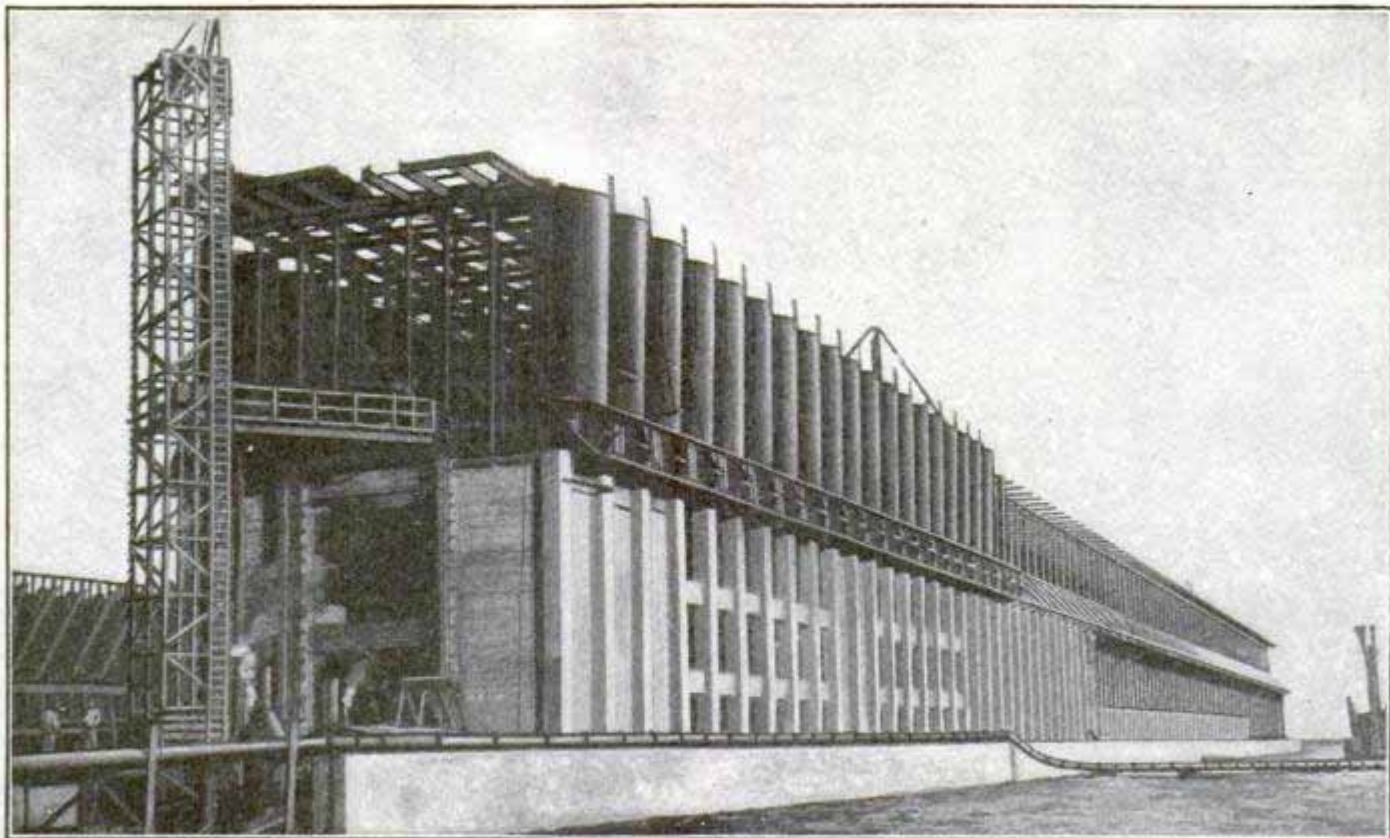
fooling the Evil Spirit: Method of Burying Adopted by Some of the Black Tribes of Australia

between the shelf and the grave. After the grave is filled in, a mound composed of sticks, built up in sugar-loaf fashion, is raised above it as a guard against dingoes and the like.

SULPHUR FERTILIZER FOR POTATOES

Experiments conducted for some time at several agricultural stations in Germany seem to show that sulphur is a most excellent fertilizer for potatoes, not only being effective as a growth stimulator, but also as an exterminator of the parasites that attack the plants, and as a preventive of rotting in cases of excessive rain.

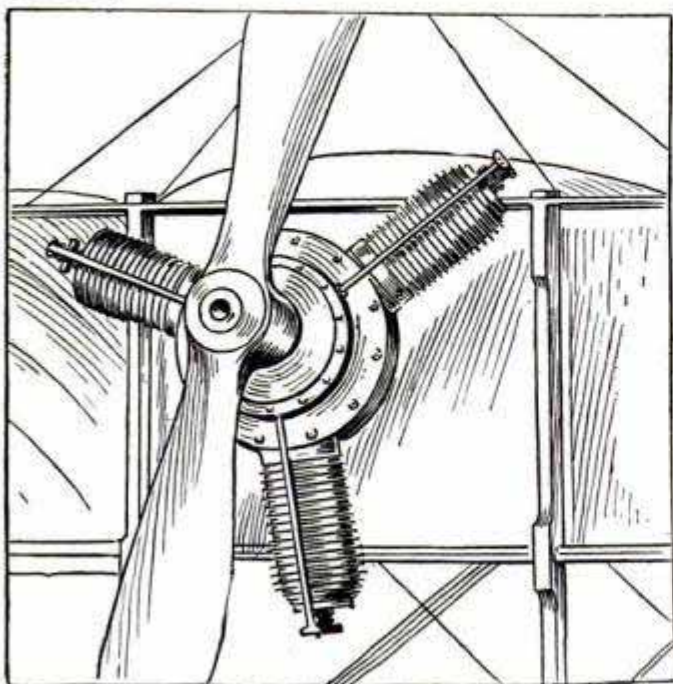
The application of refined, powdered sulphur is at the rate of 375 lb. or more per acre, and in no case has a section so treated failed to give a better and larger crop than fields not treated. Whether or not the increased crop depends most on the direct action of the sulphur or on its pest-extermi- nating action, the investigators are not willing to declare definitely at the present stage of the experiments.



Concrete-Steel Iron-Ore Dock Having 200 Sets of Electrically Operated Machinery and Chutes, and a Storage Capacity of 60,000 Tons

REVOLVING MOTOR WITH BUT THREE CYLINDERS

The latest type of Gnome aviation engine has but three cylinders and is designed for use in long flights, where motors of low power and fuel consumption are desirable. The new model develops 25-30 hp. and can be used with propellers ranging in size up to 8 ft.



Three-Cylinder Revolving Motor of Low Power and Fuel Consumption for Long Flights

CONCRETE-STEEL IRON-ORE DOCK

An iron-ore dock of unusual construction has been built at Marquette, Mich., for one of the northern Michigan ore railroads. Its length is 1,200 ft.; height, 75 ft.; width, 60 ft., and storage capacity, 60,000 tons. The lower work is of concrete with light reinforcement of structural steel, while the upper works and bin construction are entirely of steel. Four railroad tracks run on top, and there are 200 sets of machinery and chutes, operated by electricity.

It is claimed that this construction, while more expensive than the old form of wooden ore docks, costs considerably less than all-steel docks.

AN ELECTRIC FRUIT CAR

Much of the fruit grown in the great fruit belt of southern Michigan is transported to the Lake Michigan harbors for shipment to Chicago and Milwaukee in specially constructed electric fruit cars. The fruit car was originally a 52-ft. passenger car, but the rear half of the coach body was

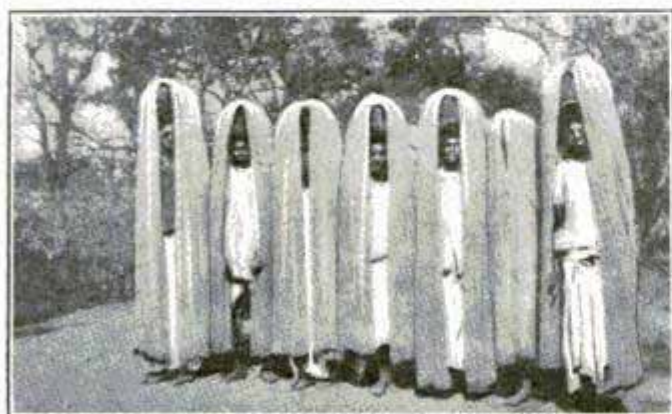
removed and a rack was substituted, extending to a height of 8 ft. from the floor of the car. Over this is stretched a canvas to keep the direct rays of the sun from the fruit, while the open nature of the whole provides plenty of air and helps to keep the fruit in a fresh condition during transportation.

CLOCK SIGN ANNOUNCES CHURCH SERVICES

An ingenious method of announcing the several different services has been adopted by the Second Avenue Baptist church, New York. On the front wall of the church is a large signboard, fringed with electric lights, on which is displayed the six foreign-speaking and the five English services or meetings. Each of the foreign-speaking services is indicated in English and its respective language. A clock at the left of the board tells the hour of the next service, and a flag displayed at the other end indicates whether it is English, Slovak, Chinese, Magyar, Italian, Polish or Greek.

FISHING NETS LOOK LIKE HEAD-DRESS

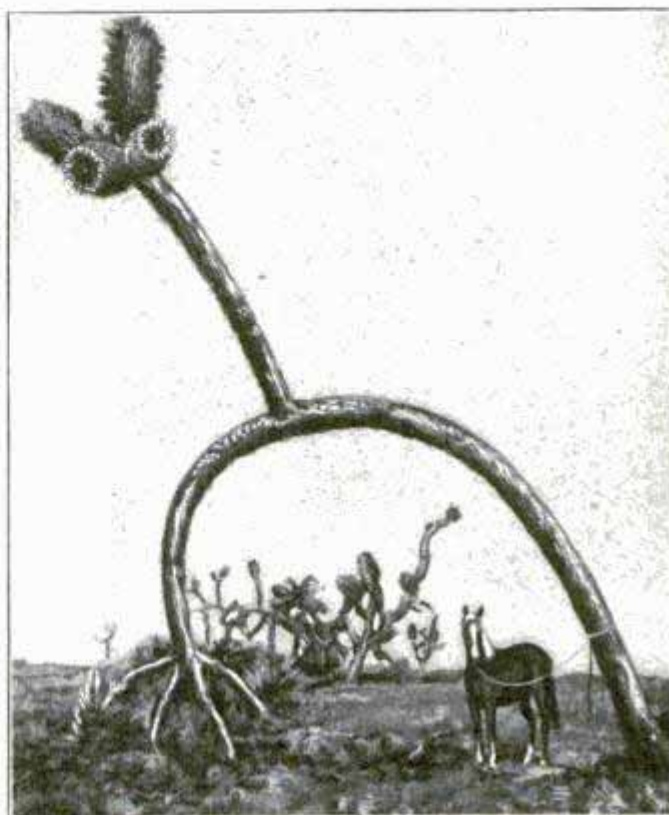
While returning home from the day's work the Malayan fishermen of Madura place the baskets of fish on their heads and then drape the fishing nets over them, in order to dry the latter in the sun. The result might easily be mistaken for a curious head-dress.



This is a Method of Drying Fishing Nets, Not a Type of Head-Dress

GIANT CACTUS RESEMBLES A SPUR

The great size to which the cactus plant grows in Arizona is clearly shown in the accompanying illustration, in



Giant Spur-Shaped Cactus as Compared in Size with a Horse

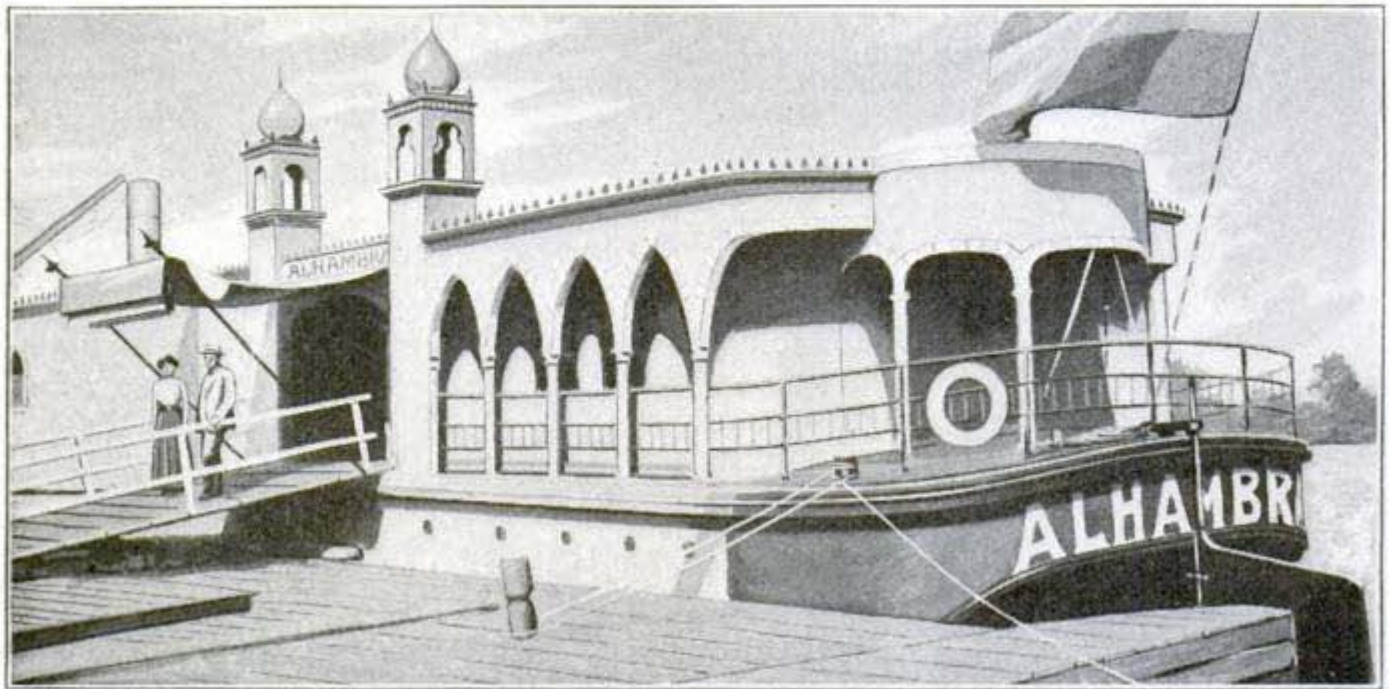
which a horse is included for the sake of comparison. Of still more interest is the fact that this plant takes the form of a spur, due, probably, to the strong winds, which bent the plant over until its top touched the earth, after which a second root formed and a new growth started upward from the top of the arch so formed.

FRENCH METALLIC FILTER

A metallic filter, claimed to be in many respects superior to the ordinary filters used in various industries, has recently been placed on the market in France. The filtering substance is simply a very slender nickel band with exceptionally small transversal ridges so that, when rolled around a central pin, there are minute interstices between the windings of the band. This roll is surrounded by a metal ring, in which it is firmly held by an appro-

priate mounting. A 6-in. filtering disk so made contains 5,250 ft. (not far from a mile) of metallic ribbon, 0.06 in. wide and 0.002 in. thick.

show or floating theater in Holland is devoted to the display of motion pictures. The theater proper is 160 ft. long and has a seating capacity to ac-



Exterior of Floating Motion-Picture Theater in Holland

This filter is said to be very effective, as foreign matter, even when glutinous and dried, never enters the small interstices, but gathers on the surface. The cleaning of the filter is accomplished by simply blowing a jet of steam or water through it in the opposite direction to that in which the liquid filters.

MOTION-PICTURE HOUSEBOAT IN HOLLAND

Traveling shows in Holland go by water instead of by train or caravan, and this mode of travel allows the means of transportation to be a theater as well. The latest type of traveling



Interior of the Theater Proper

commodate 430 spectators. The entrance is a gangway swung out over the canal bank when the barge is tied up for a performance.

ILLUMINATED CAP BADGES FOR HOTEL RUNNERS

An electric cap sign or badge, designed especially for the hotel runners or employes who meet incoming trains at night, has been placed on the market. The illuminated insignia, quickly attachable to the front of any cap, is aluminum, in the form of a box, within which is a $2\frac{1}{2}$ -cp. tungsten lamp, the illumination from which shines through the letters in the front of the box. The lamp is connected with an insulated electric cord, which passes around the cap, down under the coat collar and coat to a small dry battery carried in the hip pocket.

CA permanent patent exhibit is to be established in London, England, which will be open the year round and is designed to benefit the inventors of the United Kingdom.

RADIUM MOTORS FOR CLOCK- WORK

The energy emitted by radium has actually been converted by a German scientist into power for operating clockwork. The minute, electrically charged particles which the radium throws off with enormous speed by a kind of atomic explosion can be intercepted and collected on a metallic leaf connected with an electrometer, or, itself, serve as such. The leaf, becoming charged, gradually deviates until it touches a contact, is discharged, and then drops back. This pendulum motion is repeated at regular intervals as long as any radium remains, and thus the apparatus becomes, in reality, a motor, of very feeble power it is true, but strong enough to mark the hours for a practically indefinite time. It has been stated that this is as close an approach to perpetual motion as will probably ever be found.

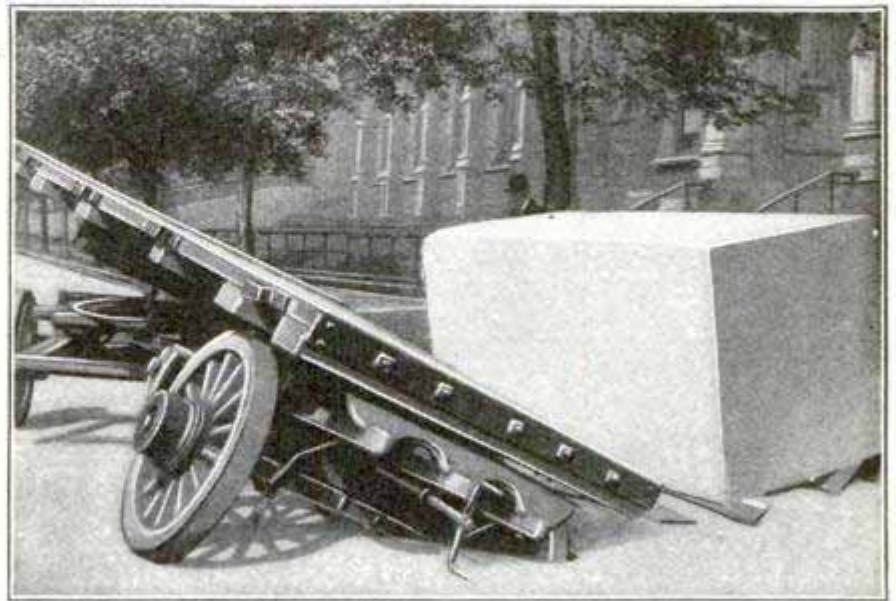
The radium motor must, of course, be kept in a vacuum in order to prevent disturbances and loss of energy, or, at least, be covered with an insulating material effectively preventing loss. One milligram (0.0154 grain) of radium salt suffices to run the motor, and the period of the running is indefinite.

CHINESE USE WOODEN TYPE

Although practically all books and papers treating of modern topics are now printed in China from metal type, books pertaining to old Chinese classics are still made with the old wooden characters. The peculiar odor of the ink used for printing from this class of type is inseparably associated with the classics to the Chinese mind and olfactory nerves.

STONE WAGON PUNCTURES ASPHALT PAVEMENT

Narrow wheels on a truck transporting a 15-ton stone block and a trench which had been poorly back-filled, resulted in the accident shown in this

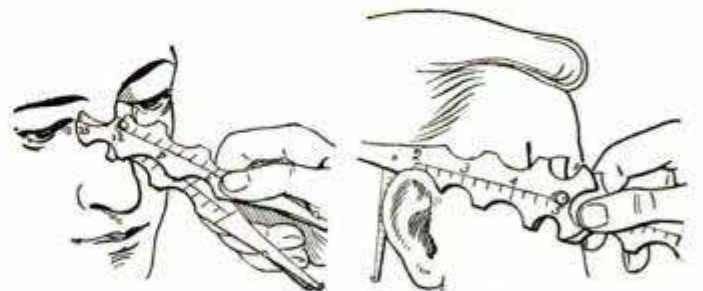


The Right Rear Wheel of This Heavily Laden Stone Truck
Cut through 10 In. of Pavement in Brooklyn

illustration. The stone was being drawn through a Brooklyn street when the rear right wheel of the truck crashed through 10 in. of asphalt and concrete pavement foundation, sliding the stone off into the street. The poor refilling of the trench had left the pavement crust unsupported.

FACE-MEASURING DEVICE FOR OPTICIANS

An ingenious measuring stick for opticians and two ways in which it is utilized are shown in the accom-



Taking Width and
Height of Nose

Obtaining Correct Length
of Temples

panying drawings. One illustrates the method of taking the width and height of the nose, while the other shows how

the correct length of the temples is obtained. The device is also used in taking the pupillary distance, the difference, if any, between each eye and the nose, the width of the nose at different angles, etc. It is made of German silver and is carried in the vest pocket like an ordinary rule.

BASKET-BOATS STILL USED IN WALES

These curious boats, resembling clothes-baskets in form, are modern types of the coracle, an ancient craft



How the Basket-Like Boats are Carried on the Back used by the Britons 2,000 years ago. They have survived the centuries and are still used in Wales by salmon fishermen. The modern coracle comprises a framework of sticks cut from the ash and beech trees, covered with a strong sheet of canvas, saturated with tar and pitch. They weigh about 25 lb. The fishermen using these boats work in pairs, the salmon net being strung between the two.

☞ There were 22,478 deaths caused by snakebite among the people of India last year and during the same period 2,400 people were killed there by wild beasts.

SUPERSTITIONS OF THE JAPANESE

The many superstitions of the Japanese, although gradually becoming less seriously taken as general education progresses, are still strongly believed by the older generation of the lower classes. Many of them, which have come down from the ancient religions and early Chinese influences, are similar to the disappearing superstitions of European races.

Chief among Japanese animal superstitions is the fear of the fox, which is believed to have supernatural power. Shrines called "Inari Jinsha," in which the fox is enshrined as a deity, are numberless. The name of the deity written in Chinese characters signifies fox, and from this it came to be generally accepted that the god was really a fox. Its natural cunning is greatly enlarged upon, and it is believed to be capable of misleading and deceiving human beings, which causes many to pray to placate the fox-god.

The badger is the next most dreaded animal in the superstitious mind. It is believed to have power to annoy people, its particular habit being a transformation into a Buddhist priest, in which disguise it is guilty of various deceptions and impositions. The crying of weasels and the baying of dogs are considered evil omens, and such insignificant happenings send a shudder over the believers. On the other hand, a light-colored mouse in the house is a sign of happiness, good omens are presaged by what are considered the pleasant cries of crows in the morning, while the so-called unpleasant notes forecast death and other dire disasters. If a spider falls from the ceiling in the morning, he brings pleasure, but if at night, it is thought reverses will follow. To see a centipede at night means happiness.

Potions also have a great place in Japanese superstitions. A potion made from a calcined lizard is said to cause a person to become enamored of the one administering the same. The power

and extent of this superstition may be judged by the fact that there are many firms in Tokyo dealing exclusively in calcined animal flesh. A solution of rice-beer in which a serpent has been immersed is thought to be excellent for consumptives. Monkey's liver is prescribed for all diseases of the eye. To have in one's possession a triangular-shaped plantain acts as a preventive of poison and shields from the designs of the fox, while many other plants are used for charms.

The number four, like 13 in our own country, is much in disfavor, owing to the fact that its name, "shi," signifies "death" in Chinese.

Many object to having their nails manicured at night, which arises from the custom of cutting the nails from the fingers of a dead person as keep-

sakes at such a time. Certain days are not considered propitious for beginning a new undertaking, but excellent for discarding anything, and the fittest for cleaning and scouring; rain on the fifth of May is thought to insure a rich harvest, wind on the third of March foretells that pear trees will be attacked by injurious insects, and fine weather on August 15 indicates a warm winter.

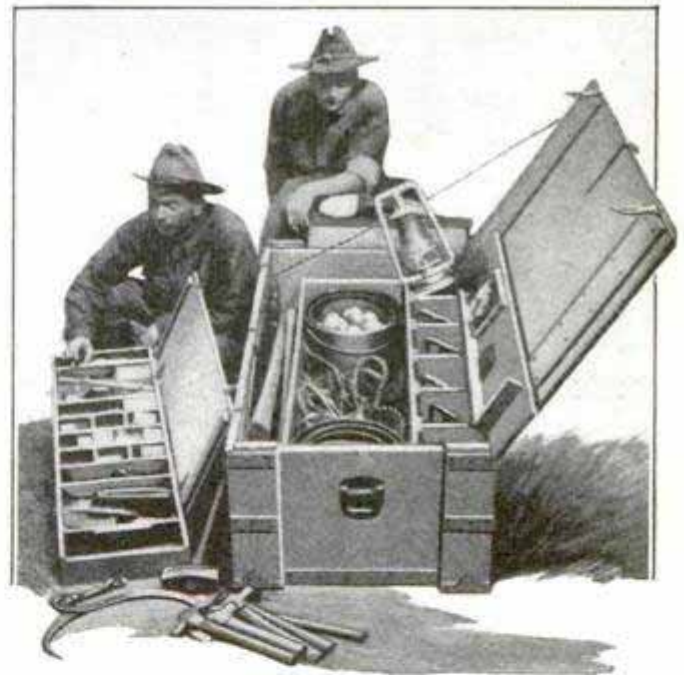
It is believed that if a person puts on a raincoat in the house, he may be destroyed by fire; tickling the sole of the foot means future poverty; if the hair of one's head be cast into the fire, he will become insane; a single cup of rice at breakfast means separation from parents; and a knife or cutting implement left on the hearth will be the cause of death at some future time.

SIMPLE SPEED INDICATOR FOR SHIPS

By inserting a vertical tube, having a short right-angled bend at the lower end (Pitot tube), below the keel of a ship with its mouth toward the stem of the vessel, a simple means for determining the speed of the vessel in relation to the water has been devised. The level to which the water rises in the vertical part of the tube depends upon the speed of the ship, and by means of a suitably arranged recording apparatus a continuous record of speed can be obtained.

TOOL CHEST DESIGNED FOR USE IN ARMY

A new type of tool chest is being given a try-out by the government with a view to its adoption for use in the regular army and national guard. The chest is designed to carry all the light tools used for emergency purposes by the troops. Heretofore such tools have been distributed through the regiments and many of them are lost. The chests are so constructed that two or three of them can be loaded

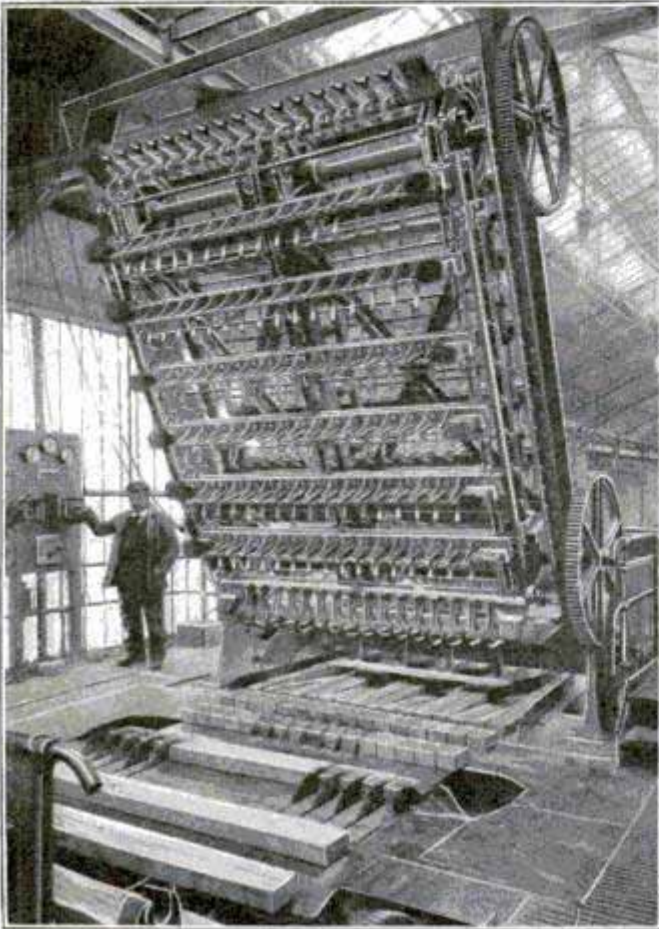


Method of Packing Tools in New Army Tool Chest

on an ordinary baggage wagon. The chest was designed by a soldier in the Ohio national guard.

☉ Experiments with canal motor barges have succeeded in England, the barge used being 71 ft. long, 7 ft. beam, which, with a cargo of sugar, made a trip from London to Birmingham at the rate of 3 miles per hour, at a cost of 2 cents per mile.

NEW MACHINE SAWS 240,000 PAVING BLOCKS PER DAY



New French Paving-Block Machine. Endless-Chain Conveyor Raised to Show Saws and Combs

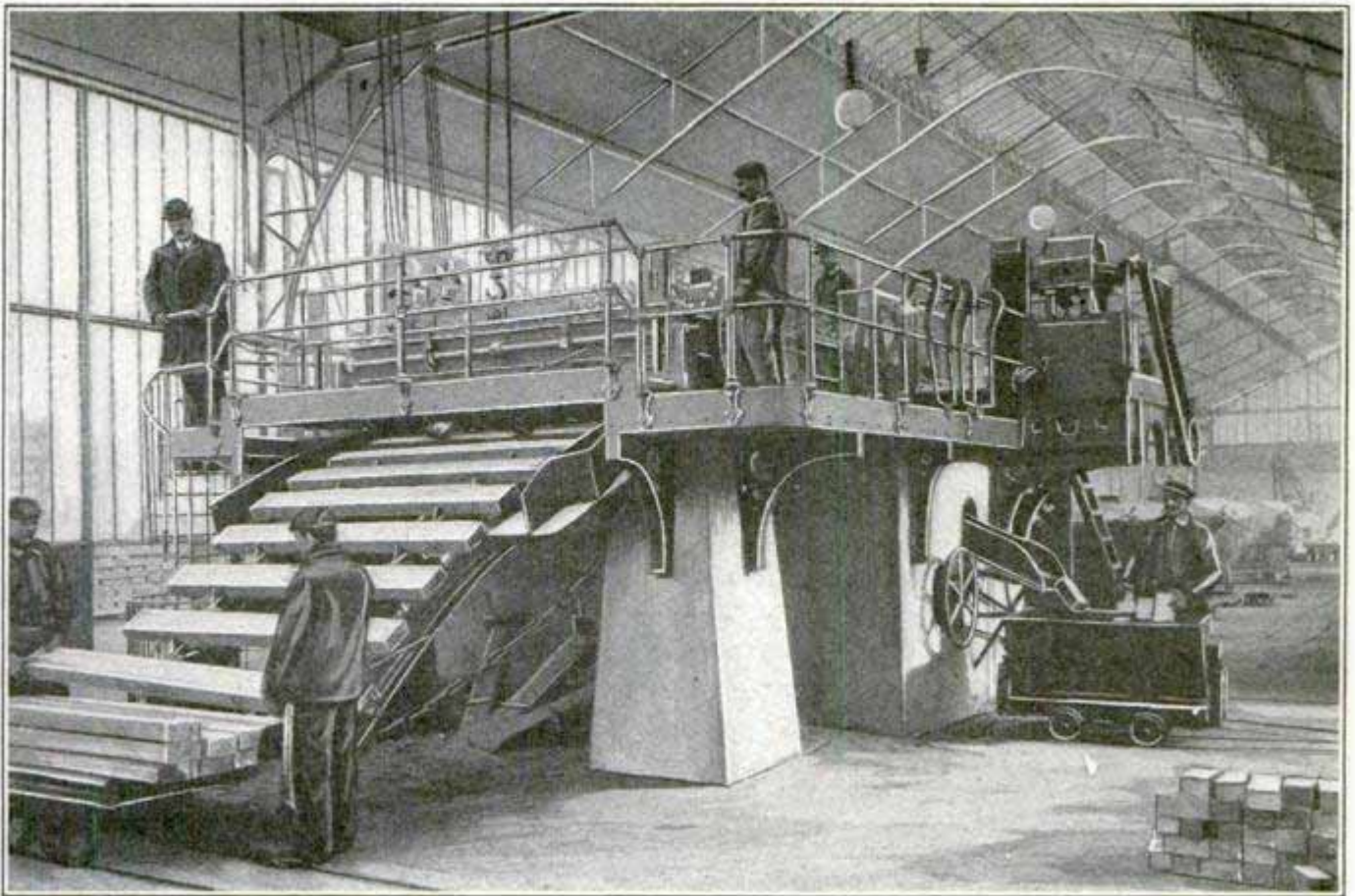
The director of the municipal workshops of Paris has invented a block-cutting machine that turns out 24,000 wooden paving blocks per hour. It is 100 ft. long, and has 17 circular saws about 25 in. in diameter, mounted on three shafts, two of which are on a line, while the third is set further back. This arrangement was adopted to avoid the excessive vibration of a single shaft. The saws protrude through slits in the table and are driven at 2,000 revolutions per minute.

The planks to be sawed into blocks, which are later creosoted, are brought to the machine on platform cars and lifted by hand onto the conveyor feeding the machines. Two sheet-iron guides keep the planks in register and assure their proper delivery to the horizontal table. The planks are then pushed along the table by combs of 16 teeth, attached to endless chains. In front of each tooth of the combs is a

spring, and the function of these springs is to keep the planks, before sawing, and the paving blocks, after sawing, pressed to the table. Near the end of the table, where the combs and springs rise and abandon the blocks, the latter are held down on the table by a set of small wheels mounted on springs. Each comb carries two little brushes, which sweep all the waste into holes at the sides of the table.

Each of the two sets of saws which are in line contains five saws. Each cuts a waste end or trimming and four blocks from the plank. These two sets attack the plank simultaneously, then the middle portion of the plank passes on between them to the third set, which comprises seven saws and divides the remnant into eight equal blocks. The 16 blocks thus cut from each plank continue to advance along the table, pushed by the teeth of the conveyor and held down by the springs until they come under the spring wheels, where they remain until pushed onward by new arrivals. When they reach the end of the table they slide down two inclined planes, enter a conveyor, are thrown into cars by eight workmen, and are then hauled to the creosoting establishment. The machine is operated by a 110-hp. electric motor, and 20 men are required in handling the blocks.

The procedure of turning out creosoted paving blocks in this country is somewhat different. It is true there are no sawing machines at present in use here having an output near so great as this new French machine, but, taking the American process as a whole, it is probably more economical and time-saving than the French system. In the operation of the French machine and the handling of the blocks, 20 men are mentioned. In this country the method is almost entirely automatic. From the time the planks enter the machines to be sawed into blocks they are not touched again by human hands



Planks Being Fed to the Paving-Block Machine, and Finished Blocks Being Dropped into a Car, Ready for Treatment with Creosote

until delivered to the paving contractors. Conveyors carry the blocks from the sawing machine to special cars into which they are dumped, and the cars are pushed into the creosoting tubes for treatment of the blocks. Then

when the blocks have become sufficiently treated, the cars are drawn out and hauled into position for automatic unloading into the railroad cars in readiness to transport them to any part of the country.

PATENTS ISSUED BY THE CONFEDERACY

Little is known about the Confederate patent office. Indeed, it is doubtful whether the army of present-day inventors and patent attorneys have even given the matter a thought, but it is nevertheless a fact that the government of Jefferson Davis, at Richmond, had a duly organized and accredited patent office, in charge of a Commissioner of Patents, which was competent to examine applications and grant its citizens protection from infringement. It is true that this protection was short-lived, but the outcome of the war was unforeseen by the founders of the Confederacy in 1861, and with the sublime confidence that characterizes the American, whether

he dwells north or south of the Mason and Dixon line, they granted P. R. Clements, of Eufaula, Alabama, a patent under which he was to enjoy exclusive rights to manufacture, use or vend an improvement in waterwheels. The period granted by the Confederacy was 14 years.

The original of this Patent, No. 13, is the cherished possession of a Washington patent attorney. Yellow with age and with the ink fading almost into invisibility, it is believed to be the sole existing reminder of the Confederate patent office; that is, the only one at present available. The fact that it was numbered 13 proves that there must have been 12 other patents granted be-

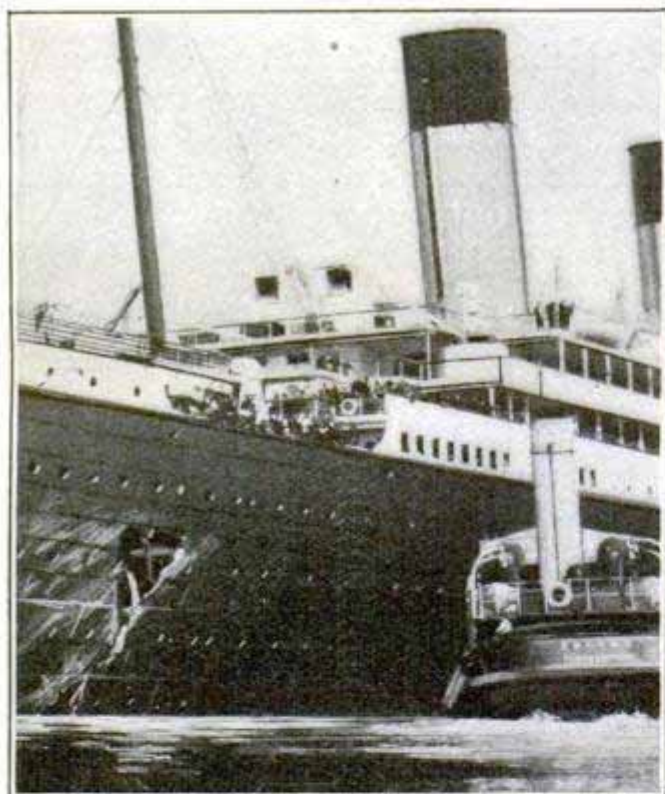
fore it, but for what devices they were issued, and to whom, no information seems available. Mystery also surrounds the successors of No. 13, yet it is not believed that P. R. Clements was the last man to receive a patent, since this patent was granted in the earlier days, and the office must have flourished after Aug. 23, 1861.

NO ELECTRIC RESISTANCE AT ABSOLUTE ZERO?

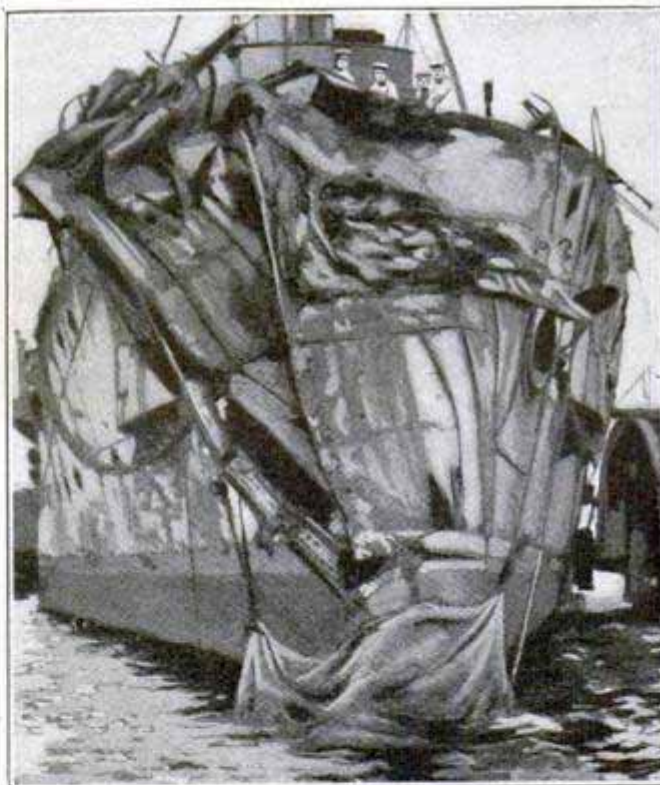
Professor Onnes, of Leyden University, has subjected a thin filament of mercury to the extreme low temperature of 454 deg. below zero, Fahrenheit, which is within a few degrees of absolute zero. At this temperature he found that its resistance, which was 173 ohms at 32 deg. F. and 40 ohms at minus 40 deg. F., had fallen to less than the ten-millionth part of the latter fig-

ure. The resistances of other pure metals follow the same law. Practically, this fact has little value; it could not be economically applied to electrical transmission lines, but in the laboratory it would be possible, for instance, to produce magnetic fields of very great intensity by cooling the windings of an electromagnet with liquid air. Generally speaking, the phenomenon is interesting because it seems to indicate that at absolute zero, could this point be reached, the resistance of conductors to the electric current might be found to be, itself, zero. The point called absolute zero is 459.6 deg. below zero Fahrenheit, at which heat is assumed to cease entirely to exist.

☞ Maurice Farman, one of the pioneer French airmen, has covered, altogether, more than 40,000 kilometers (24,850 miles) in his flights.

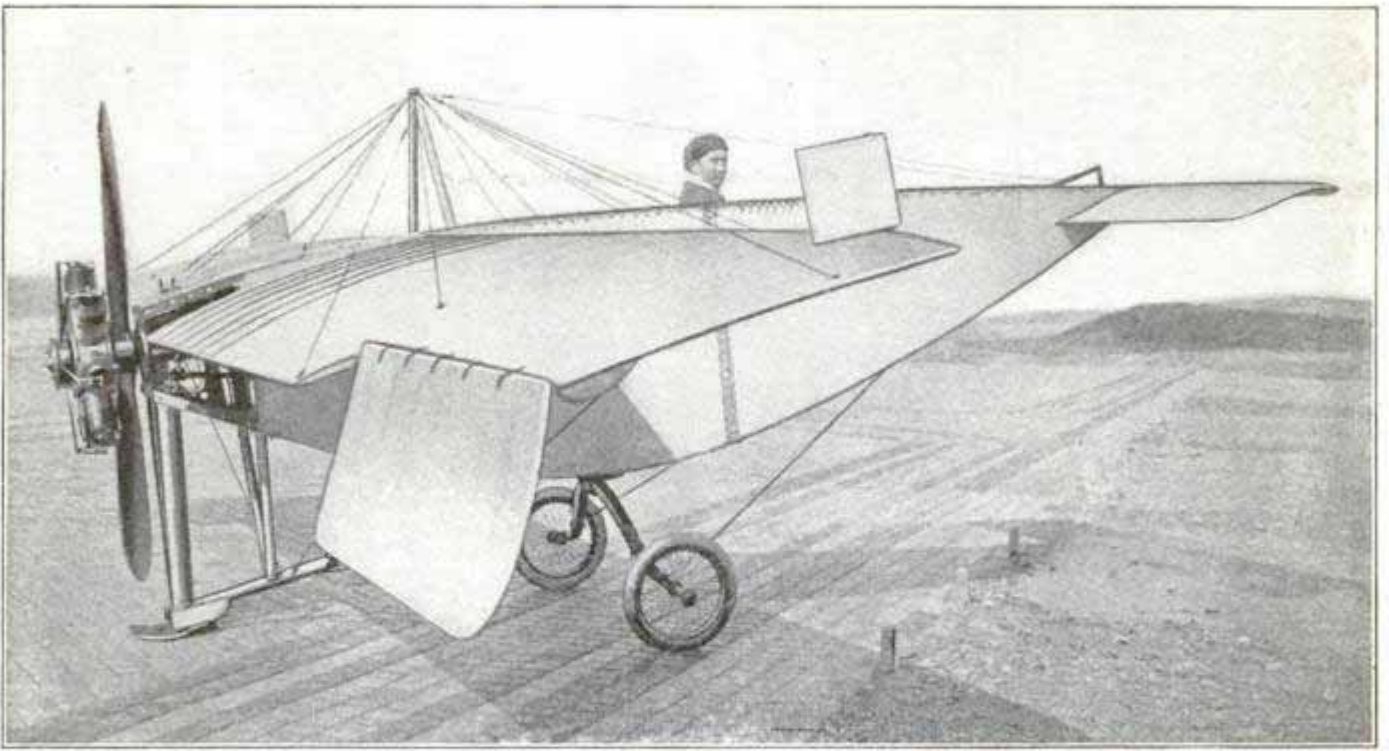


The Hole in the "Olympic," the Damage Below the Waterline being Much Greater Than That Above

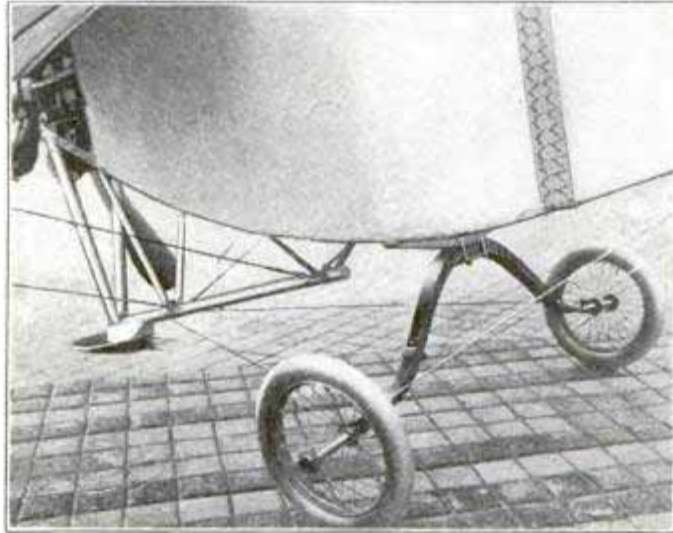


The Bow of the "Hawke," the Damage being so Great That the Ram Has Been Mashed Flat

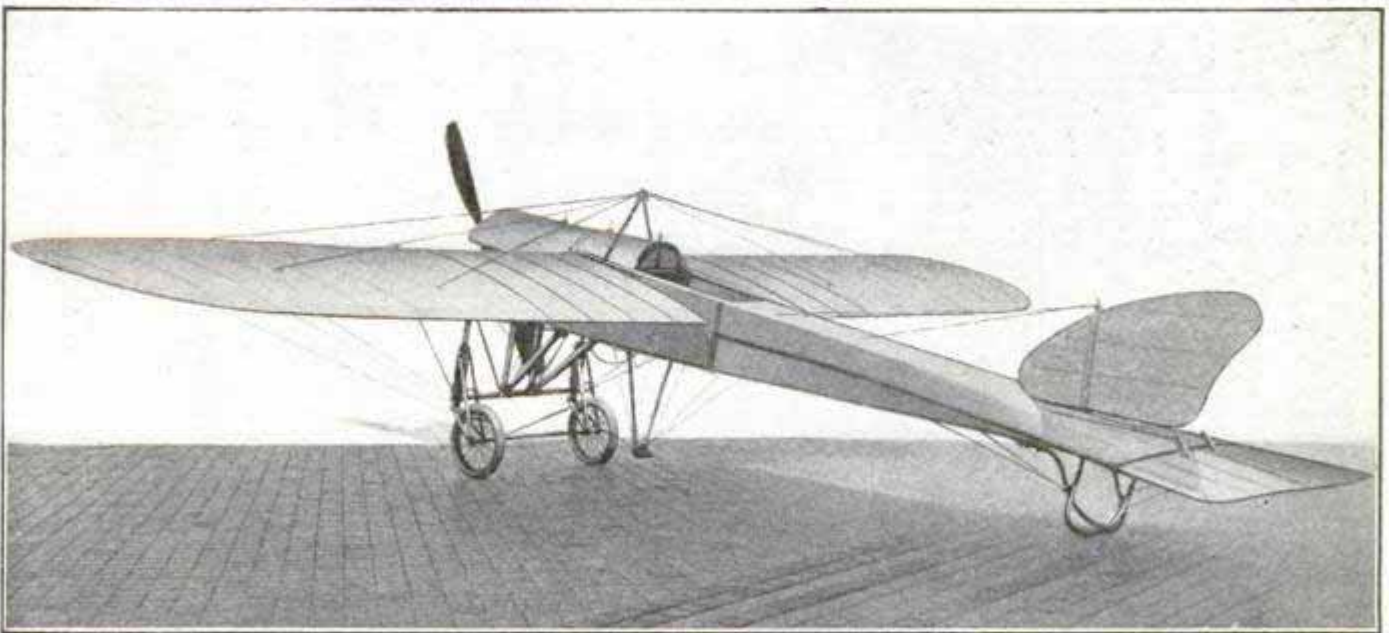
The damage to the hull of the liner "Olympic" in her collision with the protected cruiser "Hawke" was found to be much greater than was at first supposed and it may require several months to make repairs. The hole in the hull extended for some distance below the water line. The "Hawke," too, was badly injured, the fore part of the cruiser having been twisted into a shapeless mass, and her "ram" practically crushed flat. It is a remarkable commentary on the character of the construction of the modern ocean liner that the "Olympic's" injuries were slighter than those of the warship with a ram and bow especially built for running down and sinking other warships.



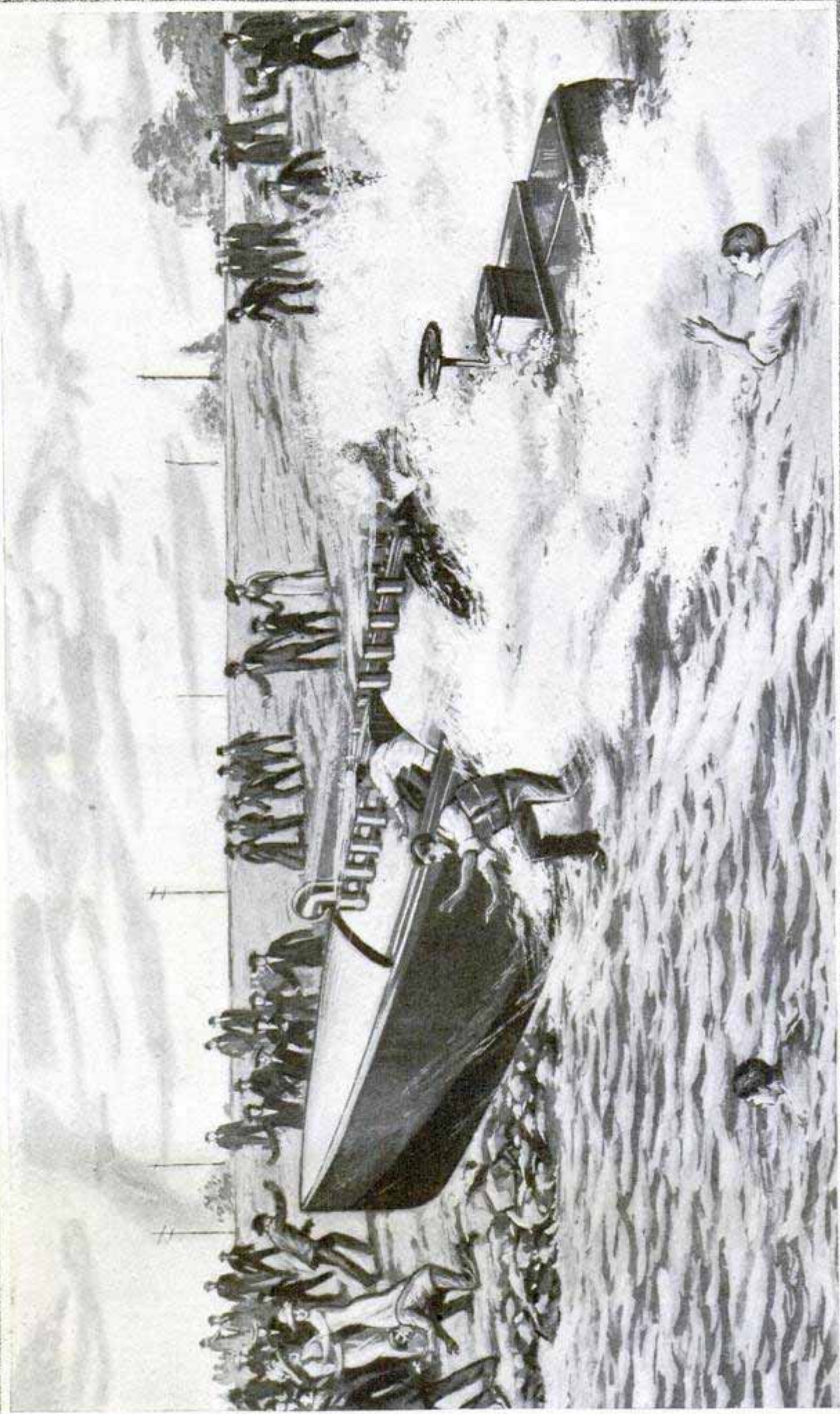
Louis Bleriot, the French aeroplane builder, has just brought out two new types of machines, both of which have made creditable flights. The new "Canard" (Duck) contains



many innovations in the shape of the body, the method of stabilization as applied to monoplanes, the position of the propeller behind the pilot, and the construction of the landing wheels.



Racing Type Which is Expected to Make Great Speed



World's Champion Motorboat, "Dixie IV," as She Appeared after Jumping from the Niagara River to the Beach near Buffalo, N. Y.

MOTORBOAT JUMPS FROM RIVER TO SHORE

Marine records were broken on the Niagara River, at Buffalo, recently, when Frederick K. Burnham's speedboat, the "Dixie IV" swerved from her course, while competing in a 35-mile race for the championship of the United States, and, while going at a rate of 40 miles an hour, hurled herself high and dry on the rock beach, crowded with spectators, and injured two boys and one woman.

What caused the accident was never learned, but the owner stated that some slight obstruction might have been hit while making the turn, which swerved the boat beyond control. Nothing was wrong with the rudders or the appara-

tus that worked them. Five persons were in the boat at the time of the mishap. Two jumped overboard, when they saw what was going to happen, and the three that remained in their seats were uninjured, though much shaken when the boat hit shore.

The people injured were spectators at the race who were struck by the boat as she leaped ashore. One of the boys was crushed under the bow and the other boy and the woman were knocked down.

Just a week previous to the accident, the "Dixie IV" won the international motorboat championship race at Huntington, L. I.

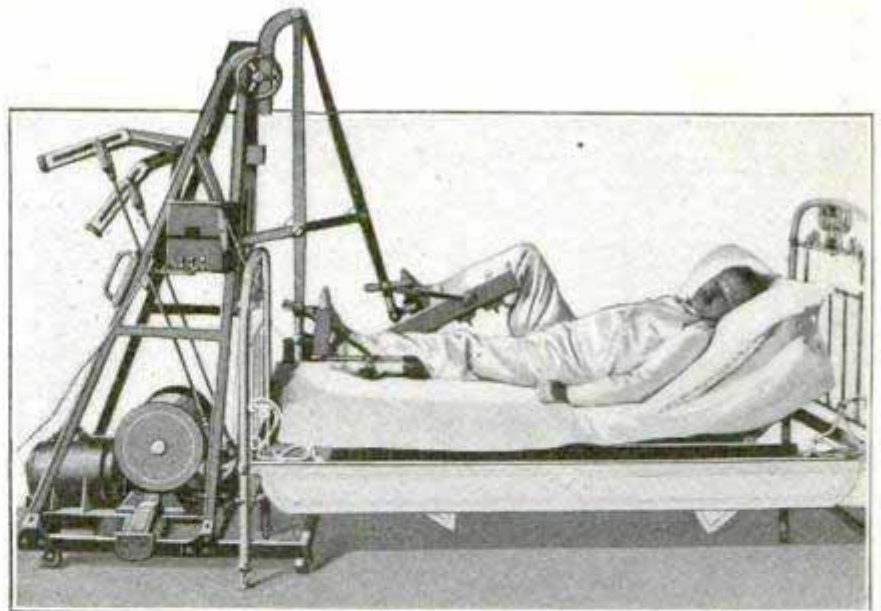
QUART OF HONEY MEANS 48,000 MILES' FLIGHT

A bee culturist has figured out some very interesting data concerning the work of bees in gathering honey. He calculates that a quart of honey represents no less than 48,000 miles of flight between the hive and the flowers. Also, that in June, which is the busiest month of the season, the workers of one colony easily cover as much as twice the distance between the earth and moon in one day. The distance of the moon from the earth is 237,600 miles. Therefore, the gathering of about 10 quarts of honey means, totaling the flight of all the workers of the colony, a flight of some 475,200 miles.

WALKING EXERCISE IN BED

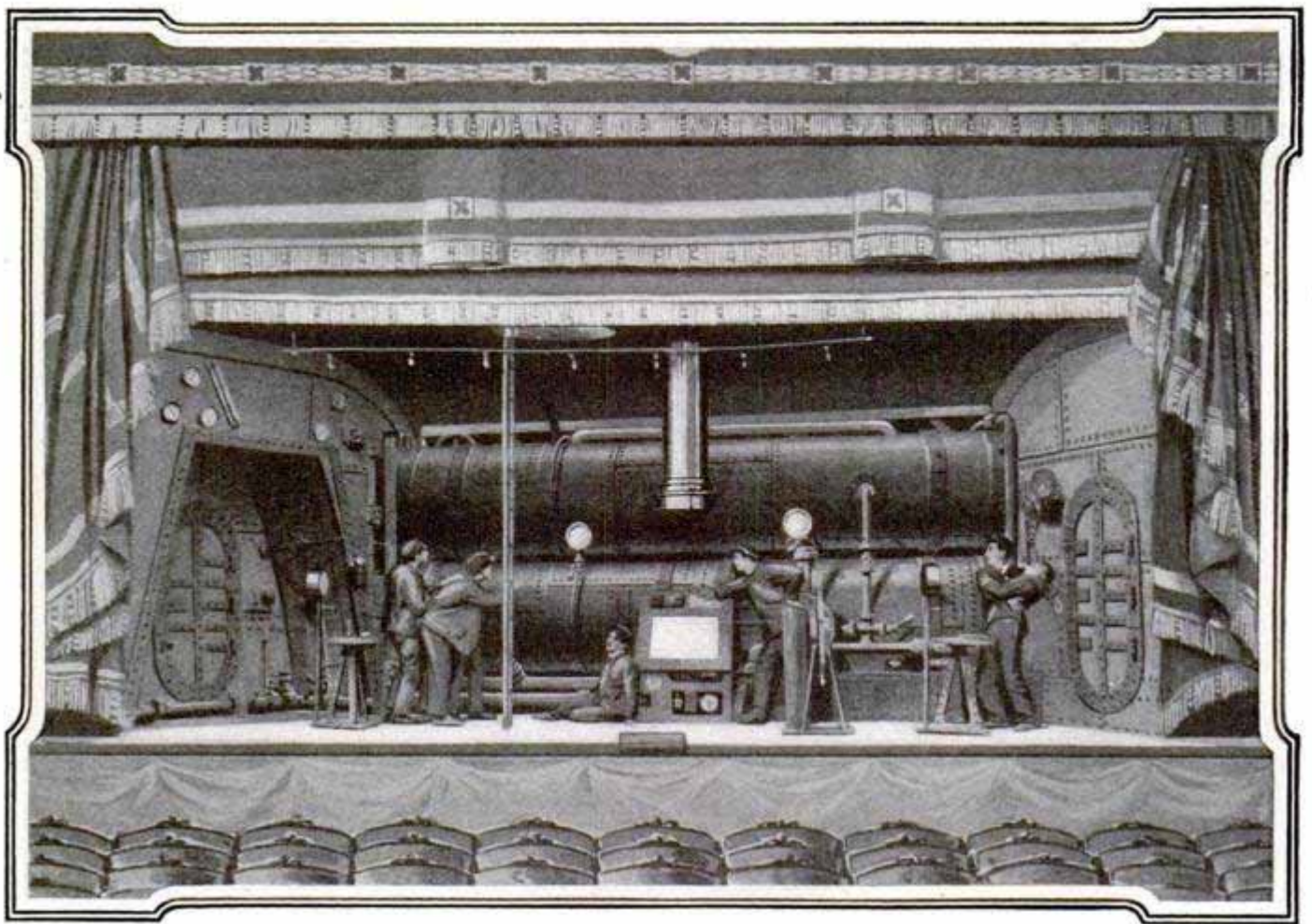
A Vienna physician has designed an apparatus by means of which the ill can get the benefit of physical exercise without leaving their beds. The feet are fastened to long levers, which are

set in motion by a small electric motor. When the patient wishes to take a "walk" in bed he starts the motor by pulling a cord. The regulating mechanism is arranged so that he can govern the speed, taking a brisk or a slow "walk."



An Apparatus Which Gives the Bed-Ridden Patient Walking Exercise

¶The United States army and navy, in conjunction with the government of the Philippine Islands, contemplate the construction of a complete wireless system for the Philippines which will have 13 high-power stations and 14 intermediate or low-power stations.

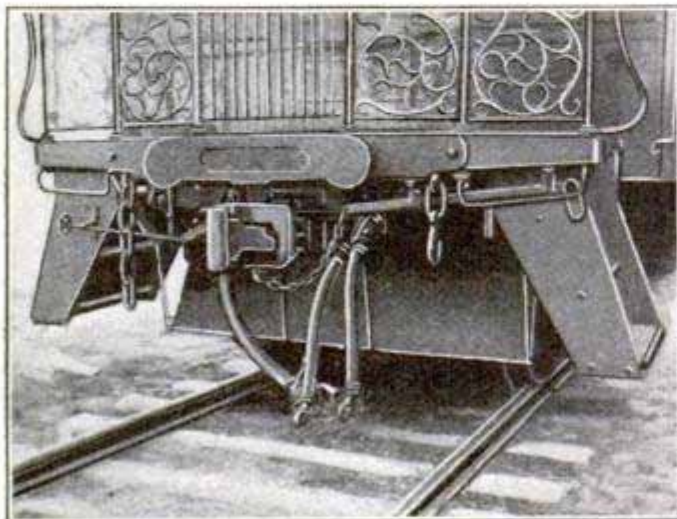


A SUBMARINE SETTING ON THE STAGE

Detailed construction of the interior of a submarine is staged in a recent production shown in Paris, called "Le Sous-Marin L'Hirondelle," (The Submarine "Swallow"). This is probably the first time that the dramatic possibilities of the submarine have been drawn upon.

DUST DEFLECTOR FOR ENDS OF TRAINS

The platform of the rear coach is, as every one knows, the dirtiest place to ride, upon the whole train. The dust and dirt curling up from the wheels of the car settle around the



Dust Deflector below Rear End of Observation Car

platform. The deflector shown in the illustration is the idea of a division superintendent whose inspections of the road kept him much of the time upon the rear platform of his car, which was usually the last one in the train.

It is simply a light framework of iron strips, covered with heavy canvas, and secured to the sills of the car. Its lower edge is near the rails, and in the creation of a secondary current of air it forces the dust to arrive behind the car from out of the limited space below the apron, which is so low that by the time the dust can rise the car has left it far behind.

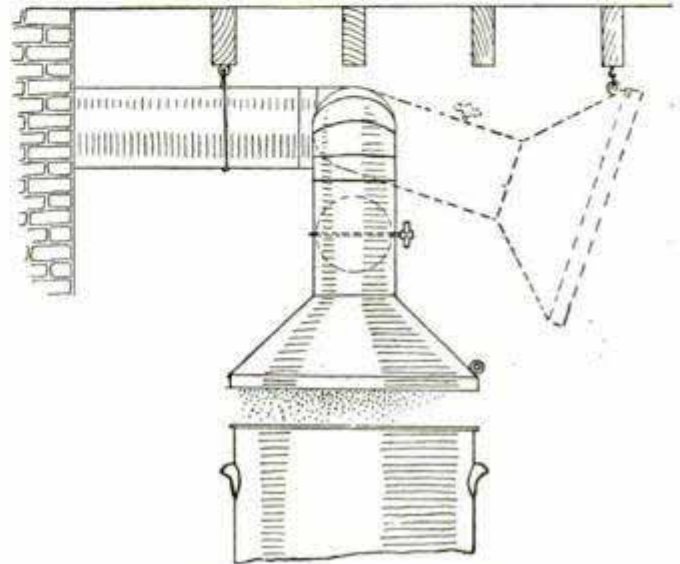
So great has the molasses trade of Hawaii grown that the product will hereafter be exported in a tank steamer, an old vessel being reconstructed to meet the special demands of the trade in this particular.



Ash-Can Dust Absorber

The dust rising from cinders taken from a furnace will, in a short time, cover everything in the basement with a coat of fine ashes and many times it gets into the rooms on the first floor. A great deal of this fine dust can be disposed of, if the ashes are put into a can which is directly located beneath a large funnel covering having pipe connections to the chimney.

The pipe must have two elbow joints and a connecting short piece so that the funnel-shaped covering can be turned up and away from the can top, as shown by the dotted lines in the sketch. The pipe and funnel are turned up when the can is taken out for emptying. A damper is placed in



Position of Hood over Can

the pipe so it can be turned to prevent a draft when not in use.—Contributed by John Blake, Franklin, Mass.

Wheels on a Shop Stepladder

A ladder with wheels is very handy for the oiler, as it saves considerable time in moving it from place to place. The ordinary wheel attachments are

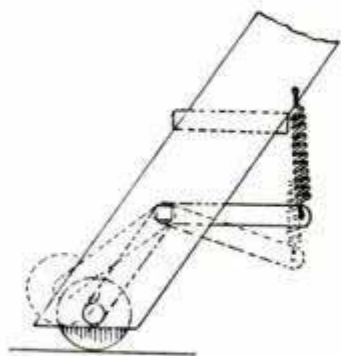


FIG. 1

Wheels on Ladder Legs

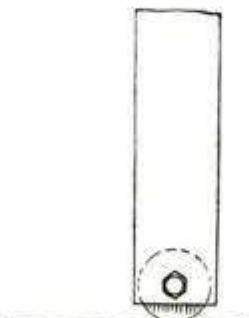


FIG. 2

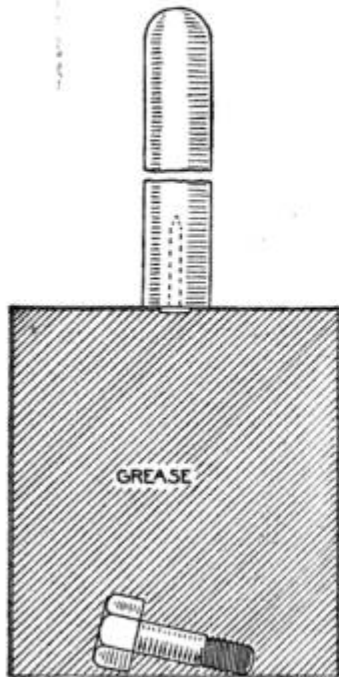
Fig. 1, a wheel attachment is shown which has a spring strong enough to carry the weight of the ladder, but will allow the wheel to rise under the weight of a person. This causes the ladder ends to come in contact with the floor and makes it impossible to move the ladder while the oiler is at the top. The wheels on the vertical supports are attached as shown in Fig. 2.—Contributed by D. J. McKenna, New Britain, Conn.

objectionable as the ladder is liable to move on an uneven floor when the oiler is at work. In the illustration,

Ⓒ An adjustable water drip for a grindstone can be made by sewing the ends of several pieces of burlap together, wide enough to fit in a can, and long enough to hang below the bottom on the outside. If water drips too fast, strips of the burlap can be folded back.

Substitute for a Small Lifting Magnet

A device that is quite useful and will take the place of a magnet for picking up small pieces, such as bolts, nuts, plugs, or anything not weighing over $1\frac{1}{2}$ lb., can be made of a long stick on the end of which a can is fastened and filled full of hard oil or grease.



Some small tool or part of machinery often falls, when making repairs, into a place from which it is hard to recover, and sometimes this will cause the dismantling of the different parts to get it out. When this happens, a magnet comes in handy. If a magnet is not at hand, the device described and shown in the sketch is a very good substitute. If the parts are brass, then this substitute will lift them where a magnet would not attract them.

The device is made of an ordinary tin can with one end open and the other nailed to a slender stick, the can being filled with hard oil or grease. When the can is pushed down on the dropped part, the grease will pick it up.—Contributed by Joseph Oleson, Milwaukee, Wis.

Protecting Automobile Engines from Intense Cold

One difficulty in running an automobile in the winter is to keep the engine from getting too cold and the carburetor from becoming covered with frost. This trouble can be avoided by making a heavy wire frame the same shape and size as the radiator front and covering it with dark

bunting which will make it look like a sieve. Fasten a strap around the wire at the top and buckle it around the water filling cap. Attach straps to each of the lower corners for buckling to the automobile frame or lamp brackets.

The bunting will stop the cold air rushing through the radiator and will shield the engine. The engine will then keep the air in the hood warm and the frost away from the carburetor. In very cold weather several layers of bunting should be used.—Contributed by Earl R. Hastings, Corinth, Vermont.

An Air Compressor

A simple air compressor that will produce about 50 lb. pressure in a tank can be constructed with two ordinary cast-iron open-well pump cylinders, $2\frac{1}{2}$ in. inside diameter, and pipe connections. These cylinders can be purchased cheaply, complete, including guide rods and plungers. Packing boxes, A and B, Fig. 1, from old discarded valves are fastened into the tee connections on the end of the pipe C. The valve rods D and E pass through the packing boxes and are attached to a device for driving the pistons F and G. The pipe connections on the ends of the cylinders have two inlet check valves, H and I, and two outlet valves, J and K, to the pipe L attached to the tank.

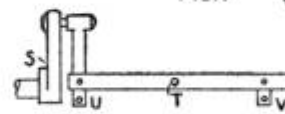
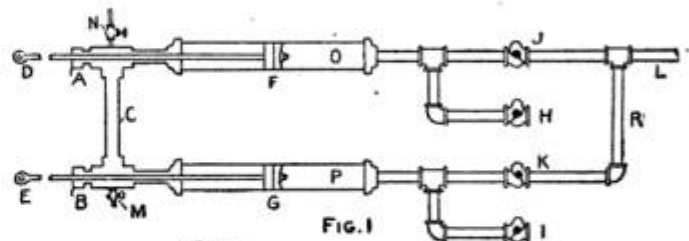


Fig. 2
Pump Cylinders and Pipe Connections

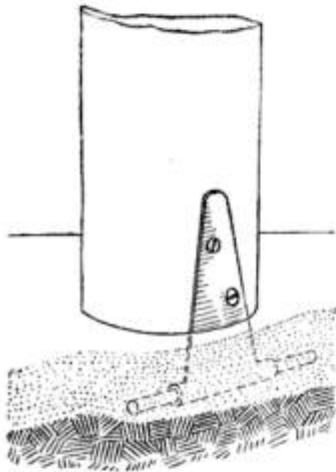
The cylinders are cooled by water in the pipe C, which is regulated by the valve M. The water outlet is through the valve N. These valves

should be regulated so that there is no pressure on the water to keep it from entering the air chambers O and P.

A crank arrangement can be fixed to operate the compressor from a shaft as shown in Fig. 2. The crank S operates an arm pivoted in the center at T. The plunger ends D and E, Fig. 1, are attached to the projections U and V, Fig. 2.—Contributed by J. S. Noble, Toronto, Ont.

Anchoring a Post to Concrete

Wood posts may be attached to concrete floors by setting one-half of a heavy hinge in the wet concrete, allowing sufficient length above the surface to admit two of the screw holes. When the cement is dry the post can be fastened to its support with screws. The hinge can be reinforced by inserting a piece of rod iron into the hole before the cement is tamped in around it.—Contributed by Paul H. Burkhart, Blue Island, Ill.

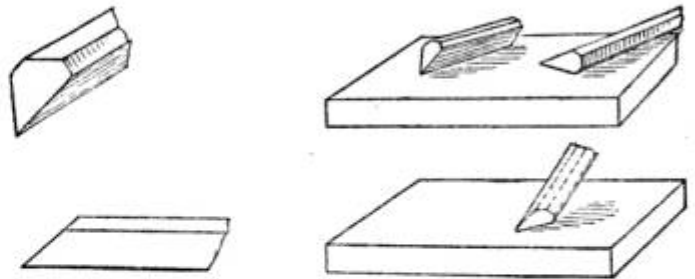


Bright Cutting on Aluminum

Grind the face of the graver in the direction of the lines, as shown in the sketch, to an angle of 45 deg. Use a fine oilstone wheel without oil. Leave the face of the graver rough and remove the bur by jabbing the end into wood. Polish the sides as shown on a hard oilstone which has had some brass rubbed into it and has been used without oil. Draw the graver from the heel toward the point to sharpen the cutting edges. Keep it moistened with pure vaseline. If the face of the graver is not polished, the metal will

not adhere to it, thus allowing the chips to roll off from the point.

This method of sharpening applies to tools for cutting any kind of jew-



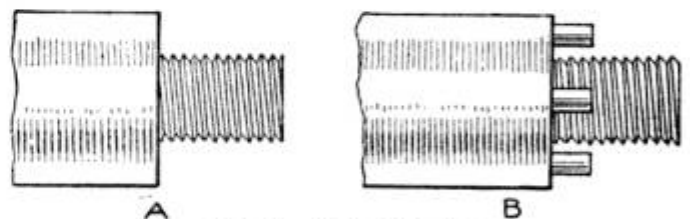
Whetting the Graver

elry except turning gravers. Turning gravers for cutting bright on brass or steel may be polished as described and given a very keen edge by drawing the face the same as the sides over the stone.—Contributed by Geo. W. Coplin, Bay City, Mich.

A Nut Arbor

Nut arbors are used to turn up pieces having threaded holes. The most common form of an arbor is shown at A in the sketch. This form has the objection of making it necessary to use a collar for the work to fit against, or the threads must be recessed in the work so as to have a close fit, or else the threads must be cut out close to the shoulder on the arbor.

An arbor made as shown at B does not have the objections mentioned. After the threads are cut on the arbor, four holes are drilled longitudinally in the shoulder and pins driven in tightly. The arbor is then put in a lathe and the pins faced off true. This makes an

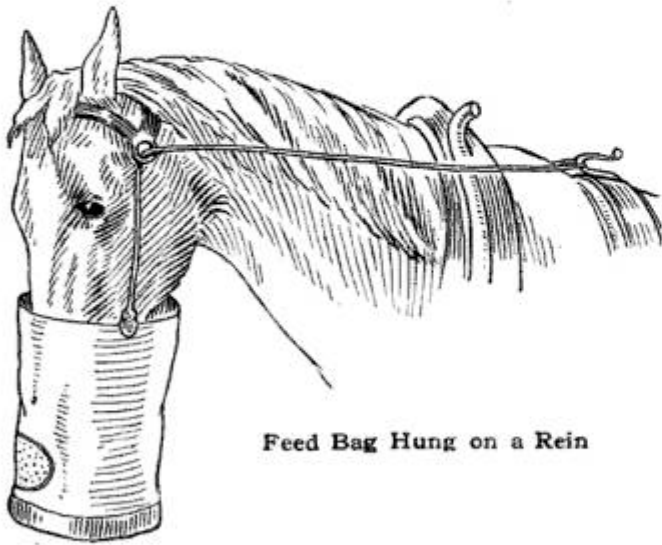


Pins in Arbor Shoulder

arbor that is good for any kind of work without resorting to collars and recesses.—Contributed by Donald A. Hampson, Middletown, N. Y.

Adjustable Feed Bags for Horses

When the feed in the ordinary feed bag gets too low for the horse to reach easily, he either throws his head up or sets the bag on the ground to get

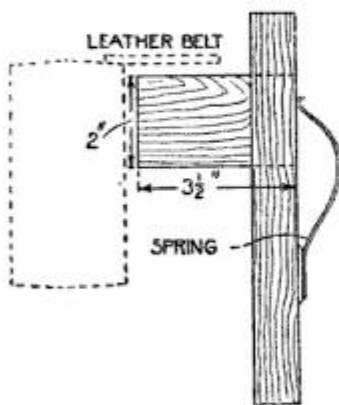


Feed Bag Hung on a Rein

the grain. In either case, much of the food is wasted. The illustration shows a feed-bag holder on the principle of a rein, which quickly adjusts the level of the grain to the mouth of the horse by a slight movement of his head downward. The sketch fully illustrates the construction of the head-gear and the rein connection.—Contributed by Leonard L. Miksch, Buffalo, N. Y.

A Belt Stick

The belt stick shown in the accompanying sketch consists of a long handle made of wood with a square



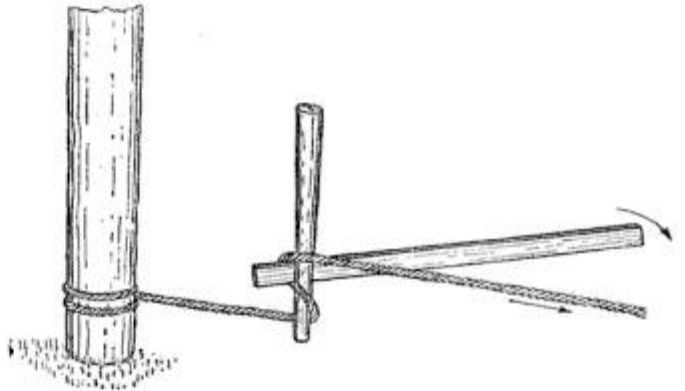
hole mortised in its upper end and a block, $3\frac{1}{2}$ in. long, fitted to slide easily in the mortise and held in place with a spring. The block is kept

from slipping through the hole by cleats or screws placed on the top and bottom sides of the block and entering a recess cut in the handle.

When a belt slips off a counter-shaft pulley, all that is necessary is to put the block under the belt and press the shifter stick on the side of the pulley. The block naturally slides back against the spring, leaving the belt free to slide on the pulley.—Contributed by Harry L. Berry, Philadelphia, Pennsylvania.

Pulling an Automobile Out of a Rut

There is a handy way of getting an automobile out of a rut if you are fortunate enough to have a rope along and the rut happens to be near a telegraph pole or tree, says the Automobile. The accompanying sketch depicts a method which was much used in the old days of the horse. A turn



Position of Lever for Taking up Rope

is taken about a convenient tree or post, then a smaller pole is placed in the position shown, to act as a fulcrum for the lever pole. In this way quite a purchase can be obtained, and if the rut is not too deep and the car not too heavy, so that the rope will not break, the car often can be withdrawn.

Quickly Made Tool for Bending Pipe

A pipe bender can be made by boring a few holes in a piece of oak plank and inserting heavy bolts or short pieces of pipe for pegs, about which the pipe may be bent as desired.

Ⓒ Rivet heads should be kept well below the surface on leather-faced clutches.

Stencil Making

By HOMER H. KNODLE

PART I—Designs

Painters, decorators and practically everyone have at some time or other felt the need of a good stencil to produce artistic duplication and were unable to make one because they did not know how to do it. Stencil making is quite simple and a few suggestions as to the methods of designing and the operations in cutting them will enable anyone to make them for pleasure or for profit.

The only tool necessary is a good sharp knife, preferably with a rounding point. The material used for a stencil is a heavy grade of tag or manila board which can be secured of a local printer or at a drug store. A small amount of boiled linseed oil will be required to coat the finished work, and, aside from the drawing tools, will be all that is necessary to do the best work.

A drawing board is necessary for designing, which must be as large as the largest size stencil to be made, a T-square, triangles, one 30 and the other 45 deg., and a set of drawing instruments. A fair grade of instruments amply accurate for this rough drafting should not cost over \$3 for the set. A box of 2-oz. tacks will be needed for fastening the paper or tag board to the drawing board.

A very simple design consisting of a square block connected by a bar, which will serve very well for practice work, is shown in Fig. 1. This is first drawn on stencil paper by dividing the horizontal lines into equal squares, then forming the blocks and connecting them with the bars, using the 45-deg. triangle on the T-square. When drawn as shown, it is ready to be cut. This design does not require binders.

In Fig. 2 is shown another simple scroll design without any binders, intended for practice work. The design is first drawn in rectangles and then

the scroll is drawn in freehand, finishing with the dots at regular intervals. The designs in Figs. 1 and 2 should not be made more than 2 in. wide.



FIG. 1



FIG. 2



FIG. 3



FIG. 4



FIG. 5

Simple Designs for Stencils

The design shown in Fig. 3 is made up of circles which contain some black and some white. The black represents the part to be stenciled in all cases and in this particular design the white space in the circle must be held firmly in place. To do this a narrow strip, called a binder, must remain in the black surface (in this, a part of the enclosing circle, as shown at A) to hold the white crescent-shaped piece in place. When through stenciling, the uncolored part under each binder may be painted or not as conditions suggest. The binders are necessary in all intricate stencils and they must be placed as inconspicuously as possible and yet hold the part firmly.

Another practice design is shown in Fig. 4 which eliminates the binders. The method of drawing is simple spacing and duplication. This design should not be over 2 in. wide or its effect will be ordinary. It is especially adapted to be cut about 1 in. wide and used in connection with another bold

design as a border or liner to mark the line of stenciling.

Some scroll work is introduced in the design shown in Fig. 5, which will give a beginner a chance to become proficient with his knife. The light scrolls will be good practice, but the main part is a good design for anything requiring a tasteful border.



FIG. 6



FIG. 7

Panel Designs

A panel design is shown in Fig. 6, which should be made in proportion of about four times its width in length. This is used for panel decoration and often several of the panels are combined to make a circular ceiling design. Circumstances will not permit its use in all cases, as the finishing border must fit. The best size for this design is 6 in. wide and 24 in. long. The design should occupy the position shown on the stencil and the dots should be cut out $\frac{3}{8}$ in. in diameter. Another panel design is shown in Fig. 7, illustrating the difference between a bold and a light effect. While the design shown in Fig. 6 would serve on a small panel, it might be out of place on a large one. The design in Fig. 7 would be more appropriate for the latter. The binders shown crossing the designs are not there of necessity but for ornament.

A wreath design which can be adapted to almost any place is shown

in Fig. 8. Stenciling a series of these designs about a center will make a nice circle to contain a center piece. It will serve equally well as a border. A pretty border can be made by placing a plain line on each side of the wreath or a design similar to Fig. 1 may be used. The wreath design should not be made smaller than 6 in.

or larger than 20 in. The dots forming the double circle should be $\frac{3}{8}$ in. in diameter for the larger sizes and reducing the diameter for the smaller sizes down to $\frac{1}{16}$ in.

Another border design which should not be made over 3 in. wide is shown in Fig. 9. The scrolls are sketched in first, then the dots and then the small squares. The border design shown in Fig. 10 is for practice in cutting rather than a design for stenciling.

It may be used in places requiring a very light design with little ornament.

Figure 11 shows a bold design of a center piece which will prove valuable for places requiring a heavy design of medium size. This design should not be less than 12 in. wide on the base and never over 30 in. It will give a very good effect if used with a darker tone of the body color and edged with a contrasting color. Binders will be necessary and these should be painted over after stenciling so important a piece as this one shown.

To lay out the design, mark the bounding circles first and then use the two triangles to draw the centerline of each bar as it appears in the sketch. Sketch in the outline of the bar at equal distances on either side of the centerline. Continue this over the entire design, sketching in the ornament around the border last.

When a stencil is finished remove it

from the board and place it in some convenient place and give the surfaces a coat of linseed oil. This serves to

rough and cannot be trimmed without destroying the symmetry of the design. Constant practice on the simple



FIG. 8

Designs for a Center Circle and Borders



FIG. 9

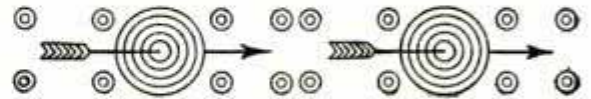


FIG. 10



FIG. 11

keep it and finishes the stencil. The knife should be very sharp and kept so, as a line cut over twice is always

designs will soon enable one to work on larger and more intricate work.

(To be continued.)

Repairing a High-Pressure Hose

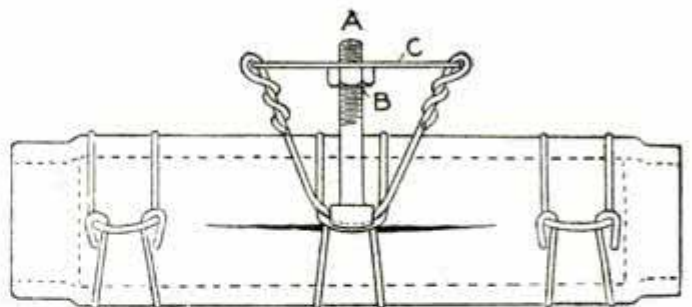
A hurry-up job had to be made on a high-pressure hose which was used in connection with a water-turbine boiler-tube cleaner with water at 150 lb. pressure per square inch. The hose had a split about 2 in. in length. The hose could not be cut off, as it would be hard to hold together under the working pressure, says a correspondent of Power.

The repair was made quickly by splitting the hose for a distance of about 5 in. on each side and inserting a nipple about 10 in. in length, first pushing it into the hose on one side of the split until the other end would enter the hose. Then the nipple was centered in the cut section. The two sides kept it from pulling apart.

The clamps used to make the connection water-tight were made of wire as shown in the illustration. When the wire was drawn tightly, the tool

was pushed forward, thus hooking the two ends over the bight of the wire.

If wire of high tensile strength is



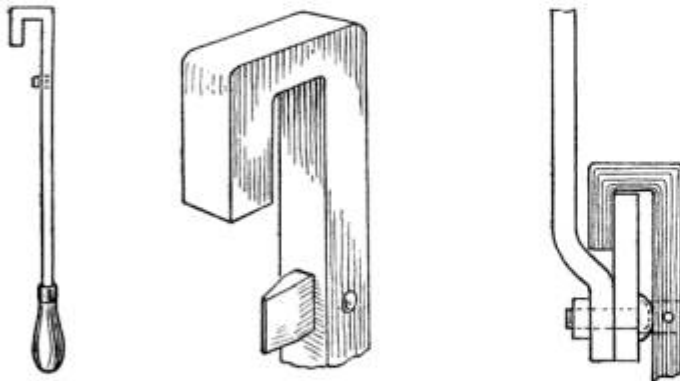
Clamping Hose with Wire

used and a little care exercised in getting the wires straight, a permanent job is usually the result. A great deal depends, of course, upon the workmanship.

☞ Spots on varnish can sometimes be removed by rubbing them well with a soft rag saturated in boiled linseed oil.

Holding Screws When Repairing Beef Tracks

The condition of the atmosphere about beef tracks soon rusts all nuts on screws and bolts. In making re-



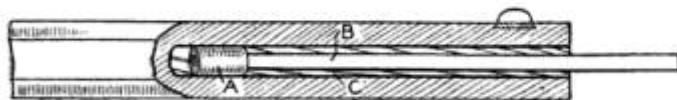
Screw-Holder Lever

pairs it is difficult to remove a nut without some means of holding the screw to prevent it turning with the nut. The leverage on an ordinary screwdriver is not sufficient to hold the screws, therefore I made a tool as shown in the sketch, the end of which is bent and fitted with a screwdriver end as shown in the enlarged view. The method of holding the screw is clearly shown.—Contributed by I. B. Spittel, Baltimore, Md.

Removing Rust Pits in a Rifle Barrel

The rust and pits on the inside of rifle barrels can be removed without rounding the edges of the rifling, with a tool of babbitt metal made to fit the bore of the rifle.

This tool can be made by inserting a wad of paper, A, about 4 in. in the barrel from the muzzle end, and a rod, B, preferably brass, held centrally in the bore while the space C is filled with melted babbitt metal. The end of the rod should be roughened or



Molding Soft Metal End on Rod

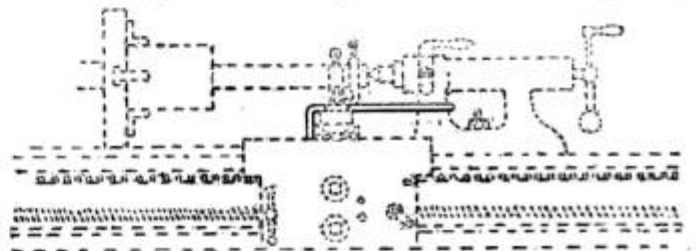
notches filed to securely hold the metal, and it should be longer than the barrel so that a loop handle can be bent in the end.

The babbitt metal will contract sufficiently in cooling to permit it to be screwed out of the barrel.

Dip the babbitt end in oil and dust emery flour over it and turn the tool through the barrel. All rust is quickly removed in this manner without damaging the rifling.—Contributed by Wilfred E. Bertrand, Philadelphia, Pennsylvania.

Drill Feed for a Lathe

Place the drill on the center with a dog as usual, then bend a piece of iron rod as shown, one end to hook over the base of the tool-post and the other to slip into the depression in the tailstock. Put a tool in the tool-post to keep the drill from "digging in" and take up the slack by screwing drill and dog up



Automatic Screw Feed for a Tailstock

tight against the tool-post. Put a slow speed on the screw feed. This will save feeding by hand.—Contributed by J. F. Tholl, Ypsilanti, Mich.

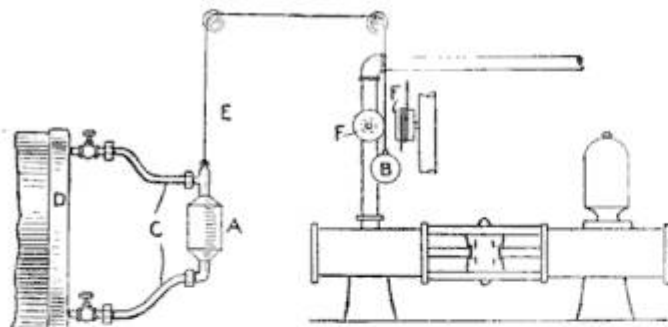
Automatic Pump Control

The device shown in the sketch is designed to control the action of a pump drawing water from a tank or hot-water receiver. It is designed to supplant the ordinary float control. The small water receptacle A is balanced, when empty, by the counterweight B. The receptacle A is filled with water through the flexible connections C as the tank fills. As it gets heavier on account of the increased amount of water contained, it slowly falls.

The flexible cord, E, by which it is suspended, is passed two or three

times around a sheave on the valve stem of the pump throttle. This winding is done in such a way that as the weighted receptacle falls the throttle valve opens. This change continues until the pump is removing water from the tank as rapidly as it comes in. Any variation in the amount of inflow is taken care of by the same process or the reverse of it. When properly adjusted the controller will maintain a level almost constant—not more than 1 in. variation being noticeable. The same device can be connected to the ordinary automatic electric motor starter and thus control motor-driven pumps of any kind.

Experienced engineers know the trouble caused by tank floats. They frequently break, and breaks are hard to discover and difficult to repair. Usually it is necessary to shut down the whole system before attempting repairs. The apparatus described may be installed, repaired or dismantled without disturbing the action of the pump or the flow of the water. It also has the advantage over the internal float of not being influ-



Substitute Float Attached to Engine Throttle

enced by the surge of the water rushing into the tank or the agitation caused by the boiling when the tank is used as a heater.

Repairing a Loose-Jointed Chair or Stool

The joints of stools and the majority of chairs are sure to become loose in time as they have no diagonal bracing, and, as time goes on, the wood of the rungs dries out and becomes smaller than the holes they fill, which

causes the chair or stool to drop to pieces, unless steps are taken to hold them together. Nails are useless as they soon work loose and screws are



FIG. 1

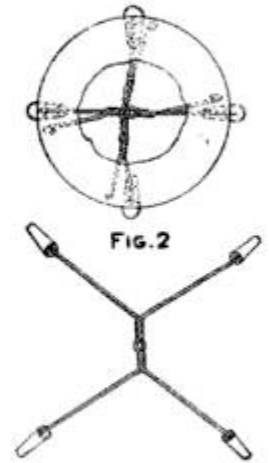


FIG. 2

FIG. 3

Wire Braces for Stools

of little value. The following method is sure to make the most shaky chair or stool in the shop firm as new:

A section of a repaired stool taken in the plane of two opposite legs is shown in Fig. 1. To repair a stool there will be required a $\frac{1}{8}$ -in. drill or bit, a brace, a pair of pliers, hammer, screwdriver and a quantity of No. 12 gauge galvanized wire. Drill four holes diagonally through the edge of the seat at one side of each leg, so that they come out on the under side; one hole through each leg obliquely toward the center, about 10 in. below the bottom of the seat, and a similar hole in each leg about the same distance above the bottom, unless it is a very low stool or chair, in which case the latter will not be required.

Insert the end of the wire through one of the upper holes in one of the legs and through the hole in the seat edge diagonally opposite. Bend a short close hook on the end of the wire with a pair of pliers, the end of the hook being parallel to the body of the wire, and hammer this into the leg like a nail, the hook lying in the plane of the grain, that is, lengthwise of the leg. Pull the wire almost taut, leaving about 2 in. slack to spare, and cut off the wire on the outside of the seat-edge hole. Turn another hook on this

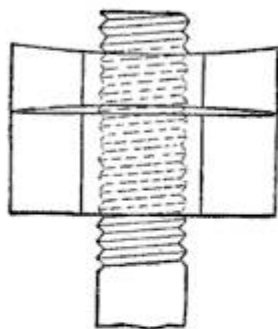
end and drive it into the seat edge, the hook in this case lying horizontal. Do the same with the diagonally opposite leg and seat-edge hole.

Take a large wire nail or screw-driver and insert it between the two lengths of wire and twist up tightly. Do the same with the other two legs and seat-edge holes, but in this case be careful to have one of the wires run over and the other under the twisted loop already formed and leaving rather more slack, because in this case two twists have to be formed in the wire on opposite sides of the first twist, as shown in Fig. 2, which is a plan view with the middle portion of the seat broken away.

The lower guying is simpler, there being only two lengths of wire, each extending between two opposite legs, and the two being twisted together as shown in Fig. 3. The whole operation takes from 20 to 30 minutes and when finished the stool is much stronger than a new one, in fact, it will hold its shape indefinitely.—Contributed by Geo. W. Colles, Milwaukee, Wis.

A Double Nut Lock

The sketch shows the principle employed. The last or lock nut is con-



caved on both sides. When set up tightly the center of the nut springs down and in a way acts similar to a spring washer. At the same time its sharp corners cut into the lower nut and hold

the lock nut in position. Extensive experiments on rail bolts have been entirely satisfactory.

☞Rats may be caught by putting a piece of cheese in the bottom of a wide-mouthed bottle and placing it in the hole. The rat will go in, but cannot get out.

Thawing a Frozen Pipe

It is no easy task to thaw out a frozen pipe where the heat cannot be applied to the outside of the pipe. If hot water is poured into the pipe, it soon cools on the ice and accumulates in such a quantity that it is impossible to touch the ice with the hot water. A very efficient method is to insert a smaller pipe into the frozen one and pour the hot water into the smaller pipe. If the end of the smaller pipe touches the ice, the hot water will come directly in contact with it in a continual stream. This will force out the cold water and thaw the ice quickly.—Contributed by John Mason, Armstrong, Okla.

Shaking Up a Telephone

Where you cannot make your party hear over a telephone, shake it up by giving the transmitter a downward strike with the open hand. Do not abuse your telephone. If a portable or desk telephone is used, turn it upside down and then right it again.

The reason for this is that talking causes waves in the air like ripples on the water when a stone is thrown into it. In a transmitter there is a small receptacle containing fine grains of carbon. The waves of sound strike upon a disk that in turn squeezes the carbon particles together. This constant compression, together with their own weight, causes the carbon grains to settle and pack into a hard lump that does not respond to the vibrations of the metal disk. When giving the transmitter a downward strike with the hand the particles are disturbed and loosened and made soft so that they easily respond to the varying pressure caused by the sound waves. When a portable telephone is turned upsidedown, all the fine grains of carbon fall to the top of their container and as the telephone is righted they settle again, but are loose and soft.

When the carbon particles are com-

pressed, the electric current flows through the transmitter easily. When they are not compressed, the current does not flow so easily, thus the sound waves produce in the transmitter a current of varying strength that passes over the line.

The receiver consists of a metal disk and a magnet inclosed in a hard-rubber casing with a cap. The magnet draws the metal disk. The varying current coming over the line flows through coils of wire around the magnet which weakens and strengthens the magnetism and makes the disk vibrate. The disk in turn causes sound waves the same as those given into the transmitter. If the cap of the receiver is loose, the disk often touches the magnets, which prevents it from vibrating easily. In such a condition it is hard to hear your party. If the cap is screwed up tight the disk is sprung away from the magnet about $1/100$ in. and it has a hollow sound when struck with the end of the little finger. This will make the receiver produce the sound waves clearly.

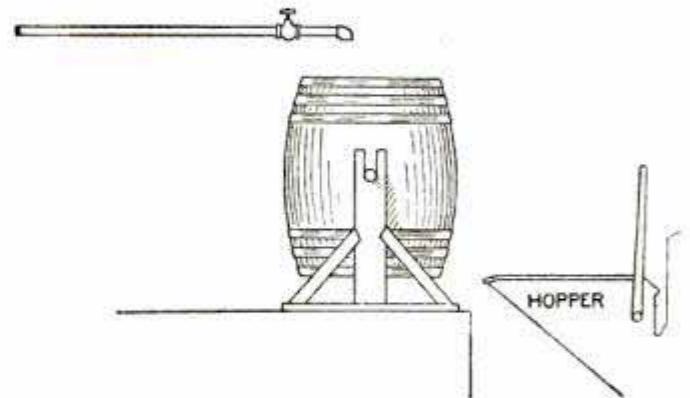
The heat of the ear expands the cap and in cooling it creeps on its threads so that it will come loose in time. This will make it sound like the party on the other end of the line is very far away. Shaking up the telephone will make your party hear you well, and keeping the cap tight will enable you to hear them well.—Contributed by E. M. Morgan, San Gabriel, Cal.

Water Barrel for a Concrete Mixer

On a concrete job, a water barrel is usually behind the mixer, and the man in charge of the mixing uses a pail to get the water from the barrel to the mixer, says a correspondent of Cement Age. The accompanying sketch shows the arrangement of a barrel mounted on a trunnion and placed to one side of the mixer. This is filled to a certain height, and when the batch is ready for the water, the barrel can be tilted and emptied easily

and quickly. This allows a measured and uniform quantity of water to be added to the mixer in the shortest time possible.

The trunnions could be mounted on



Barrel on Trunnions

a band and the band bolted at any desired height on the barrel. This would allow the easy dumping of any required quantity of water.

Bending Heavy Brass Braces

Heavy brass angular braces, such as are often used for automobile repair work, can be successfully formed to any desired angle without checking in the bend by using two ordinary monkey wrenches. The jaws of the wrench being smooth permit the metal to slip just enough to avoid breaking. And therefore this method is preferable to a vise.—Contributed by F. B. Mallory, Flemington, N. J.

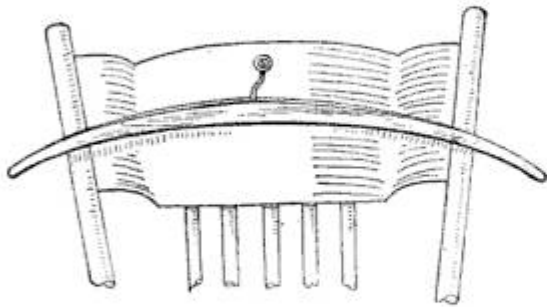
Aid in Nailing on Long Ceiling Boards

When ceiling a porch one day I had some 16-ft. pieces to put on, and as I was alone, I could not hold them while driving the nails. I secured a piece of heavy wire and bent it around a joist, as shown in the sketch, so that it would hold one end of the board while I jointed and nailed the other end. This wire clip did the work of an extra man in holding the boards.—Contributed by Albert J. Weier, Eavons, S. Dak.



Coat Hanger on a Chair

After leaning a few times against my newly pressed coat that had been placed over the back of a chair, I fastened a coat hanger on the chair back as shown in the sketch, and used it to

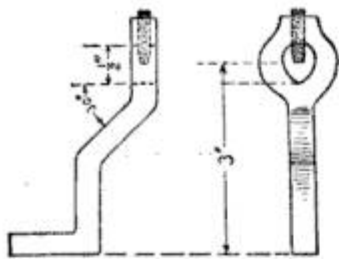


Hanger Attached to Chair Back

hang my coat on while at work. The chair can be used for the purpose it was intended.—Contributed by Victor Labadie, Dallas, Texas.

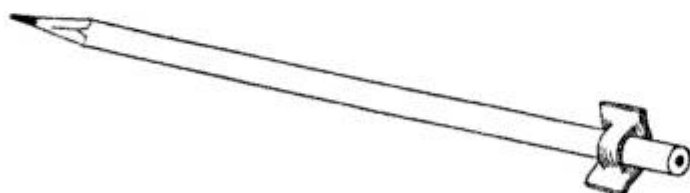
Lathe Dog for Small Work

The ordinary lathe dog used on small and short pieces is in the way of the tool-post block. To overcome this trouble, bend the tang of the dog at an angle of 30 deg. and use a headless set-screw. The sketch shows the shape of the dog and dimensions.—Contributed by Chas. Hattenberger, Buffalo, New York.



Clip to Keep a Pencil from Rolling

A draftsman usually has several pencils on the drawing board at a time and as these boards incline, it keeps one busy at times grabbing pencils as they roll down the board, says



Clip on Pencil

a correspondent of American Machinist. A piece of belt lacing placed on each pencil as shown in the sketch

will provide an anti-skid device that will keep the pencil where it is placed. The sketch clearly illustrates how the piece of lacing is applied.

Homemade Canvas Belt

Cut a tarpaulin into strips an inch or two wider than the desired belt. Procure some old roller composition that printers use and make it into solution with water and keep it hot. If the solution is too thick, add a little syrup. Cement the cloth strips together with the composition, taking care to put the laps the same way, and make it as many ply as needed for the height of the belt. Use enough of the cement to firmly cement the strips and when done go over it with a hot flatiron to make sure that all parts are cemented together. Lay the belt straight on the floor and line it to the desired width with a chalkline and trim the edges. If carefully made, the belt will be as good as could be bought, and less expensive.—Contributed by J. S. Van Alstin, Norfolk, Nebraska.

To Keep a Paint Brush Soft

After finishing a job of painting and not desiring to have a can of oil standing around the house, I filled the bristles of the brush with a good supply of paint, carefully wrapped it in paper, tied it securely with a string and placed the brush on a shelf. A short time ago I wished to use the brush and upon unwrapping it I was surprised to find the bristles as soft as when put away. The oil in the paint having soaked the inner wrappings of the paper, thus preserving the brush in first-class shape for two years.—Contributed by F. D. Koon, Schoolcraft, Mich.

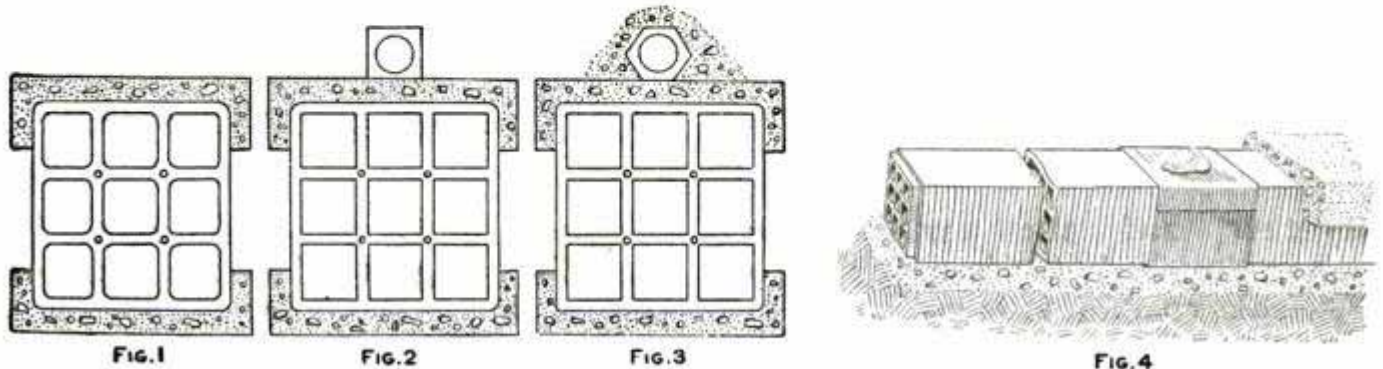
☞ Whitewash for outside work is made of $\frac{1}{2}$ bu. slaked lime, 1 lb. salt, $\frac{1}{2}$ lb. sulphite of copper and 1 gal. of sweet milk.

Underground Conduit Construction

The unsightly poles and wiring which have for years marred the appearance of city streets and country highways, as well as constituting a nuisance and source of danger, are gradually disappearing, and the innumerable wires are being laid in underground conduits. Even the smaller towns, proud of the appearance of

age that may be caused by other excavations in the vicinity.

One creosoted-wood duct having an inside diameter of 3 in., or one single-duct clay tile is usually run along on top of the cap as shown in Figs. 2 and 3. These ducts are provided to allow for laterals which may be required from time to time, and which would



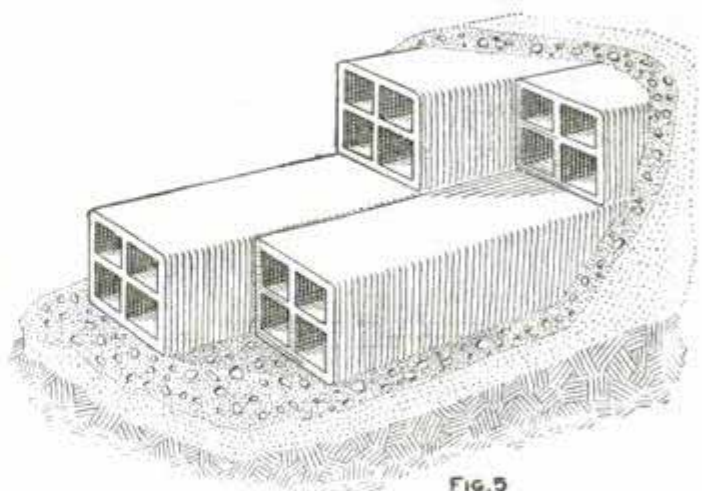
Concrete Bed and Covering

their main streets, are replacing the poles with conduits.

The present method of construction which has been adopted by the telephone and power companies consists of placing a 4-in. concrete base on which is laid vitrified clay conduit. As the material used in this conduit usually forms a cheap glass in baking, it is absolutely the best material to construct a main conduit or subway. Creosoted-wood ducts and fiber ducts are also used, but do not give as satisfactory results as the tile on heavy runs.

After the concrete bottom is placed the multiple-duct tile is laid, Fig. 1, the joints being made by placing dowel pins in the two top holes. A piece of single-ply tar paper, about 8 in. wide, and long enough to lay on the sides of the tile, is then placed around the joint to exclude dirt, concrete, etc., from the interior of the ducts. The paper is held in place by a dab of mortar as shown in Fig. 4. The clay conduit is then capped with a layer of concrete, 3 in. thick, which projects down the sides of the tile for 3 in. This cap is to protect the conduit and the cables within from dam-

otherwise necessitate excavating from the pole to the manhole. When the creosoted-wood duct or tile is used, the lateral is built from the pole to the single duct which is "tapped." A lateral, or subsidiary, is a term which applies to a one and two-duct run from a manhole or service box to a pole or building and, generally speaking, means a short light subway. The laterals are used to carry the under-



Four-Tile Unit in a Concrete Casing

ground cables to the poles or buildings above ground, so that the service from the wires can be distributed. The bends shown in the laterals in

Fig. 7 are made of 3-in. iron pipe, which is bent to shape before delivery on the job.

When creosoted wood is used on top of the tile, the joints are simply fitted

placed in the trench and on this the bottom ducts are laid. Concrete is then poured over these ducts and tamped into place. More ducts are laid and concrete tamped in to make

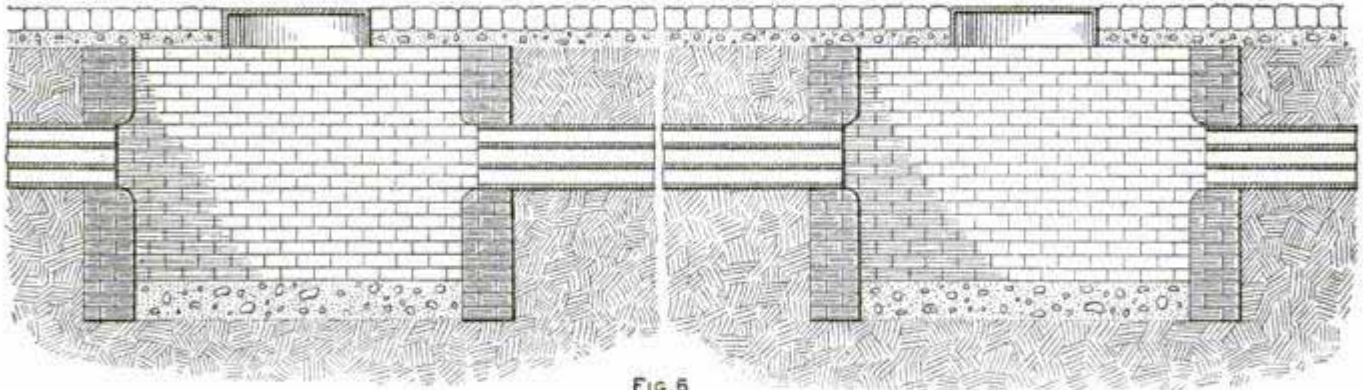


FIG. 5
Manholes

together and the earth replaced. When the single tile is used on top of the main conduit, it must be laid very carefully and covered with concrete.

As the multiple-duct tile is only made in two, three, four, six and nine-hole sizes, it often becomes necessary to build the subway using more than one unit, as shown in Fig. 5. When laid in this manner the joints must be "broken" or "staggered" and the whole run is usually, but not always, encased in a concrete jacket or envelope. When laying two-tile units, one on top of the other, it is customary in first-class work to place from 1/4 to 1/2 in. of mortar between the units so that the upper course of tile may be laid straight and true.

it appear as in the cross section, Fig. 8. The lengths of tubes are connected by a slip joint, as shown in Fig. 10. The average length of a fiber duct is about 8 ft.

Another method of building a subway is shown in Fig. 9. When the conduit is built above ground, as is sometimes the case, it is made up of fiber ducts. This method needs no description except to state that a box is built, forms are placed to line up the ducts and the concrete placed the same as in the previous description. The disadvantage of fiber ducts lies in the fact that fiber is not an insulator, as the material of which it is composed consists partly of vegetable matter. The ducts also become soft in warm

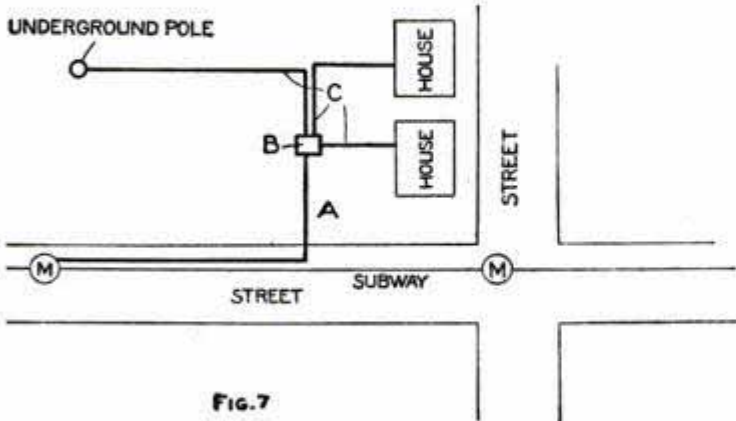


FIG. 7

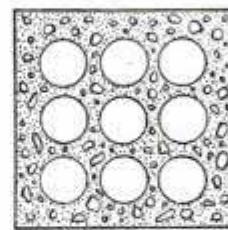


FIG. 8

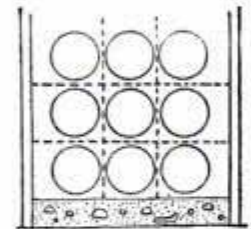


FIG. 9

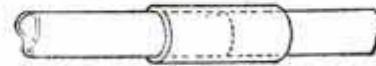


FIG. 10

Plan of Subway and Fiber Ducts Covered with Concrete

When the subway is built of fiber duct instead of vitrified clay, the method of constructing is changed. A bed of concrete, 3 in. deep, is first

weather. Great care must be exercised while placing the concrete.

The manholes used in connection with the conduit run are usually built

of hard-burned common brick laid up in walls 8 in. thick with cement mortar. The floor is usually of concrete, 8 in. thick. The thickness of the walls depends largely on the size, location and earth pressure. A conduit construction with a manhole at each end is shown in Fig. 6. The walls are built up straight and a flat iron manhole frame set on top of them. This style of frame does away with the necessity of placing railroad iron in the walls to form a roof upon which to place the old-style round frames. The standard size for manholes as specified at present is 7 ft. long and 4 ft. wide,

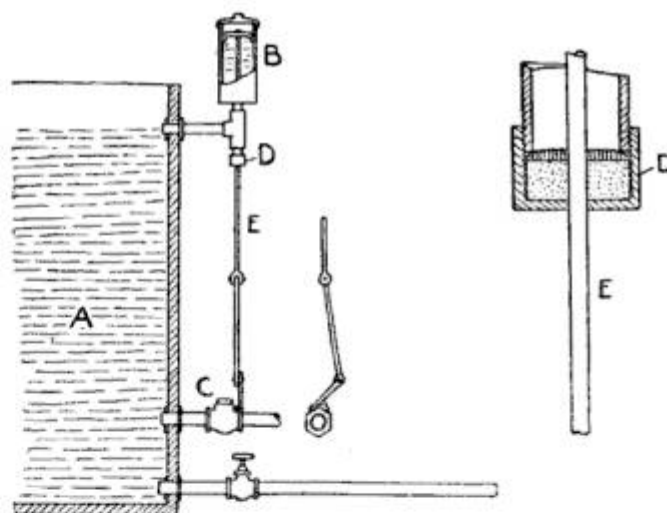
with 5½ ft. depth from floor to top of wall. Service boxes differ from manholes only in size, the length and width being from 3 to 4 ft. and the depth about the same. Service boxes are placed where there is an exceptionally long or crooked lateral, or in special cases, one of which is shown in Fig. 7. This allows for one 150-pair cable, A, to be drawn into the service box B from the manhole, where the three 50-pair cables, C, are spliced into it. The sketch Fig. 7 also shows a method of making up a working drawing of a job of this kind.—Contributed by Geo. M. Petersen, Buffalo, N. Y.

Water-Depth Regulator for a Tank

A tank used for a water supply in connection with a laundry was constructed with a close-fitting cover which would stand a 4-lb. pressure when full. A regulator was attached to the side of the tank A to keep it full all the time without attention. The regulator consisted of an iron pump cylinder, B, such as is used on a hand pump, with a plunger and connecting rod to a quick-acting valve, C, on the inlet pipe. The rod E of the plunger passed through a packing box, D, made on the end of a short piece of pipe. This is shown plainly in the enlarged part of the sketch. The short pipe was fitted with an ordinary pipe cap having a hole drilled in its center a trifle larger than the rod E. A washer was placed over the end of the pipe and packing put into the cap. The check in the pump plunger was closed and blocked to make it air-tight.

The water is admitted through valve C in the inlet pipe, when the valve is in the down position. When the tank is full of water, a portion passes into the pump cylinder and under the pump plunger forcing it up in the position shown and carrying with it the rod that connects the plunger and lever on the valve C, thus raising the lever and closing the valve.

When drawing water through the outlet pipe, a vacuum is caused in the top of the tank and in the cylinder, which draws the plunger down and



Regulator Attached to a Tank

opens the valve. This admits water through the inlet again to fill the tank. The action takes place as soon as the outlet valve is opened. The inflow of water offsets the vacuum, which makes the action of the water entirely free.

If the inlet is as large as the outlet, the water cannot be lowered in the tank. If the inlet is the largest, the valve will open and close like the slow motion of a piston on an engine.—Contributed by C. S. Enright, Cle-Elum, Wash.

Taking Care of Leaks through Hinged Windows

Most every hinged window that swings toward the inside leaks when the rain beats against it. There is no

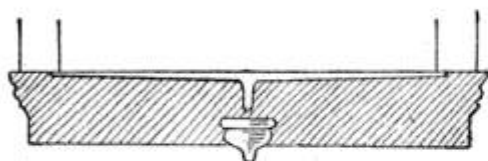


FIG. 1

Cup on Window Sill



FIG. 2

remedy for this as these windows leak even though equipped with the very best weather strips, yet architects are specifying them on new houses quite often.

While abroad I saw an attachment for these windows that interested me very much. It was nothing more than a gutter or groove cut in the window sill, being very shallow at the two extreme ends and gradually getting deeper toward the center. Right at the deepest point a hole was bored about $\frac{1}{4}$ in. in diameter, to which was attached a small pipe as shown in Fig. 1. At the end of this pipe a hook is soldered upon which a can of some ornamental design, Fig. 2, is hung. While this is not a very artistic addition to the window it looks very much better than the sill covered with towels and rags to catch the water, or having the wallpaper beneath the window stained. The device does not remedy the fault, but protects the wall and floor.—Contributed by Gilbert A. Wehr, Baltimore, Md.

Holding a Bolt in a Turning Crank

A bolt and nut may be held in the end of a turning crank or shafting by the following method, which seldom fails, even though it is inclined to work loose. Before inserting the screw place a small block of wood in the hole. When the screw is turned up tightly against the wood, the revolving motion of the machinery will not cause it to work loose.—Contributed by Loren Ward, Stockport, Iowa.

Detector for Polarity of Electric Wires

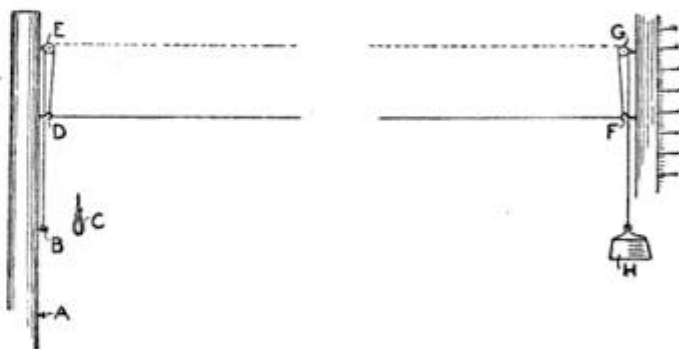
One of the simplest detectors for electrical polarity is white filter paper immersed in a solution of sodium sulphate to which has been added a small quantity of phenol phthalein. The result is a colored paper, which, if moistened, will turn violet when touched with the negative wire, but remains unchanged when in contact with the positive. The paper retains this property indefinitely, and is sensitive to a very feeble current.

Blueprint paper may be used for the same purpose, a white spot developing around the negative pole when the paper is in contact with the wire, while the positive wire has no effect on it.

Adjustable Height Clothesline

The ordinary clothesline is a source of much trouble. To have it low enough for hanging the clothes, to keep them from dragging on the ground and then to prop it up high enough for drying the garments, is invariably a stumbling block to the housekeeper. The sketch shows an easy way to adjust a line which is never slack, never drags the clothes in the dirt, is always high when the clothes are drying and is easily lowered to hang or remove the garments.

Two spikes, A and B, are driven



Clothesline with Weight

into one of the posts and two pulleys, E and G, are fastened at the top of the posts or 7 ft. from the ground. About $5\frac{1}{2}$ ft. above the ground, screw in two screwhooks, D and F. The nails A and B should have a dis-

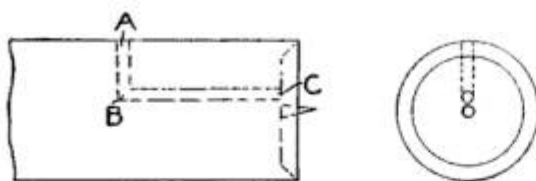
tance between them equal to the distance D and E.

Make a loop, C, in the end of the line, or tie an iron ring in the line after running it through the pulleys. Loop the end over the spike B and fasten a heavy weight, H, at the other end. Pull the line down and hook it over the hooks D and F. This will give the line the proper height for easily hanging the clothes, and the weight will keep it taut all the time.

Unhook the line at D and at the same time take the loop from the spike B and draw it to A. This action will take up that part of the line from D to E, thus making it possible to utilize all the space between the posts. Release the line from the hook F and the weight will automatically take up the line between F and G, thus keeping it taut all the time without the use of props.—Contributed by Axel C. Hanson, Lincoln, Neb.

Oiling a Lathe Cup Center

An ordinary cup center for a wood lathe can be made with an oil hole so that oil can be applied without re-



Hole for Oil in Cup Center

moving the work. The oil hole is drilled from A to B and then the hole C is drilled to intersect it at right angles. The oil being put in at A runs through the hole and strikes the end of the work at C.—Contributed by Julius Barnes, Columbus, Ga.

Grip for Strap Iron

The article here shown is a little device for erecting pipes or stacks, especially where strap-iron hangers are used, but it will grip wire just as well as strap iron, says a correspondent of Sheet Metal Shop. When putting up hangers, it is difficult to pull the slack out and get them uniform.

With this little device, which is composed of a wedge and link, one can, by the use of a very small set of

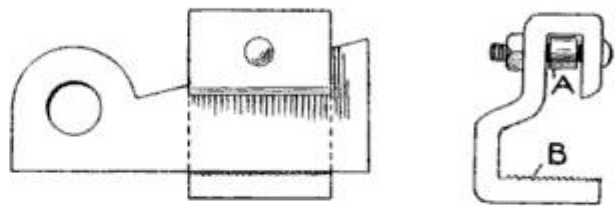


FIG. 1

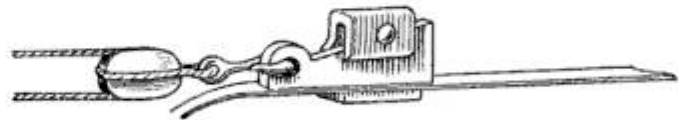


FIG. 2

Grip in the Form of a Wedge

blocks, draw the hanger to the desired tension with perfect ease and without loss of time. The wedge and link can be quickly adjusted.

The side and end views of the wedge and link are shown in Fig. 1. It will be seen that a small roller is placed at A, which allows the wedge to roll freely to its full limit. This roller is made of $\frac{3}{8}$ -in. gas pipe with a $\frac{1}{4}$ -in. bolt and nut to hold it in place. The surface of the link is made rough, as shown at B, causing it to hold while the wedge slips freely on the roller. The link may be made of $\frac{1}{2}$ by $1\frac{1}{4}$ -in. tool steel, but the wedge can be made of any kind of $\frac{1}{2}$ by $1\frac{3}{4}$ -in. iron. In Fig. 2 is a view of the grip in use.

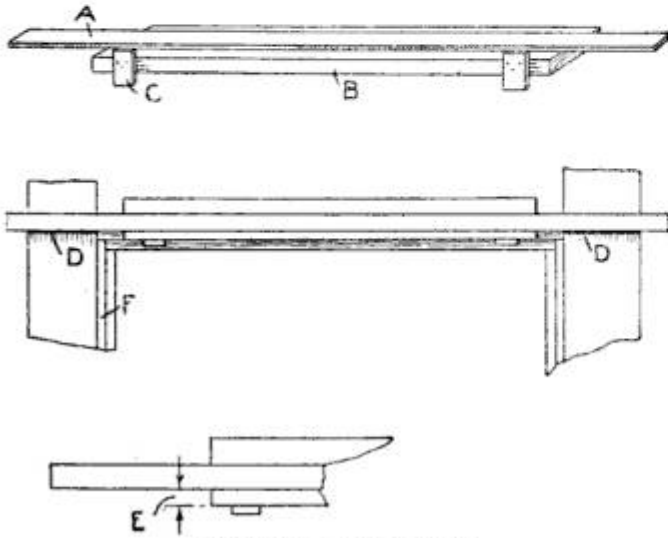
Pointing Brick Walls

When pointing up a crack in the mortar between bricks, it is necessary to cut out the mortar a little longer than the crack and about $\frac{1}{2}$ in. deep. This should be filled with a half-and-half mixture of cement and clean, sharp sand. In replacing cracked or broken bricks, great care should be taken to see that the brick is firmly bedded into the mortar on all sides, or the wall will leak and eventually settle in that particular spot.

Ⓒ Do not forget to oil a machine the first thing in the morning.

A Marker for Door and Window Head Casing

The marker consists of four pieces put together as shown in the perspective sketch. The pieces can be of any convenient material and size, but the relative sizes shown in the sketch will be found most practical. In this case



Marking Door Casing

A is a piece of window stop, $\frac{3}{8}$ by $\frac{3}{4}$ in., fastened to a piece, B, $\frac{3}{4}$ by 3 in. The pieces C are cut $1\frac{1}{4}$ in. long from window stop. The length of the tool will depend on the size of the doors and windows.

The pieces C are placed flush against the outside groove of the door frame. If the distance E corresponds to the thickness F, a pencil drawn

along the edge D makes a mark which is true with the frame of the door. The head casing can be placed on the ends of the side casing cut to the marks and nailed without fear of a crack showing.

In the case of a window head where the frame is made of different material, the piece A is placed flush with B. This tool is particularly applicable to carpenters whose door and window frames do not always fit true in door and window openings.—Contributed by Jo Sorensen, Portland, Ore.

Fitting Screws in Old Holes

When window or door screens are removed for the winter, and it is intended to hang them again in the spring, paint the holes where the screws were removed from the wood with a small brush or a piece of cloth. When the screens are replaced the next season the screws will not be loose but will hold as firmly as when the holes were first made.—Contributed by John T. Timmons, Cadiz, Ohio.

¶ If one bolt is lost on a planetary transmission, the overweight on the others is apt to shear them off.

Lemon Squeezer

As we were very much in need of a lemon squeezer one day and did not have one in the house, I soon made a substitute that gave better results

than an ordinary squeezer. I made a handle of soft pine in the shape of a paddle (Fig. 1) from the wood of an old packing-box end. The handle was 3 in. wide and 7 in. long. A 2-in. circle was drawn on the paddle part and eight 6-penny nails were driven part way in on the line, in a slanting position (Fig. 2), so that the heads formed a circle about 1 in. in diameter.



FIG. 1



FIG. 2



FIG. 3

Nails in a Board Take the Place of a Squeezer

with the nails in the positions shown in Fig. 3, and one-half the lemon is pushed onto the nails and turned. The squeezer can be used a great

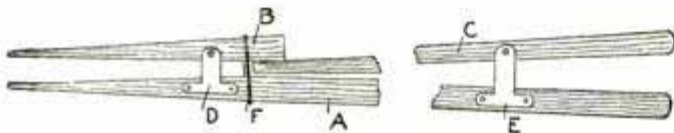
than an ordinary squeezer. I made a handle of soft pine in the shape of a paddle (Fig. 1) from the wood of an old packing-box end. The handle

many times as it is easily cleaned.—
Contributed by W. A. Lane, El Paso,
Texas.

A Show-Window Stick

A stick, as shown in the sketch, that will prove quite useful to the window dresser, can be made in a short time and used to place small articles in a window without getting inside. The stick is made of three pieces of white pine, $\frac{1}{2}$ in. thick, $\frac{3}{4}$ in. wide and in the following lengths: First, 36 in.; second, 31 in., and the third, $4\frac{3}{4}$ in. long. The longest piece, A, is first tapered from one end to the other; the next longest piece, C, is tapered to $\frac{1}{4}$ in., and the short piece, B, is tapered the same as A on the end.

The pieces are fastened together with inverted T-shaped pieces of



Stick Operates Like Pliers

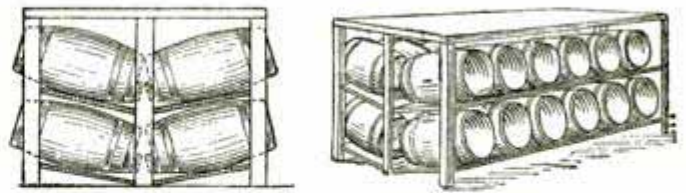
sheet brass, D and E, placed on each side in the positions shown. The shorter one is $1\frac{3}{8}$ in. high and the other is $1\frac{3}{4}$ in. A large rubber band, F, serves as a spring to keep the points separated. The stick is operated the same as a pair of pliers.—
Contributed by W. J. Faulkner, Russellville, Ark.

Nail Kegs Used as Bins

Large hardware stores do not require bins as receptacles for nails. The loose stock of nails should not be kept on the salesroom floor except those sold in 1-lb. boxes, says Hardware Reporter. A large stock of nails can be kept in the basement and orders filled from the original kegs, which can be arranged in rows underneath the counter or table.

The kegs can be arranged so they will incline outwardly on a plank shelf, the upper part of which is sheathed with angle iron to guard against wear. The bottoms can rest

upon another plank of less width, securely fastened at right angles to the shelf and elevated from the floor sufficiently to render the contents of the



Kegs in a Table

kegs accessible without the necessity of much stooping.

The kegs should be arranged in order according to the size of the nails they contain, and as each one is emptied of its contents, it is removed and another keg full of the same size nails put in its place. The sketch shows the ingenuity of the plan, in which each keg serves as a bin for its contents, and does not permit of the accumulation of dust as does the average nail bin. It also affords more advantageous use of valuable space on the first floor of the store.

How to Make a Small Jack

Small jacks are useful tools in any shop or garage. The shop that is not provided with these tools in sufficient

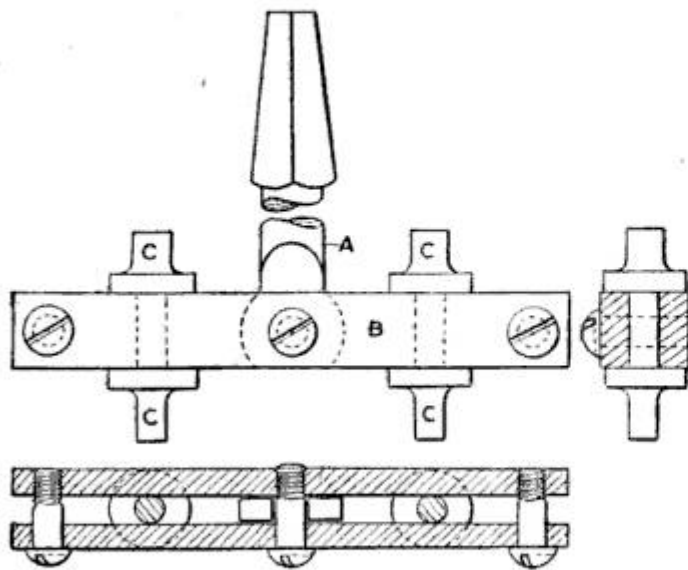
numbers can have its workmen make them in spare time from scrap material. The sketch shows a jack the body part of which is made of a bolt with a hexagon



head. The head is turned off to make a flat surface and a hole is drilled through its center and tapped the full length. The screw is a part of an old or broken clamp having a swivel head, which is very handy for adjusting itself to slanting surfaces. Any size or length can be made to suit the individual needs.—Contributed by Donald A. Hampson, Middletown, N. Y.

A Spanner Wrench

A tool for use in connection with an ordinary brace for grinding in valves of gas and gasoline engines is the in-

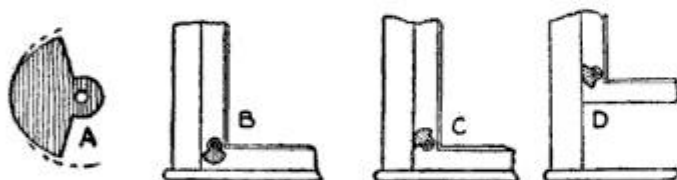


Spanner for a Brace

vention of a correspondent of American Machinist. The shank A is of any desired length. One end of it is squared as shown, while the other end is pivoted in the swinging yoke B which carries the adjustable driving-pins C. These driving-pins enter the holes usually provided in gasoline-engine valves for the purpose of grinding them in their seats.

Window Lock

A simple and effective lock which will hold the window in any position is shown in the sketch. It is attached to the window sash by means of a screw and is placed just far enough



Lock Attached to Window Sash

away from the window casing so that the edges of the outside circle will engage firmly against it, but will not allow the catch to pass the center. The outside edge is not an arc of a circle but is cut as shown at A. In the illustration, B represents the catch attached to the sash; C, in position to

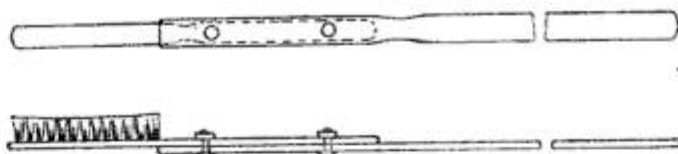
lock the closed sash, and D holds the window open at any point.—Contributed by Geo. M. Harrier, Lockport, New York.

Attaching a Lathe Dog on Threads

In shop practice it is often necessary to apply the dog to the threaded ends of bolts and studs. Where no threaded dogs are provided, the following method can be used to advantage: Take an ordinary nut, having the correct number of threads, and saw it centrally in halves. Place one half of the nut in the bottom of the dog and the other half on top. Insert the bolt or threads of the work between the two halves and tighten with the set-screw.—Contributed by J. B. Shiver, Rock Hill, S. C.

Brush for Cleaning Commutators

In the accompanying illustration is shown a little tool which comes in very handy for cleaning dirt, carbon and copper dust from commutators and brush holders, says Building

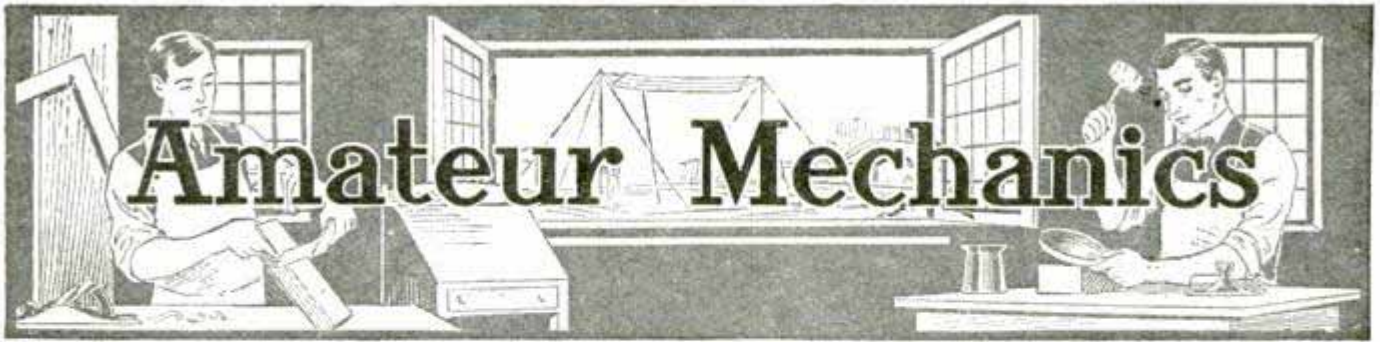


Toothbrush Fastened on Long Handle

Management. It is made by fitting a good stiff toothbrush with a long handle, as shown in the sketch. When the bristles of the brush become worn, the brush may be taken off and the handle fitted with another. This brush is also handy for cleaning the parts of circuit-breakers and other switchboard appliances.

Finishing a Hammer Handle

To put a fine working finish on a hammer handle rub in a filler consisting of a thin paste made by mixing plaster of Paris and linseed oil. This prevents the hammer from soaking up oil, and at the same time insures a good hand grip.



A Model Steam Engine

The accompanying sketch illustrates a two-cylinder single-acting, poppet-valve steam engine of home construction.

The entire engine, excepting the flywheel, shaft, valve cams, pistons and bracing rods connecting the upper and lower plates of the frame proper, is of brass, the other parts named being of cast iron and bar steel.

The cylinders, G, are of seamless brass tubing, 1½ in. outside diameter; the pistons, H, are ordinary 1-in. pipe caps turned to a plug fit, and ground into the cylinders with oil and emery. This operation also finishes the inside of the cylinders.

The upright rods binding the top and bottom plates are of steel rod about 1/8-in. in diameter, threaded into the top plate and passing through holes in the bottom plate with hexagonal brass nuts beneath.

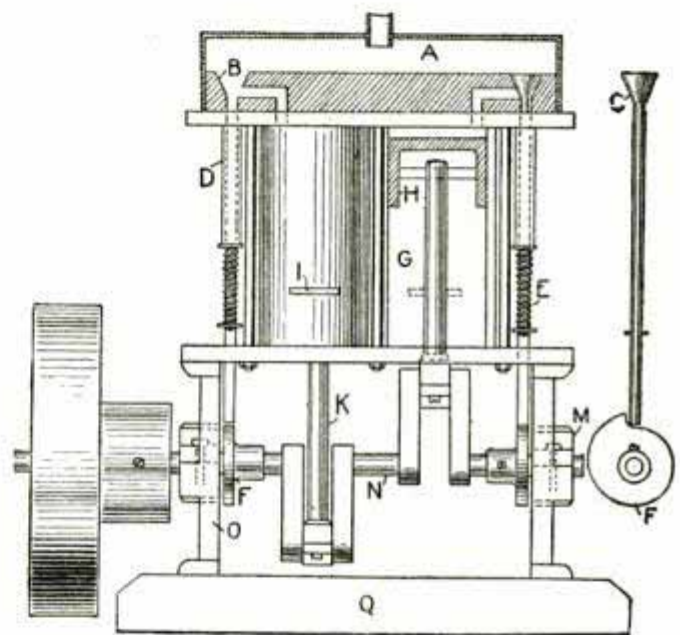
The valves, C, and their seats, B, bored with a countersink bit, are plainly shown. The valves were made by threading a copper washer, 3/8 in. in diameter, and screwing it on the end of the valve rod, then wiping on roughly a tapered mass of solder and grinding it into the seats B with emery and oil.

The valve rods operate in guides, D, made of 1/4-in. brass tubing, which passes through the top plate and into the heavy brass bar containing the valve seats and steam passages at the top, into which they are plug-fitted and soldered.

The location and arrangement of the valve seats and steam passages are shown in the sketch, the flat bar

containing them being soldered to the top plate.

The steam chest, A, over the valve mechanism is constructed of 1-in.



Engine Details

square brass tubing, one side being sawed out and the open ends fitted with pieces of 1/16-in. sheet brass and soldered in. The steam inlet is a gasoline pipe connection such as used on automobiles.

The valve-operating cams, F, are made of the metal ends of an old typewriter platen, one being finished to shape and then firmly fastened face to face to the other, and used as a pattern in filing the other to shape. Attachment to the shaft, N, is by means of setscrews which pass through the sleeves.

The main bearings, M, on the supports, O, and the crank-end bearings of the connecting rods, K, are split and held in position by machine

screws with provision for taking them up when worn.

The exhausting of spent steam is accomplished by means of slots, I, sawed into the fronts of the cylinders at about $\frac{1}{8}$ in. above the lowest position of the piston's top at the end of the stroke, at which position of the piston the valve rod drops into the cut-out portion of the cam and allows the valve to seat.

All the work on this engine, save turning the pistons, which was done

in a machine shop for a small sum, and making the flywheel, this being taken from an old dismantled model, was accomplished with a hacksaw, bench drill, carborundum wheel, files, taps and dies. The base, Q, is made of a heavy piece of brass.

The action is smooth and the speed high. Steam is supplied by a sheet-brass boiler of about 3 pt. capacity, heated with a Bunsen burner.—Contributed by Harry F. Lowe, Washington, D. C.

Magic Spirit Hand

The magic hand made of wax is given to the audience for examination, also a board which is suspended by four pieces of common picture-frame wire. The hand is placed upon the board and answers, by rapping, any question asked by members of the audience. The hand and the board may be examined at any time and yet the rapping can be continued, though surrounded by the audience.

The Magic Wand, London, gives the secret of this spirit hand as follows: The hand is prepared by concealing in the wrist a few soft iron plates, the wrist being afterwards bound with black velvet as shown in Fig. 1. The board is hollow, the top being made of thin veneer (Fig. 2). A small magnet, A, is connected to a small flat pocket lamp battery, B. The board is suspended by four lengths of picture-frame wire one of which, E, is

a connecting plug at the top. The plug can be taken out or put in as desired.

The top of the board must be made to open or slide off so that when the battery is exhausted a new one can be installed. Everything must be firmly fixed to the board and the hollow space filled in with wax, which will make the board sound solid when tapped.

In presenting the trick, the performer gives the hand and board with wires and switch for examination, keeping the plug concealed in his right hand. When receiving the board back, the plug is secretly pushed into the switch, which is held in the right hand. The hand is then placed on the board over the magnet. When the performer wishes the hand to move he pushes the plug in, which turns on the current and causes the magnet to attract the iron in the wrist, and will,



FIG. 1

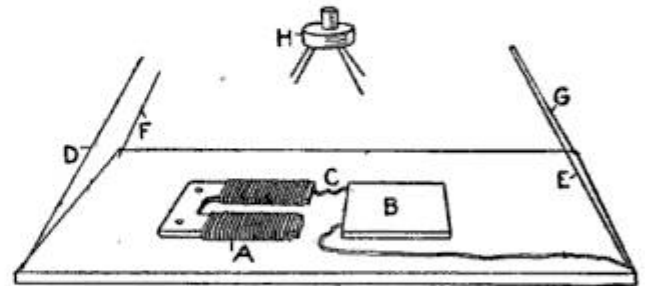


FIG. 2

Wax Hand on Board and Electrical Connections

connected to the battery and another, D, to the magnet. The other wires, F and G, are only holding wires. All the wires are fastened to a small ornamental switch, H, which is fitted with

therefore, make the hand rap. The switch can be made similar to an ordinary push button so the rapping may be easily controlled without detection by the audience.

Equilibrator for Model Aeroplanes

On one of my model aeroplanes I placed an equilibrator to keep it balanced. The device was attached to a crosspiece fastened just below the

at the lower end and two lines connecting the ends of the planes at the upper end. These are shown in Fig. 1. When the aeroplane tips, as

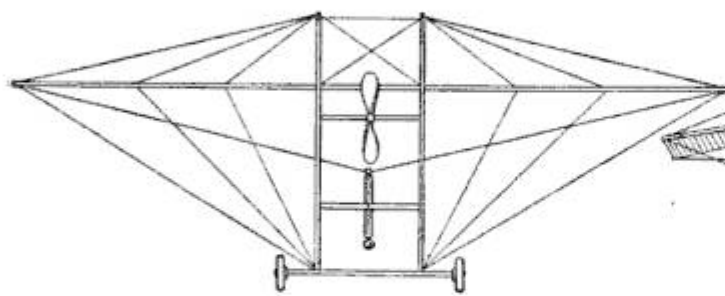


FIG. 1

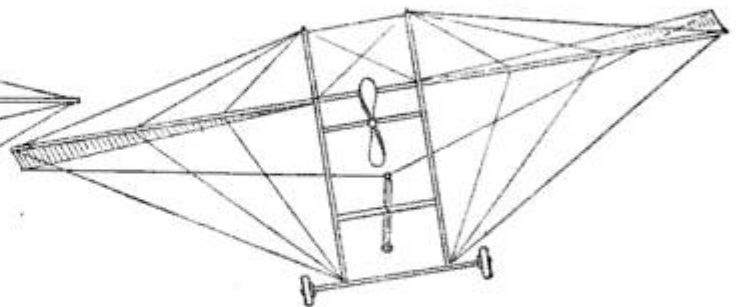


FIG. 2

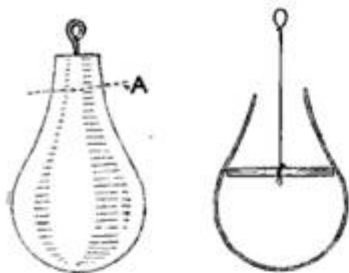
Warping the Aeroplane Wings

propeller between the main frame uprights. A stick was made to swing on a bolt in the center of the crosspiece to which was attached a weight

shown in Fig. 2, the weight draws the lines to warp the plane so it will right itself automatically.—Contributed by Louis J. Day, Floral Park, N. Y.

Repairing Christmas-Tree Decorations

Small glass ornaments for Christmas-tree decoration are very easily broken on the line shown in the sketch. These can be easily repaired by inserting in



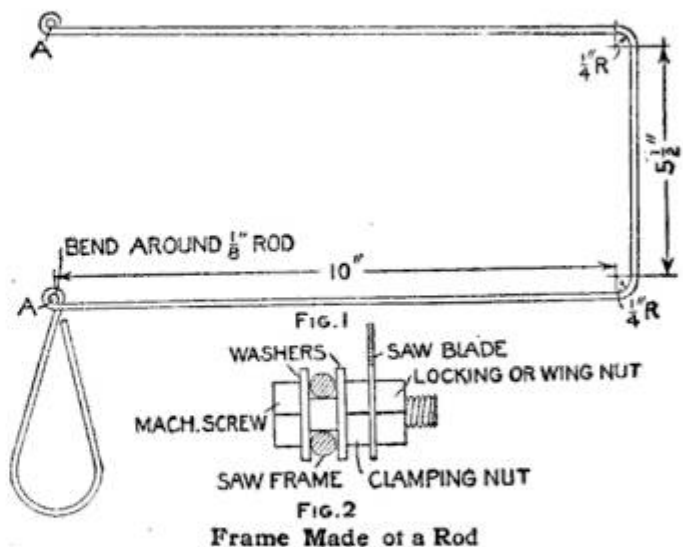
the neck a piece of match, toothpick or splinter of wood and tying the hanging string to it.

Homemade Scroll Saw

A scroll saw, if once used, becomes indispensable in any home carpenter chest, yet it is safe to say that not one in ten contains it. A scroll saw is much more useful than a keyhole saw for sawing small and irregular holes, and many fancy knick-knacks, such as brackets, bookracks and shelves can be made with one.

A simple yet serviceable scroll saw frame can be made from a piece of cold-rolled steel rod, $\frac{3}{32}$ or $\frac{1}{4}$ in. in diameter, two $\frac{1}{8}$ -in. machine screws, four washers and four square nuts.

The rod should be 36 or 38 in. long, bent as shown in Fig. 1. Place one washer on each screw and put the screws through the eyelets, A A, then place other washers on and fasten in place by screwing one nut on each screw, clamping the washers against the frame as tightly as possible. The saw, which can be purchased at a local hardware store, is fastened between the clamping nut and another nut as shown in Fig. 2.



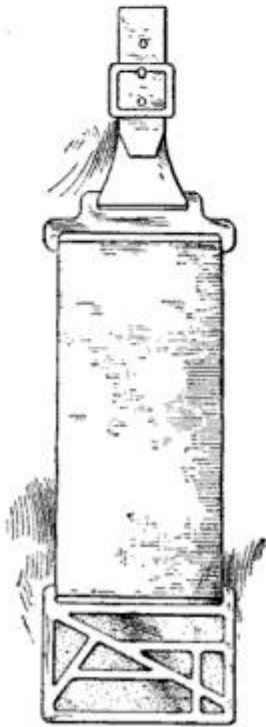
Frame Made of a Rod

If two wing nuts having the same number and size of threads are available, use them in place of the outside nuts. They are easier to turn when

inserting a saw blade in a hole or when removing broken blades.—Contributed by W. A. Scranton, Detroit, Michigan.

How to Make a Watch Fob

The fixtures for the watch fob shown—half size—may be made of either brass, copper, or silver. Silver is the most desirable but, of course, the most expensive. The buckle is to be purchased. The connection is to be of leather of a color to harmonize with that of the fixtures. The body of the fob may be of leather of suitable color or of silk. Of the leathers, green and browns are the most popular, though almost any color may be obtained.



Make full size drawings of the outline and design of the fixtures. With carbon paper trace these on the metal. Pierce the metal of the parts that are to be removed with a small hand drill to make a place for the leather or silk. With a small metal saw cut out these parts and smooth up the edges, rounding them slightly so they will not cut the leather or silk. Next cut out the outlines with the metal shears. File these edges, rounding and smoothing with emery paper. The best way of handling the decorative design is to etch it and, if copper or brass, treat it with color.

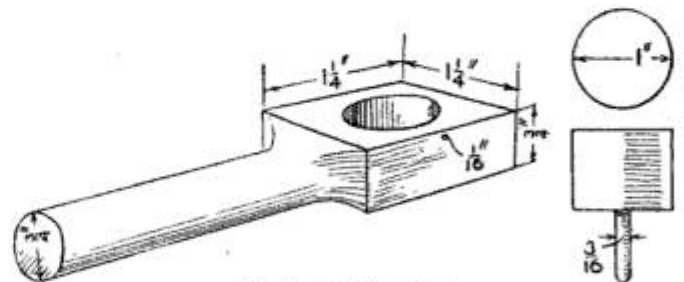
For etching, first cover the metal with black asphaltum varnish, on the back and all the parts that are not to be touched with the acid. In the design shown, the unshaded parts should not be etched and should, therefore, be covered the same as the back. Apply two coats, allowing each time to dry, after which immerse the metal in a

solution prepared as follows: 3 parts water, 1 part nitric acid, 1 part sulphuric acid. Allow the metal to remain in this until the acid has eaten to a depth of $\frac{1}{32}$ in., then remove it and clean in a turpentine bath, using a swab and an old stiff brush. The amount of time required to do the etching will depend upon the strength of the liquid, as well as the depth of etching desired.

For coloring silver, as well as brass and copper, cover the metal with a solution of the following: $\frac{1}{2}$ pt. of water in which dissolve, after breaking up, five cents' worth of sulphureted potassium. Put a teaspoonful of this into a tin with 2 qt. of water. Polish a piece of scrap metal and dip it in the solution. If it colors the metal red, it has the correct strength. Drying will cause this to change to purple. Rub off the highlights, leaving them the natural color of the metal and apply a coat of banana-oil lacquer.

An Austrian Top

All parts of the top are of wood and they are simple to make. The handle is a piece of pine, $5\frac{1}{4}$ in. long, $1\frac{1}{4}$ in. wide and $\frac{3}{4}$ in. thick. A handle, $\frac{3}{4}$ in. in diameter, is formed on one end, allowing only $1\frac{1}{4}$ in. of the other end to remain rectangular in shape. Bore a $\frac{3}{4}$ -in. hole in this end for the top. A $\frac{1}{16}$ -in. hole is bored in the edge to enter the large hole as shown. The top can be cut from a broom handle or a round stick of hardwood.



Parts of the Top

To spin the top, take a piece of stout cord about 2 ft. long, pass one end through the $\frac{1}{16}$ -in. hole and wind it on the small part of the top in the usual way, starting at the bottom and

winding upward. When the shank is covered, set the top in the $\frac{3}{4}$ -in. hole. Take hold of the handle with the left hand and the end of the cord with the right hand, give a good quick pull on the cord and the top will jump clear of the handle and spin vigorously.—Contributed by J. F. Tholl, Ypsilanti, Michigan.

Pockets for Spools of Thread

A detachable pocket for holding thread when sewing is shown here-with. The di-



mensions may be varied to admit any number or size of spools. Each pocket is made to take a certain size spool, the end of the thread being run through the cloth front for

obtaining the length for threading a needle. This will keep the thread from becoming tangled and enable it always to be readily drawn out to the required length.—Contributed by Miss L. Alberta Norrell, Augusta, Ga.

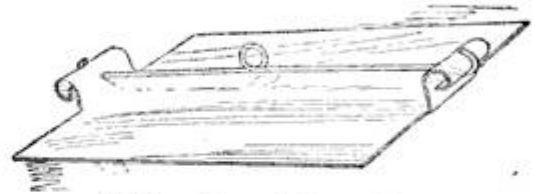
Cleaning Leather on Furniture

Beat up the whites of three eggs carefully and use a piece of flannel to rub it well into the leather which will become clean and lustrous. For black leathers, some lampblack may be added and the mixture applied in the same way.

A Baking Pan

When making cookies, tarts or similar pastry, the housewife often wishes for something by which to lift the baked articles from the pan. The baking tray or pan shown in the sketch not only protects the hands from burns but allows the baked articles easily to slip from its surface. The pan is made from a piece of sheet iron slightly

larger than the baking space desired. Each end of the metal is cut so that a part may be turned up and into a roll to make handles for the pan.



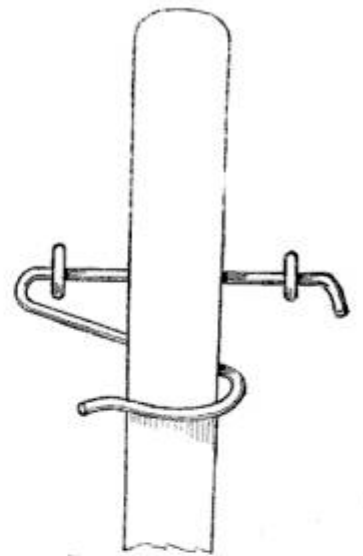
Baking Pan without Sides

A wire or small rod is placed between the handles as shown. This wire is fastened at each end and a loop made in the center. The pan can be removed from the oven by placing a stick through the loop and lifting it out without placing the hands inside the hot oven. The baking surface, having no sides, permits the baked articles to be slid off at each side with a knife or fork.—A. A. Houghton, Northville, Mich.

A Broom Holder

A very simple and effective device for holding a broom when it is not in

use is shown in the sketch. It is made of heavy wire and fastened to the wall with two screweyes, the eyes forming bearings for the wire. The small turn on the end of the straight part is to hold the hook out far enough from



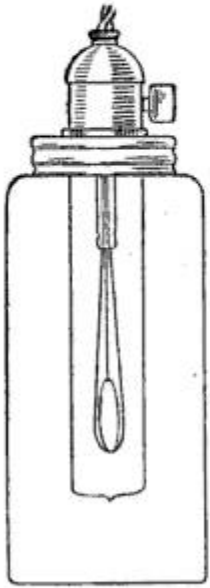
the wall to make it easy to place the broom in the hook. The weight of the broom keeps it in position.—Contributed by Irl Hicks, Centralia, Mo.

CA string for drawing electric wires into bent fixtures can be easily inserted by rolling it into a small ball and blowing it through while holding one end.

A Darkroom Lantern

Procure an ordinary 2-qt. glass fruit jar, break out the porcelain lining in the cover and cut a hole through the metal, just large enough to fit over the socket of an incandescent electric globe, then solder cover and socket together, says Studio Light. Line the inside of the jar with two thicknesses of good orange post-office paper. The best lamp for the purpose is an 8-candlepower show-case lamp, the same as shown in the illustration. Screw the lamp into the socket and screw the cover onto the jar, and you have a safe light of excellent illuminating power.

When you desire to work by white light, two turns will remove the jar.



If developing papers are being worked, obtain a second jar and line with light orange paper, screw into the cover fastened to the lamp and you have a safe and pleasant light for loading and development. By attaching sufficient cord to the lamp, it can be moved to any part of the darkroom, and you have three lamps at a trifling cost.

Preventing Vegetables from Burning in a Pot

Many housekeepers do not know that there is a simple way to prevent potatoes from burning and sticking to the bottom of the pot. An inverted pie pan placed in the bottom of the pot avoids scorching potatoes. The water and empty space beneath the pan saves the potatoes. This also makes the work of cleaning pots easier as no adhering parts of potatoes are left to be scoured out.

A Clothes Rack

A clothes-drying rack that has many good features can be made as shown in the illustration. When the rack is

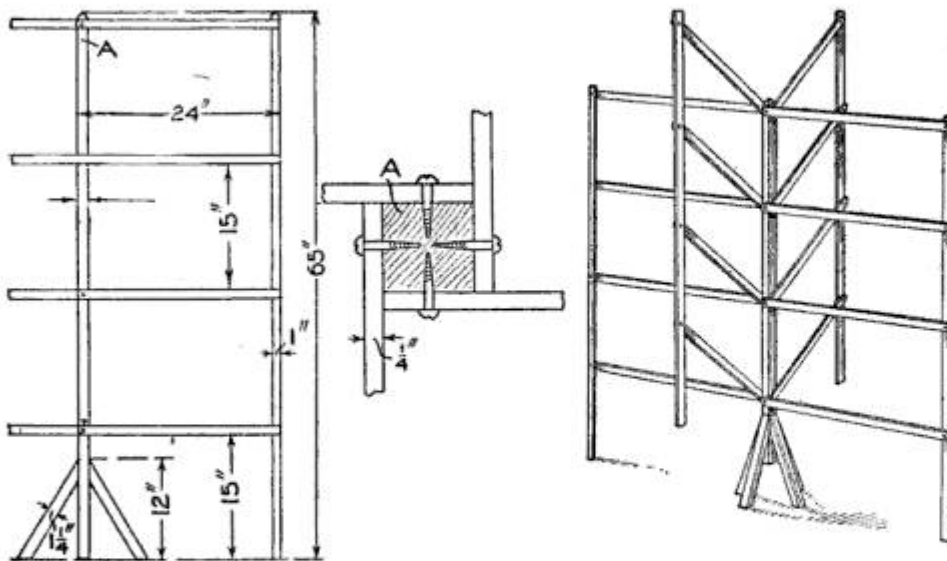
be made of any hard wood and the material list is as follows:

- 1 Center post, 1 1/4 in. square by 62 in.
- 4 Braces, 1 1/4 in. square by 12 in.
- 16 Horizontal bars, 1 by 1 1/4 by 24 in.
- 4 Vertical pieces, 3/4 by 1 by 65 in.

Attach the four braces for the feet with finishing nails after applying a good coat of glue.

The horizontal bars are fastened to the vertical pieces with rivets using washers on both sides. The holes are bored a little large so as to make a slightly loose joint. The other ends of the bars are fastened to the center post with roundhead

screws. They are fastened, as shown in the cross-section sketch, so it can be folded up.—Contributed by Herman Fosel, Janesville, Wis.



Folding Clothes Rack

closed it will fit into a very small space and one or more wings can be used at a time as the occasion or space permits, and not tip over. The rack can

How to Make Corner Pieces for a Blotter Pad

To protect the corners of blotting pads such as will be found on almost every writing desk, proceed as follows:

First, make a design of a size proportionate to the size of the pad and make a right-angled triangle, as shown in Fig. 1, on drawing paper. Leave a small margin all around the edge and then place some decorative form therein. Make allowance for flaps on two sides, as shown, which may later be turned back and folded under when the metal is worked. It should be noted that the corners of the design are to be clipped slightly. Also note the slight overrun at the top with the resulting V-shaped indentation.

To make a design similar to the one shown, draw one-half of it, then fold along the center line and rub the back of the paper with a knife handle or some other hard, smooth surface, and the other half of the design will be traced on the second side. With the metal shears, cut out four pieces of copper or brass of No. 22 gauge and with carbon paper trace the shape and decorative design on the metal. Then cut out the outline and file the edges smooth.

Cover the metal over with two coats of black asphaltum varnish, allowing each coat time to dry. Cover the back and all the face except the white background. Immerse in a solution of 3 parts water, 1 part nitric acid and 1 part sulphuric acid. When the metal has been etched to the desired depth, about 1-32 of an inch, remove it and clean off the asphaltum with turpentine. Use a stick with a rag tied on the end for this purpose so as to keep the solution off the hands and clothes. The four pieces should be worked at the same time, one for each corner.

It remains to bend the flaps. Place the piece in a vise, as shown in Fig. 2, and bend the flap sharply to a right angle. Next place a piece of metal of a thickness equal to that of the blotter pad at the bend and with the mallet bring the flap down parallel to the face

of the corner piece, Fig. 3. If the measuring has been done properly, the flaps ought to meet snugly at the corner. If they do not, it may be neces-

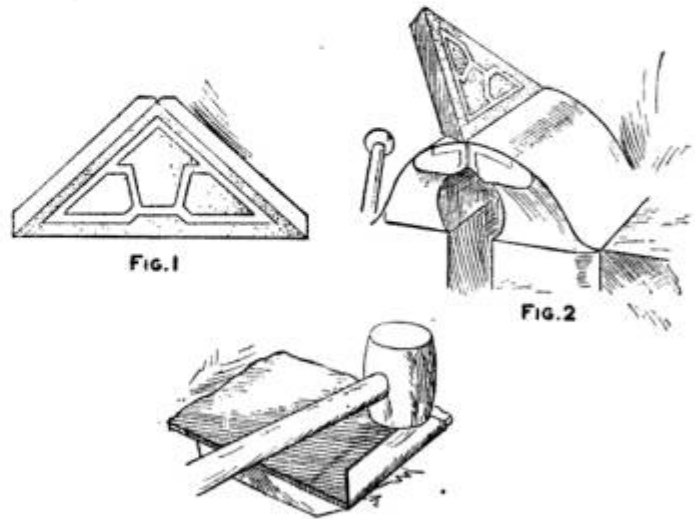


FIG. 1

FIG. 2

FIG. 3

Manner of Forming the Plates

sary to bend them back and either remove some metal with the shears or to work the metal over farther. All the edges should be left smooth, a metal file and emery paper being used for this purpose.

If a touch of color is desired, it may be had by filling the etched parts with enamel tinted by the addition of oil colors, such as are used for enameling bathtubs. After this has dried, smooth it off with pumice stone and water. To keep the metal from tarnishing, cover it with banana-oil lacquer.

Boring Holes in Cork

The following hints will be found useful when boring holes in cork. In boring through rubber corks, a little household ammonia applied to the bit enables one to make a much smoother hole and one that is nearly the same size at both openings. The common cork, if rolled under the shoe sole, can be punctured easily and a hole can be bored straighter. The boring is made easier by boiling the cork, and this operation insures a hole that will be the desired size and remain the size of the punch or bit used.

Pot-Cover Closet

The sides of the cover closet are cut as shown in Fig. 1 and shelves are nailed between them at a slight angle.



FIG. 1

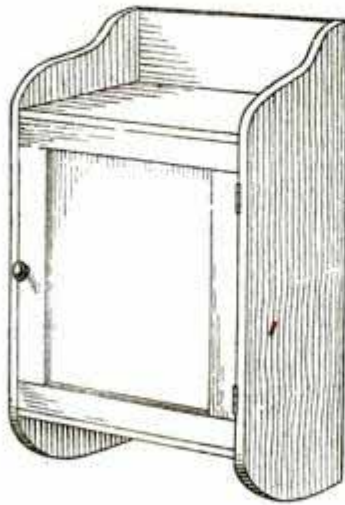


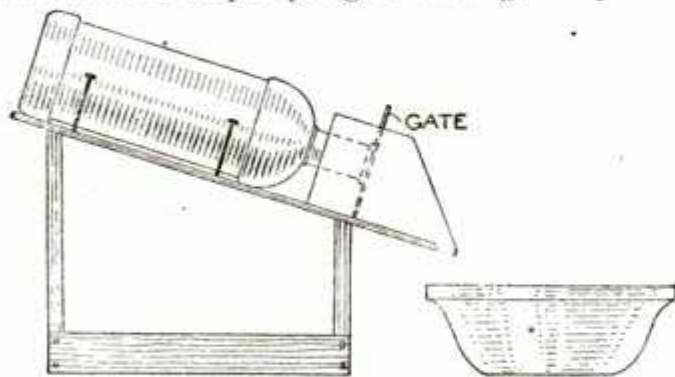
FIG. 2

Closet for Holding Pot Covers

No dimensions are given as the space and the sizes of the covers are not always the same. The back is covered with thin boards placed vertically. The front can be covered with a curtain or a paneled door as shown.—Contributed by Gilbert A. Wehr, Baltimore, Md.

Aid in Mixing Salad Dressing

Some cooks find it a very difficult matter to prepare salad dressing, principally mayonnaise dressing, as the constant stirring and pouring of oil and liquids are required in the operation. The simple homemade device shown in the accompanying sketch greatly as-



Bottle in Stand

sists in this work. It consists of a stand to hold a bottle, the mouth of which rests against a small gate directly in the rear of the attached tin trough. The weight of the bottle and

the contents against the gate serves as a check or stopper. If the gate is raised slightly, it will permit a continuous flow of liquid of the desired amount.

Saving Overexposed Developing Prints

In using developing papers, either for contact printing or enlargements, you are, by all rules of the game, entitled to a certain number of overexposed prints, says a correspondent of Camera Craft. But there is no reason why you should lose either the paper or the time and trouble expended in making these prints. By using the following method, you can turn these very dark prints into good ones.

First: these overexposed prints must be fully developed. Do not try to save them by rushing them out of the developer into the short-stop or fixing bath. The results will be poor, and, if you try to tone them afterward, the color will be an undesirable, sickly one. Develop them into strong prints, thoroughly fix, and wash until you are sure all hypo is removed. In my own practice, I carry out this part of the work thoroughly, then dry the prints and lay aside these dark ones until there is an accumulation of a dozen or more, doing this to avoid too frequent use of the very poisonous bleaching solution. The bleacher is made up as follows and should be plainly marked "Poison."

Cyanide of potassium.....	2 oz.
Iodide of potassium.....	20 gr.
Water.....	16 oz.

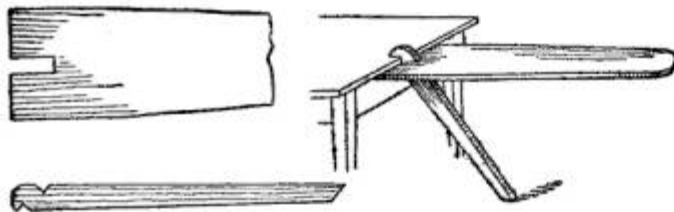
Place the dry print, without previous wetting, in this solution. It will bleach slowly and evenly, but, when it starts to bleach, transfer it to a tray of water, where it will continue to bleach. When the desired reduction has taken place, stop the action at once by immersing the print in a 10-per-cent solution of borax. The prints may be allowed to remain in this last solution until they are finished. A good final washing completes the process. This washing must be thorough and a

sponge or a tuft of cotton used to clean the surface of the print.

With a little practice, this method of saving prints that are too dark becomes easy and certain. The prints are lightened and at the same time improved in tone, being made blue-black with a delicate and pleasing quality that will tempt you to purposely over-expose some of your prints in order to tone them by this method for certain effects. The process is particularly valuable to the worker in large sizes, as it provides a means of making quite a saving of paper that would otherwise be thrown away.

An Ironing-Board Stand

An ordinary ironing board is cut square on the large end and a slot cut $1\frac{1}{2}$ in. wide and 4 in. long to admit the angle support. The support is placed against the table and the board



Stand Attached to Table

is pressed down against the outer notch which jams against the table, thus holding the board rigid and in such a position as to give free access for ironing dresses, etc.—Contributed by T. L. Gray, San Francisco, Cal.

A Desk Blotting Pad

Procure four sheets of blotting paper, preferably the colored kind, as it will appear clean much longer than the white. The size of the pad depends on the size of the blotting paper.

Fold four pieces of ordinary wrapping paper, 5 by 15 in. in size, three times, to make it 5 by 5 in. Fold each one from corner to corner as shown in Fig. 1 and again as in Fig. 2. Paste the last fold together and the corner holders are complete. Put one on each corner of the blotting paper. They

can be fastened with a small brass paper fastener put through the top of the holder. The blotting paper can

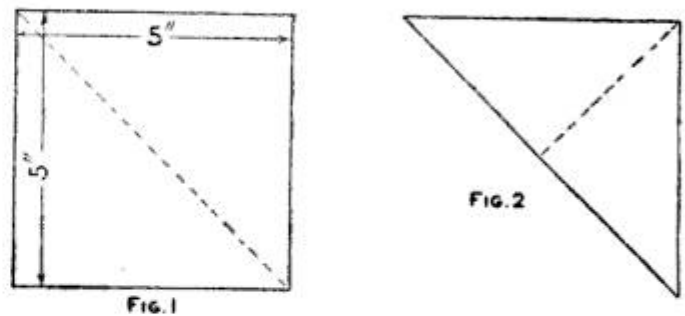


FIG. 1

FIG. 2

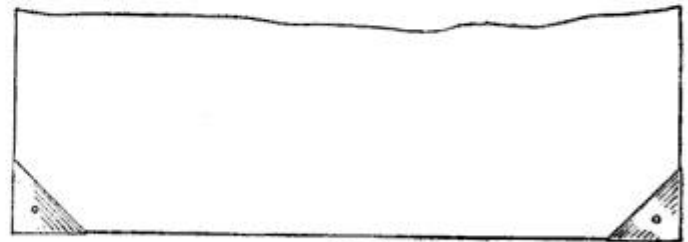


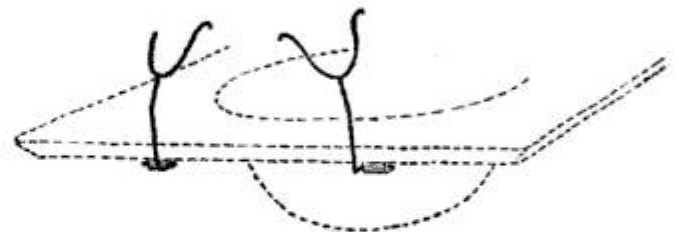
FIG. 3

Paper Corners for Blotter Pads

be easily changed by removing the holders and fasteners. Corners complete are shown in Fig. 3.—Contributed by J. Wilson Aldred, Toronto, Canada.

Sleeve Holders for Lavatories

A very handy article is an attachment on wash basins or lavatories for holding the sleeves back while washing the hands. It is very annoying to have the sleeves continually slip down and become wet or soiled. The simple device shown herewith can be made with bent wires or hooks and attached in such a way that it can be dropped out



Wires Attached to a Lavatory

of the way when not in use.—Contributed by L. J. Monahan, Oshkosh, Wisconsin.

CA pencil eraser will remove the tarnish from nickel plate, and the ink eraser will remove the rust from drawing instruments.

How to Make a Brass Bookmark

Secure a piece of brass of No. 20 gauge, having a width of $2\frac{1}{4}$ in. and a length of 5 in. Make a design similar to that shown, the head of which is 2 in. wide, the shaft 1 in. wide below the

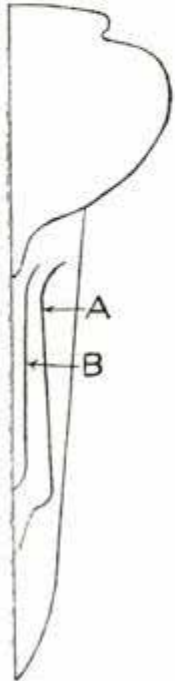


Fig. 1

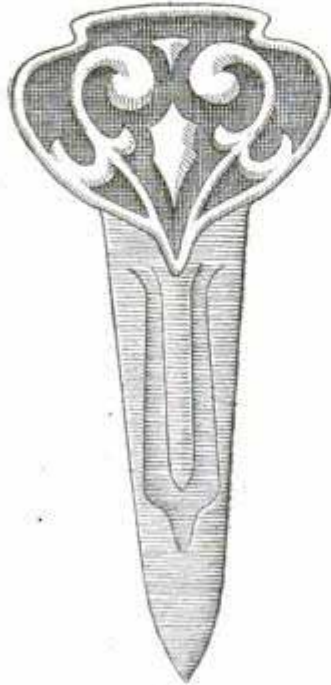


Fig. 2

The Pattern and the Finished Bookmark

head and the extreme length $4\frac{1}{2}$ in. Make one-half of the design, as shown in Fig. 1, freehand, then trace the other half in the usual way, after folding along the center line. Trace the design on the metal, using carbon paper, which gives the outline of the design Fig. 2.

With the metal shears, cut out the outline as indicated by the drawing. With files, smooth off any rough-

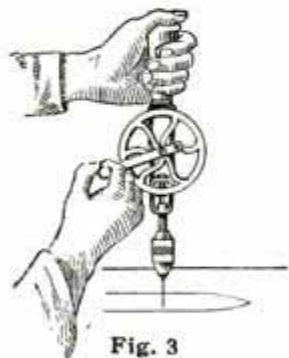


Fig. 3

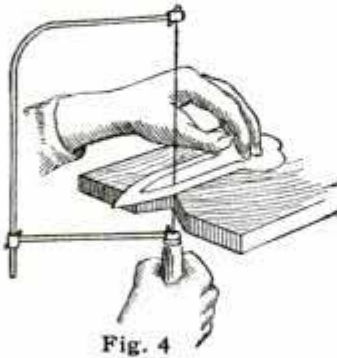


Fig. 4

Drilling and Sawing the Metal

ness and form the edge so that it shall be nicely rounded.

The parts of the design in heavy color may be treated in several ways.

A very satisfactory treatment is obtained by etching, then coloring. Clean the metal thoroughly with pumice stone and water or with alcohol before the design is applied. Cover all the metal that is not to be lowered with a thick coating of asphaltum. Allow this to dry, then put on a second coat. After this has dried, thoroughly immerse the metal in a solution composed as follows: 3 parts water, 1 part sulphuric acid, 1 part nitric acid.

Allow the metal to remain in this solution until the exposed part has been eaten about $\frac{1}{32}$ in. deep, then remove it and clean off the asphaltum, using turpentine. Do not put the hands in the solution, but use a swab on a stick.

For coloring olive green, use 2 parts water to 1 part permuriate of iron. Apply with a small brush.

The lines at A and B will need to be cut, using a small metal saw. Pierce a hole with a small drill, Fig. 3, large enough to receive the saw and cut along the lines as in Fig. 4. A piece of wood with a V-shaped notch which is fastened firmly to the bench forms the best place in which to do such sawing. The teeth of the saw should be so placed that the sawing will be done on the downward stroke. The metal must be held firmly, and the saw allowed time to make its cut, being held perpendicular to the work.

After the sawing, smooth the edges of the metal with a small file and emery paper. The metal clip may be bent outward to do this part of the work.

Cheesebox-Cover Tea Tray

The cover from a cheesebox can be converted into a tea tray that is very dainty for the piazza, or for serving an invalid's breakfast.

First sandpaper the wood until it is smooth, then stain it a mahogany color. The mahogany stain can be obtained ready prepared. After the stain has dried, attach brass handles, which can

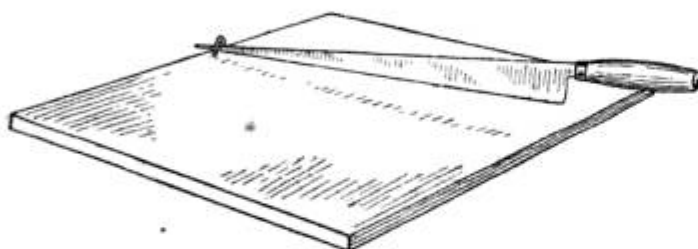
be obtained for a small sum at an upholsterer's shop. A round embroidered doily in the bottom adds to the appearance of the tray.—Contributed by Katharine D. Morse, Syracuse, New York.

Piercing-Punch for Brass

Drill a $\frac{1}{2}$ -in. hole through a block of pine or other soft wood 2 in. thick. Tack over one end of the hole a piece of pasteboard in which seven coarse sewing-machine needles have been inserted. The needles should be close together and pushed through the pasteboard until the points show. The hole is then filled with melted babbitt metal. When this is cold, the block is split and the pasteboard removed. This tool makes neat pierced work and in making brass shades, it does the work rapidly.—Contributed by H. Carl Cramer, East Hartford, Conn.

Kitchen Chopping Board

Cooks can slice, chop or mince vegetables and various other food rapidly by placing the little device, as shown, on a chopping board. It is an ordinary staple, driven in just far enough to allow a space for the end of an ordinary pointed kitchen knife to fit in it. The staple is driven in the edge of the chopping board. The knife can be raised and lowered with one hand, as



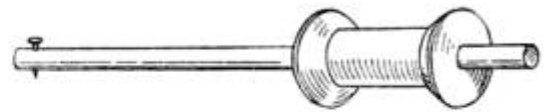
Knife Attached to the Board

the material is passed under the blade with the other. Great pressure can be applied and the knife will not slip.—Contributed by M. M. Burnett, Richmond, Cal.

☞ Sew straps to the sides of mattresses and they can be handled much easier.

A Carpenter's Gauge

The home workshop can be supplied with a carpenter's gauge without any expense by the use of a large spool and



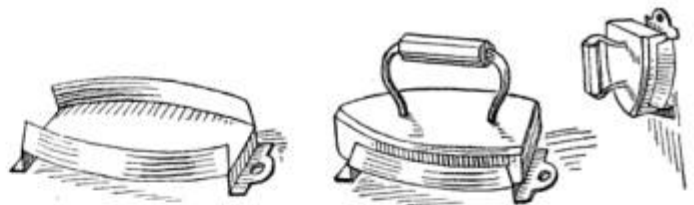
Round Stick in a Spool

a round stick of wood. The stick should be dressed to fit the hole in the spool snugly and a small brad driven through one end so that the point will protrude about $\frac{1}{16}$ in.

The adjustment of the gauge is secured by driving the stick in the hole in the direction desired. A better way and one that will make the adjusting easy is to file the point end of a screw-eye flat and use it as a set screw through a hole in the side of the spool.

A Flatiron Rest

The iron rest and wall hanger shown in the sketch is made of sheet iron. The upturned edges of the metal are



Board or Wall Iron Rest

bent to fit the sloping sides of the iron. The holder and iron can be moved at the same time.—Contributed by W. A. Jaquythe, Richmond, Cal.

Use for Paper Bags

When groceries are delivered, save the paper bags and use them for storing bread and cakes. Tie the neck of the bag with a string and it will keep the contents fresh and clean.—Contributed by Mrs. L. H. Atwell, Kissimmee, Florida.

☞ If a little chalk is rubbed on a file before filing steel, it will keep the chips from sticking in the cuts on the file and scratching the work.

INTERESTING PATENTS,



FIG. 1

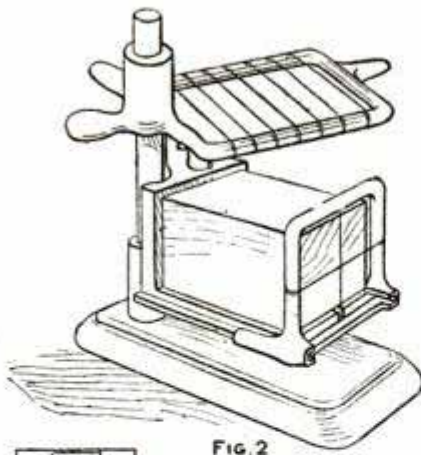


FIG. 2

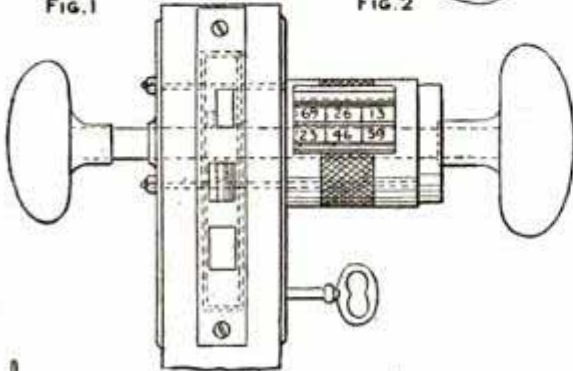


FIG. 3

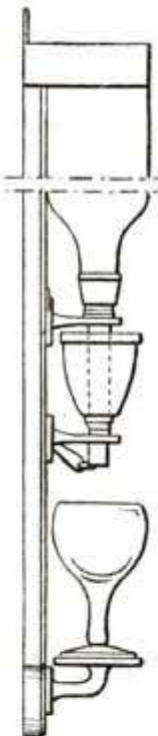


FIG. 6

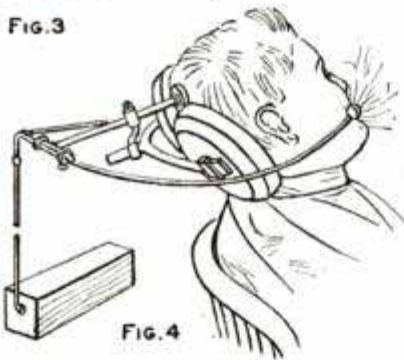


FIG. 4



FIG. 5

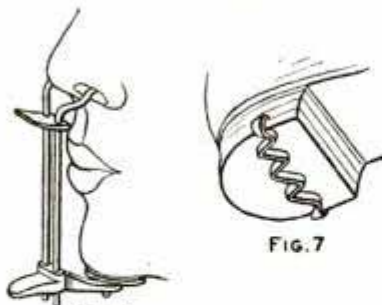


FIG. 8



FIG. 7

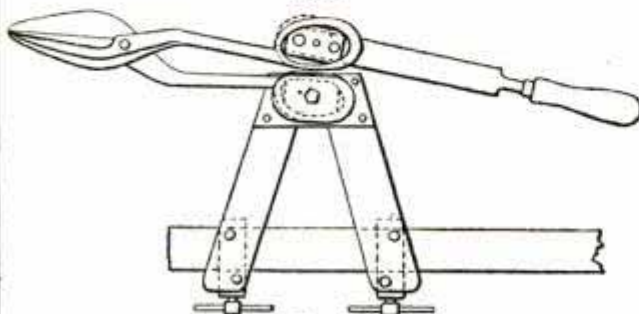


FIG. 9

FOUNTAIN TOOTHBRUSH—A self-contained or fountain toothbrush is shown in Fig. 1. Pure water, or a mixture of tooth paste or powder, may be placed in the receptacle which forms the handle, and be fed to the bristles as required. The reservoir is detachable.

WIRE BUTTER CUTTER—Figure 2 shows a device designed to cut a block of butter into 32 evenly divided portions. The block of butter is first placed on the standard and then the end frame is pushed over it, the two wires stretched across this frame cutting through and dividing the block into four longitudinal sections. Then the top frame is swung over the block and pushed downward over it, the seven wires strung across it cutting through the butter.

COMBINATION DOOR LOCK—Figure 3 is a combination lock for house doors, its members being mounted just inside one of the knobs as shown.

BREATH-BLOWER FOR DENTAL CHAIR—An inventor who wishes to guard a patient from the annoyance caused by the breath of the dentist, has designed the apparatus shown in Fig. 4. A tube, mounted as shown, and fed by a compressed-air tank, delivers a flat blast of air between the face of the patient and the face of the operator. Spring-actuated means attached to the headrest of the dental chair and adapted to be operated by a movement of the patient's head throws the tube and air blast into and out of operative position.

SAW-FILING ATTACHMENT—The filing of saws is said to be simple with the attachment shown in Fig. 5. It comprises a flat plate or member adapted to fit over a saw blade and form both a guard and a guide for the teeth and file respectively. It is provided at its outer edge with a plurality of alternating spaced guards and recesses, which are reversely tapered, the walls of the recesses defined by the front and rear edges of the guards being inclined to accord with the inclination of the saw teeth. Each alternate space separating the teeth of the saw blade is closed by the guards, leaving the spaces between the other teeth exposed.

MEASURING DEVICE FOR LIQUIDS—Figure 6 is a device for automatically drawing off measured quantities of liquids from a bottle, comprising a support for the inverted bottle, a normally sealed measuring chamber set below the bottle, and a ledge for the receptacle into which the measured quantity of liquid from the bottle is discharged.

ICE-CREEPER—A simple non-slipping device to be attached to the heels of shoes worn on ice-covered surfaces is shown in Fig. 7. The device is designed only for shoes worn while working outdoors.

CURIOUS CHIN SUPPORT—Figure 8 shows a chin support which is rather unusual, seeing that it is so designed as to utilize the nostrils as the anchorage for the jaw. It is a device to retain the mouth in a closed position, and comprises a member adapted to engage the chin or lower jaw, a member adapted to enter the nostrils and engage the bony processes of the head, said members being adjustable.

ATTACHMENT FOR METAL SHEARS—Figure 9 is a patent granted on a means of providing greater leverage for metal shears. It consists of a bracket for supporting the shears, and a handle bar to form an extension to one handle of the shears. Blocks on the bracket and on the extension handle fit into the handle eyes of the shears.

BALANCING DEVICE FOR AEROPLANES—This new balancing device for aeroplanes (Fig. 10) is interesting because, whether practical or not in the form shown, it presents an idea which shows possibilities of development. The operator's seat is pivotally suspended from the framework of the

PRACTICAL OR UNIQUE

upper plane of the aeroplane, and the under fastenings of the seat slide upon a curved bar, the whole arrangement being such as to allow the seat to swing right or left with the weight of the operator when the machine tilts. Thus, any lateral movement of the seat with reference to the framework will draw downward the free edge of the balancing plane toward which it moves, automatically setting the planes so as to right the aeroplane.

AN ELECTRICALLY HEATED STEERING WHEEL—Figure 11 is a heated steering wheel for automobiles, electricity from the magneto or dry-cell batteries being utilized as the source of heat. The wheel ring is of hollow metal and contains the heating elements.

LADIES' HAT RETAINER—Figure 12 is a hat securer comprising a flexible band for attachment to the interior of the hat, said band having offset portions with slots adapted to engage a second sliding band mounted within the first. This second band is provided with a series of inwardly curved prongs, which are engaged with the hair when the inner band is pushed around. The turning of the prong-studded band is accomplished by turning the little shaft, which looks like the head of an ordinary hat-pin.

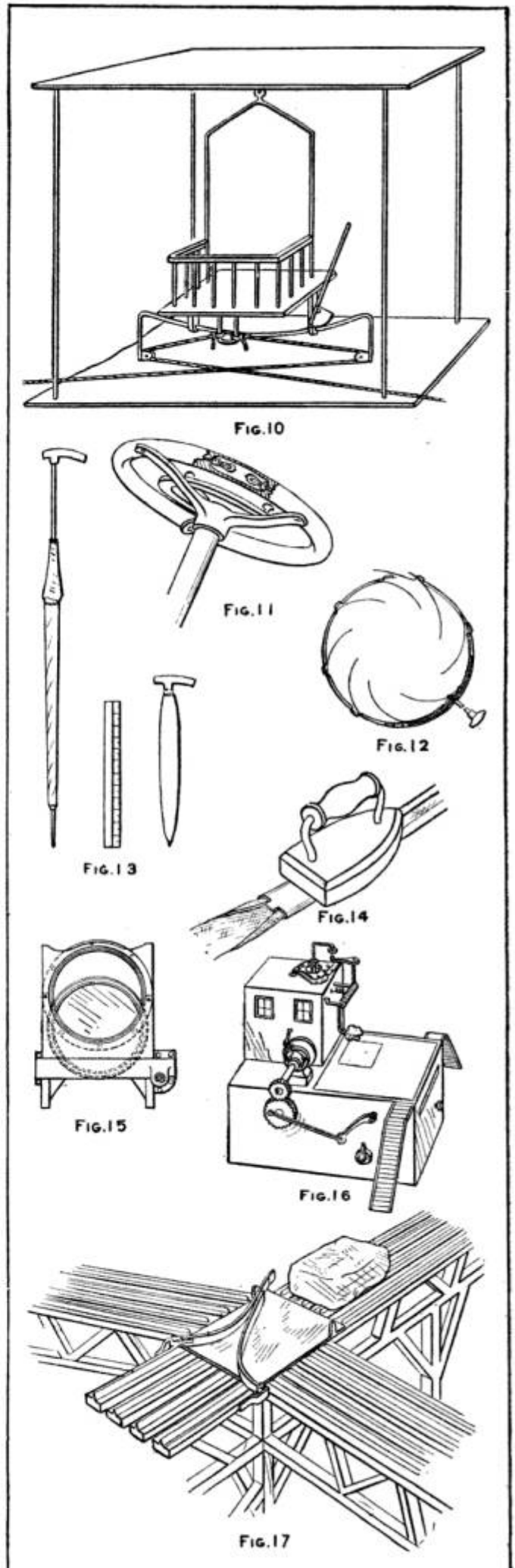
POCKET UMBRELLA—An umbrella which may be quickly telescoped to but one-third its ordinary length, and is only $1\frac{1}{4}$ in. in diameter when so telescoped, is shown in Fig. 13. By pressing a spring and giving a slight turn to one of the caps, both the rod and the ribs may be telescoped, the ribs being gathered tightly together with one hand placed around both ribs and rod while the other hand is being pushed against the handle. The ferrule of the umbrella must, of course, be rested against some firm surface while the handle is being pushed in. The drawing shows the umbrella extended and telescoped.

FOLDING DEVICE FOR IRONING—Figure 14 is a metal folder for use in ironing. It has a seat for the pressing iron and a shoulder against which the butt end of the iron rests as it is pushed over the strip of material to press down the edges folded over.

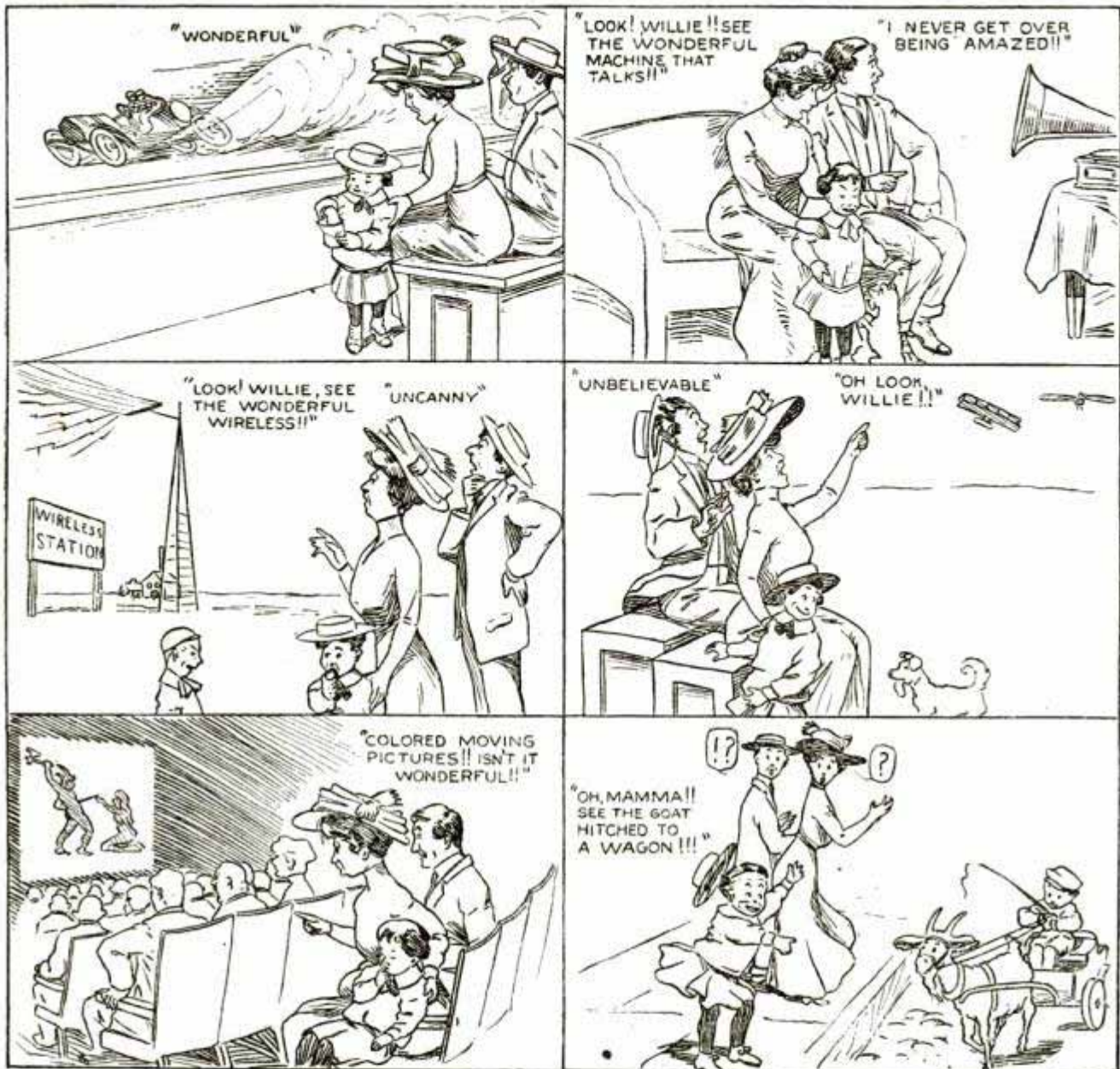
IMPROVED MOUNTING FOR DEADLIGHTS—A method of mounting vessel deadlights so that the outer surface of the glass may be easily cleaned is shown in Fig. 15. The circular sash is rotatably mounted in a ring which is raised and lowered by racks. When closed against the frame the ring is held fast by a series of wedges carried by a second ring and engaging inclines on the first ring. The outer surface of the glass is cleaned by opening the window slightly, cleaning the portions which can be reached, and then rotating the sash to bring the remaining portions within reach.

ELECTROCUTTING TRAP—The electric rat trap shown in Fig. 16 is somewhat complicated in construction and operation, but its construction is such that each rodent electrocuted drops out of sight, so that the bodies will not frighten others away. The electrocuting circuit has one electrode on a trapdoor, while the second electrode constitutes a movable bait-holder. When the rodent steps onto the trapdoor and nibbles at the bait, the electrocuting current passes through its body, and at the same time a motor is set going. This motor drives a shaft, one revolution of which causes the trapdoor to first tilt, dropping the electrocuted body into the pit, and then restores it to its normal position, in which position it remains until another rodent steps upon it and nibbles the bait.

ICE-SKID SWITCH.—Figure 17 shows a switch by means of which the blocks being slid along an ice skid may be deflected either to a right or a left branch, according to the position in which the switch is set.



THINGS DON'T SEEM WONDERFUL IF YOU'VE SEEN THEM ALL YOUR LIFE



McCutcheon—Chicago Tribune

"MR. CLEAVER, how do you account for the fact that I found a piece of rubber tire in one of the sausages I bought here last week?"

"My dear madam, that only goes to show that the motor-car is replacing the horse everywhere."—New York Times.

"The cynic," said Dr. J. H. Jowett, as he paced the deck of the "Adriatic," "seems to me as foolish and wrong-headed as the schoolboy who refused to play during the recess hour.

"As this boy sat with a discontented look on a hard, stiff bench, a comrade said:

"Why aren't you playing, Jack?"

"Jack frowned contemptuously.

"Catch me playing!" he said. "If I played the recess hour would go too fast."—Los Angeles Times.

"You, there, in the overalls!" shouted the cross-examining lawyer, "how much are you paid for telling untruths?"

"Less than you are," retorted the witness, "or you'd be in overalls, too."—Housekeeper.

The wind was blowing a bit more than a gale one night, when a benevolent old chap stopped to put a dime in the hat of a shivering blind man on the public square. The donor nearly dropped the coin, but the mendicant shoved his hat underneath it and skilfully rescued it.

"Why, you're not blind," cried the giver, scornfully.

"No, sir," confessed the beggar, "I'm just takin' a pal's place while he has a bit o' rest. He's blind, sir—been blind from birt."

"Where is he taking his rest?" demanded the stranger, still unconvinced.

"Why, he—er—why, he's gone to a movin' picture show."—Cleveland Plain Dealer.

The terrible storm had passed, and the angry waves, after engulfing many a gallant craft, had subsided.

The captain of the partially disabled steamship, as land hove in sight, hung a crutch over the starboard bow.

"Merely a bit of stage business," he explained; "all the papers will say tomorrow morning that 'the great ocean liner came limping into port.'"—Chicago Tribune.

"What're ye comin' home with your milk pail empty for?" demanded the farmer. "Didn't the old cow give anything?"

"Yes," replied the boy; "nine quarts and one kick."—Stray Stories.

A nervous-looking man walked into a grocery with his baby on one arm and a kerosene can on the other, placed the can on the counter and said: "Sit there a moment, dear." Then, holding the baby up to the dazed clerk, he added, "Fill this thing up with kerosene."—Marine Journal.

The Tesla Turbine

By E. F. STEARNS

ENGINEERS and men of science throughout the world are awaiting with unusual interest the completion of tests of a new steam turbine designed by Nikola Tesla, which preliminary experiments indicate will give enormous power from a comparatively small and extremely lightweight engine. Ten horsepower to a pound of weight has already been developed with the engines that have been tested and enthusiasts who have witnessed the work of the turbine declare the perfect rotor has at last been found. To what extent this is true, time and the construction of larger units than have yet been used must prove. At present, while the practical experimental stage has not yet been passed, the entire engineering world is profoundly interested in the work that has been done, and awaits future development with much concern.

Operation of the Tesla engine de-

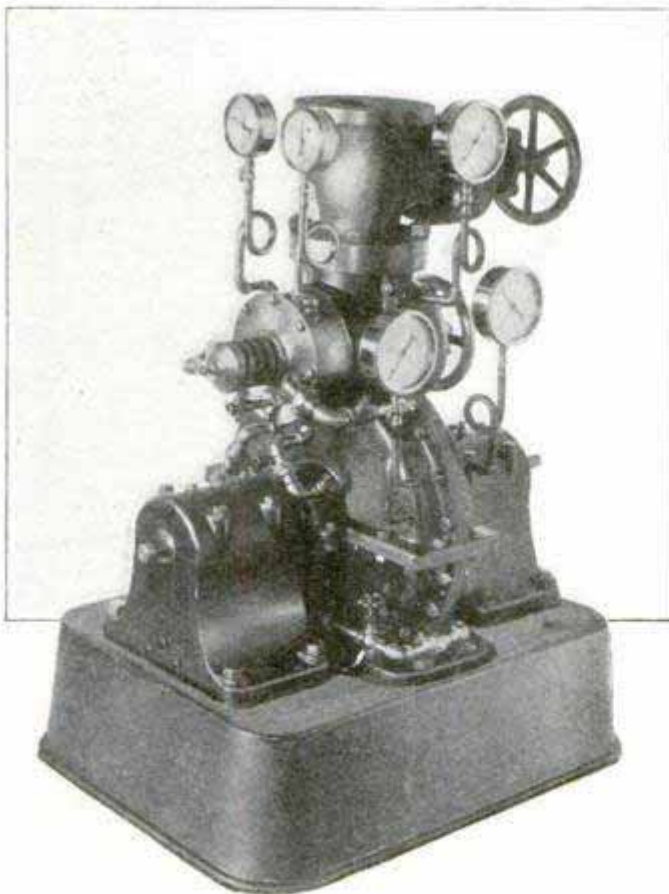
pends upon two well-known properties of fluids: adhesion—the tendency, for example, of a certain amount of water to cling to a smooth metal surface, even when the bulk of the water has been shaken off; and viscosity, the resistance of fluids to molecular separation, the tendency of one drop, in a mass of fluid, to drag adjoining drops with it, if set in motion.

In its simplest form, the new idea takes the shape of the inventor's little "air-diffuser." This consists of half a dozen very thin steel disks, some 9 or 10 in. in diameter, set horizontally, about $\frac{1}{8}$ in. apart, on the upright shaft of a small, horizontal electric motor, the center of each disk being cut away in a 3-in. circle. With current switched into the motor, the disks revolve, and instantly strong suction can be felt by the hand held several inches above the axis, while a powerful current of air is blown from the spaces between the disks. The air, in short, is being sucked into the central opening and hurled out at the periphery. Consider now that disks and shaft have been inclosed in an air-tight case, with an inlet at the axis and an outlet at one point of the periphery; we have an air pump, a Tesla blower, one of which, now in operation, is delivering 10,000 cu. ft. of air per minute. Suppose again that water, instead of air, be the fluid admitted. Entering the cut-away space at the centers of the disks, the adhesion of the metal drags it, in a widening spiral, toward the spinning circumferences, there to hurl it away in a tangential direction; and since the water must now leave the case by its one outlet, we have the Tesla pump, on rather new lines.

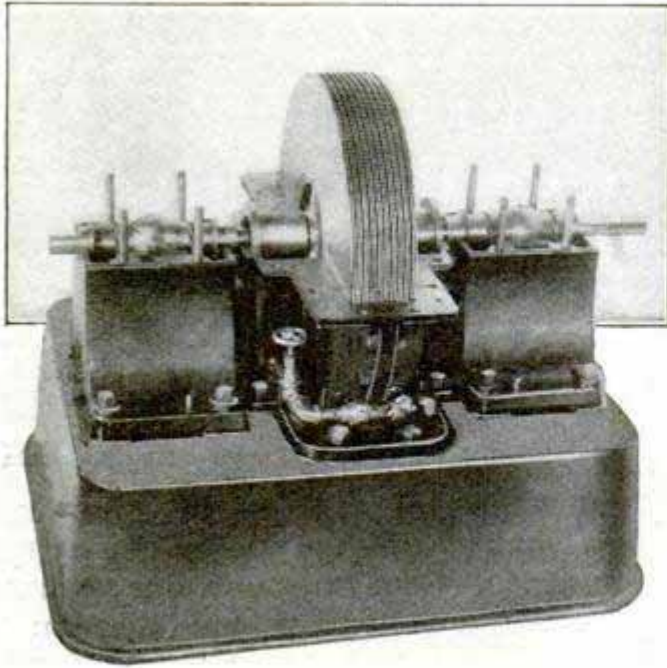
Assume that the pumping process



A Complete 110-Hp. Turbine



The Turbine, Invented by Nikola Tesla, Which is Based on a New Principle



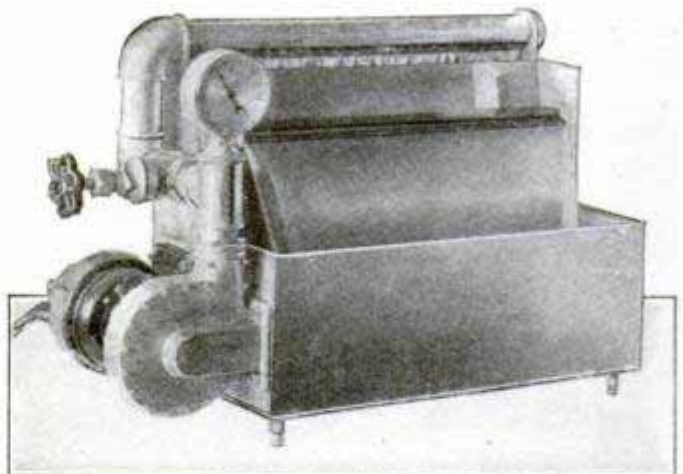
The 200-Hp. Tesla Turbine, with the Upper Section of the Case Removed to Show the Disks, etc.

is to be reversed, that the disks, instead of being turned by an outside force, are to produce power themselves, that steam under pressure has been substituted for the water. The steam, admitted to the case, strikes the edges of the disks and takes the path of least resistance between them, a narrowing spiral toward the outlet through their centers. The disks themselves are dragged around, the shaft is turned and power is being generated in an entirely new fashion.

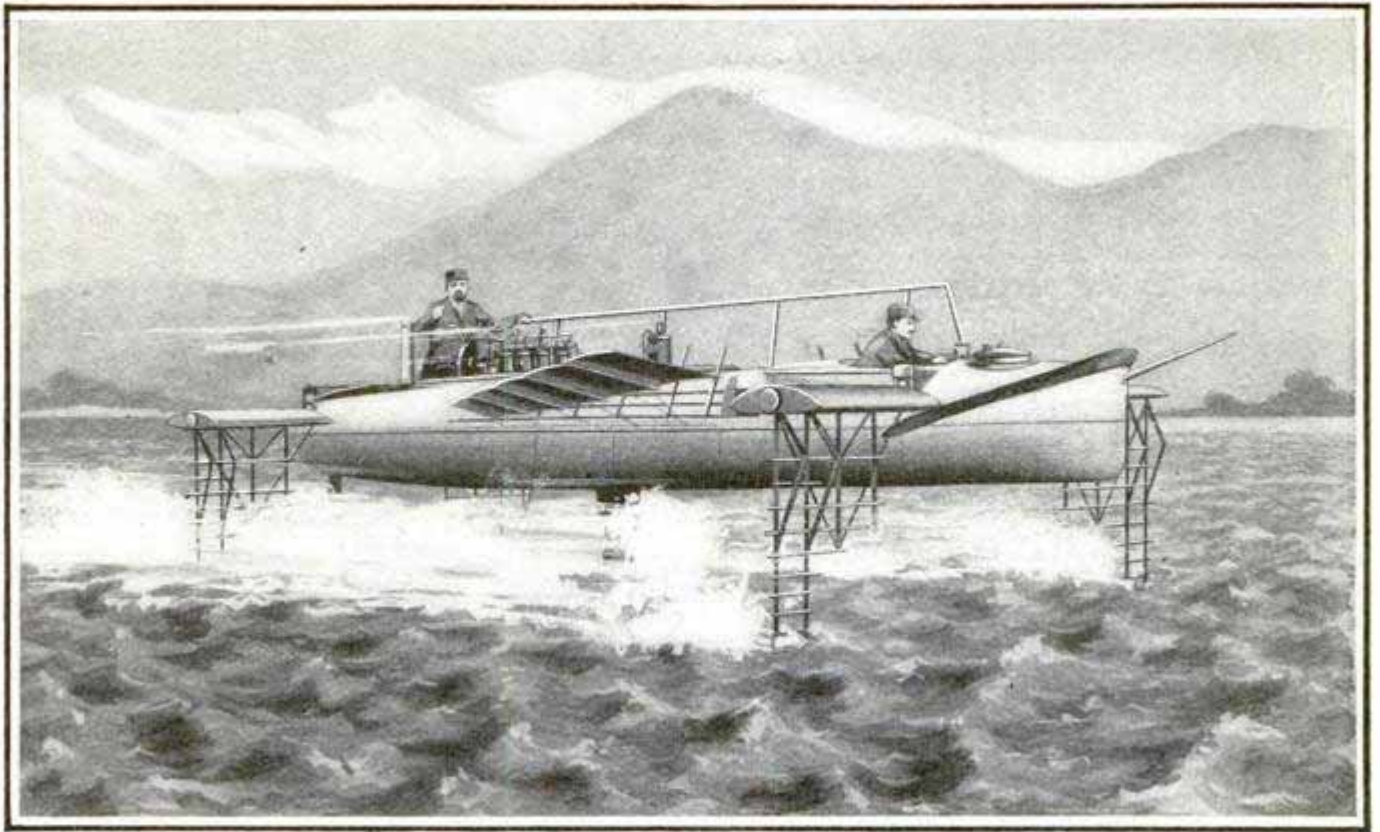
Working under the best conditions—in the experimental laboratory—a single disk of $9\frac{3}{4}$ in. diameter, with a center outlet of $3\frac{5}{8}$ in., will develop 5 hp. Without nearly approaching the limit of strain of the materials, the pressure could be increased so that the velocity of rotation would be doubled and the power quadrupled; so that with a single steel plate, $\frac{1}{32}$ in. in thickness, weighing about $\frac{3}{8}$ lb., and delivering 20 hp., we have a possible 53 hp. to 1 lb. of actually working material. Or a more concrete example can be found in a double Tesla turbine, built for practical service and nearly completed. In this there are two sets of disks, arranged to revolve in opposite directions and each set, developing 200 hp.

Comparison between the old and the newest is best given in the inventor's own words:

"In most engines, a very small proportion of the total amount of material is actively employed in the production of power. For example, in reciprocating engines of the older type, the power-giving portion—cylinder, piston, etc.—was no more than a fraction of 1 per cent of the total weight of material used in construction. The present form of turbine, with an efficiency of about 62 per cent was a great advance, but even in this form of machine scarcely more than 1 per cent or 2 per cent is used in actually generating power at a given moment. The new turbine offers a striking contrast, using as it does practically the entire material of the rotor (the whole surfaces of the disks) as an active source of power, and with an efficiency of 80 per cent or even 90 per cent. Owing to this, it is possible to get an enormous amount of power from a small space. Assuming sufficient boiler capacity on a vessel such as the "Mauretania," it would be perfectly easy to develop, instead of some 70,000 hp., 4,000,000 hp. in the same space—and this is a conservative statement."



A little model pump in which five disks, 3 in. in diameter, contained in the lower front, circular case, throw 40 gal. a minute when the little electric motor is started up. The water flows out of a slit at the bottom of the upper pipe and flows back to the lower tank as seen in the foreground. This model illustrates one point astonishingly: the power can be shut off when the pump is in full operation and everything stops, instantly without the slightest jar. With the power switched on suddenly, the full flow is resumed so quickly that the interval between the click of the switch and the full stream of water is too small to be determined with an ordinary watch.



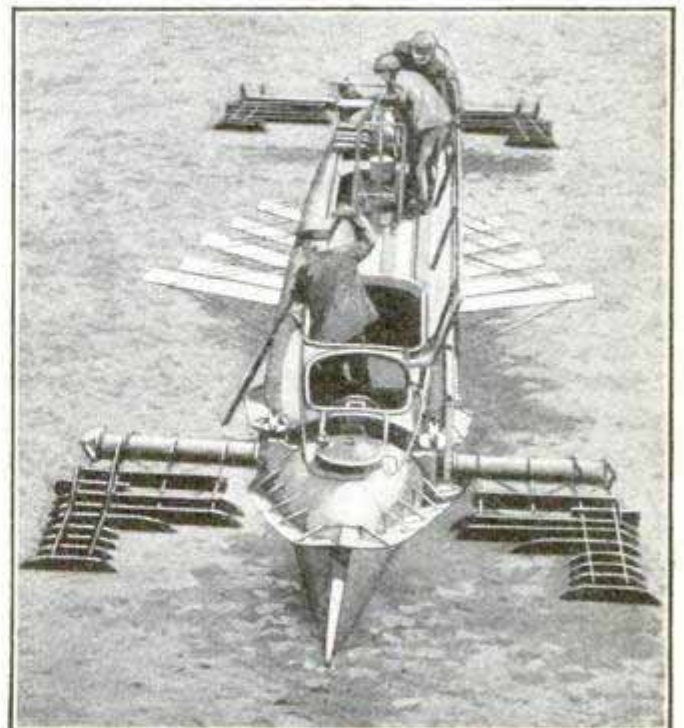
At 45 Miles an Hour is High above the Water and Only the Bottom Planes are Immersed

ITALIAN HYDROPLANE OF CURIOUS TYPE

This curiously constructed hydroplane, designed by Signor Forlanini, has attained 45 miles an hour in its trials on Lake Maggiore, Italy, where Dr. Alexander Graham Bell was recently given a ride, and it is expected that this speed will be greatly increased by new modifications.

The remarkable craft is described as one making true hydraulic flight, it being sustained by the water in the same manner that birds and aeroplanes are sustained in the air. That is, it is sustained by the dynamic reaction of the water on the planes, most of these planes remaining completely out of the water while the machine is in action. A feature for which much importance is claimed is that the resistance of the water does not depend on the speed, but remains constant, and is equal to half the total weight of the apparatus. The weight is 4,000 lb. with two persons on board, and the gasoline motor has a capacity of 100 hp. The hull is 32 ft. long, and across the bow and stern are two

strong steel tubes, to both sides of which, starboard and port, fore and aft, are frameworks containing a series of planes. When the hydroplane is at rest the hull lies in the water like that of an ordinary boat, the planes,



Lying at Rest with the Four Series of Planes Swung Upward

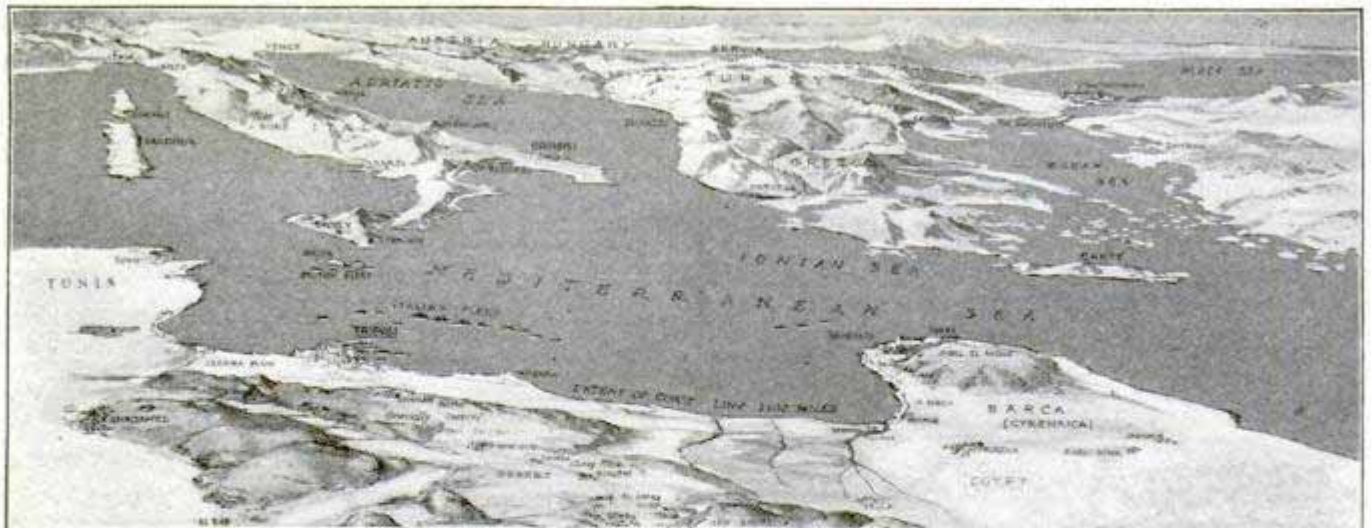
which have a slight horizontal inclination and are arranged one above the other in each of the four groups, being immersed in the water. As soon as the hydroplane begins to move forward under the force of the propeller, which is carried on a hollow fin amidships, the water exercises a vertical force on the planes, and the hull tends

to rise. As more and more speed is attained the hull rises until it is completely out of the water. The speed then rapidly increases, and, little by little, the various planes rise out of the water, until, when the maximum speed is attained, only the bottom planes remain in the water, as is shown in one of the illustrations.

WIRELESS CALLS HEARD ACROSS THE PACIFIC

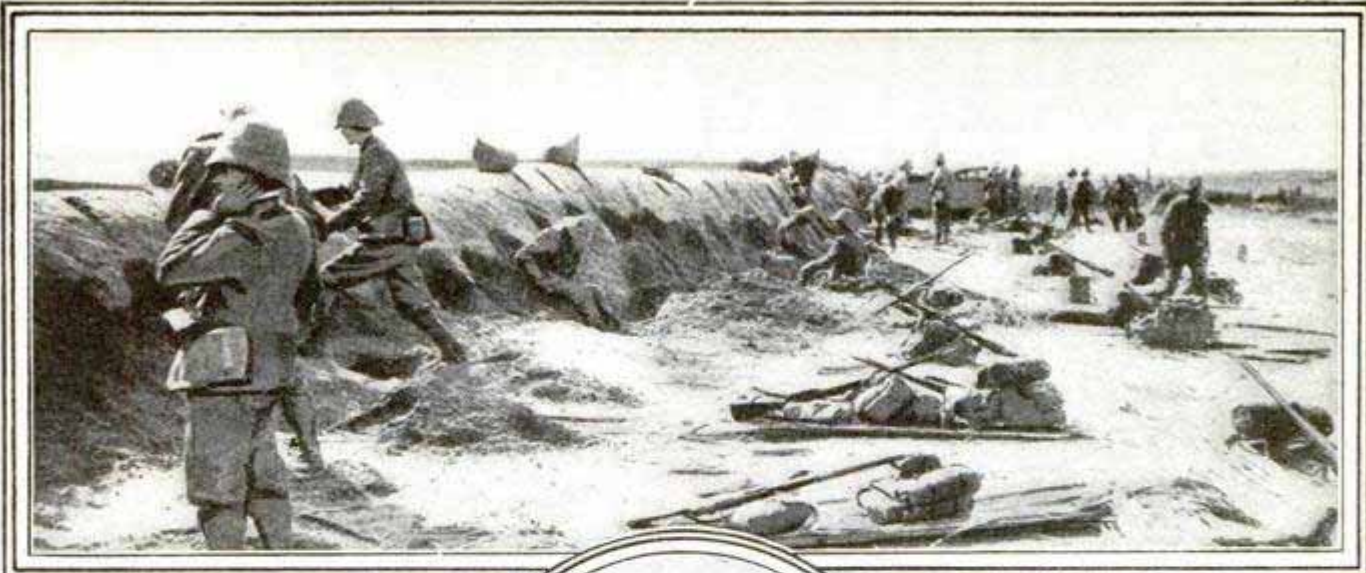
"I am not getting you very well," reduced almost to a wireless whisper, sent a thrill through the wireless operator in the Hillcrest station on San Francisco Bay, Oct. 8, when he recognized the "sign" at the end of the message to be that of the man in charge of a station on the island of Hokosha, one of the most northern of the Japanese group, which was 6,000 miles away. The publication of the prosaic, though extremely practical, sentence also sent a thrill through wireless men throughout the country, as it was the first authentic message that had been received from so great a distance across the Pacific, and sig-

nalized the knitting of America and Asia in the wireless net which is encompassing the globe. This message came in answer to signals sent out from Hillcrest, and at first it was thought to have originated on a Japanese ship then en route from Honolulu to San Francisco. A little later the operator at Hokosha told his American confrère he was "getting" him much better. The interchange of messages went no further than this and the operators have been unable to "get" each other since. The wireless company has written to the Japanese government to officially confirm the receipt of the message.



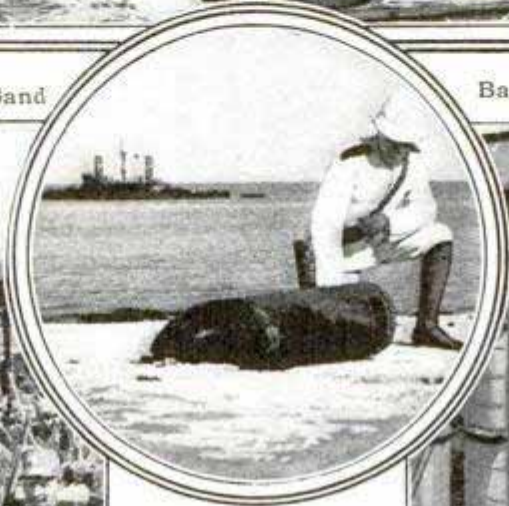
THEATER OF MILITARY AND NAVAL OPERATIONS OF ITALY AGAINST TURKEY

Up to date the war into which Turkey and Italy were suddenly plunged has involved little else than the bombardment and occupation of Tripoli by the Italians, with a few skirmishes, to Italian advantage, between ships of the opposing nations at other points in the Mediterranean and Aegean seas. The fall of Tripoli followed a vigorous bombardment from the Italian fleet and its occupation by Italian troops was only resisted in a passive fashion. Unauthentic press reports indicate fighting in the desert outside the captured city, but owing to a strict censorship nothing definite has been developed. The movement of the Italian army and navy was accomplished with great celerity and has been highly praised by military authorities. Whatever international effect the war may have, it will take a notable place in history as the first in which aeroplanes have been used in actual military operations for both scouting and dropping bombs on the enemy.

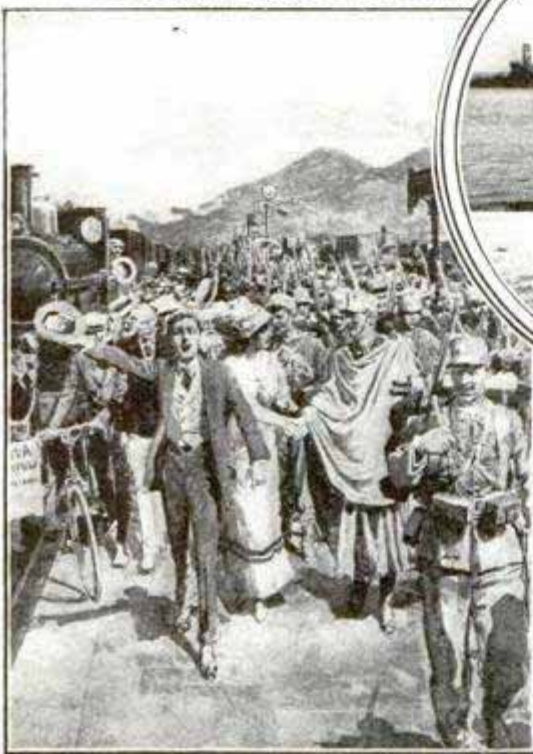


Trenches of Italian Troops in the Sand

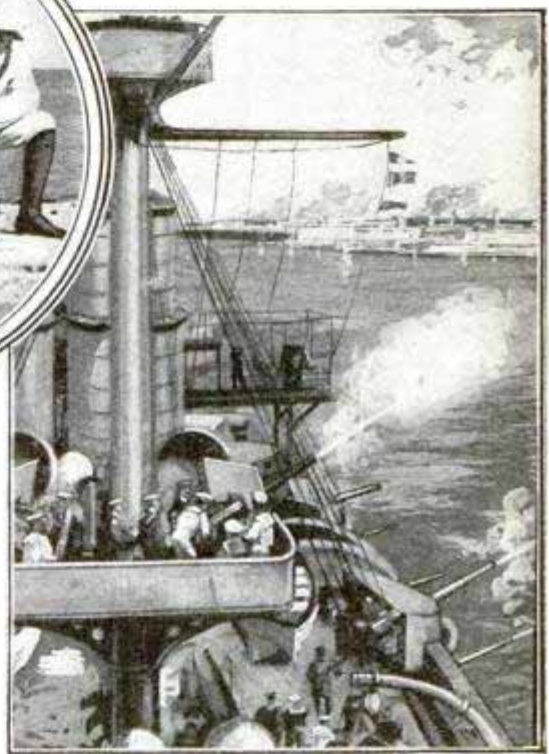
Banks outside the Town of Tripoli



Italian Naval Officer Examining a Shell Which Struck the Beach but Did not Explode



Crowds Cheering Italian Troops Departing for the Front



Bombardment of Tripoli as Seen from the Warships



Troop of Turkish Cavalry Crossing a Stream in the Desert

ITALY'S WAR ON TURKEY AND THE SEIZURE OF TRIPOLI

BOMB-DROPPING DEVICE FOR AEROPLANES

A bomb-dropping apparatus for aeroplanes, invented by Riley E. Scott, formerly a lieutenant in the U. S.



Starting on a Test Flight with Bomb-Dropping Device which Takes Scientific Consideration of All the Factors Such as Height, Speed, Etc., Necessary in Determining at What Moment a Bomb should be Dropped to Strike the Desired Object

army, has been given several tests in an army biplane, with Lieut. Milling as pilot. This device comprises a series of concentric rings mounted as gimbals at right angles to each other, and a telescope, with graduated arc and vernier, mounted on the inner ring at right angles to the plane of the ring. The center of gravity being considerably below the center of support, the inner ring assumes a horizontal position when symmetrically loaded. Two bombs, provided with guides in the form of tails, rest in canvas slings, from which they are released at the proper moment. The line of sight of the telescope describes a vertical plane when revolved, enabling the operator to lay off the angle for the particular height and speed.

TO CONNECT THE BRITISH EMPIRE BY WIRELESS

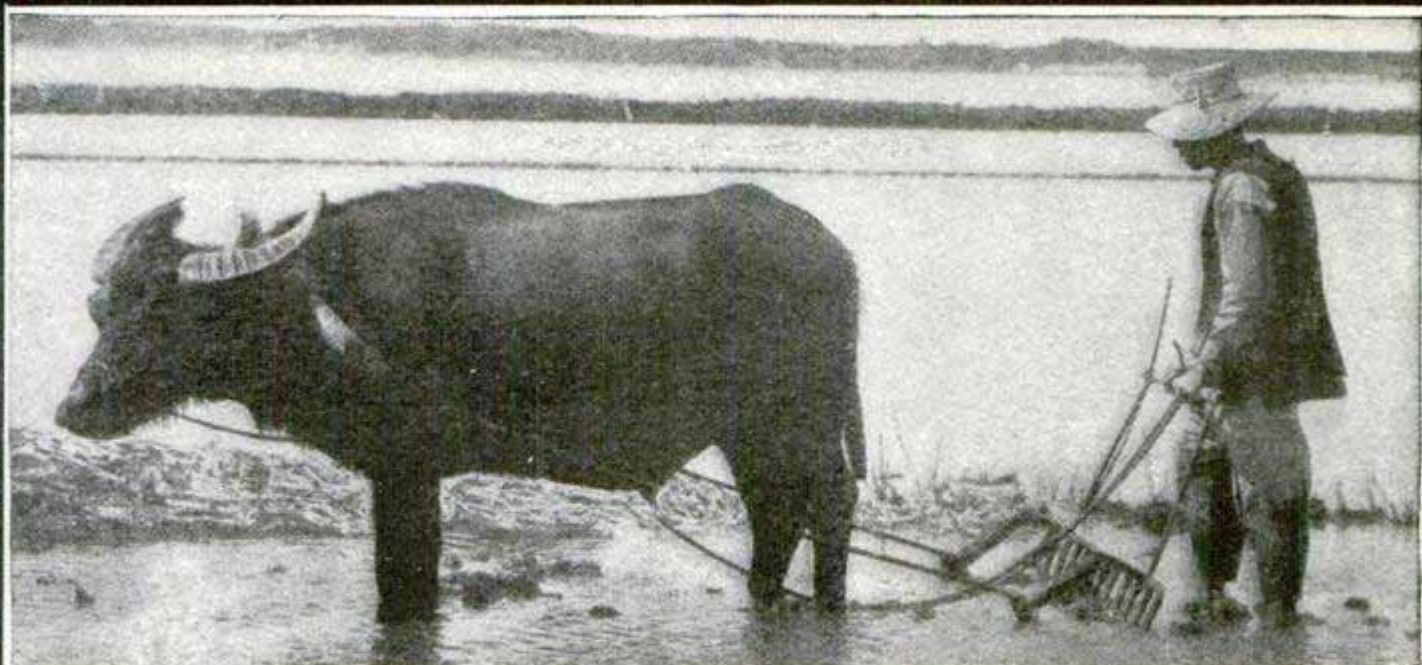
A scheme is now under consideration by the British government to unite the various parts of the empire by a wireless-telegraph system having direct communication with the Admiralty in London. The first chain of imperial high-power wireless stations contemplated will have stations at Gibraltar or Malta, and at Cyprus, Aden, Bombay, Singapore, and in Australia. England and Canada are already in communication, and Mr. Marconi has been carrying out experiments in Newfoundland with a view to perfecting this system.

¶ Capt. Klaus Larsen has again shown his contempt for the dangers that encompass a trip through the Whirlpool Rapids of Niagara in a small boat and his faith in the staunchness of his motorboat. Captain Larsen's second trip through the rapids was made Oct. 29. The trip through the 6 miles of turbulent waters occupied just 28 min.



FLAG OF THE CHINESE REVOLUTIONISTS

The flag of the Chinese revolutionists has been hoisted in several places in the United States. The feature of the flag is a large star in the upper corner. Aside from this it is plain colored bunting. The star bears a strong resemblance to the "rising-sun" emblem of the Japanese. The photograph shows the flag at the headquarters of the rebel committee in New York.



A PHILIPPINO FARMER preparing his land for a rice crop. These far-away Islands of the Sea, inhabited by an inferior race, are said to be so fertile that an entire family can be supported by its own back-yard. The above is but one of over 1,200 striking photographs in the wonderful and interesting Set of Books,

OUR ISLANDS AND THEIR PEOPLE

Consisting of two sumptuous, royal quarto volumes, 12 by 16 inches, and containing 1,200 wonderful photographs taken expressly for this work by America's famous outdoor photographer, Walter B. Townsend, on that famous Expedition through the wilds of Cuba, Porto Rico, Isle of Pines, Hawaiian Islands, Samoa, and the Philippines, which occupied more than a year's time and cost over \$35,000. Besides these marvelous photographs the work contains 800 pages of interesting narrative and descriptive matter of these far-away islands, written by the noted Author and War-correspondent, José de Olivares, under the supervision and direction of our Editor, the late Major-General Joseph Wheeler. The subject matter is written in Mr. Olivares' most fascinating style and accurately portrays the manners, customs and characteristics of these peoples and recounts fully the vast natural resources of the Islands themselves.

The Philippine Islands are 20,000 square miles larger than Great Britain and Ireland put together and are a veritable "promised land," so wonderfully rich are they in natural resource. For 400 years Spain tried to civilize the Philippine Islanders, but her efforts had little effect on that vengeful and treacherous race. How Uncle Sam will deal with the Philippino problem must be decided by the voters of the United States, and in order to form a correct opinion, every American citizen should have at hand the best source of information regarding our Island possessions. Now is your last chance. The Editor, Major-General Joseph Wheeler, is dead, the plates have been destroyed according to agreement and no more of these books will ever be printed again.

ONLY $\frac{1}{3}$ REGULAR PRICE

The regular price of this great Set is \$15.00, and over 400,000 sets have been sold at that price, but the plates are destroyed and in order to make a clean-up sale, the remaining sets will be sold at one-third the regular price—**only \$5 per set.** Fill out the coupon and mail it to us and we will send you the books for five days' free examination in your own home. Then if you are perfectly satisfied, send us \$1 as first payment and \$1 a month for four months until this "Special Sale" price of only \$5 is paid. If you are not satisfied return them at our expense.

A CHRISTMAS GIFT

These books are so entertaining and fascinating they would make an ideal Christmas present for anyone. Remember no more will ever be printed and they are going fast. Mail coupon today.

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THOMPSON
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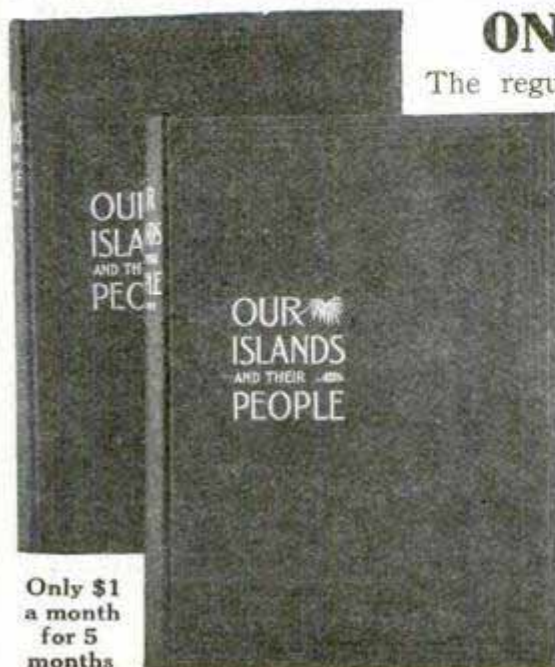
Send me for five days' free examination, one set of OUR ISLANDS AND THEIR PEOPLE. If I am satisfied with them I will send you, within five days, \$1 as first payment and \$1 a month for four months thereafter until the "Special Sale" price of only \$5 is paid. If I do not wish to keep the books, I will notify you within five days after arrival.

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OCCUPATION.....

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12-11 P M



Only \$1
a month
for 5
months



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Elec. Lighting Supt.

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Present Occupation _____
Street and No. _____
City _____

This Man

is sure of himself and marks the I. C. S. coupon confident that it will benefit him in salary and position.

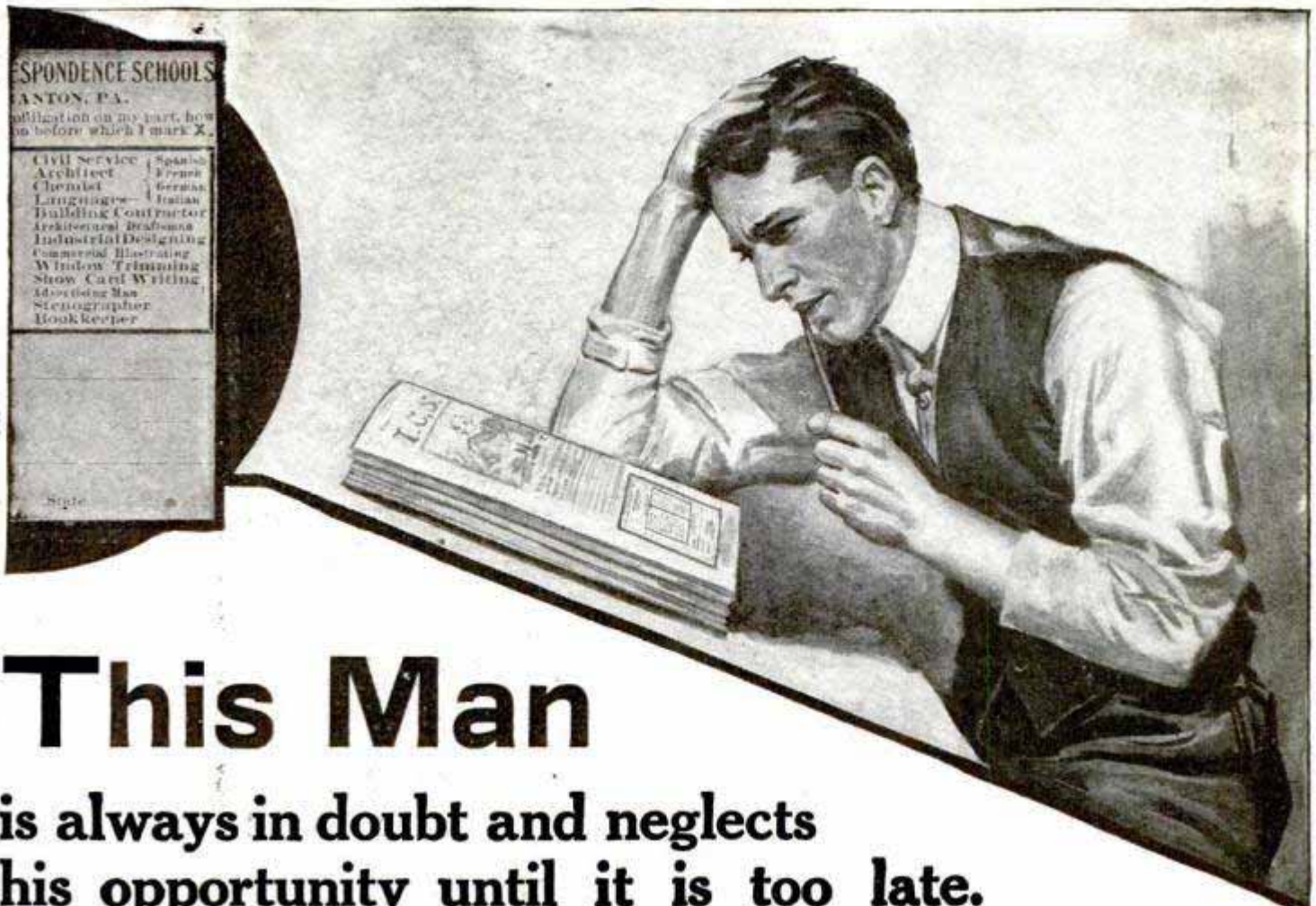
There are thousands upon thousands of "confident" men who have marked this coupon, and as a result are today occupying high-salaried positions. But there are still thousands of "perplexed" men who are putting off the marking of this coupon simply because they are wondering whether the I. C. S. can help them.

If you belong to the "perplexed" class, the I. C. S. says to you frankly that you are doing yourself a great injustice in not at least investigating a plan that cannot help but increase your earning power.

You do not have to take the word of any one person for this, because every month there is an average of over 400 I. C. S. students who voluntarily report an increase in salary as a direct result of I. C. S. training. The I. C. S. will give you their names and addresses, and will send you the record of thousands of others who are in the prosperity army of the I. C. S.

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is always in doubt and neglects
his opportunity until it is too late.
Which kind of a man are you?

Every man who reads has read about the International Correspondence Schools, and how they benefit working men in every branch of industry. The first step in the I. C. S. system is to clearly explain to the worker how he can be benefited—how little it will cost in time and money, and how quickly he can get returns.

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 Textile Manufacturing
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 Mechan. Engineer
 Mechanical Draftsman
 Electrical Engineer
 Elec. Lighting Supt.
 Agriculture
 Electric Railways
 Structural Engineer
 R. R. Construction
 Metal Mining
 English Branches
 Gas Engineer
 Foreman Plumber

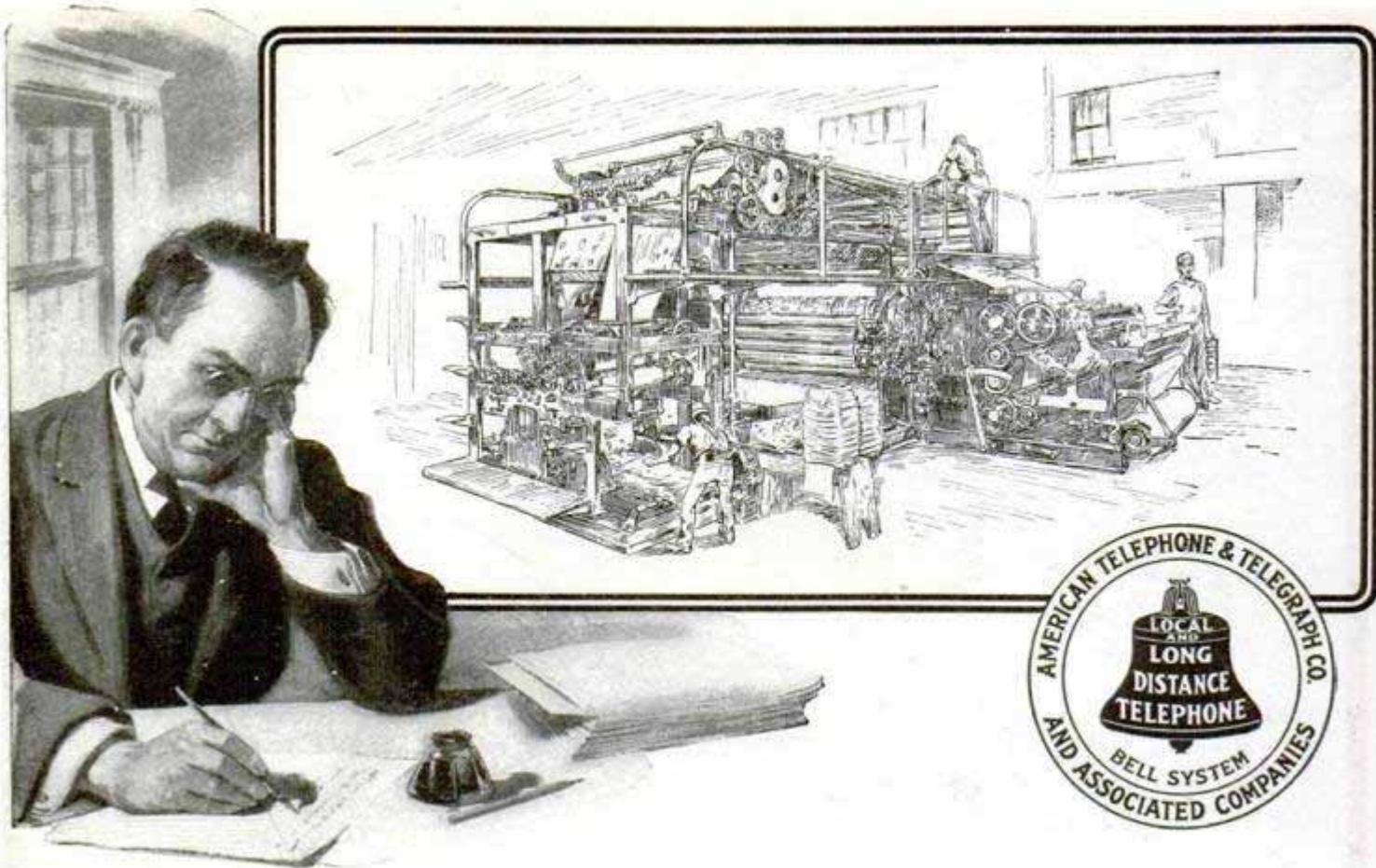
Civil Service
 Architect
 Chemist
 Languages
 Commercial English
 Building Contractor
 Architectural Draftsman
 Industrial Designing
 Commercial Illustrating
 Window Trimming
 Show Card Writing
 Advertising Man
 Stenographer
 Bookkeeper
 Cotton Manufacturing
 Woolen Manufacturing
 Toolmaking
 Foundry Work
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 Blacksmithing
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Present Occupation _____

Street and No. _____

City _____ State _____



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The power of the individual writer is multiplied by the printing press. In the same way the power of the individual telephone is multiplied by the Bell system. In both cases, increased usefulness comes from progress towards universal service.

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By co-operation with telegraph and cable systems, universal service for communication is being made international.

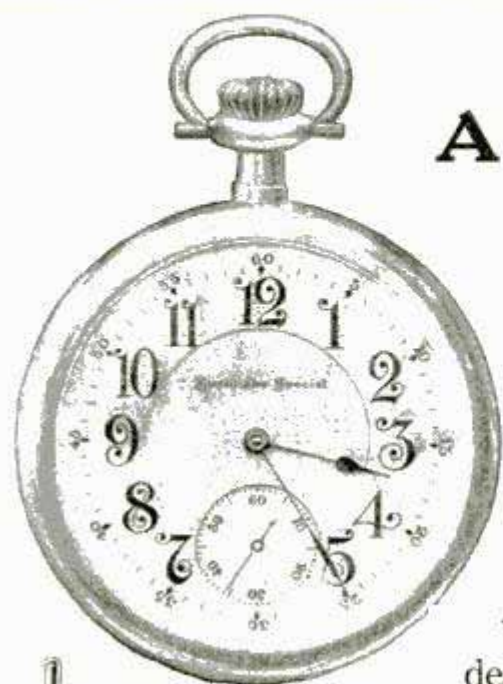
**AMERICAN TELEPHONE AND TELEGRAPH COMPANY
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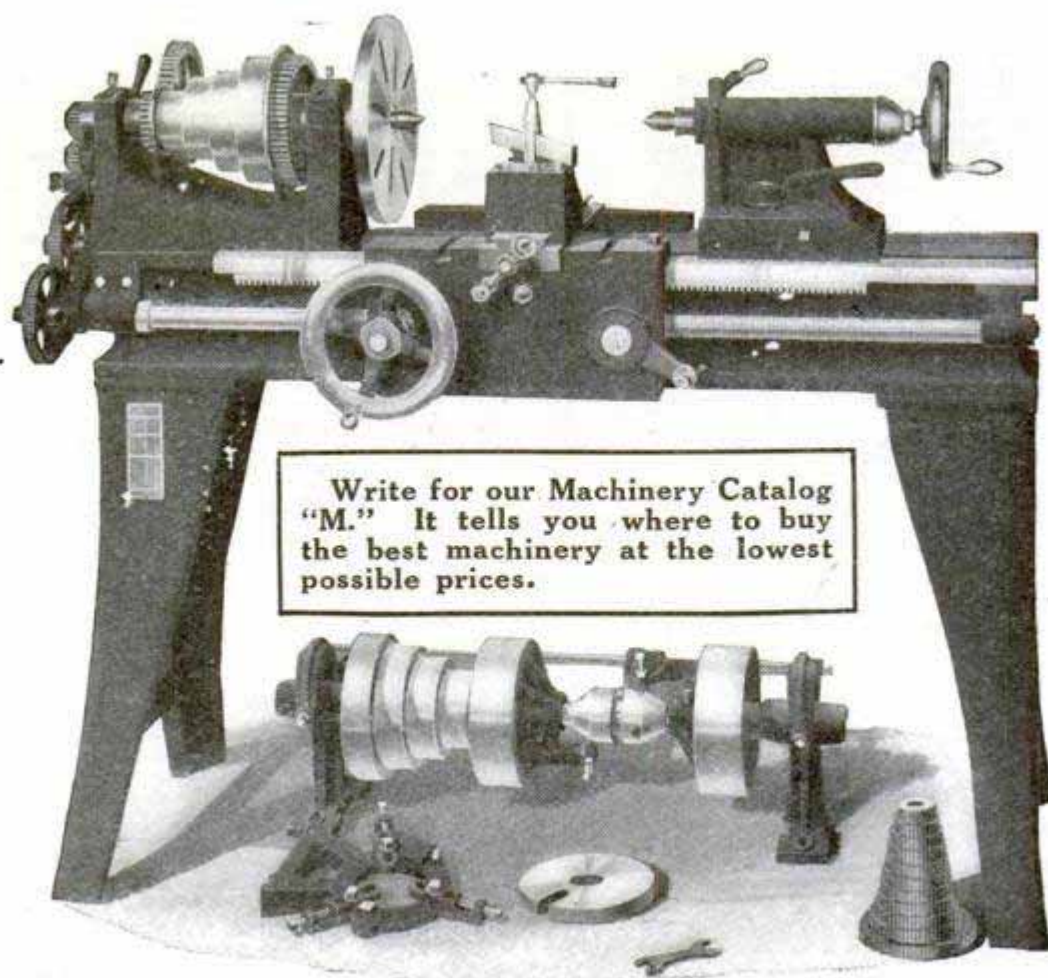
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Write for our Machinery Catalog "M." Mailed free. It puts you under no obligations whatever.

Our lathes are practical in design, unexcelled in workmanship, and size for size, considerably heavier than other makes that will compare with ours in general design.

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PRICES RANGE FROM \$60.00 UP.



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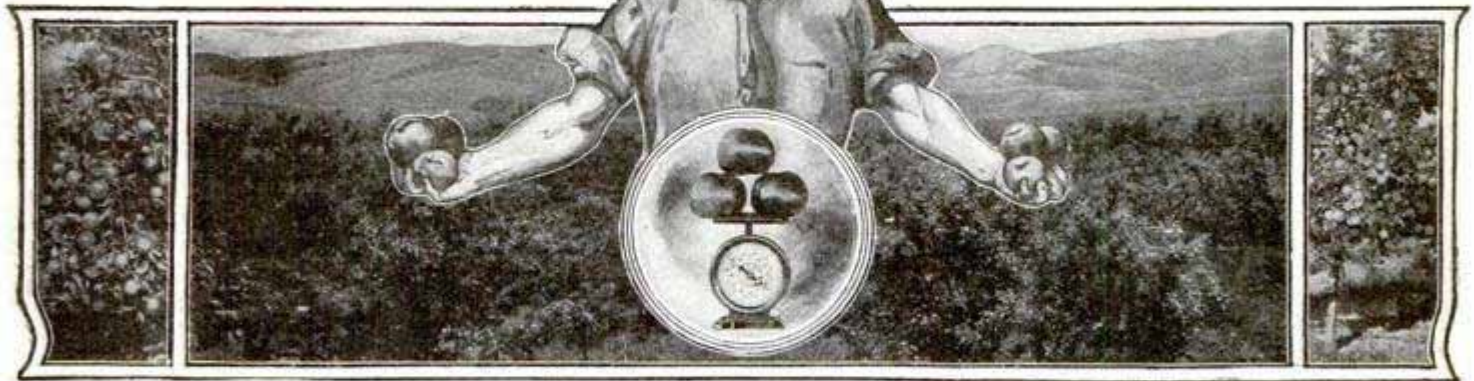
Address, SEARS, ROEBUCK AND CO., Chicago

\$5,000.

A Year

6 Months'

Vacation



Do You Want the Job? Is that enough income for you and long enough time to enjoy it in fishing, hunting, travel or some other way? All right—now we'll proceed to explain how you can secure such an enviable position away from the noise and nerve racking turmoil of the city. Where you can obtain personal freedom and independence, best of health and enjoy with your family the ideal life. Such an opportunity comes but once in a lifetime. It presents itself now to any one who has \$50. in cash and a present fair income.

Our plan of selling

Improved Orchard Tracts

practically amounts to loaning you \$2,500 to \$5,000 with which to buy and cultivate a 5 to 10 acre orchard on improved, well irrigated land, in the most famous apple growing region in the world!

The Sunnyside Bench Lands on which our tracts are located, are the very garden spot of the Bitter Root Valley!

They are the best situated as to city advantages, schools, universities, churches and amusements. Big game abounds in the adjacent mountains, fine fishing is found in the waters of the valley.

You must get our printed literature, to read and appreciate the full details of the ideal soil and climatic conditions which make this region the finest apple growing region in the world; together with statistics of undeniable facts of production, all endorsed and supported by the highest authorities in the world, including government reports, horticultural experts and practical orchardists.

Everything Conducive to Perfect Fruit

Our tracts are abundantly irrigated from a great irrigation system costing nearly \$4,000,000. The drainage is perfect. The apples grown there are hardy and perfect—as one government official observed, "not one worm in a hundred thousand boxes," big, bright, sound, toothsome fruit, ideal for export as well as domestic markets.

There are no destructive frosts; wormy fruit and crop failures are unknown. Transportation facilities splendid, social atmosphere and living conditions ideal, climate perfect, cool nights and long, sunshiny days. Everything that tends to health, happiness and prosperity.

\$5,000 Yearly for Life from 10 Acres

A Bitter Root apple orchard bears commercially in its fifth year. Ten acres, fully developed, will return you during early maturity, strictly net, a profit of from \$2,000 to \$5,000 yearly. Beginning with the tenth year from planting,

judged by experience of others, 10 acres will net you an income of \$5,000 yearly and employ only half your time.

If you have a fair-sized income now and are willing to improve your condition, you do not need capital to possess one of these big-paying orchards.

Our Proposition and Plan

briefly stated, is this: We will sell you a choice 10 acre Orchard Home Tract, already planted (spring of 1911) to best standard varieties (all apples, or apples and cherries)—with the Company's definite, written contract to care for and develop your orchard under expert horticultural supervision for 5 years from date of planting, including all land taxes and irrigation charges—for \$500 an acre.

The land will easily be worth, conservatively stated, in fair comparison with other improved lands, \$1,000 an acre. There's a clean profit to you of 100% on a 5 year investment, at the outset. Only a \$50 cash payment required now to secure your orchard tract—balance in easy payments divided over a ten-year period. Your payments for the next few months are practically all the cash outlay you will have, as your orchard tract will pay for itself during the buying period and yield you a handsome profit besides!

Fractional orchard tracts of 5 acres and over at proportionate prices and easy terms—(\$25 monthly for 5 acres.)

Our orchard contracts contain the fairest and most liberal features ever offered you.

Responsibility of Our Company

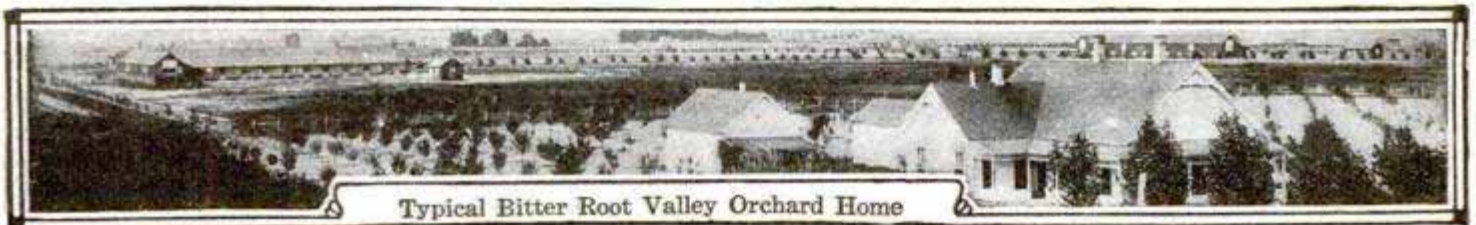
We are the largest orchard planters and growers in the Northwest.

Our guarantees and contracts are as good as bonds for we have assets of over \$5,000,000; our lands are paid for; we are not hampered with debts, encumbrances or other "promotive" needs. We have plenty of money to finance both ourselves and our buyers. Buying these Bitter Root Valley Orchard Home Tracts is like buying government bonds on easy payments—except that the returns are infinitely larger, and you are at the same time making a future ideal home for yourself and family!

Write today for our free illustrated book—for here's a proposition it will certainly pay you to investigate.

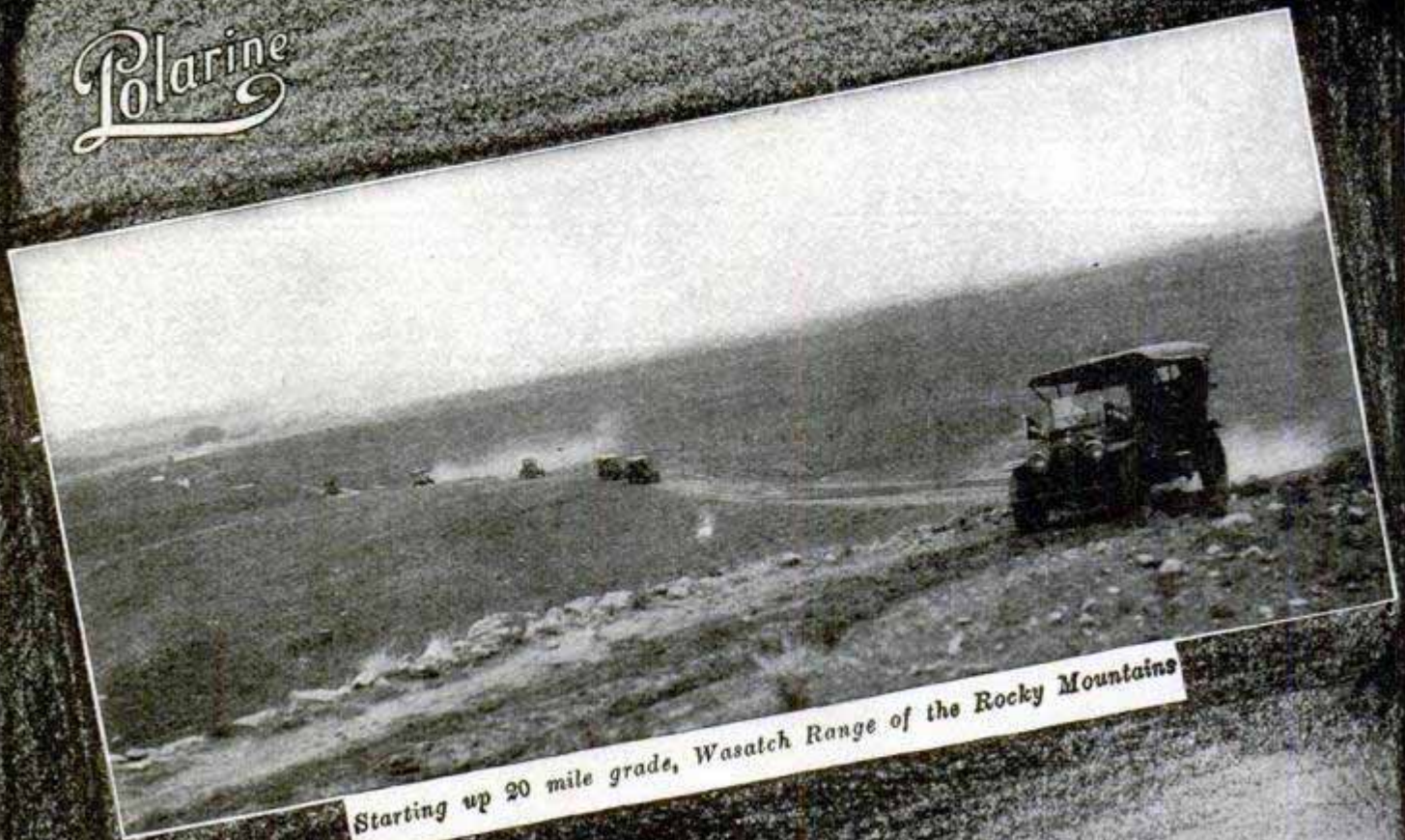
BITTER ROOT VALLEY IRRIGATION COMPANY

838 to 846 First National Bank Building, Chicago. U. S. A.



Typical Bitter Root Valley Orchard Home

Polarine



Starting up 20 mile grade, Wasatch Range of the Rocky Mountains

PREMIER MOTOR MFG. CO.

Indianapolis, Ind., Aug. 30, 1911.

Standard Oil Company,
555 West 25th Street, New York.

Gentlemen:—On the recent Ocean to Ocean run of the Motor Tourists, Polarine Oil, Polarine Transmission Lubricants and Polarine Greases were used on all the cars.

The lubrication of Polarine was ideal.

While we carried large African water-bags to supply water for our radiators in the event of overheating in the steady climbs and steep grades of the Rockies, Sierrá Nevadas and the coast ranges west of Omaha, they were practically unnecessary.

A heated motor was almost unknown. There was also notable freedom from carbon deposit. Furthermore, the stops where Polarine could be obtained were so numerous that at no time were we embarrassed in purchasing supplies.

The Polarine Transmission Lubricants and Greases rendered equally satisfactory service.

Very truly yours,

J. G. MONIHAN,
Secretary Motor Tourists.

Polarine

Stands up under
the severest test.

Are You Using
Polarine on Your Car?

Send to our nearest agency for
"Polarine Pointers." It contains use-
ful hints on the care of motor cars.

Standard Oil Company

(Incorporated)

My Famous Anti-Nicotine Pipes at Forty Cents Each, Three for a Dollar

I want thousands to know how a smoke can be improved by the construction of a pipe and by the materials put into it.

SMOKERS talk about the flavor, aroma and smoothness of tobacco. I know tobacco — so listen to me. A lot of that flavor, a lot of that aroma and a lot of that smoothness is *made or killed* by the pipe you smoke. Everybody knows it. I know men who have spent years trying to find a pipe they could smoke—and who today consider my scientifically-made Anti-Nicotine Pipes simply wonders! Some of them have actually given up other forms of smoking.

Handsome Models!

My Pipes Kill the Poison as Well as Improve the Smoke

Here's my original Anti-Nicotine Pipe at the top of this advertisement, and my new Anti-Nicotine Calabash Pipe at the bottom of this advertisement. In both these pipes I put the famous bowl that does the work—that makes the nicotine disappear. This bowl is made of a material as old as the Babylonians, a material that is like clay, a special composition first discovered by the ancients. This material is as hard as any clay, but it has a peculiar porous quality—just like the finest meerschaum—which *absorbs* the nicotine, keeps it out of your system and uses it to give the pipe a beautiful meerschaum coloring. I know that this special low price cannot blind you to the *quality* in these pipes. I know that the value to the health and enjoyment of my customers of these perfectly-made pipes, will get me twenty more customers every place that I send one now.

ANY THREE FOR A DOLLAR

Above is my popular claw design—the kind you see at the rich men's clubs. And below I show my new Calabash, modeled after the original African Calabash Gourd, graceful and highly finished, trimmed in German Silver. The claw design colors like the finest Meerschaum: the Calabash colors and looks *exactly* like the genuine African article which sells anywhere from \$3.00 up. With them there is no burning the tongue—no charred wood fumes—no disgusting odor—and you do not have to "break them in." Any three for a dollar. Choose two of one design and one of the other, or all three of the same—just as you desire. I will sell these pipes to you at 40 cents each or three for a dollar. Order now—know that if you are not entirely satisfied, your money will be returned cheerfully. This offer holds good for this time only. Send the Coupon now.

My handsome illustrated 1911 Smokers' Book sent FREE with every order.

H. MENGES
The Smoker's Friend
815 Menges Bldg.
ST. LOUIS
MO.

NAME

ADDRESS

TOWN

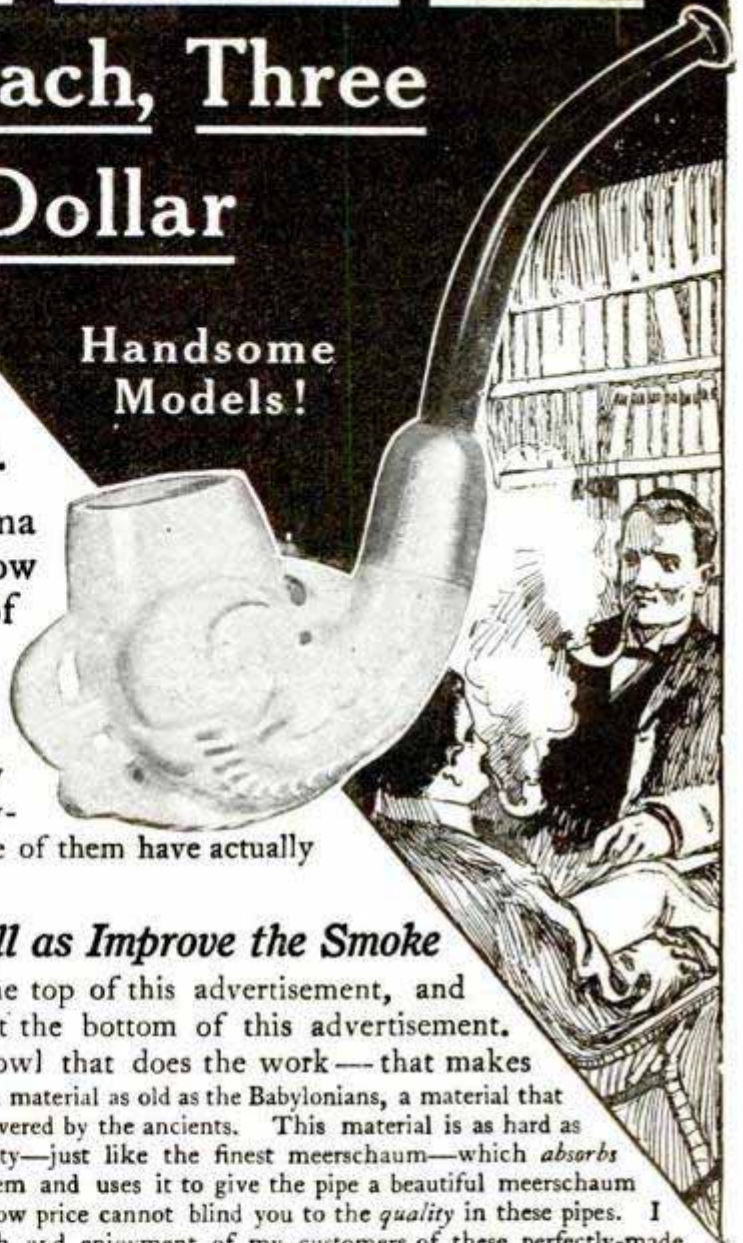
STATE

CUT
OUT
AND
MAIL
TODAY

Claw is Design
A, Calabash is
Design B

H. MENGES
815 Menges Bldg.
St. Louis, Mo.

Enclosed find 40 cents for one, \$1.00 for three of your Anti-Nicotine pipes. Please send Design A..... Design B..... (State how many of each design wanted.) It is understood that if I do not like the pipe or pipes I am to return the goods and receive my money back in full.





**Wins
Every
Race!**

Flexible Flyer

**"The sled
that steers"**

The ideal Christmas gift. Nothing will make the children so happy! Don't buy simply a "steering sled." Get a Flexible Flyer, the safest, speediest, handsomest and most economical sled made. Can be steered **at full speed** in any desired direction, **around** all obstacles and **past** other sleds. Has patented spring steel runners **grooved** to prevent "skidding." This is far superior to flat or rounded runners on ice or snow. It is light and graceful. Easy to pull up hill, yet so strong it **outlasts three ordinary sleds.**

Just the sled for boy or girl. Saves shoes, prevents wet feet, colds, etc., and saves doctor's bills. If you wish the advantage of these exclusive features insist on a Flexible Flyer and look for this trade-mark on the sled.

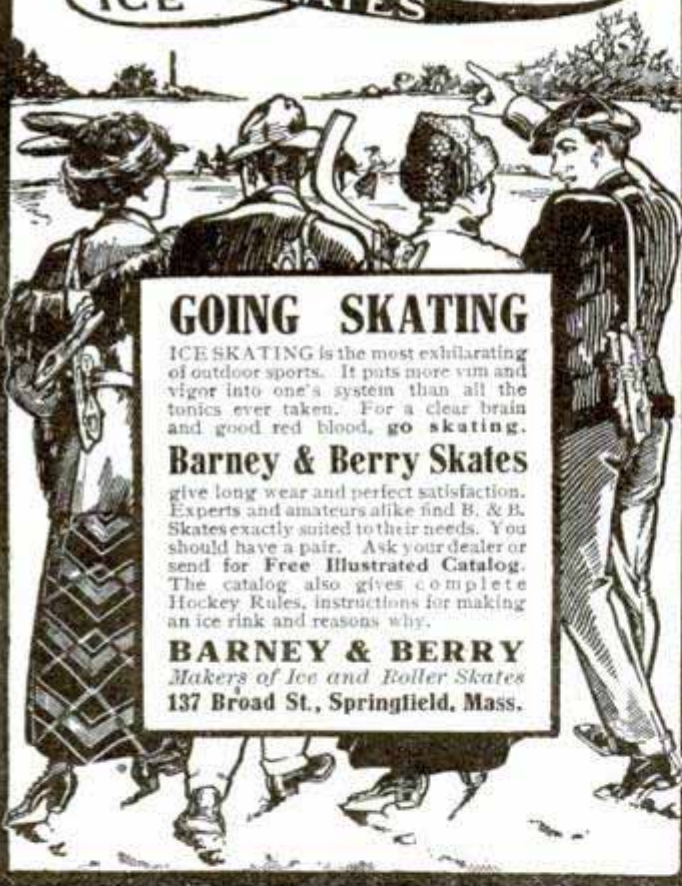
FREE a cardboard working model. Also beautiful booklet illustrated in colors showing coasting scenes, etc. Both free. Write a postal, giving your name and address, and say "send model and Booklet." **Write today!**
S. L. ALLEN & CO., Box 1101G. Philadelphia, Pa.



TRADE-MARK

BARNEY & BERRY

ROLLER
ICE SKATES



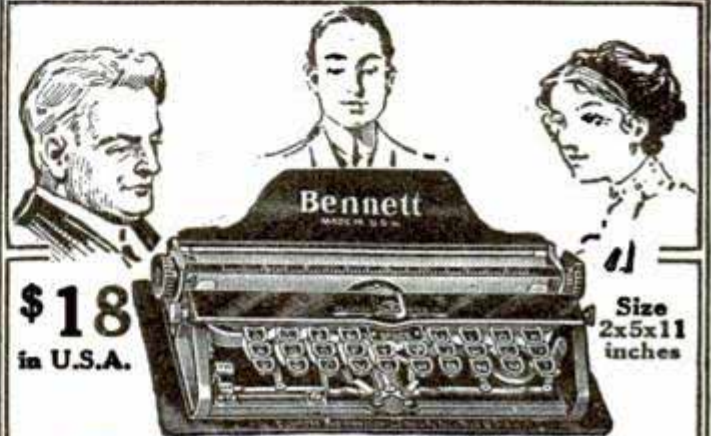
GOING SKATING

ICE SKATING is the most exhilarating of outdoor sports. It puts more vim and vigor into one's system than all the tonics ever taken. For a clear brain and good red blood, go skating.

Barney & Berry Skates

give long wear and perfect satisfaction. Experts and amateurs alike find B. & B. Skates exactly suited to their needs. You should have a pair. Ask your dealer or send for Free Illustrated Catalog. The catalog also gives complete Hockey Rules, instructions for making an ice rink and reasons why.

BARNEY & BERRY
Makers of Ice and Roller Skates
137 Broad St., Springfield, Mass.



The Most Wanted Gift

Decide right now to give the one you are most interested in a Bennett Typewriter for Christmas. It will delight the young man or young lady, encourage them to become business-like, and enable them to make spare time money, if they choose. It is just what the business man needs. He can't be up-to-date without a typewriter. He can carry the Bennett wherever business takes him. It slips into pocket or grip like a book. It will be of untold help to the woman who has considerable correspondence. No other gift you can buy for \$18 will be so genuinely appreciated as this easily carried, modern

Bennett Portable Typewriter

Gives \$100 quality of service—quick, accurate, time saving—standard key board—built in the celebrated Elliott-Fisher Billing Machine Factory and guaranteed by them. Sold so cheaply because of a wonderful, unique and simplified construction.

Money Back If Not Satisfied

You take no risk whatever in making the gift of a Bennett. If recipient does not like it, return within 10 days and we'll refund your money. Write today for special Xmas offer and catalog.

P.M. BENNETT TYPEWRITER COMPANY, 366 Broadway, New York
A Few Capable Representatives Wanted
Foreign Address, 75 Cannon Street, London, E. C.

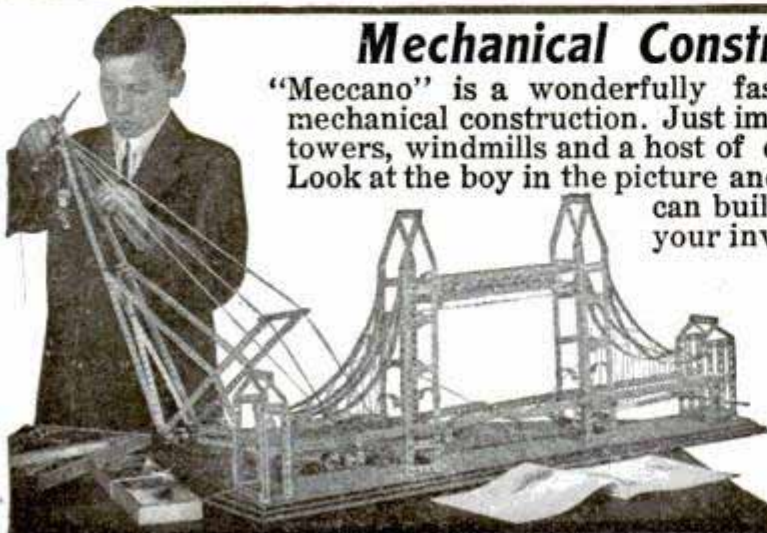
Mechanical Construction Taught by Play.

"Meccano" is a wonderfully fascinating game that actually teaches a boy mechanical construction. Just imagine building bridges, traveling cranes, signal towers, windmills and a host of other fine things that *work* just like real ones. Look at the boy in the picture and see the dandy tower bridge he has built. You can build the same and just as many other things as your inventiveness will permit.

"MECCANO"

comprises all the main mechanical parts used in machines—levers, beams, wheels, axles, pulleys, bolts, etc. Parts are made of nickel steel and brass and can be used over and over again. *Every father should give this instructive toy to his son.* Sold by leading toy and sporting goods dealers. Write for illustrated catalogue P.

THE EMBOSING COMPANY, Albany, N. Y.
Manufacturers of "Toys That Teach"



"17 Cents a Day"

The Plan That Promotes Success

THE "17-Cents-a-Day" Plan of purchasing The Oliver Typewriter means more than promoting sales of this wonderful writing machine.

This Plan is a positive and powerful factor in *promoting the success* of all who avail themselves of its benefits.

It means that this Company is giving *practical* assistance to earnest people everywhere by supplying them—for pennies—with the best typewriter in the world.

The "17-Cents-a-Day" Plan is directly in line with the present-day movement to substitute *typewriting* for *handwriting* in business correspondence.

Ownership of The Oliver Typewriter is fast becoming one of the essentials of success.

"17 Cents a Day" and The Printype —

OLIVER Typewriter

The Standard Visible Writer

There is no *patent* on the "17-Cents-a-Day" Purchase Plan.

We *invented* it and *presented* it to the public, with our compliments.

The "17-Cents-a-Day" Plan leaves *no excuse* for writing in primitive *longhand*. We have made it so easy to *own* The Oliver Typewriter that there's no need even to *rent* one.

Just say "17 Cents a Day"—*save your pennies*—and soon the machine is *yours*!

The Oliver Typewriter is selling by *thousands* for 17 Cents a Day.

When even the *School Children* are buying machines on this simple, practical Plan, don't you think it is *time for you* to get an Oliver Typewriter?

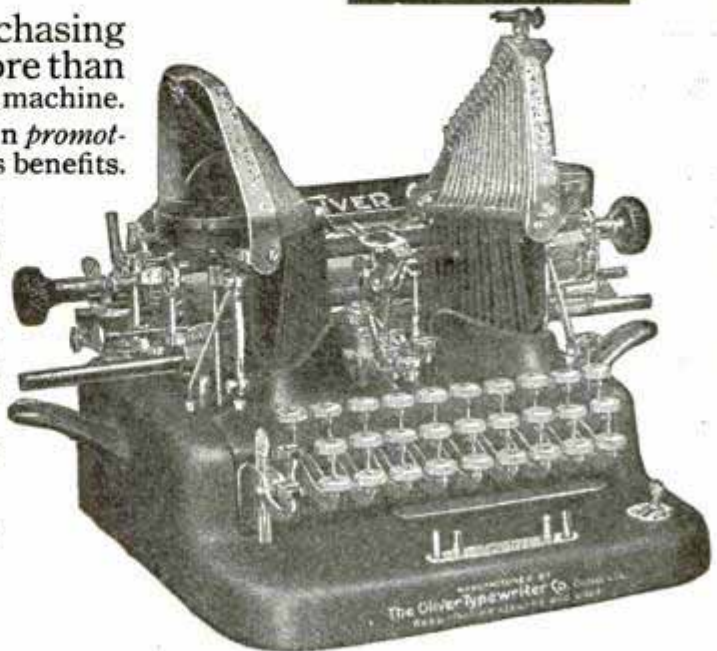
17 Cents a Day Buys Newest Model

We sell the new Oliver Typewriter No. 5 for 17 Cents a Day.

We *guarantee* our No. 5 to be *absolutely our best model*.

The same machine that the great corporations use.

Their *dollars* cannot buy a better machine than you can get for *pennies*.



The Oliver Typewriter No. 5 has many great conveniences not found on other machines.

We even supply it equipped to write the wonderful new PRINTYPE—for 17 Cents a Day.

Make the Machine Pay Its Cost

The Oliver Typewriter is a *money-making* machine. It helps "big business" pile up huge profits.

Tens of thousands of people rely on The Oliver Typewriter for their very *bread and butter*.

A small first payment puts the machine in your possession.

Then you can make it *earn the money* to meet the little payments.

If you are running a business of your own, use The Oliver Typewriter and make the business *grow*.

If you want to get a start in business, use The Oliver Typewriter as a *battering-ram* to *force your way in*!

The ability to operate The Oliver Typewriter is placing young people in good positions every day.

Get The Oliver Typewriter—on the "17-Cents-a-Day" Plan—it will help you win *success*.

Ask About "The Easy Way"

to secure the newest model Oliver Typewriter No. 5. The Art Catalog and full particulars of the "17-Cents-a-Day" Purchase Plan will be sent promptly on request. Address

THE OLIVER TYPEWRITER COMPANY

Agencies Everywhere

(143)

822 Oliver Typewriter Building, Chicago

Model Aeroplanes Make Desirable Christmas Gifts

OUR new improved No. 34 "BLERIOT" Racing Monoplane is the latest achievement in MODEL AEROPLANE construction, size 28x32 inches, double service motor, Integral type propeller, planes adjustable, divertable rudder, beautifully finished and fitted with special aluminum parts, especially equipped with running gear, enabling model to ascend *gracefully from the ground*. This machine has a record of 356 ft. and is no doubt the finest model offered the public, every model guaranteed to fly and raise from the ground. Safe delivery assured. If you are interested in the greatest science of the age, AERONAUTICS, you should have our "BLERIOT" No. 34. SPECIAL offer during the Holidays—the above model sent by prepaid express on receipt of.....

\$5⁰⁰

Send Money Order. Personal checks must allow for exchange. ORDER TO-DAY.

Just the Engine for Model Aeroplanes



"NOMIE" ¼ H. P., 3 Cylinder ROTARY ENGINE

The only MODEL AVIATION MOTOR in the world, that will successfully fly MODEL AEROPLANES. Motor develops a full ¼ H.P. at 2,500 R.P.M., weighs 6¼ ozs., operates on Compressed Air, Carbonic Acid Gas, or Steam. Air Tube furnished with engine weighs 16 ozs., and contains 1.176 lbs. of air, tube can be exchanged for new charge for 15 cts, extra tubes 75 cts each. The lightest and most powerful motor for its size in existence. Engine fully guaranteed for one year. Look out for imitations. "NOMIE" Engines are for sale by all leading MODEL SUPPLY houses or order direct from the sole manufacturers' agents. Price of Engine and Tank \$15.00 F.O.B. Chicago. Orders filled promptly.



Price List No. 5 just off the press. Send for it. No postals.

GOFF AEROPLANE COMPANY (Not Inc.) The largest and oldest manufacturers of MODEL AEROPLANES in America 219 S. Dearborn St., CHICAGO, ILL.



AEROPLANES MODELS—SUPPLIES

Announcing our First Edition 1912 Catalogue S. Free on application. Listing complete new line of Model Accessories; and our Bleriot, Antoinette, Wright, Nieuport and a guaranteed 1000 foot Racing in "Knocked Down" form and complete ready to fly Model.

THE WHITE AEROPLANE CO. 337 Adams St. BROOKLYN, N. Y.

Model Aeroplanes A Splendid Christmas Gift



"Ideal" Wright 3 ft. Bi-Plane Model

If HE is a man or boy interested in scientific or mechanical things, nothing will please him more for Christmas than a really

scientific model aeroplane.

The "Ideal" Wright is the only three foot Bi-plane Model absolutely guaranteed to fly. Complete materials, ready to assemble, with plan and instructions \$6. (If prepaid, add 40 cents for express charges.) Plan and directions for building (no materials) 25 cents.

Complete materials, ready to assemble, of 3 foot Bleriot Monoplane \$3. (If prepaid, add 25 cts. for express charges.) Plan and directions for building (no materials) 15 cents.

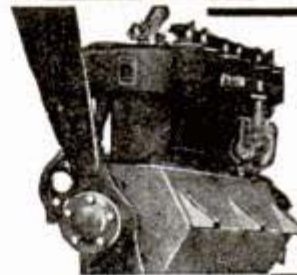
We can furnish complete model aeroplane supplies of the highest quality. Our line includes everything needed for building scientific, practical models.

Send stamp for most complete Catalog published, containing illustrations and full descriptions.



"Ideal" 3 ft. Bleriot Monoplane Model

IDEAL AEROPLANE & SUPPLY CO. 82-88 West Broadway NEW YORK CITY



MAXIMOTOR

DEPENDABILITY THE AIM

4 and 6 cyl. 30-75 h.p. 4 cycle. Surprisingly simple. Ask

MAXIM MOTOR MANUFACTURERS DETROIT

67 CRANE AVENUE

ORIGIN OF THREE CHEERS—We go back to Crusaders for the reason for the "cheers", or three chords sounded by the band before and after completion of the march down and back in front of troops at parade. The soldiers selected for a crusade were formed in line; the other soldiers not selected were lined up also, the two bodies being separated. The band then marched in front of those selected for service and back to its place, thus singling out and honoring those chosen to uphold the cause. The assembled populace no doubt cheered the selected soldiers, and the "three cheers" now given by the band were symbolic of the cheers for the Crusaders.—National Guard Magazine.



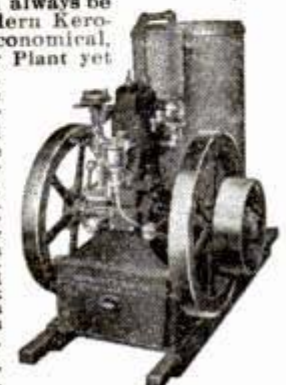
BE PROSPEROUS

Grow Mushrooms at home all winter in cellars, stables, sheds, boxes, etc. Large demand. \$20.00 a week easily made. Only small space necessary. We are large growers, make best spawn, and insure your success. Write for big booklet and learn how.

NAT'L SPAWN CO., Dept. 12, HYDE PARK, MASS.

POWER AT LOW COST Kerosene as Fuel 15 Days FREE Trial

HERE is Power for you that can always be relied upon. The Colton Modern Kerosene Engine is the most economical, simplest and most reliable Power Plant yet invented. Its many new improved patented features are most valuable and are not found on any other engine. Power is constant, speed regulated without stopping engine — adjusts itself instantly to any overload — no cranking to start it. Every Colton is sold under a positive, unqualified guarantee to give satisfactory service or money refunded. Our company has been established 27 years. Get it on trial and compare its simple, compact construction, superior quality materials and high grade workmanship. You will see it operate with less attention and furnishes more power per rating than any engine you ever saw. Send for Free Engine Book at once.



Arthur Colton Co., 182 Brush St. Detroit, Mich.



HANSEN'S GLOVES

"Built Like a Hand"—For All Kinds and Conditions of Service

DO you treat your hands well? They are *your fortune*; neglect of them is bad business, for men at work or play. For trade, profession or sport, Hansen's Gloves give the only *perfect protection* with full *liberty* of fingers and fist.

Hansen's Gloves are made of horsehide or pigskin leather, tanned by a special process, warranted not to shrink nor shrivel, harden, crack nor peel. Washing in gasoline leaves them soft, pliable and shapely as new.

MADE IN HUNDREDS OF STYLES and all sizes in various colors for automobilist and cyclist, hunter, farmer, miner, ironworker—you cannot name a field of play or work for which there is not a Hansen

Glove practically *made to order* but ready to wear.

They are "built like a hand" and built exactly to suit all lines of labor. They are economical, too. They cost no more and outlast the ordinary kind.

FREE BOOK: Fill out attached coupon, mail to us and receive free book describing and illustrating all styles. Or, write us a postal if more convenient.

O. C. HANSEN MFG. CO.
291 Milwaukee Ave. Milwaukee, Wis.

O. C. HANSEN MFG. CO.

291 Milwaukee Ave. Milwaukee, Wis.

Please send me your Free Book illustrating and describing your styles of gloves and mittens. I am most interested in the styles you make for the following purpose:



Hansen "Glad Hand" One of a hundred styles.

Name.....

Address.....

Town..... State..... 1932

SHARK FISHING FOR PROFIT—A new industry has sprung up in the Hawaiian Islands, where the sea that surrounds that region is almost alive with sharks.

Honolulu business men have formed a company for the purpose of producing oil from the sharks. It is said the oil, which is very strong and possesses a rather rank odor, can be so refined that it will have ready sale.

Shark oil contains certain medicinal properties something similar to the well-known codfish oil, and it is said that when it is deodorized it will go into general use.

The shark skins are also valuable for the making of a



4 Musical Instruments FREE

You get these marvelous attachments—superb harp, Tyrolean zither, concert guitar and artist banjo, FREE with every celebrated WING piano or player piano. You can play as well as the most accomplished specialized artist by pressing a pedal. We ship, prepaid, for four weeks Free Trial a WING with these unprecedented additions. Write today for big piano book and details of wonderful offer.

WING & SON, Dept. 1199, 9th Ave. and 13th St., NEW YORK CITY

BROOKSVILLE, FLORIDA, BOARD OF TRADE

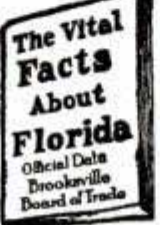
80 Bushel Corn Farms

also produce the best oranges and grape fruit. Truck farming equal to any in state of Florida. Only a small amount of Florida soil is rich, high, black hammock land such as surrounds our city. We, the Brooksville Board of Trade, have no land to sell, but want to interest ambitious men with from \$500 to \$1000 capital to help develop tremendous agricultural and industrial advantages of Brooksville and Hernando County. Although farm and fruit land has been steadily going up in price, some good land can still be bought far below its real value.

FREE

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It tells you about the different kinds of Florida soil, and why the biggest corn crops (80 bushels per acre), best citrus fruits, truck and staple crops are grown here. 300 feet above sea—no swamps or marshes. Ideal climate—schools, churches, good roads, all modern conveniences. If you are not afraid of work and have at least \$500 to \$1000 capital, come to Brooksville. We need you and will help you by giving the benefit of our advice and experience. Write us today. BOARD of TRADE, Box. 510 BROOKSVILLE, FLA.



A Card in Evidence

When the time comes for the use of a card, it is very essential that the card should be **right**.

A Peerless Patent Book Form Card

is **right**, when the time comes for the use of a card, no matter what the circumstance.

It is **always clean, always smooth, always there** in the case, and **always a source of pride** that it is always just the best card that money can buy or effort can produce.

No feature could be added to make it any better, else we would have done so long ago, when we made the first and original improvement in cards.

A sample tab of the cards, will give you the evidence when you detach the cards one by one, and note the smooth edges and the cleanliness that must be the result of the book in the case. Send for the tab, and see for yourself.

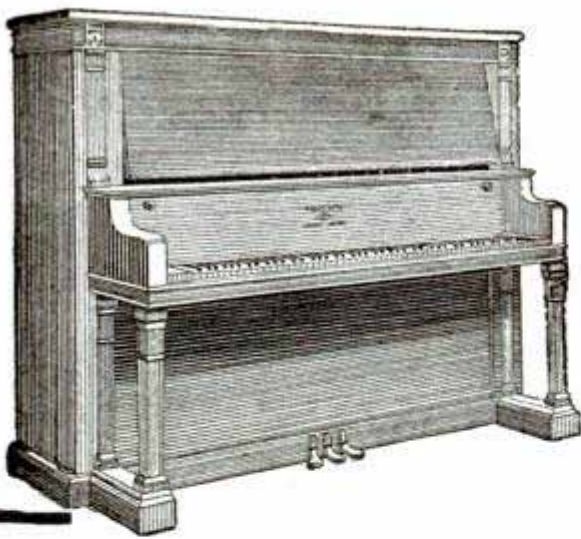
OUR SMART CARD IN CASE



The John B. Wiggins Company

Engravers Die Embossers Plate Printers

62-64 East Adams St., Chicago



The World Famous
**MEISTER
 PIANO**

Sent to any home in America on
30 Days Free Trial

The Freight Prepaid

Eight artistic styles to choose
 from ranging in price from

\$175 to \$350

Sold direct from the factory to you, and
 not sold to dealers or commission men under
 any circumstances.

If you like the instrument and desire to
 keep it after the month's free trial, these are
 the terms of sale:

SMALL WEEKLY or MONTHLY PAYMENTS
NO CASH PAYMENT DOWN
NO INTEREST ON PAYMENTS
NO EXTRAS OF ANY KIND
PIANO STOOL AND SCARF FREE

Sold under Rothschild & Company's Guar-
 antee Bond, which is as good as a Gov-
 ernment Bond.

Rothschild & Company's resources are in
 excess of \$4,000,000, and every promise they
 make is absolute. Ask any banker in America
 for Rothschild & Company's commercial rating.

Send for our beautifully illustrated catalog
 showing Meister pianos in the natural wood
 colors. The book also contains hundreds of
 testimonial letters from delighted customers.
 A post card will bring it.

The Meister Piano Co.
 (Rothschild & Company, Sole Owners)
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You Can Carry a Gun



If it is one of our novelty
WATCH FOBs. Perfect mini-
 atures of the Cowboy's six-
 shooter.

Metal gun inserted into
 leather holster, like the picture,
 typical of the gun-carrying
 days of the West.

**A Novelty Worth
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Now is the time to obtain
 this splendid novelty, new
 on the market. Sold by all
 druggists, newsdealers,
 tobacconists and novelty
 stores.

Mail us twenty-five cents
 (coin) and we will send you
 one of these unique fobs by
 return mail.

**Five for one dollar,
 charges paid**

ALAMO LEATHER & NOVELTY CO.
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kind of leather which has been found to be quite service-
 able in many ways, and owing to the vast quantities of
 these ugly fish it is thought the new industry will be a
 success.—Philadelphia North American.



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For College, School, Society or Lodge.

Descriptive catalog with attractive prices
 mailed free upon request. Either style of

pins here illustrated with any three letters and figures,
 one or two colors of enamel. **STERLING SILVER, 25c**
 each; \$2.50 doz.; **SILVER PLATE, 10c each; \$1.00 doz**

BASTIAN BROS. CO. Dept. 672

ROCHESTER, N. Y.

BENJAMIN AIR RIFLE
 FOR MEN
 AND
 OLDER BOYS.

An air gun that will shoot through
 one-half inch pine easily. Many times
 more powerful than spring guns. Uses com-
 pressed air, same as air brakes, rock drills, etc. 15c
 pays for 1,000 shots, (delivered 30 cents). Practical for small game.
 37 inches long. Walnut stock. Nickel barrel. Takes down. Fully
 Guaranteed. 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 \$3.00. Circular free.
BENJAMIN AIR RIFLE & MFG. CO., 2002 Frisco Bldg., ST. LOUIS, MO.

400 Plans for \$1.00
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Are you going to
 build? Send for our
 latest designs of cot-
 tages, bungalows,
 single and double
 houses, flats, etc.,
 from \$300 to \$12,000.
 Don't build until you
 have seen them.

J. H. DAVERMAN & SON, Architects
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30 Days' Free Trial

Luther Hummer Tool Grinder

30 Days' Free Trial

A workshop in itself—does all kinds of sharpening, grinding, buffing and polishing, and can be used as a jig, rip, and cut-off saw, lathe, force feed drill, etc., 30 attachments—30 days' Free Trial.

DIMO-GRIT

“THE WHEEL FOR STEEL”

10 times more efficient than emery. 25 times faster than the grindstone—will not draw temper. Dimo-Grit, the newest artificial diamond abrasive, cuts steel away in tiny shavings—no need of cooling with water—cuts hardest steel as emery does copper. Dimo-Grit is especially adapted for steel. On the wheels of the Luther Hummer, turning 4000 revolutions per minute, it makes any job of sharpening quick, easy work. Dimo-Grit wheels far outlast emery wheels. Carborundum wheels furnished if wanted. No other machine so moderate in price—saves money and makes work easy in so many different ways. It is a big economy and money-maker for any tool user, as you can prove by trying it 30 days free.

Easy Running Shaft Drive

The Hummer is all steel and iron construction, absolutely rigid, and without vibration. Has bevel gear shaft drive, ball bearings, gravity lubrication, etc. See illustration. Patent tool rests make it easy even for apprentices to sharpen twist drills, saw, chisels, etc.

Dimo - Grit Sharpening Stones

Ask your dealer for Dimo-Grit sharpening stones, the fastest stones especially suitable for steel. Look for the name “Dimo-Grit”

30 Days' Free Trial

Write today for our 30 days' Free Trial Offer. You will be under no obligations. We will also send you an interesting 40 page illustrated book, describing the Hummer, and containing McClure's Magazine's story of the discovery of artificial diamond abrasives. Write for free trial offer today.

Luther Grinder Mfg. Co., 209 Stroh Bldg., Milwaukee, Wis.



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*—There is a Constant Demand
for Good Inventions*

Thousands of the biggest money-making inventions have been the "little" things that have made people wonder why they were never thought of before.

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and

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If you have an invention send us a sketch, photograph or model of it. We will give you a report as to its patentability absolutely free. If you have no invention send for our book, "What to Invent." It contains hundreds of valuable suggestions.

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Your idea will never do you any good if someone else patents it ahead of you. Act quick! Let the other fellow say "he thought of it a long time ago." You reap the profit. Let the others wish they had.

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We have secured patents for thousands of inventors and have many letters proving the value of our services. Write us. Send rough drawing or model of your invention for our opinion. We will guard it carefully and report quickly. You are under no obligations to proceed further. Our plan is simply a square deal to all. Our books, "What to Invent" and "How to Obtain a Patent" are the best publications written for the man who has an idea to patent, or who is of an inventive turn of mind. They show just how to proceed with your idea and tell of hundreds of things to invent. We gladly send these books free. The sooner you write for them the sooner you will know all about patents and the many different lines in which new inventions or improvements may be made.

*If you have an invention send us a sketch of it for
report and ask for the books at the same time.*

CHANDLEE & CHANDLEE, 984 F Street, Washington, D. C.

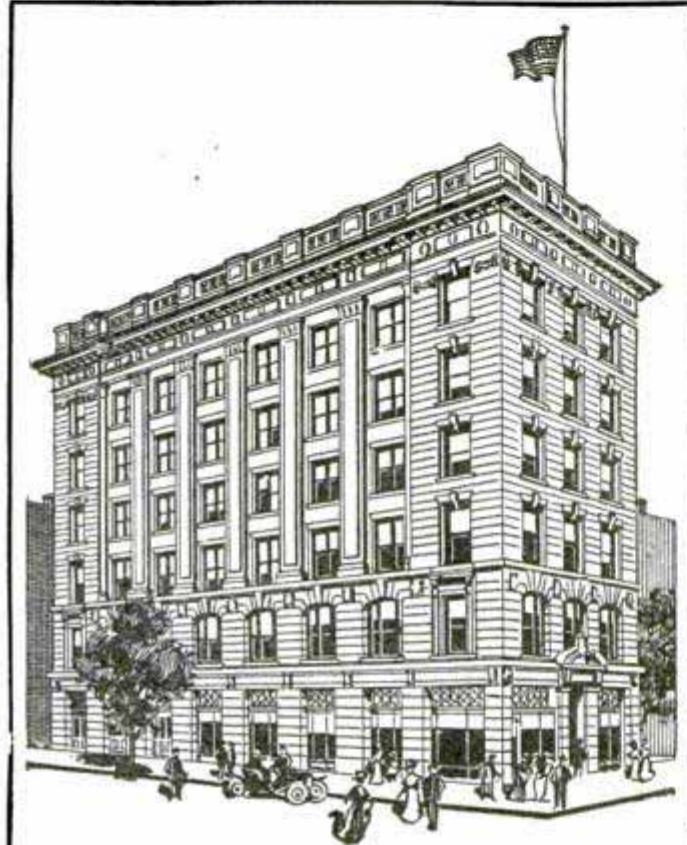
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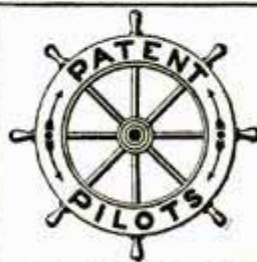
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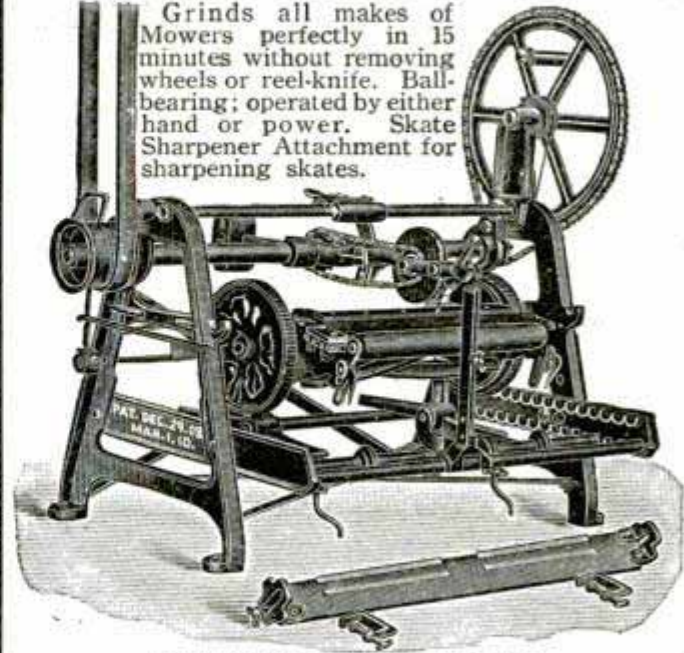
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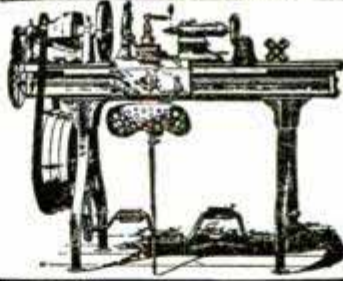
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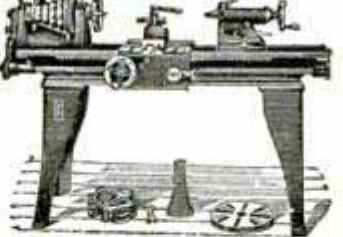


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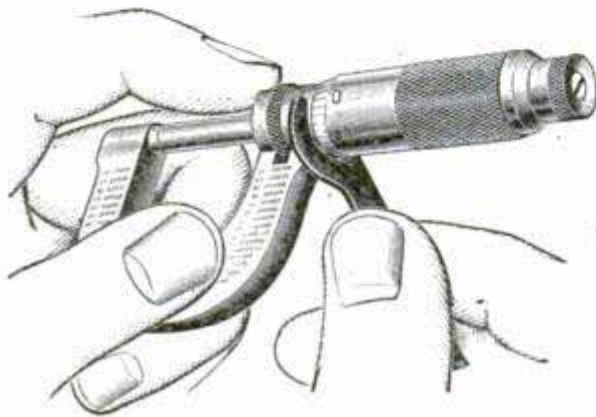
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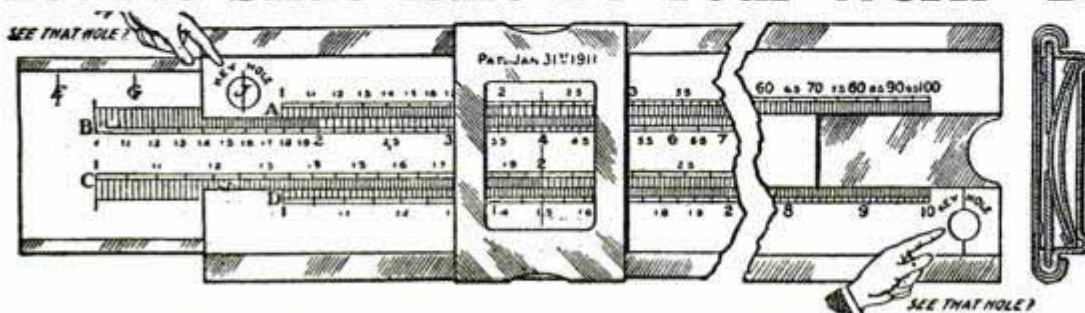
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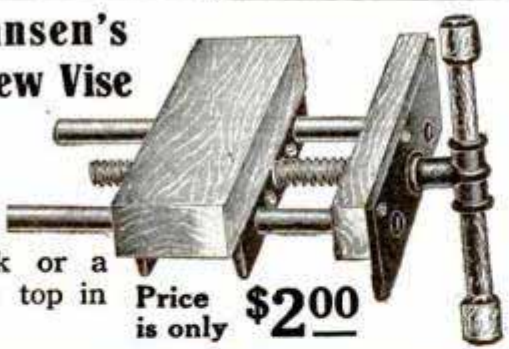
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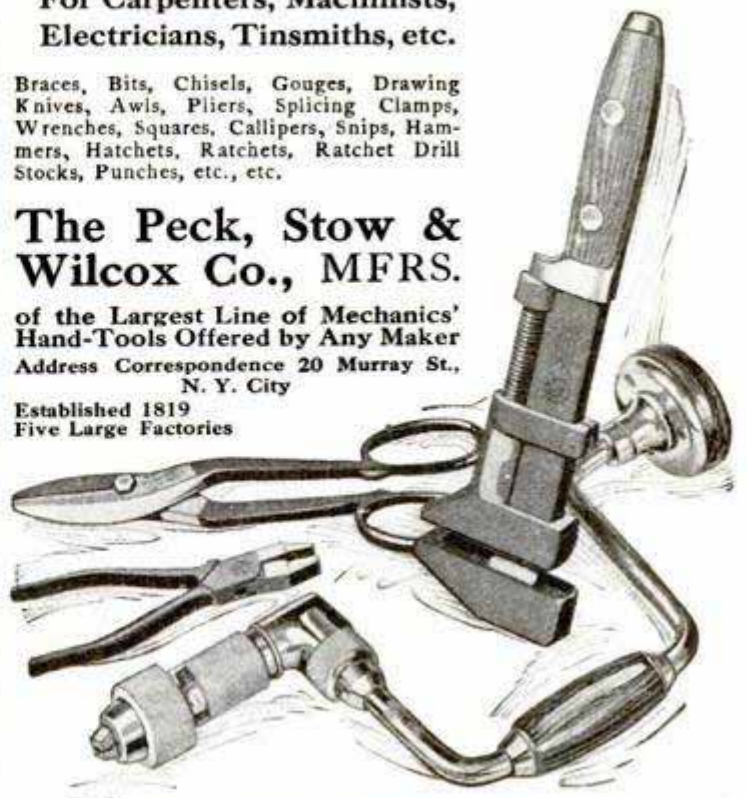
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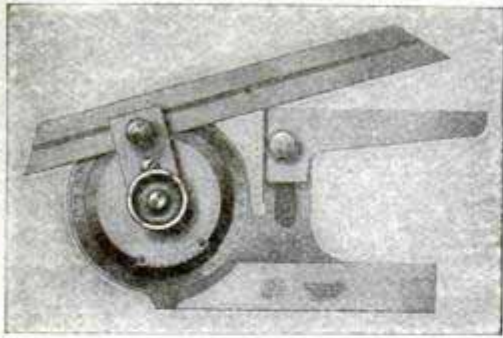
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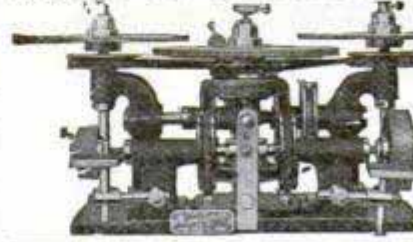
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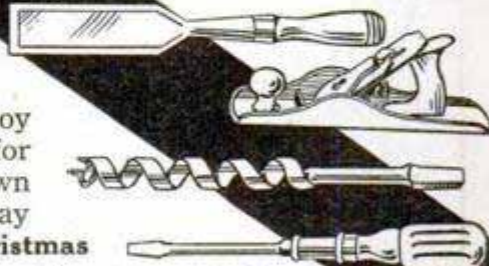
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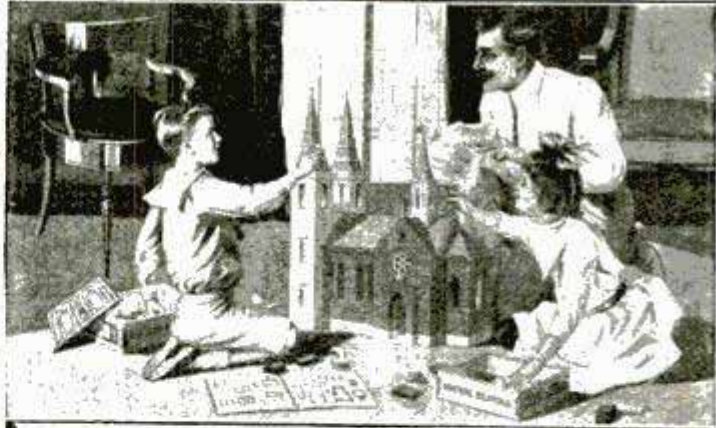
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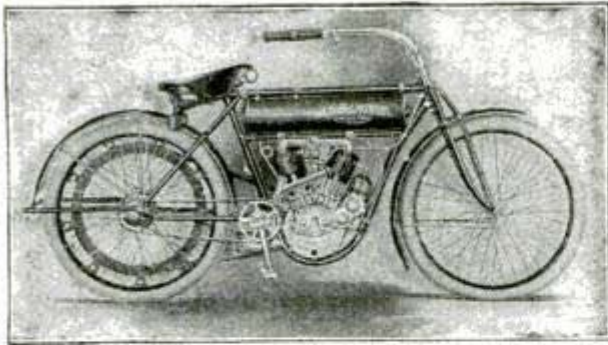
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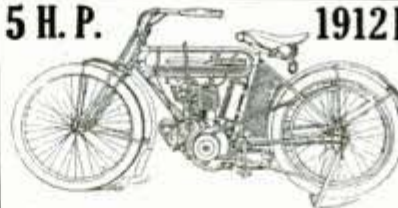
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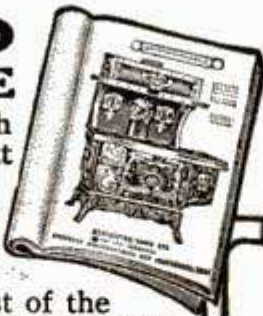
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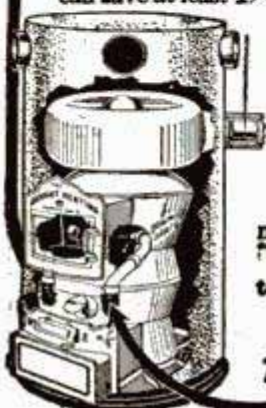
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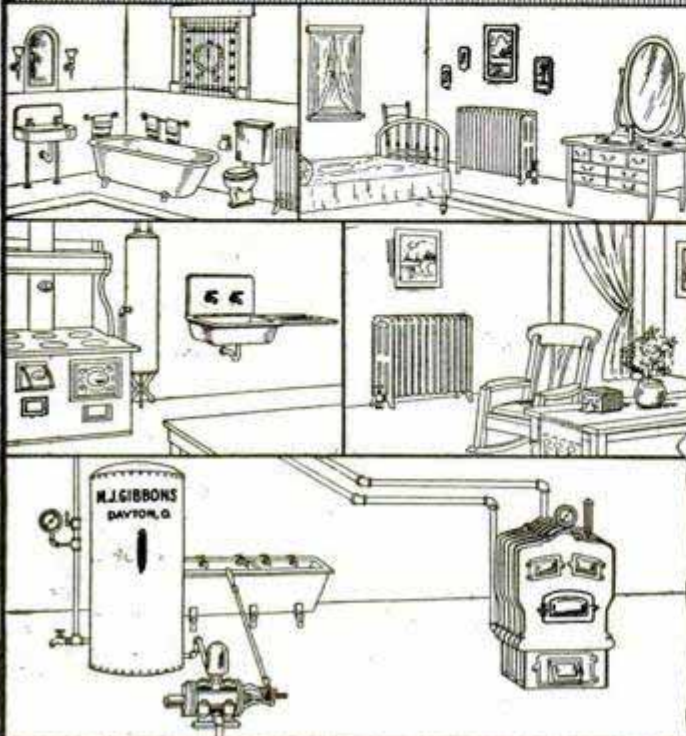


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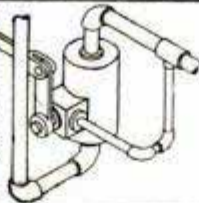
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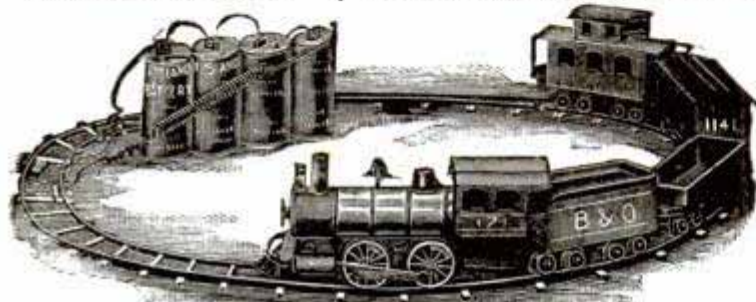
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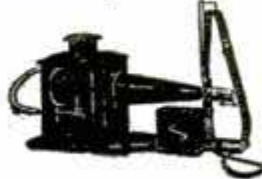
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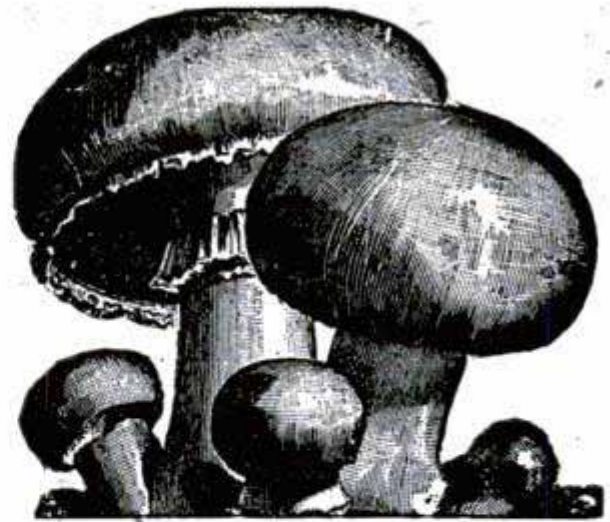
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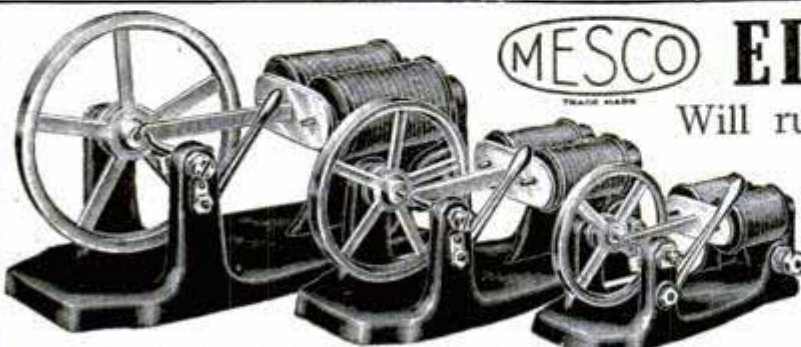
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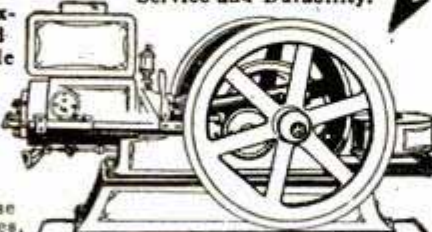
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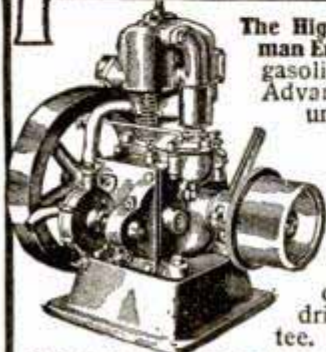
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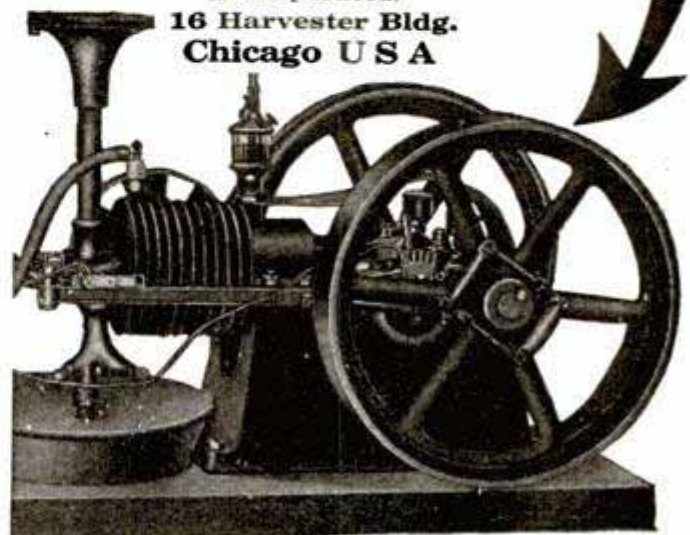
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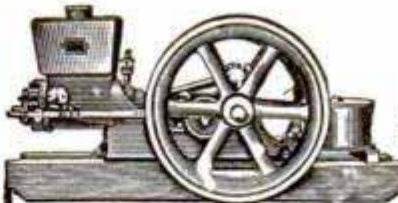
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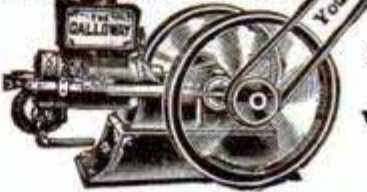
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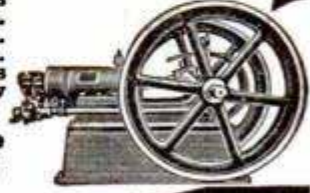
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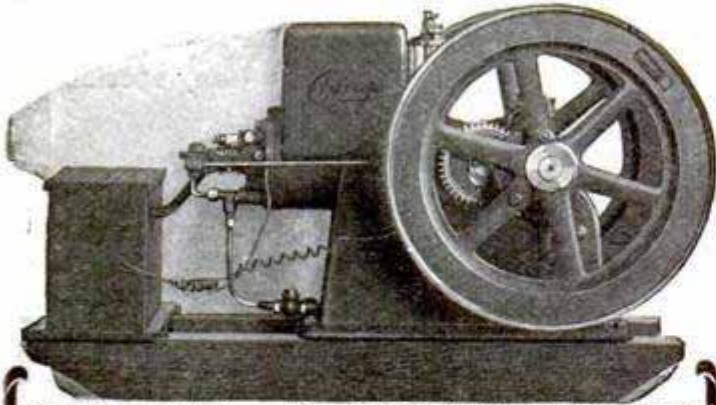
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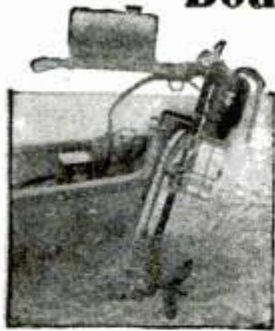
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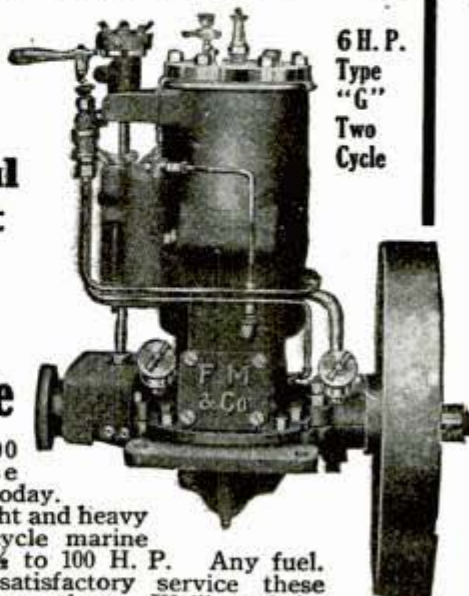


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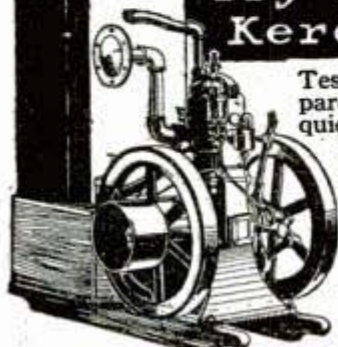
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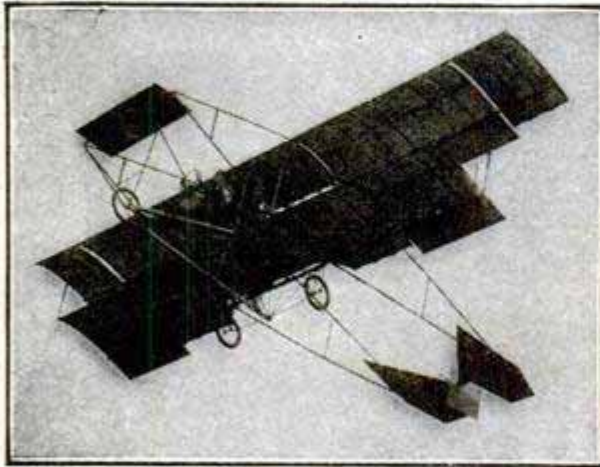
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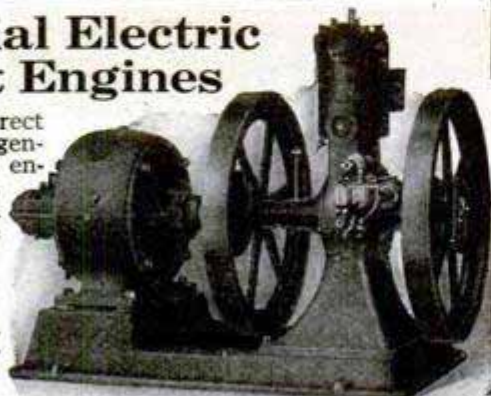
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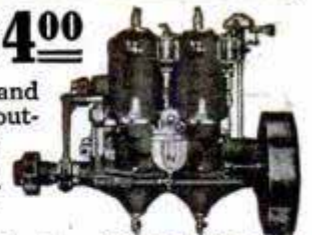
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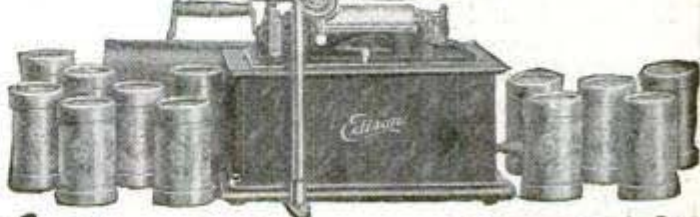
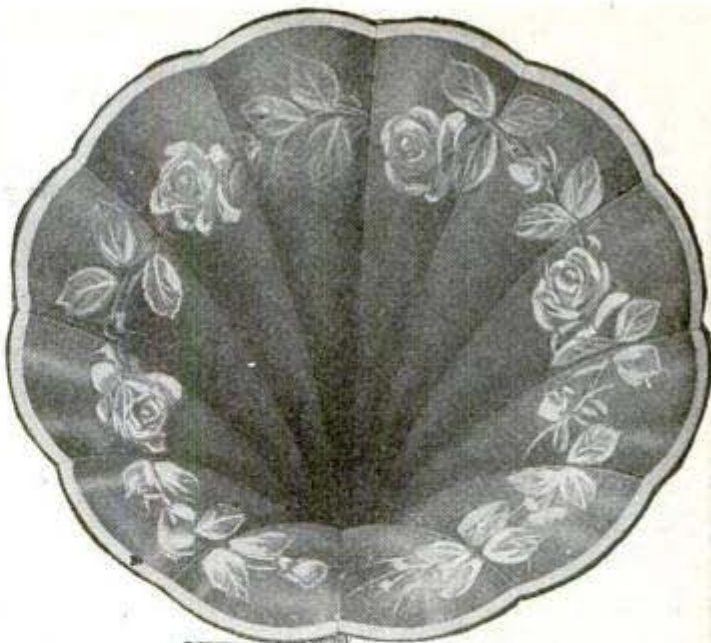


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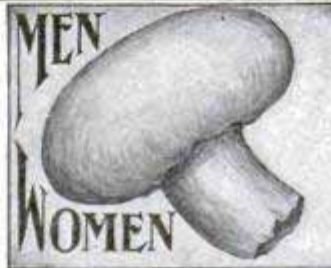
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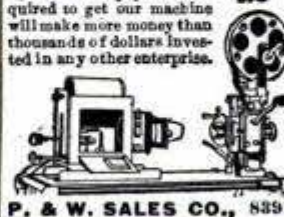
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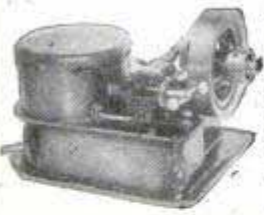


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It is neat compact, attractive and unbreakable; supplies the heat without flame, smoke or smell. We make 20 styles of these heaters from 90c each to \$10. Most of them have attractive carpet covers with asbestos lining. They have been on the market ten years and please every purchaser. We guarantee that you will be pleased or money refunded. They fit in at the feet, occupy little space and are just the thing.

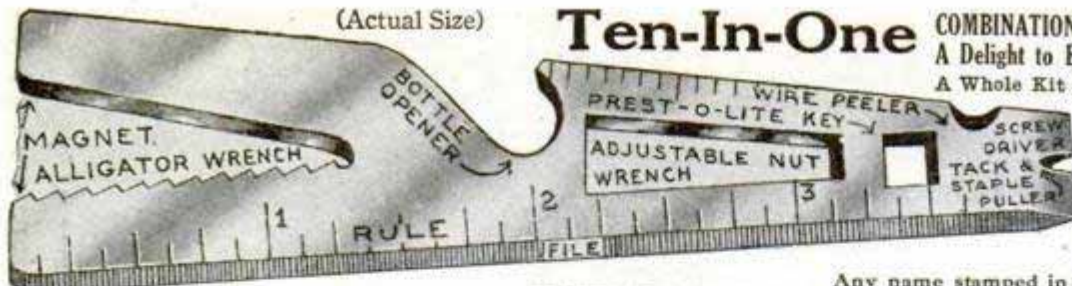
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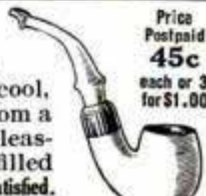


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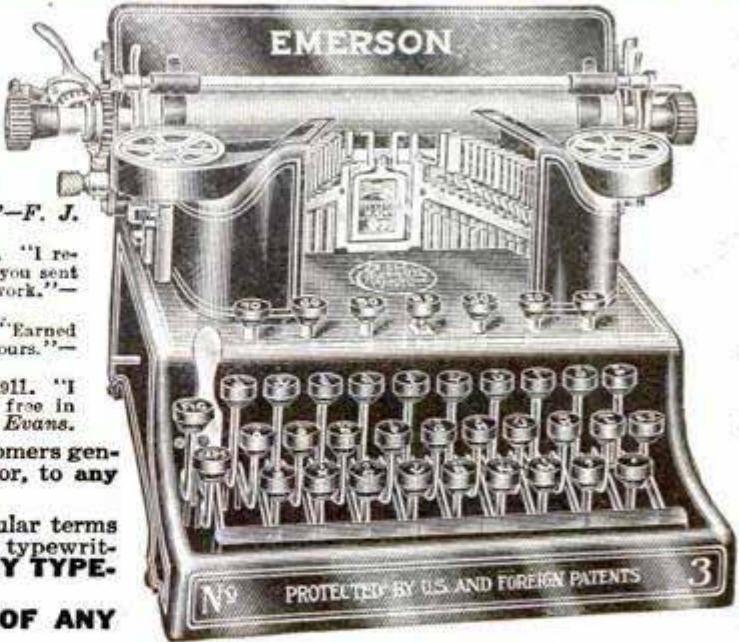
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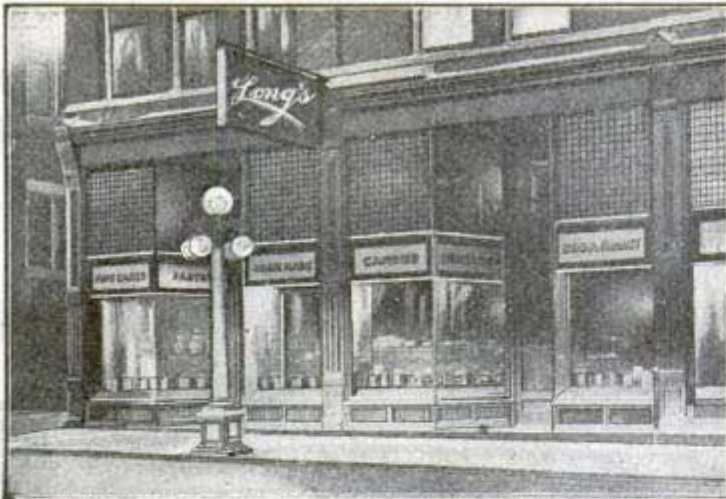
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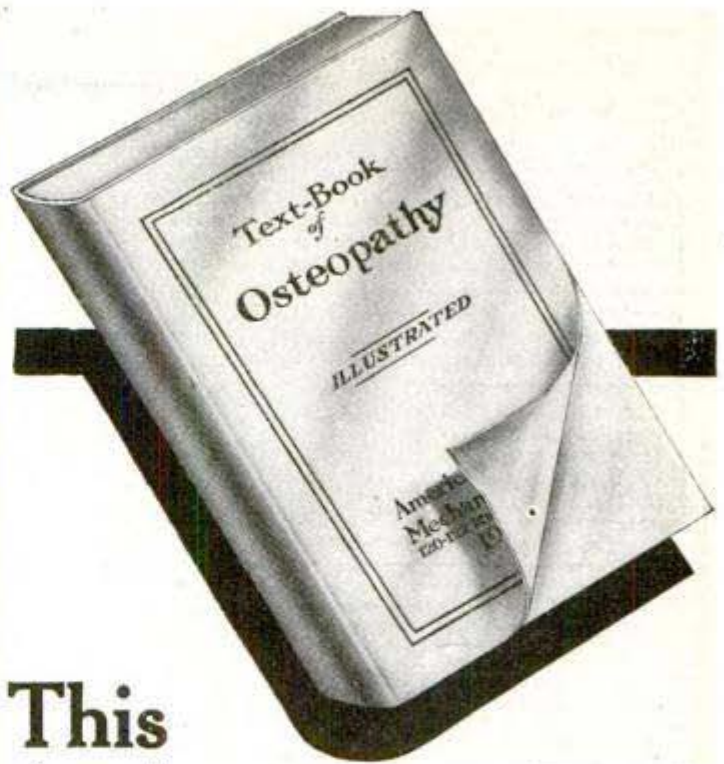
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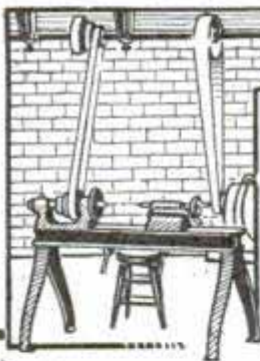
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The Blackstone Water Power Massage Machine. A New Invention.

The Blackstone Vacuum Massage Machine is a distinct achievement of modern invention. It is operated by simply running water. It slips on any faucet, and can be operated by any member of the family instantly and thoroughly. No cost of operation. Guaranteed against breakage. Endorsed by leading physicians and professional masseurs. With it you can enjoy a perfect vacuo-vascular scientific process of delightful, stimulating massage for face, scalp, bust or body. It is the home beautifier and health giver. It has captured the heart of woman and the earnest endorsement of man wherever its name and a description of its operation has been whispered. A handsome, illustrated booklet, entitled, **"The Power and the Love of Beauty and Health,"** fully describing this wonderful new machine, sent free on application.

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WITH A Scripps Motor

What Capt. Larsen Who Made this Dare-Devil Trip Says of His Scripps Motor:

"That's the second time I've gone through the rapids and come out alive. This trip was far worse than last year, and if my Scripps Motor had not run in perfect condition, I would not have lived to tell the story.

"Just before I started, I took a trial spin around below the falls. I found my engine working like clockwork, and immediately counted on a more successful trip than last year.

"When I struck the whirlpool, I knew at once that my life depended entirely on the power and the reliability of my Scripps Motor. The thousands who watched my trip know how nobly she responded."

CAPT. KLAUS LARSEN

The Most Remarkable Trip Ever Made in a Motor Boat

On October 29th, Capt. Klaus Larsen, of Detroit, performed the most remarkable feat ever achieved by a man and a marine motor. In his 15-foot motor boat Niagara, powered by a two-cylinder, 8-10 H. P. Scripps Motor, he made the seven mile trip through the Whirlpool Rapids at Niagara Falls.

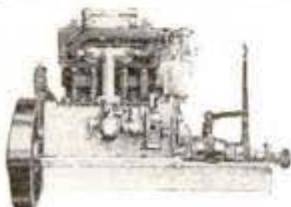
Starting at the Maid-of-the-Mist landing on the Canadian side, Capt. Larsen arrived safe and sound 31 minutes later, at Lewiston, below the rapids, having accomplished in his small craft the seemingly impossible task of traversing safely the wildest waters known to the civilized world.

Just 23 minutes after the start, the intrepid navigator reached the big whirlpool. Skirting the edge of the pool, the boat was almost sucked, stern-first, into the swirling mass of logs and water. For half a minute, the boat hung on the edge of the pool motionless, but a moment later, the Scripps Motor asserted its power, and with a burst of speed, the boat darted into the swiftly flowing current below the pool. Never before has man, boat and motor so completely crowned themselves with glory. All through the trip, immense waves were dashing over the boat continually, but the water did not affect the gallant Scripps in the slightest. The Scripps Motor used was a regular model, two cylinders, 8 to 10 horse power. It was in no sense special, and you can have its duplicate, or any of its big or little brothers in your boat.

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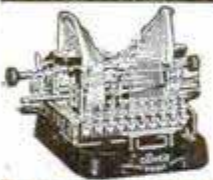
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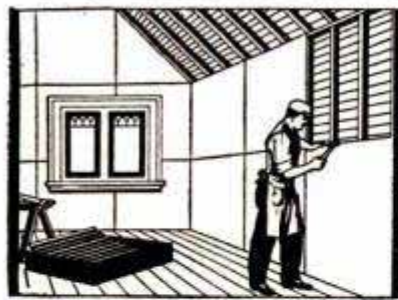
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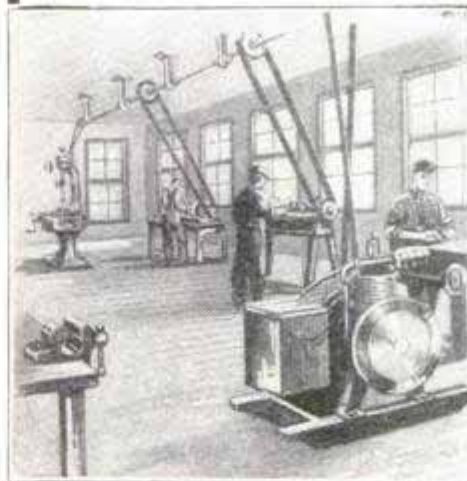


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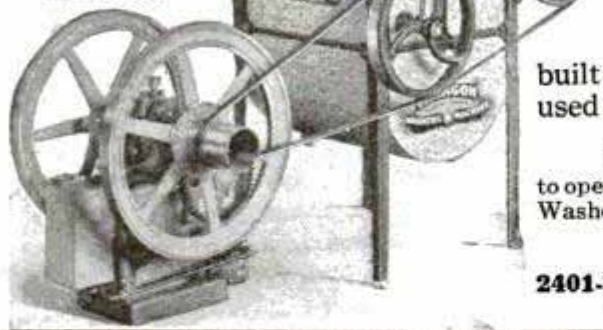
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100 Grand Trunk Pacific Towns

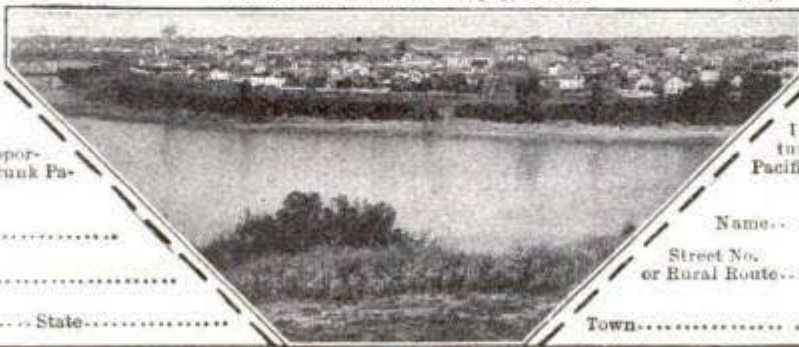
The year of 1913 will see the completion of this great Transcontinental Railway with its more than 8,600 miles of main and branch lines. Hundreds of towns are being established along this railway, and it is the purpose of the Railway Company to make these towns the leading ones of the Canadian West. You are invited to become a partner of the Grand Trunk Pacific Railway in this great work. Those who have already taken advantage of this lifetime opportunity are profiting. In 1910, in a Grand Trunk Pacific new town of less than 500 population, one Implement Dealer did a \$90,000 business; one General Store sold \$53,000 worth of goods; a Hotel did a \$17,600 business; a Lumber Yard did a \$70,000 business.

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THE INDEX

TO VOL. XVI

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It tells of the difficulties in the way of designing and making a *dependable, accurate, powerful* pocket automatic, and of the simple and logical way in which each separate problem has been solved in the construction of the SAVAGE.

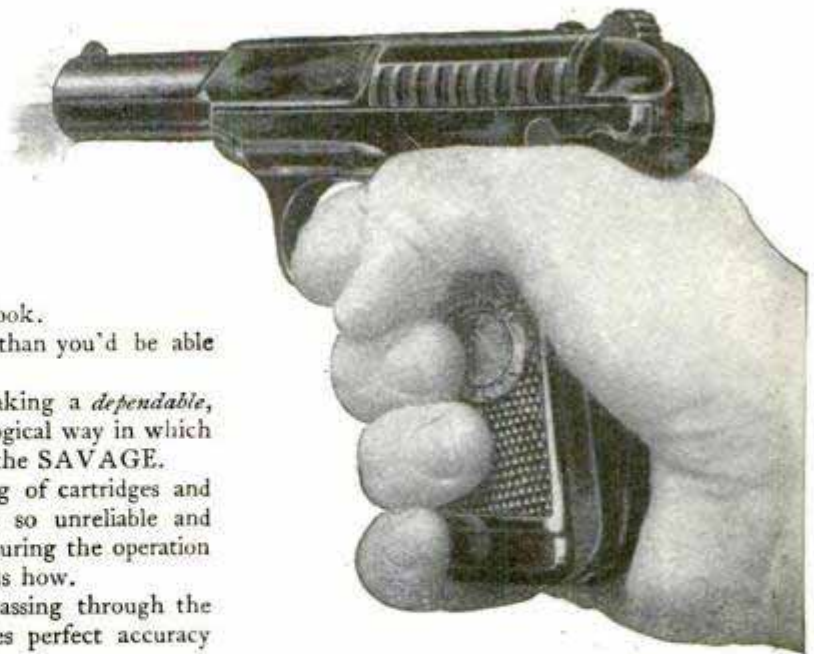
For the design of the SAVAGE prevents the jamming of cartridges and shells during rapid fire—the thing that makes automatics so unreliable and dangerous. The SAVAGE positively *controls* the cartridges during the operation of the mechanism so that they *cannot* jam. The booklet tells how.

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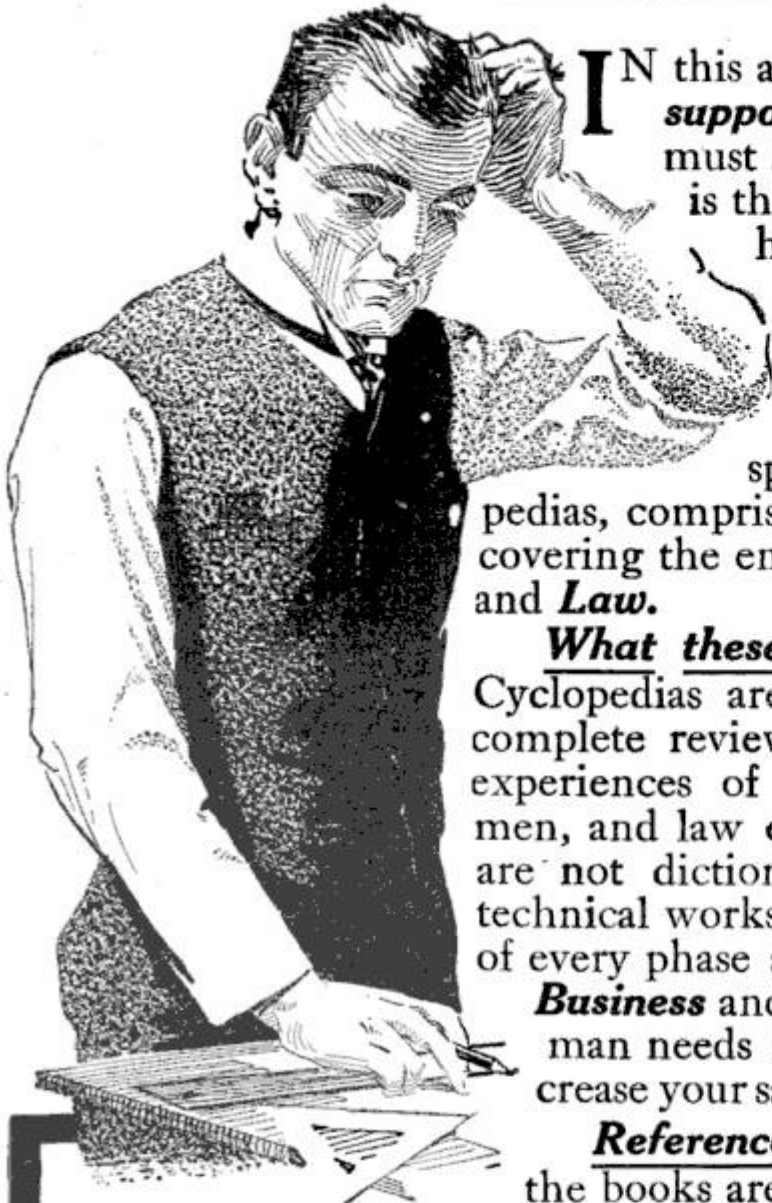
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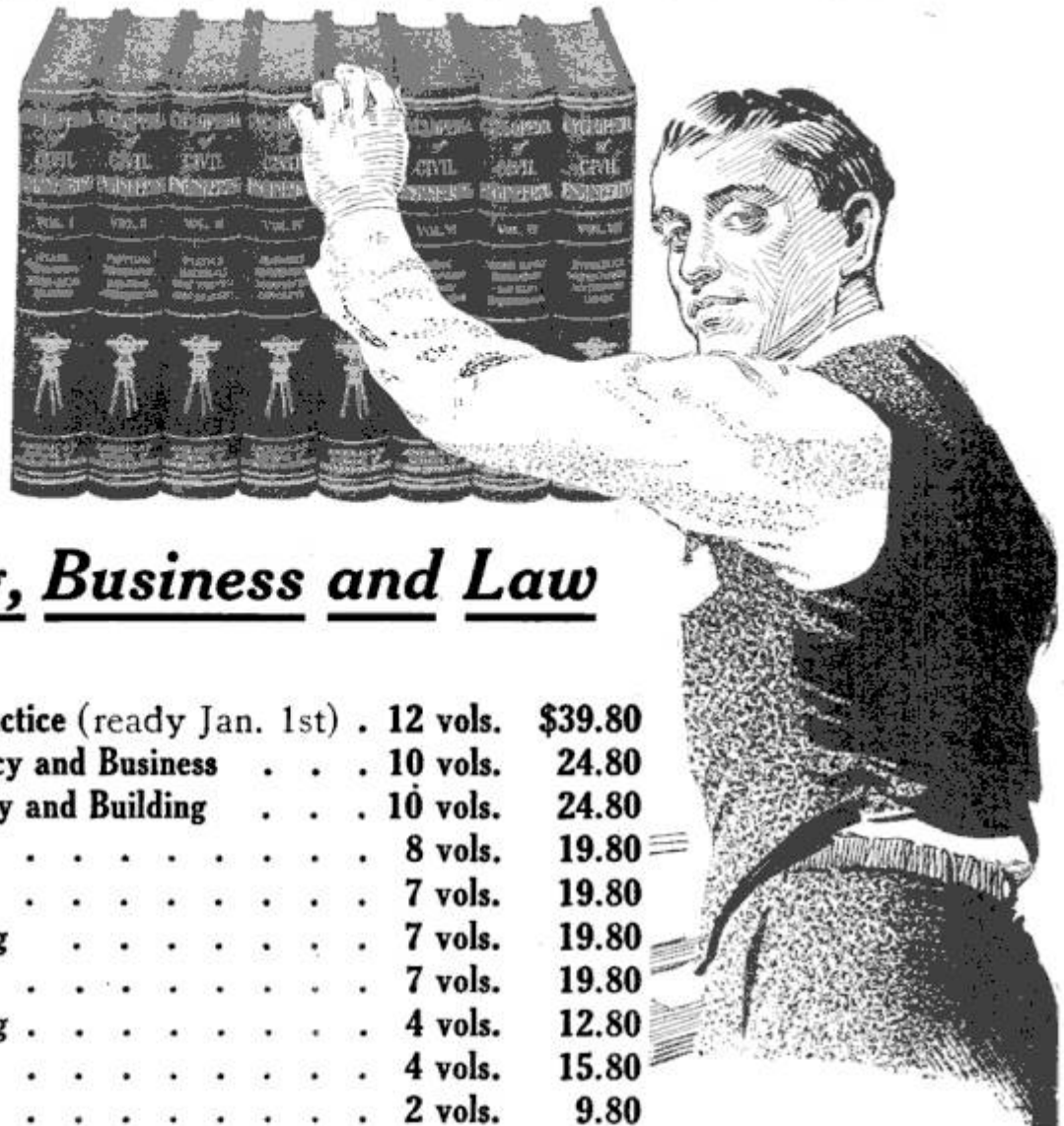
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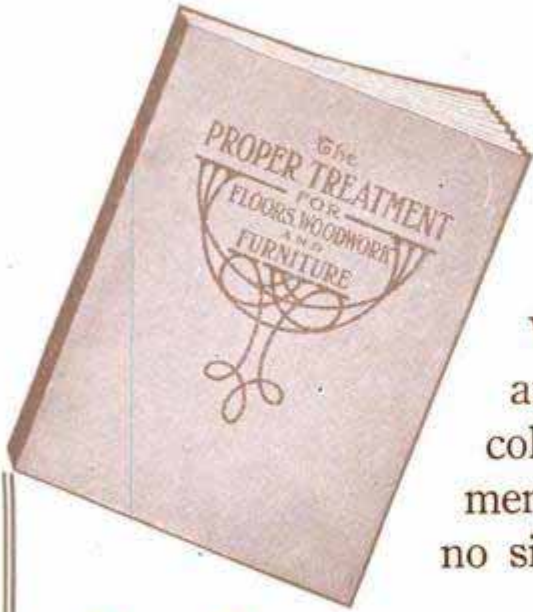
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