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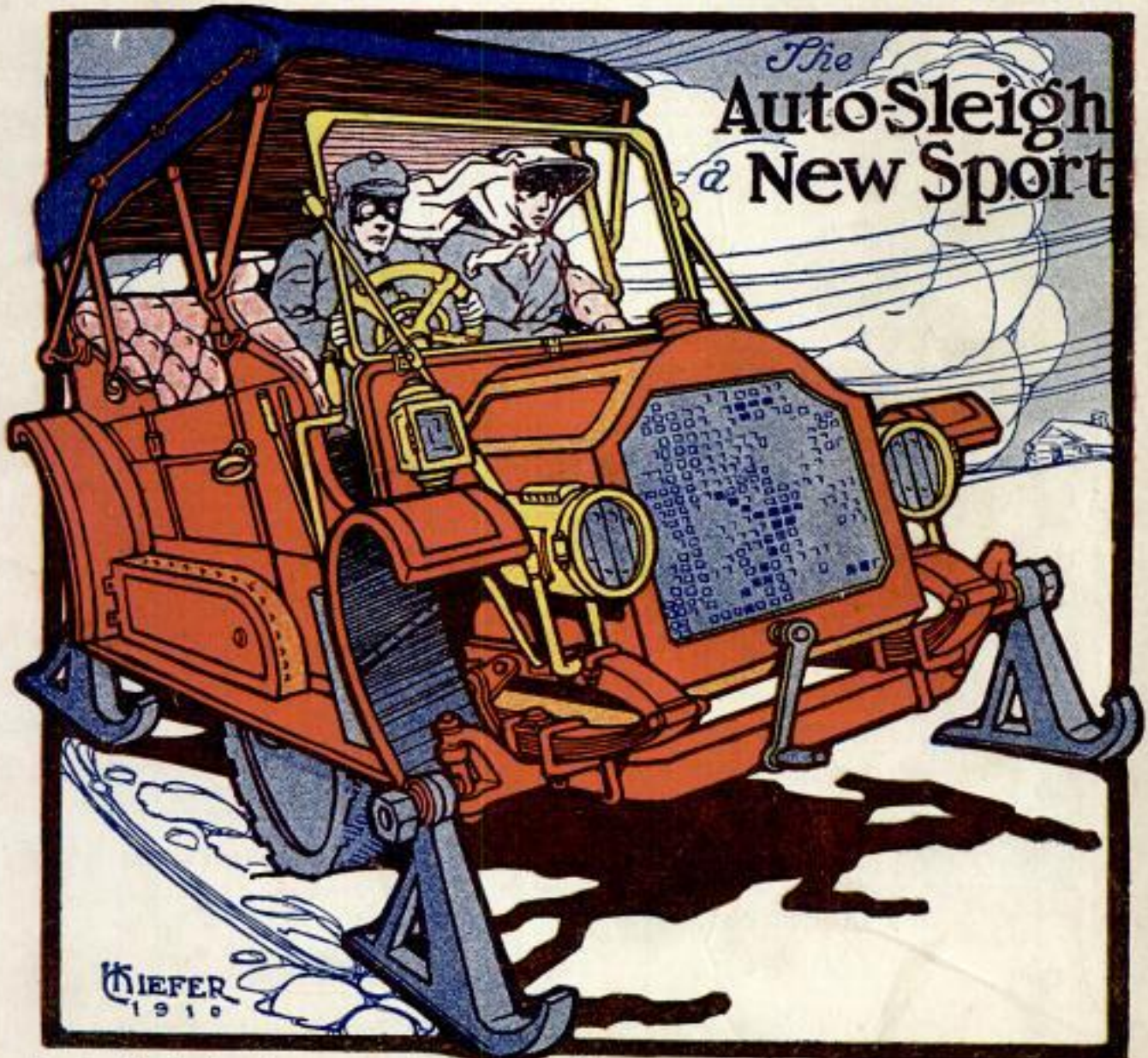
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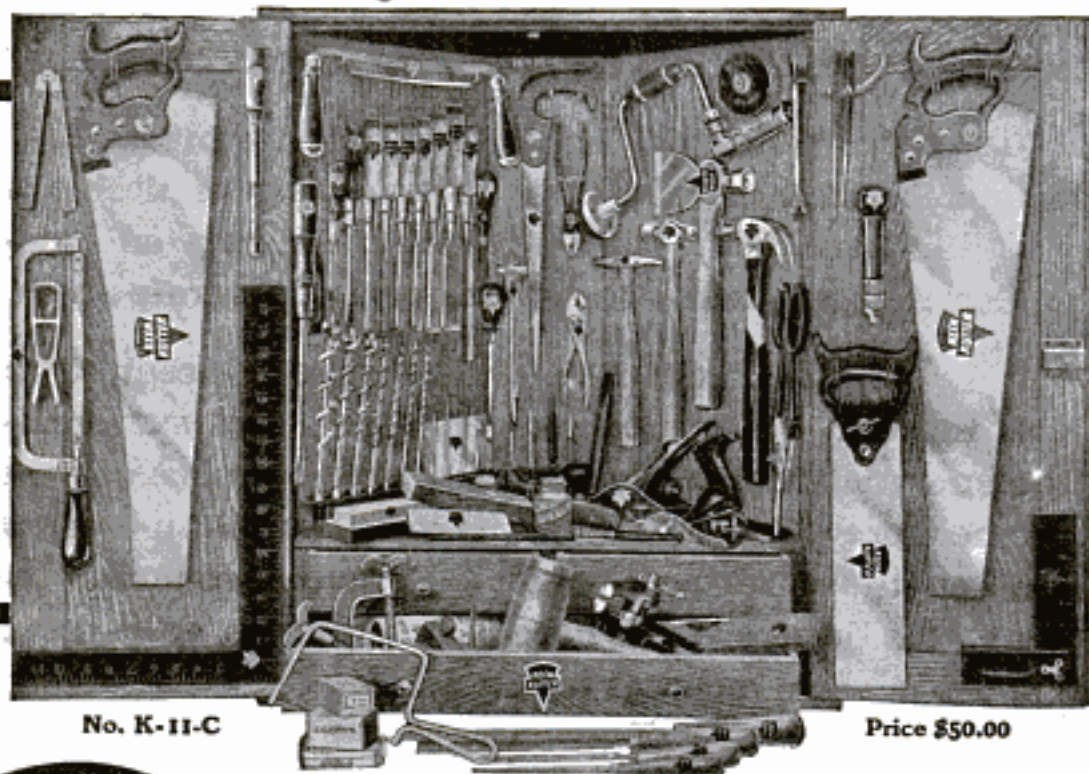
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Contents for December, 1910

Automobile Tires Withstand Intense Heat.....	765	California Pigeon Farm.....	823
Automatic Photograph Printing Machine.....	766	Electrocution of Cattle.....	823
Swiss Make Watch Dial of Growing Flowers.....	769	Trolley Cars Used as an Aid in House Wrecking.....	824
The Bench Marks of the Geological Survey.....	768	Oriental Narcotic Overpowers Firemen.....	824
Automobile Kitchen of the United States Army.....	767	Submarine Hauled Ashore to Make Repairs.....	825
Running a River under a River.....	769	Music Heard by Telephone 500 Miles Distant.....	825
Six-Passenger Aeroplane.....	769	Hot Wire Used to Fell Trees.....	825
Wreck of Los Angeles Times Building.....	770	Steel Beams Used for Temporary Bridge.....	826
The First Aviation Christmas.....	771	Telephone Exchange Acts as Office Boy.....	826
A Natural Incubator.....	776	Metal Figures on Freight Cars.....	826
Framework of a "Waterfall".....	777	The Riddle of the Oil Well.....	827
A Sled Merry-Go-Round.....	778	Telephone Designed for Train Announcer.....	832
Wine 2,000 Years Old.....	778	Stranded High on Rocks.....	833
The Motor-Driven Warship of the Future.....	779	Scrubbing and Painting Stool.....	833
Microphotographic Apparatus.....	782	Norwegian Cavalry-Skee Charge.....	835
The Aeroplane vs. the Battleship.....	783	Tire Picks Up Railroad Spike.....	835
New Automatic Drinking Fountain.....	790	Washington to Have Handsome Postoffice.....	835
The Naming of American War Vessels.....	790	Unique French Crane.....	836
Cunarder Sunk at Dock to Save Her from Fire.....	791	Electric Boilers to Heat Tunnel Trains.....	836
Aerial Charts to Show Air Currents.....	791	Marble Quarrying in Spain.....	836
"America II" Sets New Record for Balloon Flight.....	792	Submarine Provided with Wireless Equipment.....	837
Airman Visits White House in Aeroplane.....	792	Trolley Guide to Prevent Accidents.....	838
The Wellman Vaniman Attempt to Cross the Atlantic in a Dirigible.....	795	Canceling Machines for St. Louis and Chicago.....	838
Another Transatlantic Trip Planned.....	798	No Bright New Coins for Christmas Trade.....	838
Five Airmen Killed in October.....	799	United States a Kindergarten for Spies of Other Nations.....	839
Extraordinary Accidents Befell Airmen.....	799	Picking Up a Submarine Cable.....	844
Aero-Skiing.....	801	Transcontinental Line in Far North Planned.....	844
Small Meteor Startles Ohio Farmer.....	801	Railway Forest-Fire Patrol.....	844
Locket Umbrella Handles.....	801	Growing Pumpkins on a Trellis.....	845
Seventy Lives Lost by an Explosion on Gunboat.....	801	Weather Reveals Ancient Stone Mason's Error.....	845
New Incandescent Lamp.....	802	Siren as Aerial Race-Starters.....	845
Electric Truck on Farm.....	802	"Caesar" Dog Rival of the "Teddy" Bear.....	846
Trained Reserve Planned for Army.....	802	A Diver's Nerve.....	846
Lights under Water in New Natatorium.....	803	Wireless Telephones for Trains.....	846
Padded Jackets for Aviators.....	803	Rambler Roses Abate Dust on Railway.....	847
"Automusicograph" for Composers.....	804	Icing Logging Roads in Winter.....	849
Winnipeg is Now America's Wheat Center.....	804	Gold Fields Discovered by Scientists.....	849
Congress Waking Up to Need of Airships.....	804	Motor Ice Harvester.....	849
Hudson River Bridge Plan Has Been Abandoned.....	805	Canadian Hydraulic Lift Locks.....	850
Unusually Clear Instantaneous Photograph.....	805	Flogging in London Prisons.....	851
Wind Wagon That Runs on Land and Water.....	806	Mechanical Waiter-Service for Restaurants.....	852
The Clement Paris-to-London Air Passenger Scheme.....	806	Oiled Paper Umbrellas of the Japanese.....	852
The American Navy in Battle Practice.....	809	Three-Wheeled Electric Delivery Auto.....	852
His Satanic Majesty on the Bridge.....	813	Emergency Lighting for Theaters.....	853
England and the Continent Connected by Phone.....	813	Motorcycle with Three Rear Wheels.....	853
Comment and Review by H. H. Windsor.....	813	Cherokee Indian Claims to be Oldest Man.....	854
Belmont Park Meet Shows Development of Aero- plane.....	817	Hypochlorite Plant Made for Quick Service.....	854
		Switches Cleared of Snow by Steam Heat.....	854
		Heat—Part XI, Steam, Boilers and Engines.....	855

[Continued on Page 6]

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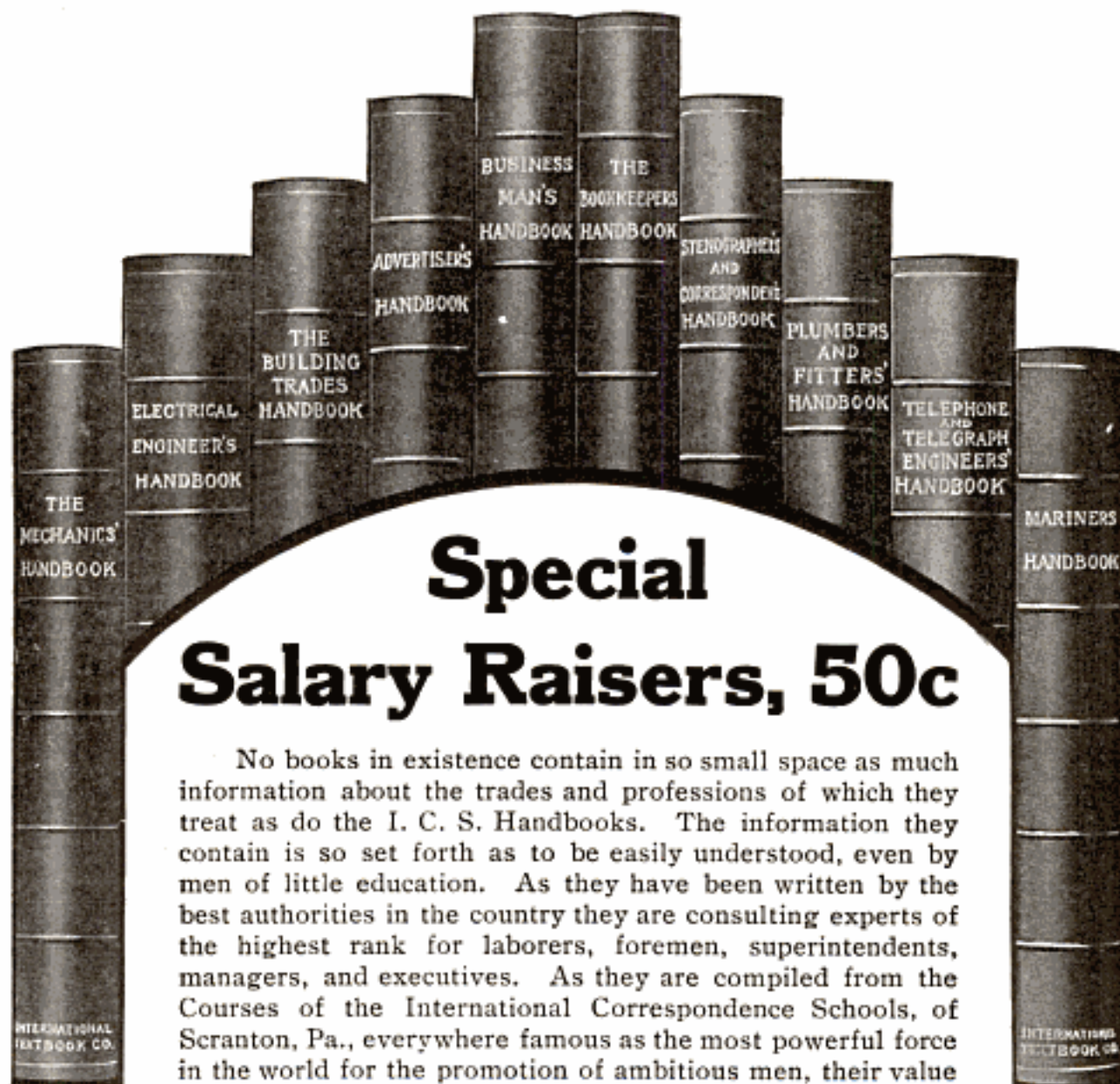
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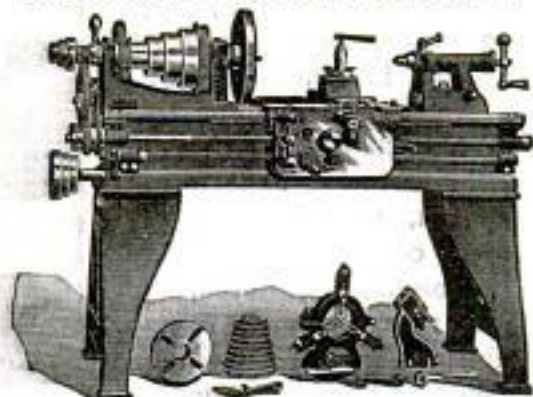
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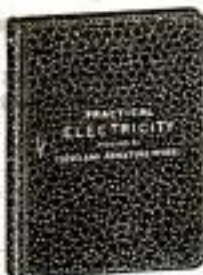
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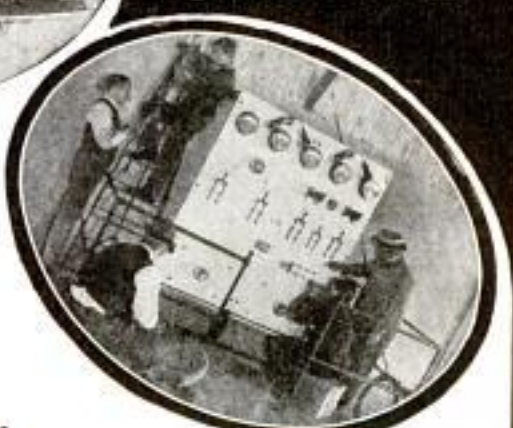


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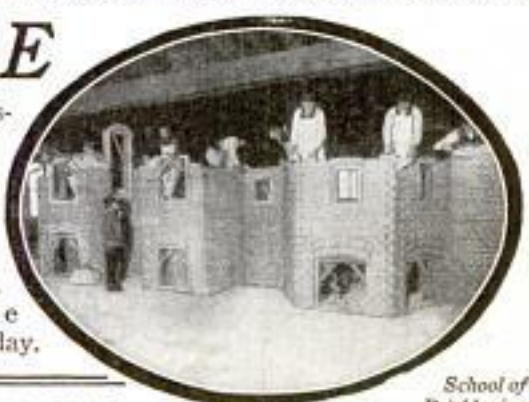
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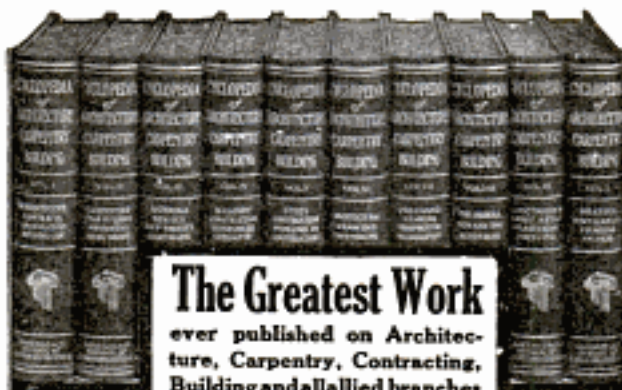
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AGENTS WANTED

\$10.00 A DAY SALARY is good enough for any man, isn't it? Yet hundreds of our live wire agents are making this much and more with our new plan of taking orders for positively the highest grade strictly made-to-order men's suits and overcoats, sold at one-third less than others charge. We can show any man who will work how to make big money. Our new plan brings orders quick. No waiting around. You get the orders, every time—right off, no man on earth has this plan—that's why our agents make the big money every day. We supply everything free needed to start you right and make money right from the jump. You need no experience or capital. Exclusive territory. We send free our new outfit of samples, fashion plates, complete instructions and details of our new plan that makes more money for agents than any one ever dreamed possible in the business. Write now. The Direct Tailoring Company, 810 Schiller Bldg., Chicago, Ill. P. 8. —Ask about our special offer, which enables you to get all your own clothes for nothing.

MAKE \$100.00 between now and Christmas. You can do it easily with our four beautiful new holiday catalogues showing 2,000 different Christmas articles, consisting of watches, tableware, jewelry, leather goods, diamonds, neckties, postcards, Christmas cards, and 1,000 novelties that sell at sight. Goods shipped by prepaid express. Everything guaranteed. Extra presents to agents this month. Big prize contest. Splendid commission. Largest assortment, best goods and lowest prices. We are the most reliable agency company in America and want you to have our free sample catalogue of 150 pictures. Write for it quick. A. W. Holmes & Co., 123 Bond St., Providence, R. I.

ANOTHER BIG SELLER in connection with Modern Self-Heating Irons. The Modern Saffery Iron Stand. Fits any kind, style or make of iron. Agents for Modern-Make-Milwaukee specialties are getting the money. Sell advertised goods. Write today for new agency proposition. Modern Specialty Co., Manufacturers, Milwaukee, Wis.

\$25 to \$40 A WEEK at home or traveling. If you are making less than \$25 to \$40 a week, sit right down and write to the American Woolen Mills Co., for the most amazing money-making proposition of the age. This concern is the largest mail-order tailoring establishment in America, with immense capital and resources. They make the finest made-to-measure suits at prices that defy competition. Suits \$7.50 and up. Pants \$2.25 and up. All their vast business is done through agents. They start any ambitious man in the tailoring business, furnishing everything required, at their own expense. Men without any previous experience can make \$25 to \$40 a week, right from the start. Many of their salesmen make as high as \$200 a week. The American Woolen Mills Co. produces its own cloth. This is the secret of the low prices its agents are able to offer on finest made-to-measure suits. With its own great tailoring shops, skilled tailors and finishers, it gives more style, better quality, greater value than any similar concern in existence. Best of all, it supplies its agents with handsome suits at cost, and turns over to them all inquiries received from their territory. If any of you readers are looking for easy work, big pay and independence, we advise them to write to the American Woolen Mills Co., Dept. 468, Chicago, Ill., at once, for their wonderful proposition.

GENERAL AGENTS—125 per cent profit, 97 per cent saving or more to customer. Hand rope making machine, new, absolutely no competition, virgin territory. Makes rope from scrap twine (free) or binding twine, any length or thickness, twice as strong as factory rope, saves hundreds of dollars yearly for farmers, ranchers, factories, stores; all rope users. Demonstration brings crowds. One man sold 12 first twenty minutes, another sells 100 weekly. Get territory now, appoint sub-agents. Sells for \$4.50, costs \$2.00. Handsome outfit free. Chicago Specialty Factories, "Dept. A," 49 Michigan Ave., Chicago.

\$80.00 PER MONTH paid railway mail clerks, customs and internal revenue employees. No "layoffs." Short hours. Rapid advancement to high salaries and high government positions. Thousands of appointments coming. Common education sufficient. Political influence unnecessary. Country and city residents stand same chance of immediate appointment. Examinations announced everywhere January 15th. Coaching free to first 25 applicants. Write immediately for schedule showing places of the examinations. Franklin Institute, Dept. D 86, Rochester, N. Y.

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 age is 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.

U-KAN-PLATE SILVER PLATER and polisher; silver-plates copper, brass and nickel—delays tarnishing—extra strength for plating automobile parts. Agents wanted. A. R. Justice Co., 607 Chestnut St., Philadelphia, Pa.

GET READY NOW for big Christmas and 1911 business. Sales and profits way out of the ordinary all the year round. An evolution in bathing—combines shower, shampoo, massage at 1-20 cost and better than expensive over-head showers. Sells fast in cities, small towns and has special attachment making use ideally practicable in country homes without bathrooms. 250,000 sold already 1910—at least 500,000 1911. Sample outfit furnished. Apply quick for agency before all open territory is filled. E. H. Selezman, Sales Mgr., 635, 210 Monroe St., Chicago, Ill.

AGENTS—Free sample to working agents. Sell the best Vacuum Cleaner on the market at a price so ridiculously low that anyone can afford them. Sells on sight. You be the one to get the thousands of dollars in profits. A postal will bring you full particulars. Free full-sized working sample. Braham Co., C 13, Cincinnati, Ohio.

LIVE AGENTS WANTED—Hustlers to handle our 6 new catchy Xmas packages. Our "Baby Package" is a winner. Many are making as high as \$20 per day. Big rush on. Start now with us and get in right for 1911. Write today for catalogue of complete line including Xmas Specials. Davis Soap Co., 80 Union Park Ct., Chicago.

AGENTS earn from \$3 to \$6 a day selling Victor razors and straps. Fine outfit, goods sell at sight. 100 per cent profit, exclusive territory. We teach how to make sales; earn while you learn. The Victor Manufacturing Co., Dept. P. M., Canton, O.

ALADDIN Kerosene Mantle Lamps sell fast as you can demonstrate them. Needed in every home. Generate gas from kerosene (coal oil) and give light more brilliant than city gas, gasoline or electricity. Our Sunbeam Burners fit other lamps. You are losing dollars every minute you hesitate. Write nearest office. Mantle Lamp Co., Desk 567, Chicago; Portland, Ore.; Waterbury, Conn.; Winnipeg, Montreal, Can.

AGENTS—Either sex, 100 per cent profit made selling our systematic household account books; no talking; public demand them. Send stamp today for particulars. Climax Specialty Co., Shermange, Pa.

BOY and girl agents, sell 24 packages of postcards for us at 10c each and receive a beautiful aeroplane free. Write today. The Home Novelty Co., Dept. 1, Littleton, Colo.

CANYASSERS AND AGENTS—We manufacture face creams, powders, toilet specialties, with your name; 500 per cent; no competition. Arthur V. Kempton Co., Detroit, Mich.

AGENTS WANTED to sell rich-looking imported 36x88 rugs at \$1 each; R. H. Carter, Milan, Tenn., sold 115 in 4 days; his profit \$51; you can do as well. Write for sample offer and unique selling plan; exclusive territory. A. Condon, Rug Importer, Stoneington, Maine.

AGENTS—Send 10c for handsome sample German silver key chain, your name and address stamped thereon. Big commissions for taking orders. Blank stock and stamping outfits supplied. Hart Manufacturing Co., 89 Guernsey St., Brooklyn, N. Y.

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

YOU CAN MAKE MORE money than you ever dreamed possible decorating china, burnt wood, metal, etc., in colors from photographs. Men successful as women. Learned at once, no talent required. Takes like wild-fire everywhere. Send stamp quick for particulars. R. Vallance Co., Elkhart, Ind.

YOU CAN MAKE a good income acting as agent for Manheim Mendless Hosiery for men and women, bearing a positive six-months' guarantee against holes. Box six pairs, men \$1.00, women \$1.50; assorted colors. Direct from mills to wearer. Write today for terms. Manheim Hosiery Mills Company, Dept. P., Manheim, Pa.

ONE LIVE MAN OR WOMAN in every town to represent the largest factory in America selling on credit at Wholesale prices direct to the consumer. No money required. Send your name and address, we will send you full particulars of how to begin work. Experience unnecessary. Start earning money at once. Address R. C. Read, Manager, 11 S. 7th St., Philadelphia.

GET AWAY from wage slavery; the Booster Magazine shows you how to start in business for yourself with a small investment; two months' subscription, 10c. Booster H. Co., 22 Fifth Ave., Chicago.

WONDER OIL LAMP—Revolutionizes lighting—needed everywhere—40,000 already sold; agents enthusiastic; big profits; exclusive territory. Write quick. Free sample to active agents. United Factories, Dept. D, Kansas City, Mo.

WANTED—COUNTY REPRESENTATIVES for Success Hand Vacuum Carpet Cleaner; sells for \$15.00; the only successful single person machine on the market; biggest kind of profits; write for terms. Hutchison Mfg. Co., Wilkesburg, Pa.

AGENTS IN EVERY CITY and town; best selling automobile specialty; large demand for goods; success assured; start at once. Kuehnleux Specialty Co., Dept. P, 7100 Butler St., Pittsburg, Pa.

ROOSEVELT'S WONDERFUL BOOK. Life and African trials. Postpaid \$1.48. Big demand. Agents wanted. Lock Box 537, Tyndall, South Dakota.

AGENTS' HARVEST—Revolving rubber heels, the only heel that cannot wear top-sided, because it revolves automatically at each step, thus wears off evenly down to a wafer. Anyone can put them on in few minutes. Mark outline of heel. Send 25c for sample pair. Revolving Heel Co., Morris, Illinois.

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

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

(CELLULOSE)—Door plates, new, lettering pure gold. Send for sample case. Nothing invested, 100 per cent profit, sell to every house. Public demand them. LaFontaine, inventor and manufacturer, Sherburne, N. Y.

AGENTS—Sell our Yankee Self-Wringing Mop and make \$4.00 to \$10.00 daily; we also manufacture 500 other fast sellers; particulars free. Scheff Co., 1537 Wells St., Chicago.

GLOVE CLEANER—Soiled gloves made to look new. Sample mailed, 20 cents. Good proposition for agents, salesmen as side line. Distributor, Box 6, Cumberland, Md.

AGENTS—Three crackerjack sellers, household necessities, including guaranteed hosiery. 100 per cent profit; write quick. The Direct Co., 11 South St., Boston.

AGENTS—SCHEMER MAGAZINE, ALLIANCE, Ohio, prints 48 pages new 5-peters every month; copy, with catalogue 800 big winners, only 10c.

WE WILL APPOINT YOU our agent to sell our specialties in your locality. Articles bringing quick sales and large profits. Write for particulars. P. D. Gardner, 855 South Eleventh St., Newark, N. J.

SMALLEST NEW TESTAMENT PRINTED, stamp size, latest novelty. Sample and prices, dime. Wesley Company, Aurora, Ill.

INK-OFF REMOVES BLOTS and errors from books and documents instantly. Ink stains from linen and carpets without injury. A powder, not a liquid. By mail, 10c. Agents wanted. Wythe & Co., South Dayton, N. Y.

AGENTS—Simple demonstration with book will sell everybody in sight automatic book mark, fine chance to make easy money; sample, 10c. Atlas Stamping Company, 557 Jackson Blvd., Chicago.

WANTED—MEN of neat appearance to act as district managers; a good proposition for hustlers; small capital required. J. Peters, 618 N. 8th St., Richmond, Va.

PREMIUMS FOR BOYS and girls; send no money. Twenty thimbles to sell at 10 cents, package of needles free. Wm. Moore & Co., 104 Main St., Seneca, Pa.

AGENTS WANTED—Rubber stamps and novelties; send 4 cents for catalogue and particulars. A. S. Mankin & Co., Alexandria, Virginia.

WE PAY TWO five agents in each town to distribute samples of imported silver, stove, shoe, metal polishes. Carrs & Son, 42 Broadway, New York.

AGENTS—Season now on to sell our Metal Window Refrigerator Box. No ice. Quick sales. Big returns. Bishop-DeWaters Co., 293 Pine, St. Louis, Mo.

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

AGENTS WANTED—Milk bottle openers, 40 cents dozen, with circulars; sell 10 cents each. Sample, 10 cents. Robt. Illing, 633 Stratford Place, Chicago.

GOOD PAY, CASH WEEKLY made. \$10 earned spare time. checking, copying form letters, attending advertising material for each locality. Pandora Mfg. Co., London, Ont.

PUZZLE, Cover the Spot, 15c. for sample; agents wanted. Magician Supply Co., Providence, R. I.

THE SMALLEST BIBLE MADE, 10c. Contains 250 pages New Testament, illustrated. Size of postage stamp. Agents wanted. Sample, 10c. R. M. Tyra, Minneapolis, Minn.

SELF-FILLING FOUNTAIN PEN, Retail, 25c., equal of \$1.50 pens. Splendid Christmas presents. Send 15c. for sample and agency. Standard Co., 367, Providence, R. I.

SLIPS sell for 5c., cost agents \$1.35 per 100. Every man buys. Sample and snappy money making idea, 5c. in stamps. Joan Manufacturing Co., Box 252, Springfield, Ohio.

AGENTS sell handsome beauty pins. Samples, 10c. Kukkola, Wendell, N. H.

BIGGEST MONEY MAKER, entire new field. \$10.00 day guaranteed. Abeles Co., 4229 Harrison St., Chicago.

AGENTS—Over million cans "King Menthol" sold. Write for sample. King Manufacturing Co., Pittsburgh, Pa.

AGENTS—Clay cooking set. Face Pottery, Roseville, Ohio.

MARBLE SHOOTING PISTOL for children. Sample, 10c. Frisco Motor Co., 618 Fell, San Francisco.

425 WEEKLY and expenses to men and women to collect names, distribute samples and advertise. Steady work. C. H. Emery, ME 25, Chicago, Ill.

AGENTS—Duplicating order books sent postpaid upon receipt of 10 cents. Success Supply Co., 247 West 139th St., New York City.

POCKET ADDING MACHINE.—Lightning seller. Agents write us. Cincinnati Specialty Manufacturing Co., Cincinnati, Ohio.

AGENTS—Give double value, make 100 per cent. Arv. Johnson, New Market, N. J.

WE PAY LIVE AGENTS to distribute convincing talk on Holman's Sure Cure Malaria Pads; also pay attractive commission. Holman Pad Co., Box 2112, New York.

HERE'S AN OPPORTUNITY to double your present earning capacity. We want one agent in every factory to sell the best known and the best advertised hand soap on the American market. We give exclusive sale and only want ambitious men. For particulars, write today. N. E. Supply Co., 9 Fulton Place, Boston, Mass.

AGENTS—THE BRUSH BUSINESS is the best paying thing in this country today. Our brushes sell to houses, hotels, libraries, schools, offices, etc. Sell all times of the year. We give territory and protect you. We are leaders in the brush business. Write for information. Torrington Brush Works, Torrington, Conn.

MECHANICS DOUBLE YOUR INCOME selling Laitoe Pine Tar Paste hand cleaner. Cures chapped hands. Tremendous demand. Sample 10c prepaid. F. C. Laitoe Soap Co., 584 Niagara St., Buffalo, N. Y.

AGENTS WANTED for staple article. Sells like wildfire. 200% profit. Send 10c for sample and terms. Johnson Manufacturing Co., Providence, Ky.

COLLECT NAMES, information, etc., for business concerns. Steady, profitable home work. Instructive booklet for stamp. Information system, 228, Marietta, Ohio.

AGENTS make 500 Per Cent Profit selling Our Novelty Signs. Any one can put up our New Gold and Silver Signs Letters, and make \$5.00 per day. Enormous demand. Catalogue and particulars free. M. O. Sign Co., 4741 State St., Chicago.

GERMAN SILVER KEY CHECKS—Steel letters for marking same, key rings, etc.; over 50 styles. Agents wanted. Sample marked with your name and address, 15c. Pease, Die Maker, Winchester, N. H.

AGENTS WANTED in all parts of the country to handle our Hygienic Odorless Dustless Duster, and also a new line of Flavouring Extracts. L. A. Haloun Co., 4458 Perry St., Denver, Colo.

BRUSHES! BRUSHES! BRUSHES!—30 new varieties of the Capitol Brush—One for every need of every housekeeper—Our guarantee protects you and the buyer—exclusive rights—over 100% profit. Write now for territory.—Capitol Brush Co., Hartford, Conn.

BOKARA DIAMONDS, AGENTS, EVERYONE—Wanted to wear and sell these famous gems. Big profits. Sample offer and catalogue, Free. Northwestern Jewelry Co., 55 Northwestern Bldg., Chicago.

AGENTS AND DEALERS wanted to sell "Safety" Spark Plugs. Geo. F. Day, 21 Haverhill St., Boston, Mass.

AGENTS—Sell Christmas Cards. Samples. Card Printing Co., New Cumberland, Pa.

GOLD SIGN LETTERS; sell everywhere; over 500% profit; sample free. Johnston Co., Quincy, Ill.

AGENTS and **BRANCH OFFICE Managers** Wanted. Household article that sells itself over and over again. If not making \$5.00 daily, address Winslow Popular Co., 27 Randolph, Chicago.

AGENTS—EVERY MERCHANT BUYS our 1910 air brush show and window display cards. Nothing like them; latest hit; sensational sales; no competition. Samples free. People's Show Card, 777 W. Madison St., Chicago.

400 PER CENT PROFIT, made by Agents, with greatest labor saving article. Three samples for dime. Eagle Rubber Company, 213 East Tenth Street, New York.

A BONAFIDE PROPOSITION—Agents make \$5-10 daily. We guarantee results. Greatest thing yet. Particulars free. P. L. Campbell, 409 Prescott St., Toledo, Ohio.

BE YOUR OWN BOSS: Start Mail-Order Business at home; devote whole or spare time. We tell you how; very good profits. Everything furnished. No catalog outfit proposition. For "Starter" and free particulars address P. M. Krueger Co., 155 Washington St., Chicago, Ill.

BIG MONEY MAKERS—Send for illustrated circular of the finest salted peanut vending machine in the country. Simplex Company, Victor Bldg., Washington, D. C.

LOOK HERE—Don't you want to make \$5 or more a day? Then sell Ford's Wood (no rubber, felt or metal) Air-tight Weather Strip; readily applied to doors and windows; lowers the coal bills, samples and terms free. Ford Mfg. Co., 14 Burns Block, Holyoke, Mass.

WANTED FIVE LADY DEMONSTRATORS to demonstrate toilet goods in the homes of users. Can make from \$1.50 to \$5.00 per day. Chance for advancement. Write H. Husted, Fourth St., Grand Rapids, Mich.

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

"AGENTS' MONTHLY", 3 months, 10c. None free. P. M. Walter, 35 Dean St., Brooklyn, N. Y.

AGENTS WANTED to sell printers, engineers, motormen, anybody who wants clean hands, Vaneo, the perfect hand soap and household cleanser. Give a sample and you make a quick sale. Add \$12 per week easily to your income. We want hustling representatives in every shop. Enclose 10c in stamps for full size card and particulars. Address Box V, The J. T. Robertson Co., Manchester, Conn.

AGENTS—The biggest money-maker ever known. The new Cancheater Incandescent Kerosene Lamp revolutionizes old lighting methods. Burns air instead of money. Six times brighter than electricity, gas or acetylene at 1-10th cost. Burns with or without mantle. Burner fits any lamp. Saves 75% oil. No trimming wicks. Showing means selling. Territory going fast. Write today. Handsome outfit furnished. Cancheater Light Co., Dept. P. M., 26 State St., Chicago.

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

AGENTS: 100 PER CENT PROFIT. Monkey-wrench, plumbers' pliers, with 13 other tools combined. Most wonderful combination of tools ever made. Lightning seller. Sample free for examination. Forstner Co., B. 1535, Dayton, Ohio.

AGENTS—\$75 monthly. Combination Boiling Pin. Nine articles combined. Lightning seller. Sample free. Forstner Mfg. Co., Box 248, Dayton, Ohio.

AGENTS WANTED in every county to sell Transparent Handle Pocket Kutters. Big commission paid. From \$75.00 to \$200.00 a month can be made. Write quick for terms. Novelty Cutlery Co., 67 Bar St., Canton, Ohio.

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—Here's a few of our quick sellers—Coffee Maker, pure aluminum, retails 25c. Soap and premium combination, retails for 5c. Noodle Cutters, Iron Waxers, Wire Novelties, Jewelry, Cutlery, Razors, Hardware Specialties, Wm. A. Rogers Silverware, 1,000 Articles in our Catalogs. Express and Freight Certificates with orders of \$5.00. Get in touch with us at once. Send for free Proposition. The Phillips Co., 10 Phillips Bldg., Dayton, Ohio.

WE HAVE an ideal side line. Nets big returns, \$5.00 to \$10.00 a day easily made. Getting orders for our Safety Matches bearing Dealer's special advertisement. Something new. Sells itself. If you have a few spare moments on your route, this is your opportunity. Pocket sample case. For particulars, address Dept. P., Importers, 2282 East 53th St., Cleveland, Ohio.

AEROPLANES, DYNAMOS, ELECTRIC FANS. Picture Machines, Mechanical Toys, at half price. Catalogs, 200 Illustrations with your name on. Samples and particulars free. Murphy Company, Norwalk, Conn.

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

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

THE NEW "SWIFTLIT" LAMPS light instantly with 1/4 match; like city gas; no alcohol used; radically different from any other; portable or systems, 100 to 1,000 candle power at will; burners cheap for old lamps; Agents making money; great novelty; wholesale price for introduction. Planet Mfg. Co., Dept. 4, St. Louis. (Established 1868.)

AGENTS—\$5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 463 Third St., Dayton, Ohio.

MEDALLIONS SELL AT SIGHT. 200 per cent to 500 per cent profit. Make up your own goods and be independent. "It's easy." Catalog free. Fred Roseng Co., 1205 W. Randolph St., Chicago.

WANTED—A Man or Woman to act as our Information Reporter. All or spare time. No experience necessary. \$50 to \$100 per month. Nothing to sell. Send stamp for particulars. Sales-Association, 601 Association Bldg., Indianapolis, Ind.

MALE HELP WANTED

WANTED—BY MANUFACTURERS of several high-grade steam specialties, a first-class man to represent us. Prefer one having actual selling experience in this line or with mail supplies, who has knowledge of boiler room equipment. One who is now traveling and visiting boiler plants, so that he would not be dependent for his subsistence on orders he might take for first few weeks. Write fully and confidentially; give references and state territory. Address P. O. Box 265, Detroit, Mich.

\$80.00 PER MONTH paid railway mail clerks, customs and internal revenue employees. No "layoffs." Short hours. Rapid advancement to high salaries and high government positions. Thousands of appointments coming. Common education sufficient. Political influence unnecessary. Country and city residents stand same chance of immediate appointment. Examinations announced everywhere January 15th. Coaching free to first 25 applicants. Write immediately for schedule showing places of the examinations. Franklin Institute, Dept. D 21, Rochester, N. Y.

\$3,000 to \$10,000 YEARLY in the Real Estate business, without capital; we will teach you the business by mail, appoint you Special Representative, in your locality, of leading real estate company, list with you readily salable properties, co-operate with and assist you to permanent success; a thorough commercial law course free to representatives. If you are honest and ambitious, our free 62-page book will surely interest you. Address International Realty Corp., Dept. 4534, Chicago, Ill. (Successor to The Cross Co. and H. W. Cross & Co.)

WANTED—SUPERINTENDENT to take entire charge of construction of wood and steel launches. Must thoroughly understand and be capable of producing launches in large quantities. References for character and ability required. Address Detroit Boat Co., Detroit, Mich.

\$80.00 PER MONTH paid railway mail clerks, customs and internal revenue employees. Thousands of appointments coming. Common education sufficient. Examinations announced everywhere January 15th. Coaching free to first 25 applicants. Write immediately for schedule. Franklin Institute, Dept. D21, Rochester, New York.

MEN WANTED, age 18-35, for firemen, \$100 monthly, and brakemen, \$80, on all railroads. Experience unnecessary; no strike. Positions guaranteed competent men. Promotion. Railroad Employing Headquarters—over 500 men sent to positions monthly. State age; send stamp. Railway Association, Dept. 89, 227 Monroe St., Brooklyn, N. Y.

RAILWAY MAIL CLERKS—Customs—Internal Revenue employees wanted, \$80.00 per month. Examinations announced everywhere January 15th. Coaching free. Franklin Institute, Dept. D21, Rochester, N. Y.

REPRESENTATIVES WANTED—Salesmen, traveling, erecting engineers and manufacturers' agents wanted to represent us in their territory, on commission, for the sale of the best metallic packing for steam, air, gas, and ammonia. Ideal Metallic Packing Co., South Stillwater, Minn.

SEVERAL MACHINE DESIGNERS and draftsmen, \$75-\$120 per month; 2 experienced automobile draftsmen, \$90-\$100; experienced draftsmen on tools, fixtures, dies, etc., various salaries. The Engineering Agency, Inc., Est. 1893, Monadnock Block, Chicago.

\$80.00 PER MONTH paid railway mail clerks, customs and internal revenue employees. Thousands of appointments coming. Spring examinations everywhere. Coaching free. Write for schedule. Franklin Institute, Dept. D21, Rochester, N. Y.

WANTED—MEN WITH ORIGINAL IDEAS; ideas have made fortunes. If your invention has merit, lose no time in turning it into money. Our free booklets tell how; from the first step in patenting it to the actual sale of the patent. Write 1-day. Desk 556, Patent Development Corporation, Washington, D. C.

RAILWAY MAIL—Customs—Internal Revenue employees wanted. Examinations announced everywhere January 15th. Coaching free. Franklin Institute, Dept. D21, Rochester, N. Y.

BIG MONEY WRITING SONGS—Thousands of dollars for anyone who can write successful words, or music. Past experience unnecessary. We want original song poems, with or without music. Send us your work today, or write for free particulars. H. Kirkus Dugdale Co., Dept. 265, Washington, D. C.

AMBITIOUS YOUNG MEN to become traveling salesmen. Great demand, \$2,000 to \$5,000 yearly. Experience unnecessary. Send for information blank. Bradstreet System, 125 Cornwell Bldg., Rochester, N. Y.

DON'T BE HARD UP. Make \$4 to \$7 daily silvering mirrors at home or traveling. Anyone can do the work. Write for free booklet and sample. G. F. Redmond, Dept. 365, Boston, Mass.

SPECIALTY SALESMEN, here's your chance; make \$200 per month selling our new device to merchants. Automatic, 247 Dearborn St., Chicago.

WANTED SALESMEN to handle latest electrical device as main or side line. Can be sold wherever electricity is used. Liberal commissions paid. Further information furnished upon request. Hagstrom Bros. Mfg. Co., Lindsborg, Kans.

PLUMBING, ELECTRICITY, BRICKLAYING or Mechanical Draughts e. taught by expert workmen. Short time and small cost. Positions always open. Catalogue free. Write today. Cuyne National Trade Schools, 80 E. Illinois St., Chicago.

MAKE BIG MONEY—Great Booster tells how. Price, 10c. Trojan Supply Co., B-x 873, Orange, N. J.

GOVERNMENT CLERKS, \$90 weekly. Free booklet, 15, "Government Positions, How to Get Them." Clerk Agency, Providence, R. I.

CHRISTMAS PLAN that enables you to start a business of your own. We have a new easy plan in the Mail Order line to keep our factories busy. Spare time required to start. No canvassing. Large profits. Small capital. Personal assistance. Write today and make a start. We show you positive proof and sworn statement. J. M. Pease Mfg. Co., Xmas Department, Pease Bldg., Buffalo, N. Y.

COLLECT NAMES, information, etc., for business concerns. Steady, profitable home business. Instructive booklet for stamp. Information System, 229, Marietta, Ohio.

INCREASE YOUR PRESENT EARNINGS—Learn the clothing cutters' trade. Cutters earn from \$25.00 to \$75.00 weekly. Interesting and easily learned at home. Send for booklet. Success School of Cutting, Dept. 10, Jackson, Mich.

GENERAL AGENTS for \$6.00 Vacuum Cleaner. No Vacuum Cleaner retailing as high as \$25 superior to ours. You will agree with us when you see one. Territory contracts. Alca Co., 305 W. 54th St., Dept. E, New York.

I WILL START YOU in the Mirror Business. Best paying trade of today. Famous French method. \$5 to \$12 daily. Let me prove it. Free particulars. Corey, Dept. 36, Omaha, Neb.

WANTED—Experienced general pattern maker; also a machinist acquainted with electrical equipment. Feizer & Co., Springfield, Ill.

DO YOU WANT to make big money? Here is your opportunity, representing in your locality, large reliable established business house; no experience or capital required. Write for free particulars. Dept. N, Du-Jel H. Ritter Co., Chicago, Ill.

EXPERIENCED OR SUCCESSFUL SALESMEN to sell gasoline lighting systems suitable for any place or purpose; attractive proposition, write for catalogue. Doud Lighting Company, 216 N. Jefferson St., Chicago, Ill. Dept. A.

WANTED—1,000 CHAUFFEURS and Repair Men. Our demand for automobile engineers exceeds the supply, calls for men of intelligence and mechanical bent, capable of commanding \$100 to \$150 monthly upon graduation. Resident course \$20 to \$60. Home correspondence courses completed by practical road and shop work at any of our branches or affiliated schools, highly successful. Look This Up. Auto Schools of America, 1631 Michigan Ave., Chicago.

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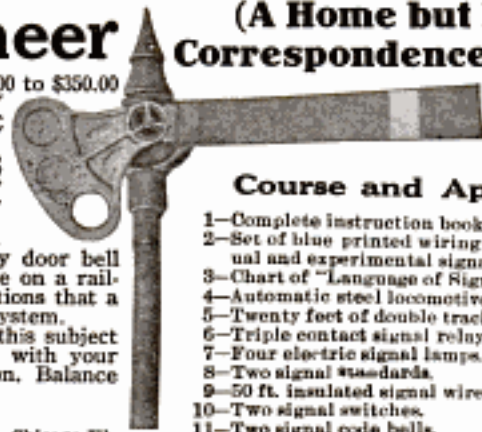
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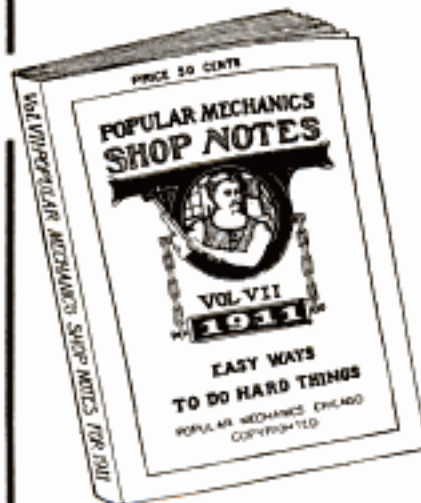
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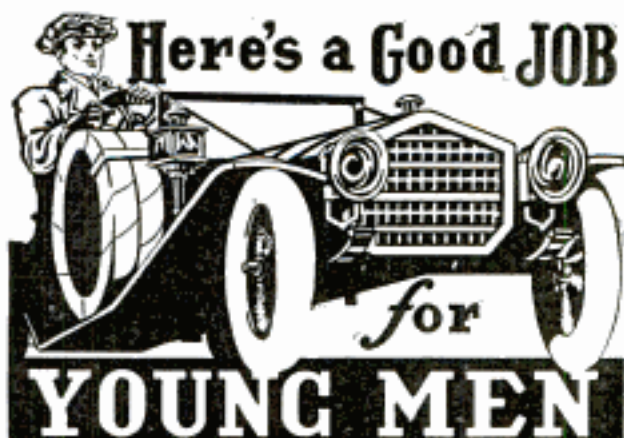
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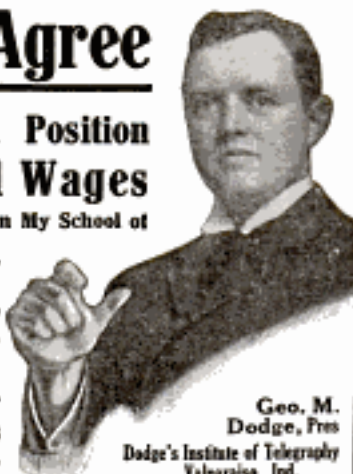
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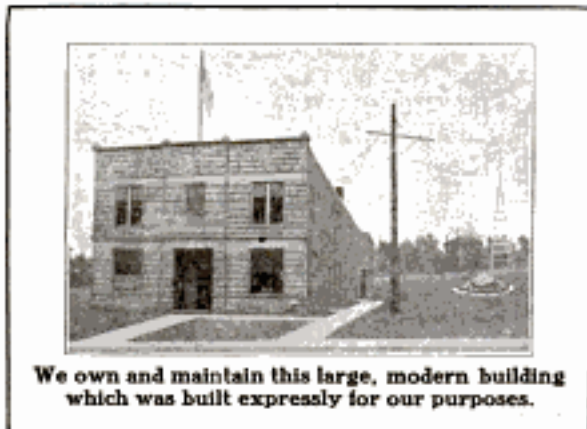
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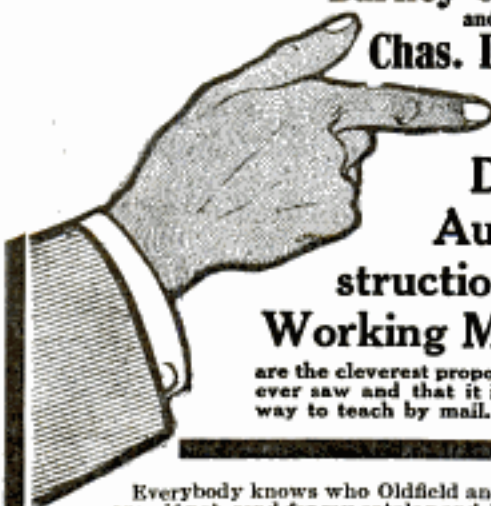
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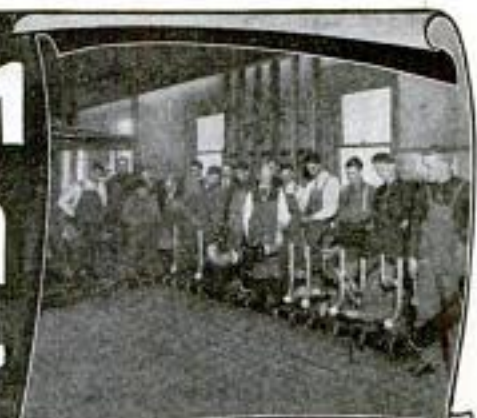
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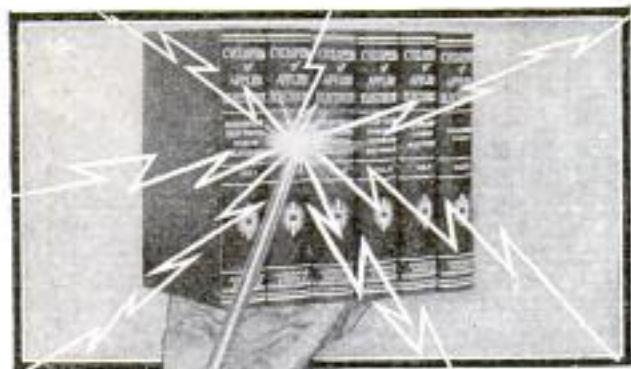
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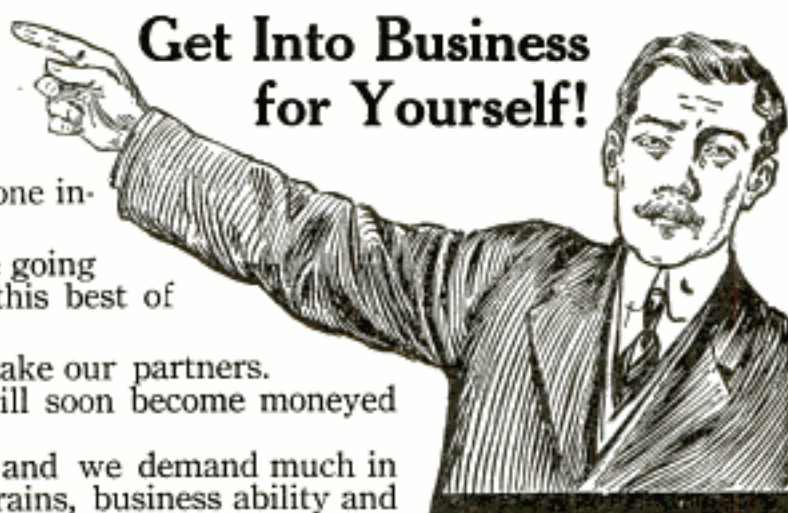
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I know a man who is fifty-five years old. He is a student. He is a graduate of three colleges, and he carries more letters after his name than I care to mention. But this man is neither bright, witty, clever, interesting, learned nor profound. He's a dunce.

And the reason is that he CAN NOT REMEMBER. Without his notes and his reference literature, he is helpless.

This man openly confesses that he cannot memorize a date or a line of poetry, and retain it for twenty-four hours. His mind is a sieve through which sinks to nowhere the stuff he pours in at the top. Education is only what you remember. The lessons that you study into the night and babble about the next day in class are rot, unless you retain them and assimilate them by the slower process of memory. You cannot gulp and discharge your facts and hope they will do you any good. Memory only makes them valuable.

Every little while in business I come across a man who has a memory, a TRAINED MEMORY, and he is a joy to my soul. He can tell you when, where, why, how much, what for, in what year, and what the paper said the next morning.

Like this man is another, the general manager of a great corporation in a Western City. He never misses a face. If he sees you once, that's enough. The next time he'll call you by name, inquire about the folks at home and ask if you have recovered from that touch of rheumatism.

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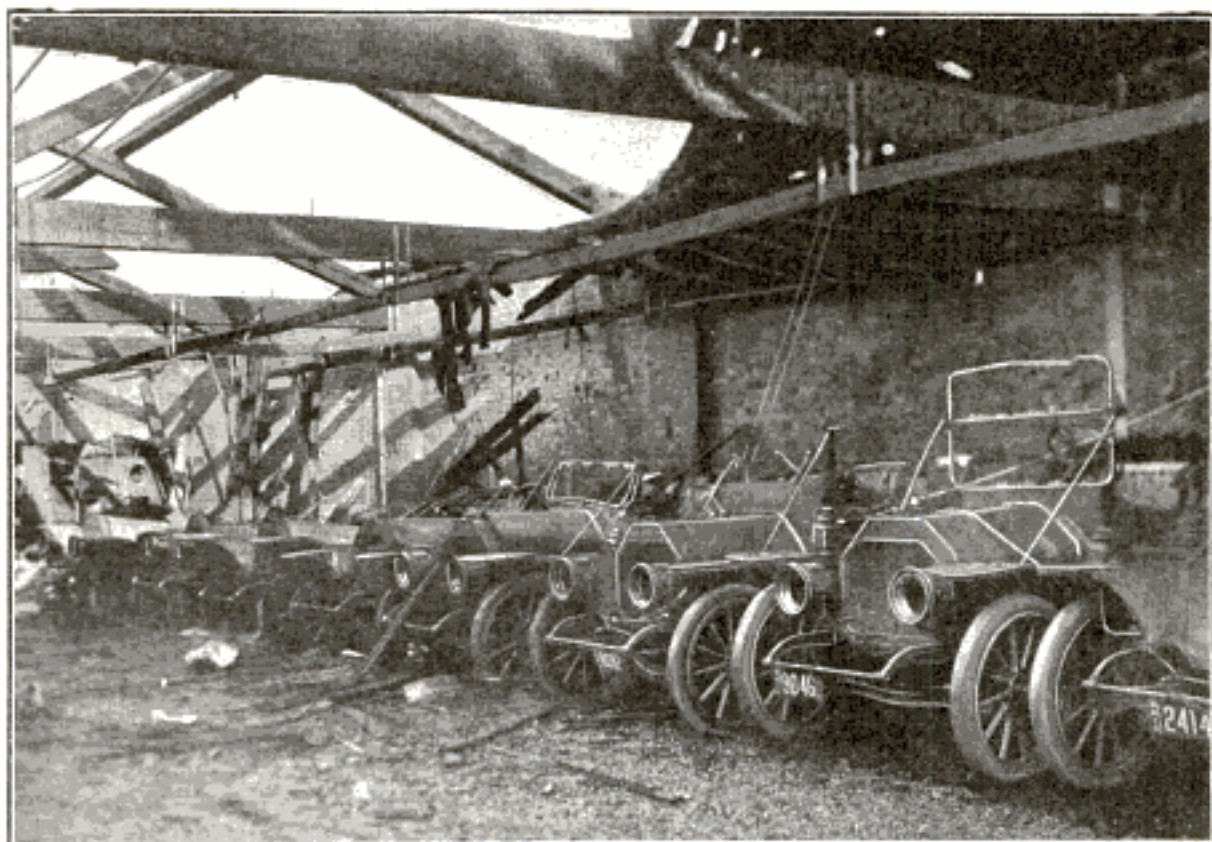
Written So You Can Understand It

Vol. 14

DECEMBER, 1910

No. 6

AUTOMOBILE TIRES WITHSTAND INTENSE HEAT



Garage and \$50,000 Worth of Automobiles Wrecked by Fire, Though Tires Are Undamaged

IT is generally known that tires used on racing automobiles in long-distance contests are obliged to withstand great heat caused by friction against the roadway, but that tires can be subjected to the intense heat of flames and remain intact was demonstrated in a recent garage fire in Cincinnati.

There were 25 cars, valued at \$50,000, in the building at the time of the fire. The woodwork on most of them was burned, the glass in the wind shields of every one being broken

by the heat. Exploding gasoline wrecked the engines and transmission mechanisms. But the tires were found intact when the blaze had been finally extinguished. That this unusual condition prevailed was due to the low combustion of the tires. Automobile men account for this by the fact that the ingredients used to make up a heavy, tough auto tire contain little pure rubber, and when the tires have been used for a while, they become hardened by mud and water and are almost non-combustible.

AUTOMATIC PHOTOGRAPH PRINTING MACHINE

An automatic photograph printing machine, built on the lines of a job



Prints Photographs by the Hundred

printing press, is one of the latest novelties in photography. The print is exposed by pressing down the handle shown in the illustration, the time of exposure being regulated by an adjustable gauge which allows an exposure of from one second to as long as required. It is claimed that 1,000 prints have been made from one negative in 45 minutes.

SWISS MAKE WATCH DIAL OF GROWING FLOWERS

A watch that keeps excellent time though its dial is made entirely of growing flowers was presented to President Fallieres of France on a recent visit to Bern, Switzerland, one of the centers of the watch-making industry of the world. It has been placed in the garden of the Elysee palace. The

dial is 6 ft. in diameter and is a mass of violets, anemones, pansies and asters. The hands are long beds of beautiful blossoms of a different color from the face of the clock, and the Roman figures are of a still different color. All the flowers are growing in boxes of fine mould. The movement is one of the most famous of Swiss manufacture, and the mechanism has been so delicately balanced that its makers declare it will keep time with the accuracy of a chronometer.

THE BENCH MARKS OF THE GEOLOGICAL SURVEY

The reports of the U. S. Geological Survey show that since 1897, when Congress authorized the work of determining elevation above sea level and the setting of bench marks, over 200,000 miles of spirit leveling have been run by that bureau alone, in connection with which more than 24,000 substantial metal bench marks have been set.

One of the types of bench marks used by the survey is shown in the illustration. The tablet is $3\frac{3}{4}$ in. in diameter with a stem 3 in. long. They have been cast of brass, aluminum, and recently of aluminum bronze, and are used whenever substantial masonry structures, large boulders, solid rock, and rock or cement posts are avail-



Bench Mark Tablets Used by Geological Survey

able. Drill holes are made for the stems, which are fastened therein with cement.

AUTOMOBILE KITCHEN OF THE UNITED STATES ARMY

Tests are being made by United States troops on the Pacific coast of an improved type of rolling field kitchen, designed to feed the men in the field and on the march. The kitchen, which has been tried out extensively while mounted on an escort wagon and hauled by four mules, has given good service, and the officers in command praise the device.

Fireless cooking is one of the features in preparing meals on the kitchen, and the vehicle is equipped with a sufficient number of airtight compartments to prepare the rations for two companies of infantry or troops of cavalry. The entire equipment consists of these fireless compartments, a large improved field range with hot water attachments, a large tank for carrying hot water and compartments for meat and utensils.

The kitchen is intended to prepare the food for a battalion of infantry or squadron of cavalry, a total of about three hundred men. The meals for two companies are prepared, brought to boiling on the range and then are put into the asbestos lined compartments on the rear of the platform. The rations for two more organizations are next cooked on the range until done.

It has been found that many articles of food, which enter into the army ration, such as beans, rice, mush and all farinaceous foods, are cooked better in the fireless compartments than in the company kitchen of the average army post, and that coffee made in this way is far superior on account of its freedom from the oily taste produced by long boiling.

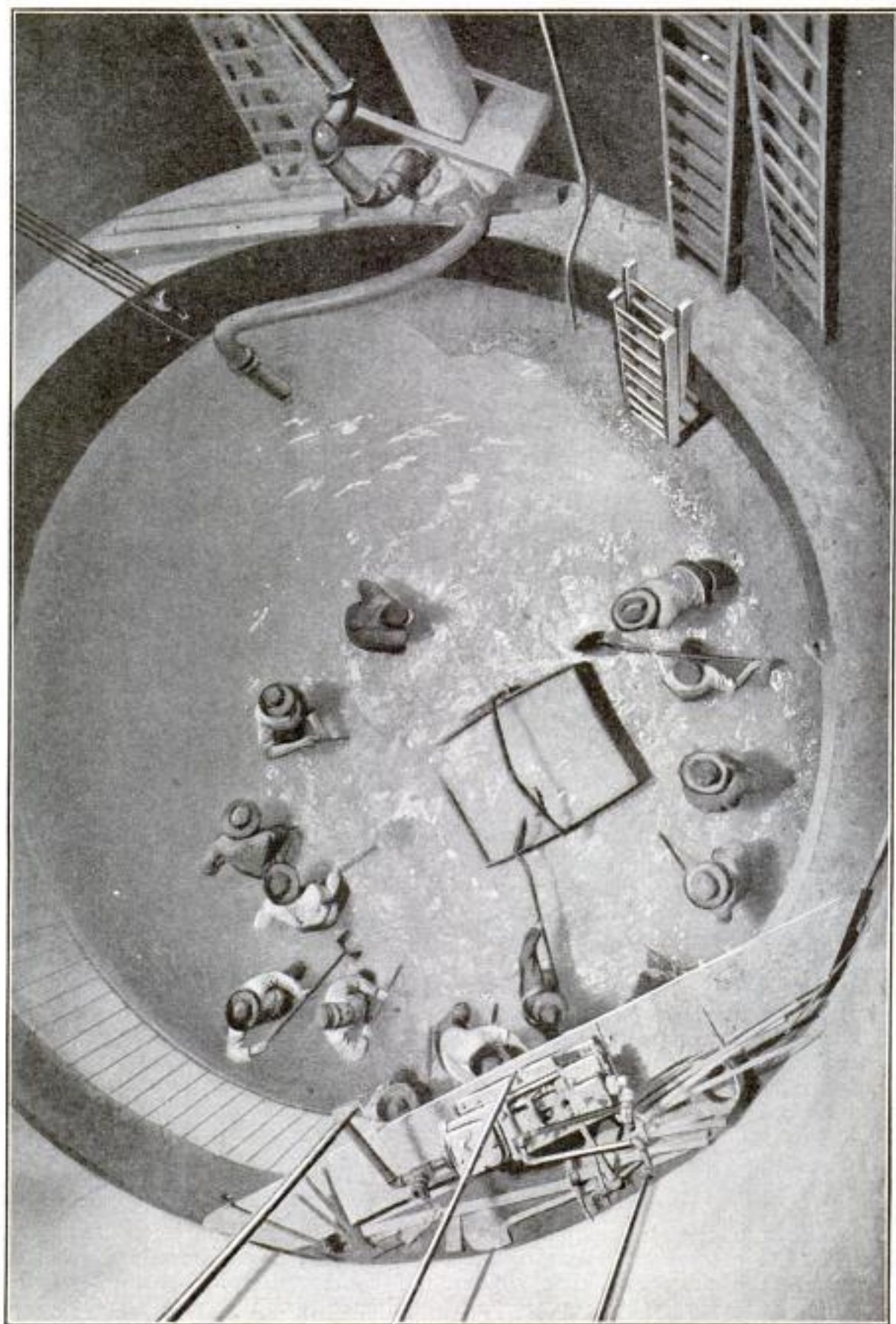
At present, the kitchen is mounted on a 60-hp. automobile truck, equipped for service over the roughest country, and the average cost for motive power



Designed to Furnish Troops with Well-Cooked Food in Camp and on the March

so far has been one dollar per day, with gasoline at 25 cents a gallon. The truck and kitchen were used by a battalion of the Eighth Infantry on its 200-mile march from the presidio of Monterey to the maneuver camp at Atascadero. Here it was turned over, for further tests, to various commands of cavalry, infantry and field artillery.

The kitchen is the invention of Capt. Frederick Stopford of the coast artillery corps, post commissary at the presidio of San Francisco. The War Department has set aside \$5,000 for the construction and testing of the equipment, and reports on its efficiency are to be sent to the chief commissary of the army.



Working in the Caisson of Yuma Project

RUNNING A RIVER UNDER A RIVER

One of the remarkable features of the Yuma project of the United States reclamation service is the immense concrete siphon which will carry the water from the diversion dam under the bed of the Colorado River from California to Arizona.

This concrete siphon has an inside diameter of 14 ft., and is in the shape of two concrete shells or caissons, one on each side of the river, extending straight down to a depth, when completed, of 150 ft. These will be joined by a tunnel running through the sandstone 100 ft. below the river bed, and the volume of water which is thus carried under the Colorado would equal that of a full sized river.

The intake of the siphon on the California side will be 2 ft. higher than the outlet on the Arizona side, so that the water will rush through at the rate of 8 ft. per second.

The illustration shows the interior of the caisson on the Arizona side, looking down from the mouth, and gives a good idea of the manner of sinking this tube of concrete. A circular steel cutting edge forms the base of the caisson wall and this has a beveled surface

which forces the loose rock and gravel toward the center.

At the time this picture was taken, the method of excavating was a pick and shovel gang working in a foot or so of water and filling an iron bucket that was taken up with a crane. Later, as the depth increased and the formation became harder, miners were sent down to blast the sandstone, and the crushed rock was removed by a clam-shell bucket. As the water became deeper, it was necessary to send down a diver to do this mining work and a professional marine diver was engaged for the purpose.

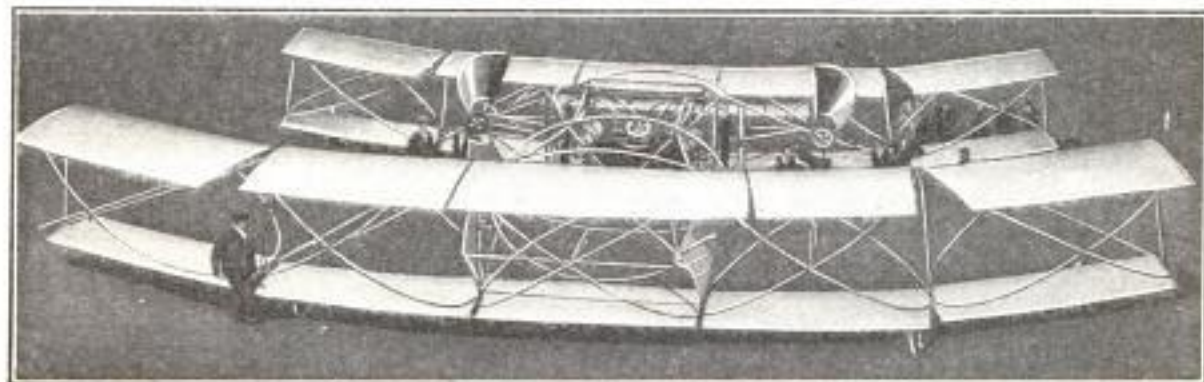
After each blast the caisson drops a trifle, then with the removal of the muck from the core, the massive structure gradually settles. Steel forms are clamped to the top of the caisson and when it has sunk about three or four feet, the forms are unclamped, raised about the same height, clamped again in place and filled with concrete.

About 55,000 acres of arid land on the Arizona side will be irrigated by means of this siphon, although this is no more than about a third of the total area to be reclaimed by the project.

SIX-PASSENGER AEROPLANE

The six-passenger aeroplane designed by Lieut. J. W. Seddon, of the British navy, is designated as a tandem biplane, and embodies several structural features entirely new. Hoops of steel tub-

ing take the place of ordinary wing framework and bracing wires. The machine weighs 2,000 lb., has a plane area of 1,000 sq. ft., and will be driven by two 80-hp. engines.



A Giant Aeroplane



Broadway Side of The Los Angeles Times Building after the Explosion and Fire



Searching for the Dead among the Ruins

THE extensive plant of The Los Angeles Times was completely destroyed and 20 persons killed by the explosion of dynamite bombs during the early morning hours of October 1. Death's heaviest toll was taken from the composing room under which the bombs were placed. Personal enemies of General Harrison Grey Otis, editor and proprietor of The Times, who has waged a bitter fight against union labor, have been charged with the crime. The unions disclaimed responsibility for it, and joined in the offer of a reward for the arrest of the perpetrators, made by General Otis, and the city and state.

THE FIRST AVIATION CHRISTMAS

By E. E. NORTH

THE whirr of the aeroplane propeller has replaced the tinkle of sleigh bells as a warning of Santa Claus' coming, and 1910 will go down in history as the first year to have an "Aviation Christmas." In the toy shops throughout the world, where genius is working overtime to devise things

the flight of those that must be suspended from the ceiling or the chandelier by a cord, as these machines, which cost as little as 25 cents, widen their radius of flight by the clockwork or electric mechanism which turns their propellers.

The practical airships, real fliers, range in price from \$5 to \$25 and are made of silk and aluminum or cotton cloth and wood, according to the price. One of the most interesting and instructive is

to amuse and educate children, the most skillful artisans have been busy for months turning out new toys, and most of these have been aeroplanes.

There is scarcely a form of air craft that will not be seen in all sizes and at all prices, in the stores. There will be biplanes and monoplanes, dirigibles and kites, machines that fly by themselves, that actually mount in the air from the ground and speed 150 yd. or more without other support than their own planes.

All of these machines are practical models; they will all fly in some way or other. It is only the more expensive models that support themselves while aloft, but the power of the propeller has much to do with sustaining



Exact Model of Antoinette Monoplane Made in France, Has Silk Wings and Aluminium Frame—Note the Rubber "Engine" Which Furnishes Power

a biplane that the purchaser must assemble himself.

This machine sells for \$5 and its planes are 3½ ft. in length. The parts, all neatly packed in a small flat box, consist of the cloth covers for the planes, cord and wire springs for bracing, four wheels, a hundred or more slender pine sticks to be joined together with brass binders, a 10-in. propeller and an "engine." The "engine" is of the same kind in all

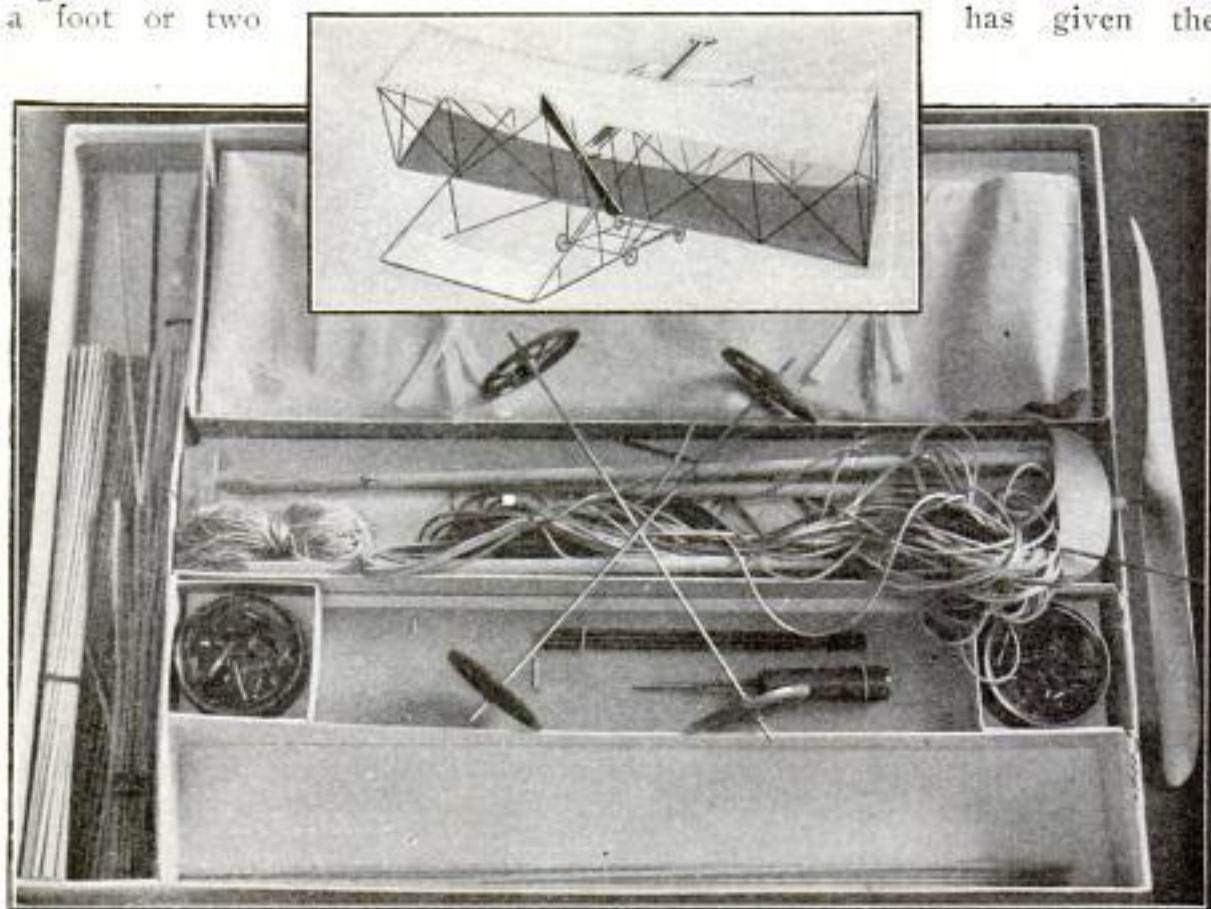
these aeroplanes. It is simply a number of long strands of rubber, bunched together, one end of which is firmly fastened to the framework, while the other is attached to a swivel hook connected with the propeller shaft. The rubber is twisted tightly by turning the propeller from 100 to 200 times. With the "engine" thus wound up, the machine is placed on the ground and the operator loosens his grip on the propeller. The blades begin to whirl at so rapid a rate that they seem a mere blur, sending the machine a foot or two



The Newest Thing in Baby Dolls with Features of Human Infant

along the ground before it darts into the air. On the more expensive machines, for instance, the model of an Antoinette monoplane, with wings made of silk and aluminum 4 ft. from tip to tip, there are three bunched strands of rubber used with their ends attached to gears that operate the propeller. Some of the monoplanes have two propellers. The dirigibles are all of the type that must be suspended by a cord, and there is one that is dismantled and packed in parts to be assembled by the purchaser.

While aviation has given the

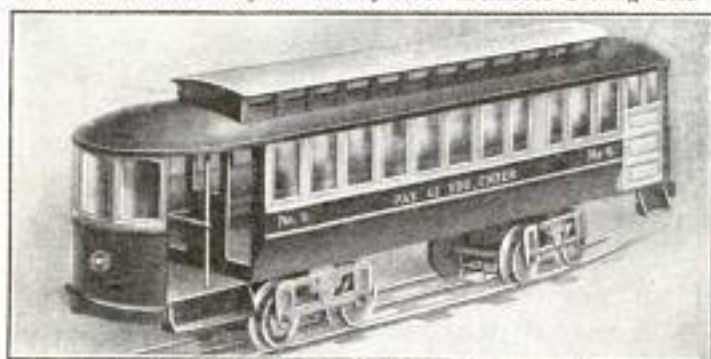


Model Biplane as it Comes Packed, and What it Looks Like after it is Assembled



Russian Nested Dolls, the Entire Family of Twenty-three Members Fitting One within the Other

toy-makers an exceptional opportunity to exercise their skill and ingenuity, there is a general opinion among them that this year will not witness the creation of any one toy or mechanical contrivance that will outsell all others, as did the famous "Teddy Bear." The appearance and rise in popularity of the "Teddy Bear" is one of the most remarkable events in toy-making history. "Teddy Bears" were known to the trade and had a fairly good sale before they became a "craze." But even after this had



The Toy Pay-As-You-Enter Electric Car Model, Showing Improved Contact Shoe on Third Rail



Boy and Girl "Character" Dolls with Faces That Are Exact Reproductions of a German Boy and Girl

subsided, a steady demand for the fuzzy little animals has made them as much a staple in the toy trade as the dressed doll, not alone in the United

States, but throughout the civilized world. No real success has followed the attempts of the toy-makers to create a successor for the bear, although, in England, they have lately had a competitor in a toy dog modeled after the late King Edward's favorite terrier "Caesar."

Peary's expedition to the North Pole has furnished the

idea for a new educational toy, or rather set of toys, that belongs in a class with the lead soldier. It comes in various sizes at various prices, depending upon the number of figures it contains. A model of the Peary ship "Roosevelt," is found in every set with such number of sleds, igloos, Eskimos and explorers as the purchaser's fancy demands or his purse can afford, a good set bringing as much as \$7.50.

Another educational toy, first marketed a year or so ago but greatly improved for the 1910 season, is designed for the youthful metal-worker, the embryo engineer. This toy, made in Ger-

manufacturer must first improve and bring up to date the staple articles of a preceding season before he ventures into the making of a novelty of uncertain popularity. The miniature railroads exemplify this. The third-rail electric road has been brought completely up to date. In addition to the solid vestibule trains with furnished sleepers, diner and observation cars, which were made in less perfect form last year, there now appears the "pay-as-you-enter" street railway car, equipped for the third-rail contact; and the electric motors in the cars have been simplified. In the new models,



Toy Submarine Boat Which Actually Moves under Water, Propelled by Clockwork Mechanism Weighs Eight Pounds; Costs \$20

many, consists of an assortment of steel, iron and brass in various lengths and shapes which can be assembled into a large number of models. There are several sets of brass cogs or gears, with car wheels and bent steel rods, together with two large boxes filled with brass screws, nuts and rivets. A book of instructions accompanies the set and gives a long list of possible combinations, which include bridges, aeroplanes, framework for buildings, and almost anything that can be made of structural steel. The price of this toy ranges from \$2 for the smallest set to \$45 for the largest.

The class of specialties that comes under the general heading of mechanical toys is—except for the air craft—almost barren of novelties this year. This condition has its natural explanation in the fact that the toy

the contact shoe has been made very broad, and the motor is mounted on extra heavy trucks, as can be seen beneath the rear platform in an illustration of the car. The "pay-as-you-enter" type, which sells for \$13.50, is equipped with transparent celluloid windows for sides and vestibules, sliding doors and an electric headlight.

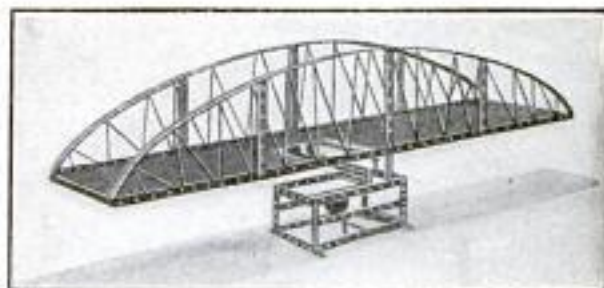
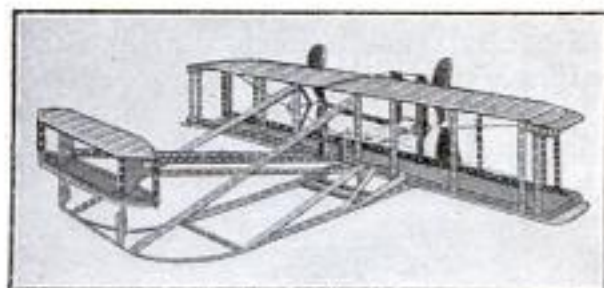
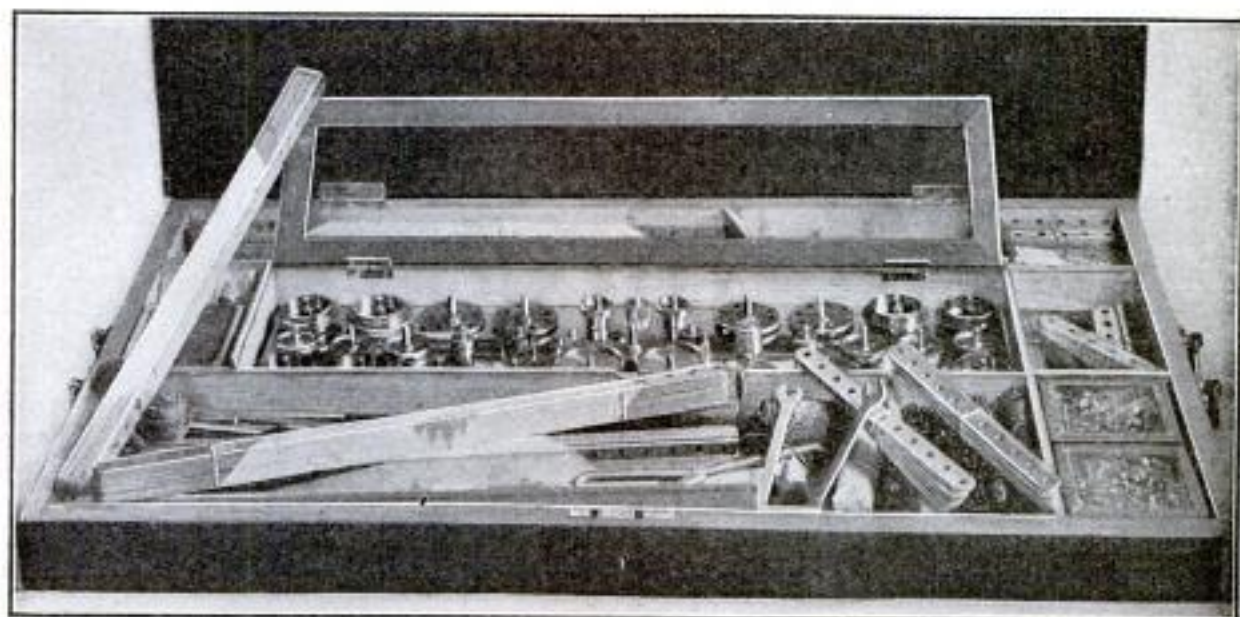
One really new thing is a submarine boat which actually travels under water. The boat is propelled by clockwork, being fitted with a very heavy spring motor. The keyhole where the motor is wound up is fitted with a watertight cover. The boat, weighing about 8 lb., is made of steel and iron, and the best type sells for \$20.

While the "Chanticleer" vogue has had its influence on the manufacture of dolls, the output has been exceedingly meager, and the chicken effects are not

the real novelties of the trade. The new things are found in the so-called "character" dolls and in the Russian nested type. The latter is an extraordinary example of the toy-maker's skill. In outward appearance resembling the nested toys of the Chinese and Japanese, this Russian article shows more careful and patient workmanship, and while the Orientals are content to carve a nest of six or eight

features, coloring and expression, all being faithfully copied from the faces of living models. They can be purchased dressed or undressed in all sizes, and while but a few types were made last year, this season offers an almost endless variety. They sell for from 50 cents to almost any price the purchaser will pay, and range in size from 4 in. to the size of a real baby.

Building blocks made of cork have



One of the Structural Metal Working Sets and Bridge and Aeroplane Models Constructed by Youthful Engineers

units, the Russian doll can be had with as many as 23 separate figures, ranging in size from 10 in. to $\frac{1}{4}$ in., and each making one complete doll. The largest doll, with 23 parts, sells for \$25.

The character doll has been greatly improved for the new season, a large number of character faces having been added. This doll is in a class by itself. Instead of the conventional expressionless doll face, it is given human

been fashioned in Germany to meet the objections made against the cement blocks, that were a novelty several years ago. The heavier blocks, while indestructible, are considered undesirable because sometimes they scrape the varnish on floor or table and can be used as effective missiles by a mischievous child. There has also been devised a new nested block, the figures of which are perfectly plain. They contain both animal pictures and

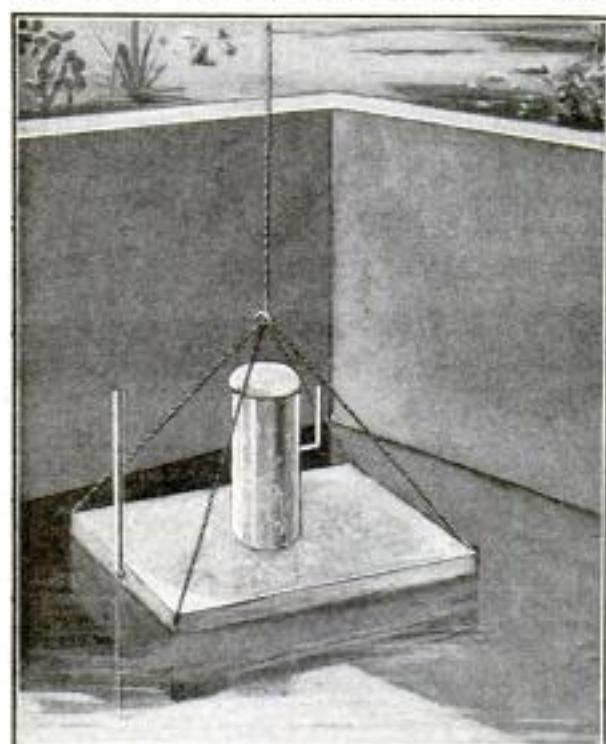
alphabets. The youngster aspiring to become a municipal engineer may have at his disposal cities and towns of various sizes, made of cardboard, to be put together as he thinks fit. These are elaborations of systems devised by the toy-makers several years ago.

But all these things are overshadowed by the flying-machines. The makers have devoted much of their time and capital, as have also the dealers, to this exploitation of aviation,

and they all expect to reap a harvest. However, as one dealer expressed it, no one can tell just what will happen. The little folks, on whose fancy depends the success of all this work and thought, may not like aeroplanes and dirigibles—they may remain faithful to the doll and the drum, and then the men who have put money into these things, will be where they had hoped to send their flying-machines—up in the air.

A NATURAL INCUBATOR

An ingenious rancher in the neighborhood of Mecca, California, has made



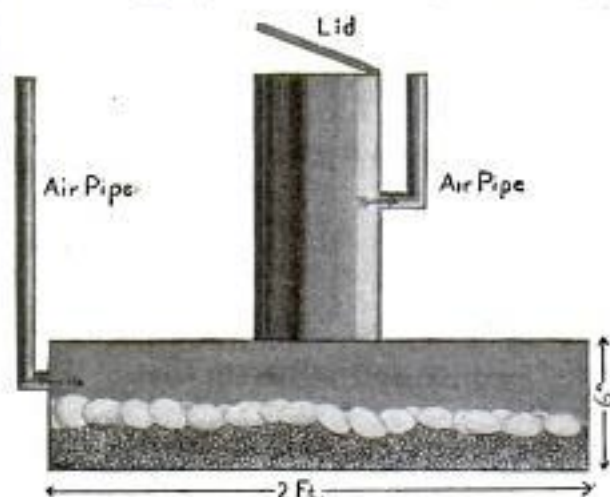
Incubator Suspended in Well

use of a flowing well on his desert homestead which has an unvarying temperature of 103° F. As he was in the poultry business in a small way, he decided to test the incubating possibilities of his well by suspending a bucket in it with a setting of eggs, 15 in number. Every day he would turn the eggs over to equalize the temperature, and on the 21st day his patience was rewarded when he heard the sound of little chicks peeping in the bucket and found that all the eggs had hatched.

A galvanized iron incubator was especially built for this purpose and the accompanying diagram shows its design. It is 2 ft. long, 18 in. wide and 6 in. high, fitted with two air pipes and a chimney-like ventilator with a cover 12 in. high.

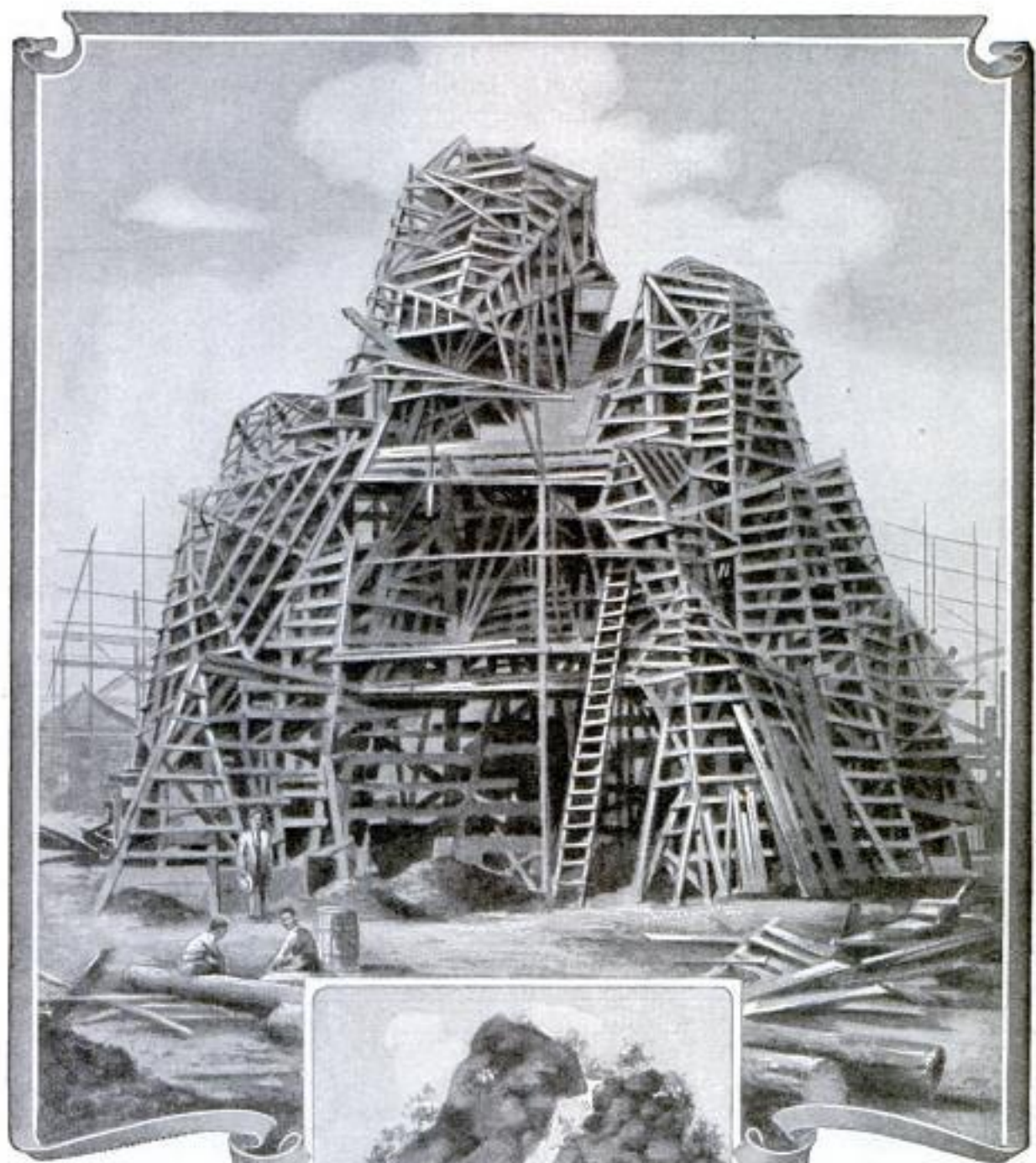
A little sand was put in the bottom of the incubator before placing the eggs in it, and then it was simply set in the cement box built around the well so that it was two-thirds submerged, allowing the warm water to circulate about it.

Although later attempts did not make the perfect score of the first test, 96 out of 100 hatched. Success with this natural incubator has encouraged the rancher to go into the poultry business on a large scale and he expects his in-



The Galvanized Iron Incubator

cubator to hatch several thousand eggs this fall.



Without the accompanying waterfall illustration, it would be difficult for the reader to venture a guess as to the purpose of the seemingly tangled pile of scaffolding shown in the uppermost illustration.

The Scaffolding Skeleton and the Finished Waterfall

tion. At first glance, it looks more like the work of a cyclone or hurricane than of skilled Japanese carpenters.

The waterfall is one of the attractions of an amusement park in Tokyo.

A SLED MERRY-GO-ROUND

During the cold winters in northern Germany, ice sports play a prominent part in the amusement of the children, a group of whom may be seen in this illustration enjoying a whirl on an ice merry-go-round.

A vertical shaft or stake, provided

WINE 2,000 YEARS OLD

In the course of excavations in Saint Seurin, an old Roman cemetery at Bordeaux, an enormous sarcophagus was uncovered, which, according to the archeologists, dates back to the first century of the Christian era. Beside the skeleton was found a glass vial



Winter Fun in Northern Germany

with a couple of old cart-wheels, is inserted in a hole in the ice. One wheel acts as a turning base and prevents the shaft from sinking into the pond, and the other forms a support for the long sweep attached for propulsion purposes. The sleds are made fast in a string to the long end of the sweep, which, turned at a trot, causes the sleds to fly over the ice at a high speed.

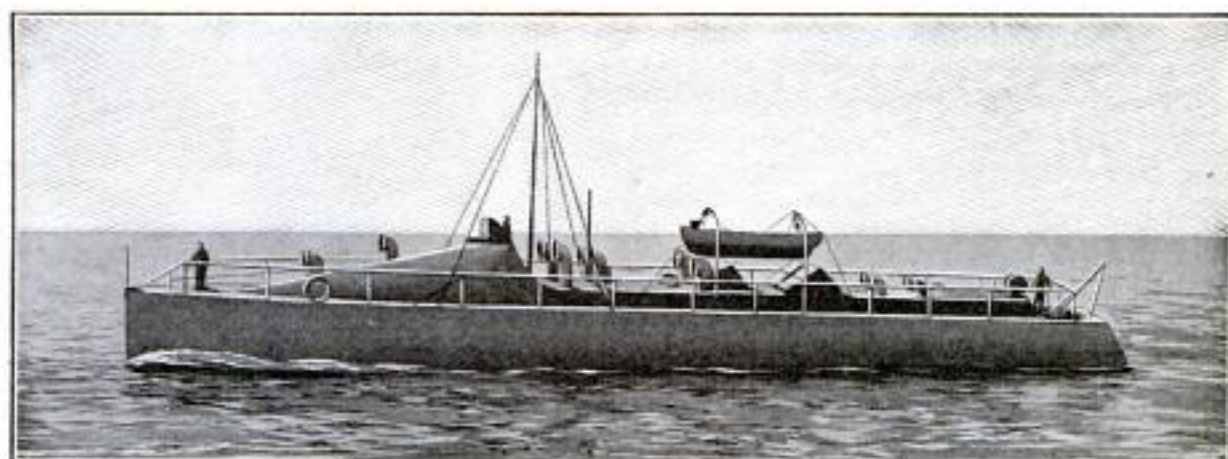
—
CAn English chemist claims to have discovered a new malleable alloy of aluminum which has but one-third the weight of brass, the strength of steel, and can be produced in large quantities for commercial uses.

about 17 in. long and of a shape hitherto unknown. It contained residue, which, when analyzed by an expert, revealed traces of tannin. This, and other circumstances, unquestionably proved that the vial had contained wine.

The shape of the vessel gave evidence of Syrian origin. At that time the commercial intercourse between Syria, the wines of which were much appreciated, and the whole Bordeaux region was lively.

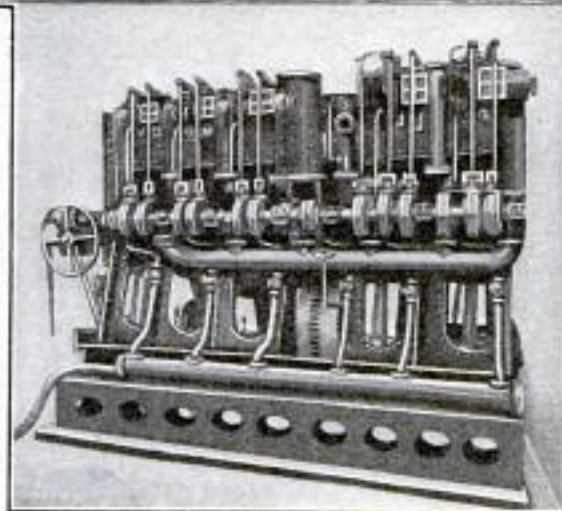
—
CA grandfather's clock that is 7 ft. high and made entirely of crystal, has just been finished by a London clock-maker for an Indian prince.

THE MOTOR-DRIVEN WARSHIP OF THE FUTURE



Naval experts all over the world are awaiting eagerly the result of the action of the British admiralty in ordering internal combustion engines for one of its new unarmored cruisers. The vessel is to be between 4,500 and 6,000 tons displacement, and its behavior during the trials will form the basis on which will rest the future of this type of engine in naval warfare. The English gas-engine experts are jubilant over the action of the authorities and believe that it marks a revolution in naval engineering. They point to the success attained with small vessels of this type, a small motor torpedo boat having shown one-third greater speed on one-half the weight of fuel, giving a sailing radius two and a half times greater than a steam-propelled vessel of the same type and displacement.

But the principal question to be solved is whether or not the multiplication of power necessary for a 20,000-ton battleship will show a proportionate saving of space by the reduction of the amount of machinery and storage

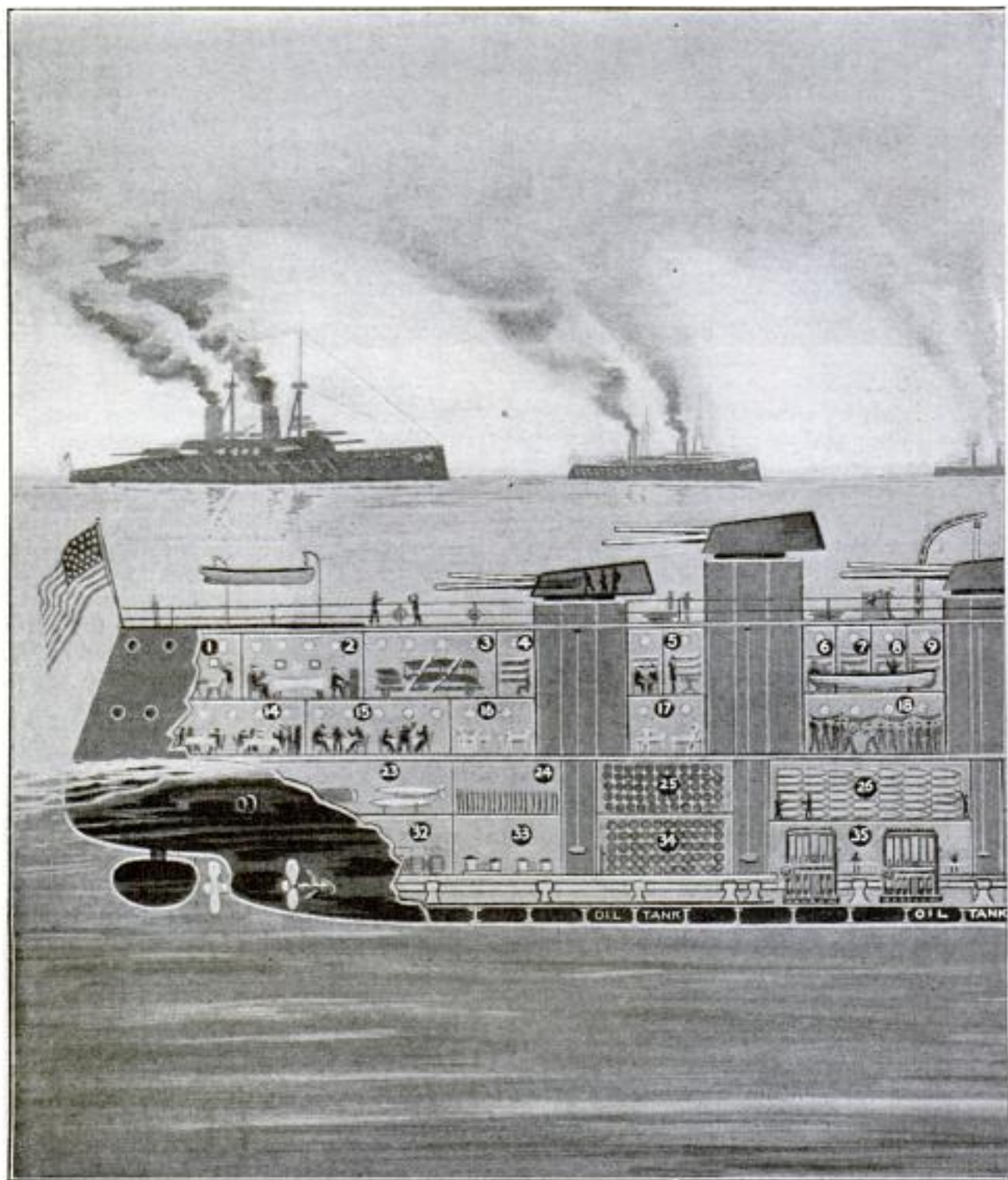


Torpedo Boat Built to Test Internal Combustion for Naval Vessels and Gas Producer Engines of H. M. S. "Rattler."

room for fuel. It is pointed out that engines of 16,000 hp. would have a weight of 1,105 tons against 1,585 tons for steam engines, and that while the latter type would occupy 7,250 sq. ft., the internal combustion engine would occupy but 5,850 sq. ft.

English engineers have spent some months studying the installation of gas-producer engines on the old gunboat "Rattler." This ship is of 715 tons displacement. She was fitted with internal combustion engines after she had been placed out of commission as a part of the regular fleet, and has attained a speed of 10 knots an hour. Her engines have five independent cylinders, each 20 in. in diameter, which give her 500 brake horsepower. She has been run 2,000 miles at an average of eight knots an hour. In space and weight, between 25 and 30 per cent is saved compared with the steam engines with which she was equipped before. With the old engines, four engineers and 13 stokers were required. Under present conditions only three engineers and four producer attendants are needed, and

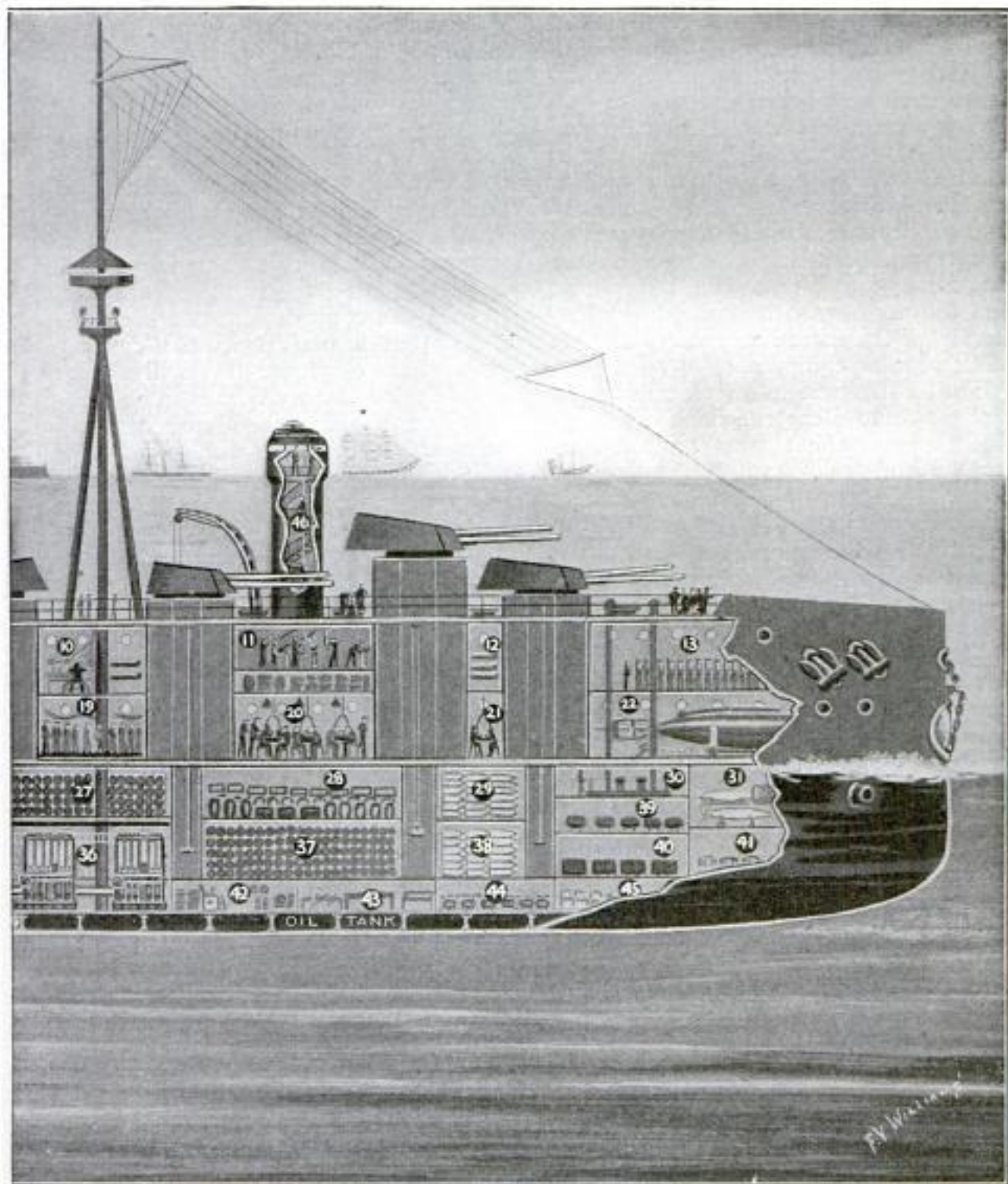
MOTOR-DRIVEN BATTLESHIP OF THE FUTURE



1 and 2—Admiral's Quarters
 3—Aeroplanes
 4-9—Warrant Officers' Quarters and Lifeboats
 10—Wireless Operator's Room
 11—Chart Room
 12—Petty Officers' Quarters
 13—Drill Deck
 14 and 15—Officers' Quarters and Ward Rooms

16 and 17—Hospital
 18-21—Crew's Quarters
 22—Submarine
 23—Stern Torpedo Room
 24—Armory
 25-27—Ammunition
 28—Provisions

AND ITS LONG LINE OF PREDECESSORS



29—Ammunition
 30—Dynamos
 31—Forward Torpedo Room
 32—Storeroom
 33—Dynamos
 34—Ammunition
 35 and 36—Gas Engines

37 and 38—Ammunition
 39 and 40—Mines
 41—Torpedo Stores
 42—Boatswain's Stores
 43—Carpenter
 44 and 45—Provisions
 46—Conning Tower

their work is to watch the engines and the indicators from the bridge and to charge the gas producer with anthracite coal every two hours, only hard coal being suitable for this purpose.

That a complete change of the interior and deck arrangement of a battleship would be possible is easily conceived. By the reductions possible in its fuel-storage space, in the engine room and the quarters for the engineering and fireroom forces, space would be given for increasing the size of the magazines and for stowing aeroplanes and submarines, both of which the battleship of the future may carry as part of its regular equipment.

The abolishment of funnels and stacks would clear the deck of everything except the turrets or barbets for the guns and a single mast which could serve to support the fire-control station with its range-finder, the conning tower, the wireless antennae and signal apparatus. Under these conditions, a vessel could be designed with a broadside fire including every gun on deck, which, in the case of the 20,000 ships would be 12 of the heaviest guns used on battleships.

Whatever the boundless possibilities

opened by the success of the internal combustion engines may be, however, it is not possible that all of the old type of ships will be cast aside. On this subject Percival A. Hisslam, in *The London Graphic*, writes:

"It goes without saying that we shall be told that gas engines will render all steam-propelled ships obsolete; but it will be as well to remember that the 'Dreadnought' did the same thing according to the same sources of information five years ago, and that we still have 46 pre-Dreadnought armored ships in full commission. At the same time, what a marvelous half-century of naval development this will appear when its full history comes to be written! Iron displaced wood and steel has succeeded iron. Sails and spars have disappeared, ousted by the steam engine; and when the steam engine reaches perfection in the turbine, it, in turn, finds itself challenged by internal combustion. Muzzle-loading guns have gone; torpedoes, submarines, airships and wireless telegraphy have come. How long, we wonder, will it be before electricity throws the whole of our latest developments into the limbo of the obsolete?"

MICROPHOTOGRAPHIC APPARATUS

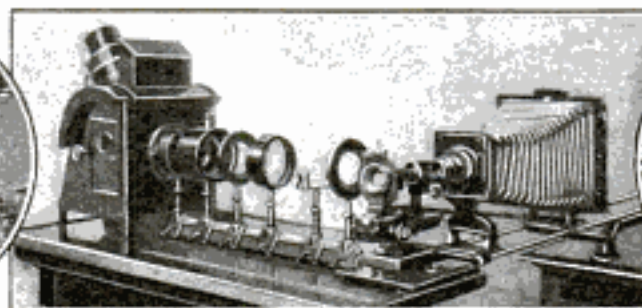
The wonderful microphotographic apparatus is being used with remarkable success in the metallurgical branch of the physical department at Neubabelsberg, near Berlin, in ascertaining the structure of metals and their alloys. As the name implies, the apparatus is a combination of the microscope and camera, and photographs

of metal filings, magnified as high as 2,500 times, can be taken with it.

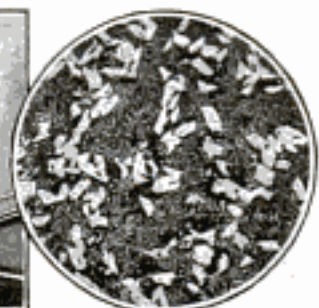
Heretofore, alloys were tested by studying their structure at a broken surface, but with this apparatus, it is possible to determine quickly whether the alloy is well made or overheated and useless—a matter of great importance.



Common White Iron
Magnified 2,500 Times



Microphotographic Apparatus



Various Metals Magnified
500 Times

THE AEROPLANE VS. THE BATTLESHIP

FROM THE AIRMAN'S VIEWPOINT

By VICTOR LOUGHEED

Author of "Vehicles of the Air"

SINCE the publication, in the September number of Popular Mechanics, of Captain Richmond P. Hobson's article minimizing the importance of the aeroplane as a factor in naval warfare, the editor has received scores of letters on the subject, manifesting a vivid and general public interest in the impending adaptation of the flying-machine to military and naval operations. A great number of experts differ with the naval constructor, and space is given this month to the other side of the question, written by an authority whose close touch with the subject of aeronautics qualifies him to render an expert opinion from the aviators' viewpoint. The reader should remember, however, that the issue involved must not be regarded as one merely between individuals holding opposite opinions. Many contend, and the marvelously rapid development of aeronautics strongly suggests, that the aeroplane is destined to revolutionize warfare—perhaps to make war, the war of blood and destruction, obsolete, and thus prepare the world for a millennium of peace. Whatever may be the outcome, the subject is of the profoundest importance to every thinking man and especially to those who have in charge the welfare of nations. All the facts should be known and weighed.

HISTORY is full of examples in which one power has succumbed to another because the opponent was more alert, and quicker to grasp the significance and to make practical application of the latest developments in war machinery.

The great Napoleon owed his initial successes chiefly to the fact that he was above everything else a great artilleryman. He did not merely revise tactics, he devised new tactics for this new arm of the service, which at that period was only just coming into practical form.

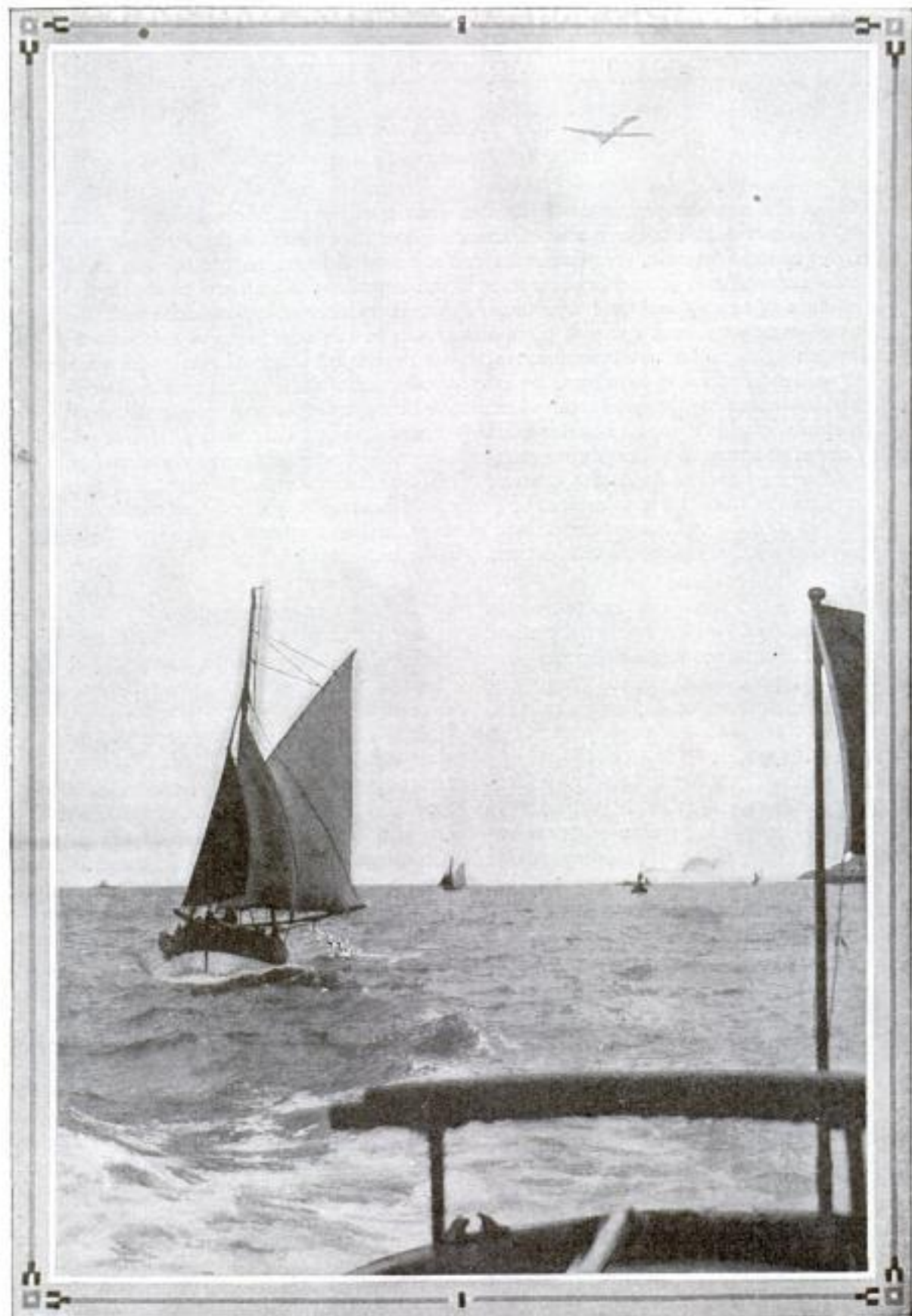
Nothing more appalling can be imagined than that some far-seeing, resourceful nation, wholly untrammelled by traditions, should effectively seize upon the latest mechanical improvements that lend themselves to the waging of war, and in some great conflict terribly surprise its less resourceful opponent. The recent Russo-Japanese war is a significant example.

Regardless of the reluctance with which ancient ideas disappear from a modern world, it must be admitted that the waging of all warfare now depends for a successful outcome—that is to say, for victories—upon the devel-

opment of machinery for the destruction of life and property, and the perfection of organizations for making the most safe and effective use of such machinery.

Advocates of a large navy, urging the construction of great battleships at enormous public expense, hold that any abatement of the national activity in the acquisition of these floating monsters would mean disaster. The writer will endeavor to suggest that the continued expenditure of millions upon millions of dollars in the construction of the costliest fighting-machines that ever have been produced—which in the very near future it is likely to prove easy to destroy by the attacks of comparatively inexpensive aeroplanes—is a folly so great that its continuance is likely to be of the most serious menace to the nations that are so shortsighted as to persist in it.

In appraising the menace of aeroplane versus battleship, it is neither logical nor reasonable to consider the problem so simple as the mere attack of one aeroplane upon one battleship. Battleships, as Captain Hobson points out, "cost as high as \$12,000,000, and



Latham, in an Antoinette Aeroplane Flying over the Shipping in the Harbor of Havre, France, Suggesting How Small a Target Such a Machine Makes at a Moderate Elevation

are still rising.' The best modern aeroplanes cost on an average not to exceed \$6,000 each, and their cost is rapidly lowering. Two thousand aeroplanes, therefore, cost no more than one battleship—besides which they require few more men to operate them than is required for the crew of a single vessel.

The prospect, then, becomes one of cost against cost, of national resources pitted against national resources, the vital difference being in the particular weapons of defense and offense on which each nation may elect to make the expenditures. And for the one that chooses the flying-machine there impends a prospect of success that is not so much comparable to the suggestion of a single "eagle attacking a lion" as it is to that of smaller winged animals in swarms attacking a creature perfectly capable of making effective resistance to a few of its enemies, but helpless against them in numbers.

This idea, followed through, quickly suggests that aerial vehicles, far from being helpless, may prove in numbers as effective against the battleship as is a swarm of mosquitoes against cattle floundering through a swamp, or a nest of hornets against a man with a rifle. This crux of the question of airship versus battleship is the conclusive answer to the argument that "the size of the battleship has increased and will continue to increase." For just as the battleship increases in size, so, and even more in proportion, will it increase in cost. And since the aeroplane will decrease in cost, so must there result a constant increase in the number that it will be practicable to pit against the battleship. Indeed, by far the most serious count in the indictment against the battleship is this most weighty fact that its cost is so enormous as to constitute a serious drain on the resources of even the most prosperous nations.

Thus, in every respect, it must appear that, limited in their field of operation, tremendous in their cost, and serving a purpose that they will cease to serve, it can be a matter of

only a few years before these great, complicated, and cumbersome mechanisms of war will commence to recede into the limbo of forgotten things. They must surely take their final place with the other extravagances and follies of progressing mankind—with such other colossal extravagances of human effort as the pyramids—like them wonders of a world, but regarded as such more because of their uselessness and worthlessness than of such downright efficiency and effectiveness as pertains to the irresistible advance of the inexpensive, developing and wonderfully promising vehicles of the skies.

An additional reason why governments should expend from the appropriations of their military and naval departments for aeroplanes is the universal utility of these machines, considered as fighting devices. Unlike the battleship, an identical type of aeroplane can be built suitable for waging war over either sea or land, with no special regard to the difference in conditions.

To assume that a battleship can absorb the flying-machine and fight aeroplanes with aeroplanes is dismissing, not resolving, the question of airship versus battleship. Fighting between aeroplanes is a certainty of the future, and what constructions and tactics will prevail is for the future to determine. But that a battleship can serve better as a base for such war aeroplanes than some base that is not a battleship, is to contend that a mechanism not specially developed for a given purpose is better than one that is developed for that special purpose.

To assume that the "offensive power of the aeroplane . . . is almost negligible" is to court an obsession with the present status that will defeat even a most moderate insight into the future. All the probabilities are that the offensive power of the aeroplane of the future, and even of the present, is as much underrated as the defensive and offensive power of the battleship against aerial craft is overrated.

In this connection there are many



DUBONNET IN A TELLIER MONOPLANE

Flights at speeds in excess of 70 miles an hour have already been made with this type of machine. The *vol plane* which pilots can execute with this monoplane would disconcert the most expert gunner who might try to stop the mechanical bird in an attempt to rush close to a battleship's decks and drop a package of explosive.

factors that have received little consideration. There are, for example, explosives of far greater power than any in use, which never have been developed for warfare because the extreme danger of their premature explosion makes it impossible to discharge them from cannon. Thus, while it is perfectly true that dynamite, explosive gelatine, gun-cotton, cordite, and other of the explosives that are commonly regarded even by experts as the last word in destructive power, are inadequate in anything but unreasonably large quantities to blow in the sides of a large, heavily-armored vessel, or to induce sufficient commotion in the water adjacent to it to cause its foundering, it is a fact known to every chemist that chloride of nitrogen, nitrogen iodide, some of the picric-acid compounds, and certain of the fulminates, notably that of silver, are of a nature

to insure the most serious results, if dropped in small packages down the 20-ft. diameters of a battleship's funnels, or even cast against the decks.

The fact that accurate aim of a dropped missile is not overly easy to secure from a considerable height has been widely urged as an insurmountable difficulty. Its fallacy must appear from an acquaintance with the maneuvering capacity of modern aeroplanes in the hands of proficient pilots. It is a law of geometry that with every doubling of the distance between an airship and battleship, the volume of space comprised within that distance increases with the cube, and while wonderful things are accomplished by modern firearms in the hands of trained gunners, such a thing as maintaining full of projectiles any considerable portion of the atmosphere adjacent to an attacked vessel is, of course, out of the question. Its attempt, even were there weapons existing capable of its accomplishment, would entail the consumption of ammunition in quantities that in a very short time would exceed even the enormous weight of the vessel itself.

Turning from this to the more practicable proposition of seeking less frequent but more specific effectiveness against the target, no hunter who has ever tried to kill birds with a shotgun will need to be told of the exceptional difficulty certain to attend any attempt to wing a terrifically fast vehicle, pursuing a continuously-changing course through the air, with a weapon that cannot be swung on the shoulder. The



How the Operator is Seated in the Best Modern Monoplanes—Note the Comfortable Accommodations

size of the aeroplane might seem to make it a better target, but it must be remembered that shells or shrapnel can pass harmlessly through the fabric, may even break stay-wires or struts, or strike anywhere but against operator, motor or main framing, without completely incapacitating the aeroplane. And even when by sheer luck or clever gunnery a machine may be brought down, the loss inflicted upon the enemy can be no more than that of one or two men, plus a few hundred dollars' worth of cheap machinery—to inflict which damage is likely to require the throwing of thousands of pounds of projectiles and the burning of great quantities of powder. Even in land warfare, where the target has much less ability to move and the firing platform is always stable, it is the lesson of all military history that on an average it takes his weight in lead to kill the individual soldier.

Moreover, the war aeroplane of the impending future, and the aeroplane tactics of the future, will not include and will not need to include attempts to drop explosives accurately on a target from a height of, say, 2,500 ft. A few dozen brave men, as well capable of handling aeroplanes as some of the best modern aviators, could almost with impunity glide down within a few feet of the decks of a battleship and get away unharmed ninety-nine times out of a hundred, insofar as a couple of dozen rapid-fire guns would prevent. Flight in a uniform line, at a constant speed, such as any hunter knows is at the basis of his every opportunity to pot a bag of game, is not



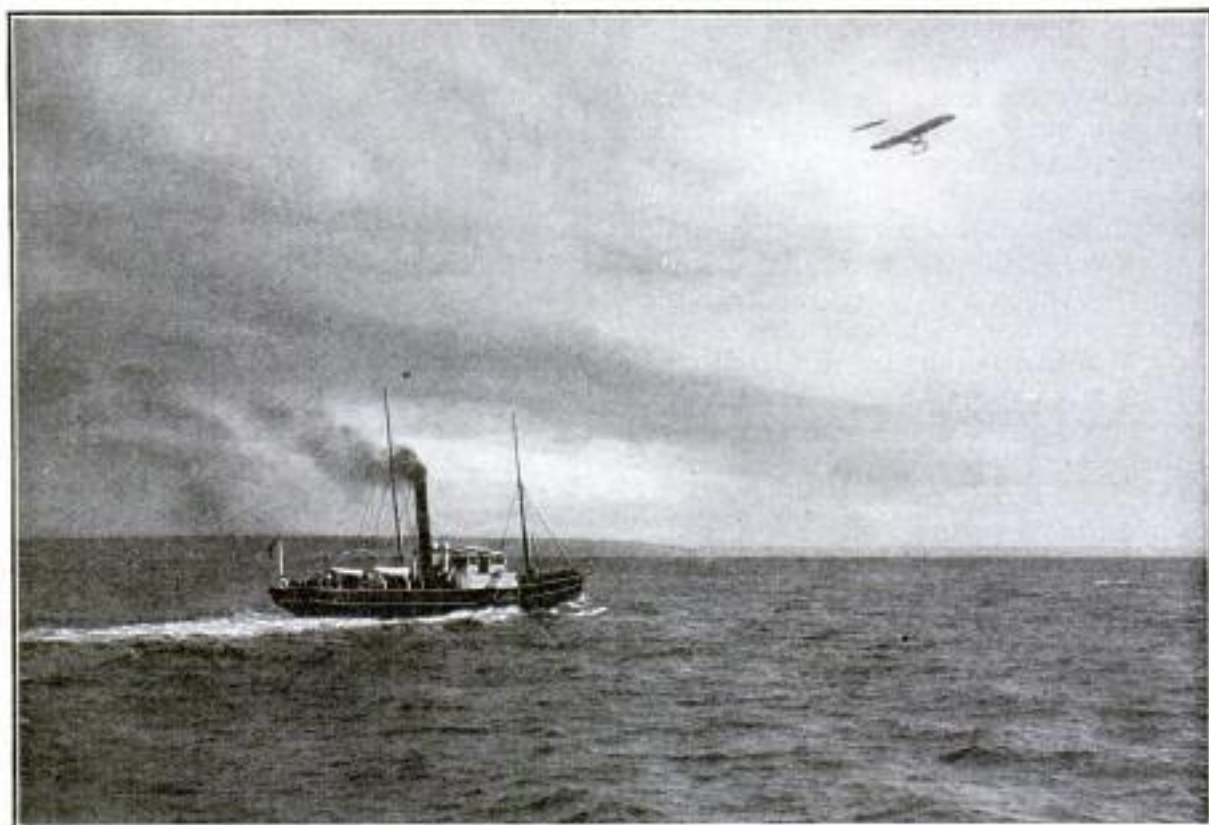
SANTOS-DUMONT'S TINY MONOPLANE IN FLIGHT.
This machine, which is the smallest yet constructed, has been placed on the market in France at prices ranging from \$1,200 to \$1,500, and certainly could be built in quantities for the military department of any modern government at a cost not to exceed \$600 each. This is one-twentieth-thousand of the cost of one of the \$12,000,000 battleships

going to be the trick with man's brain on the job of flying. On the contrary, imagine how disconcerting to a gunner will be a few of the sweeps and dives that even now prove so easy to the expert airmen. Terminate these by a *vol plane* properly executed, and finish with the explosive dropped on the vessel.

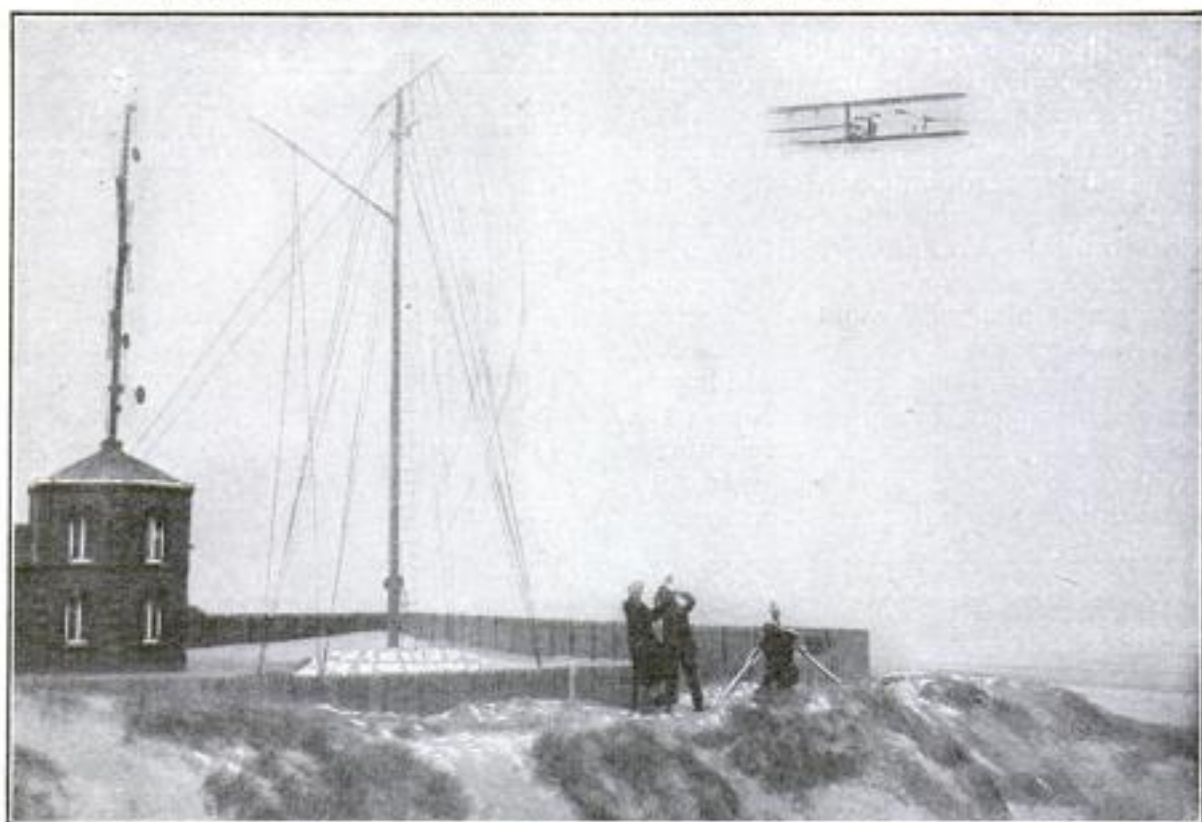
The aeroplane is developing, and whatever is within the range of performance with present machines will surely be exceeded by the machines of the future. Furthermore, what can the proponents of the battleship say about night attacks? Do they seriously expect that searchlights can be kept trained on a whole fleet of maneuvering aeroplanes, and guns effectively aimed at them?



Note Also the Comparatively Small Size of the Individual as Compared with the Whole Machine



Aubrun, One of the Most Famous of the Bleriot Pilots, Flying Over the Sea at Trouville, France



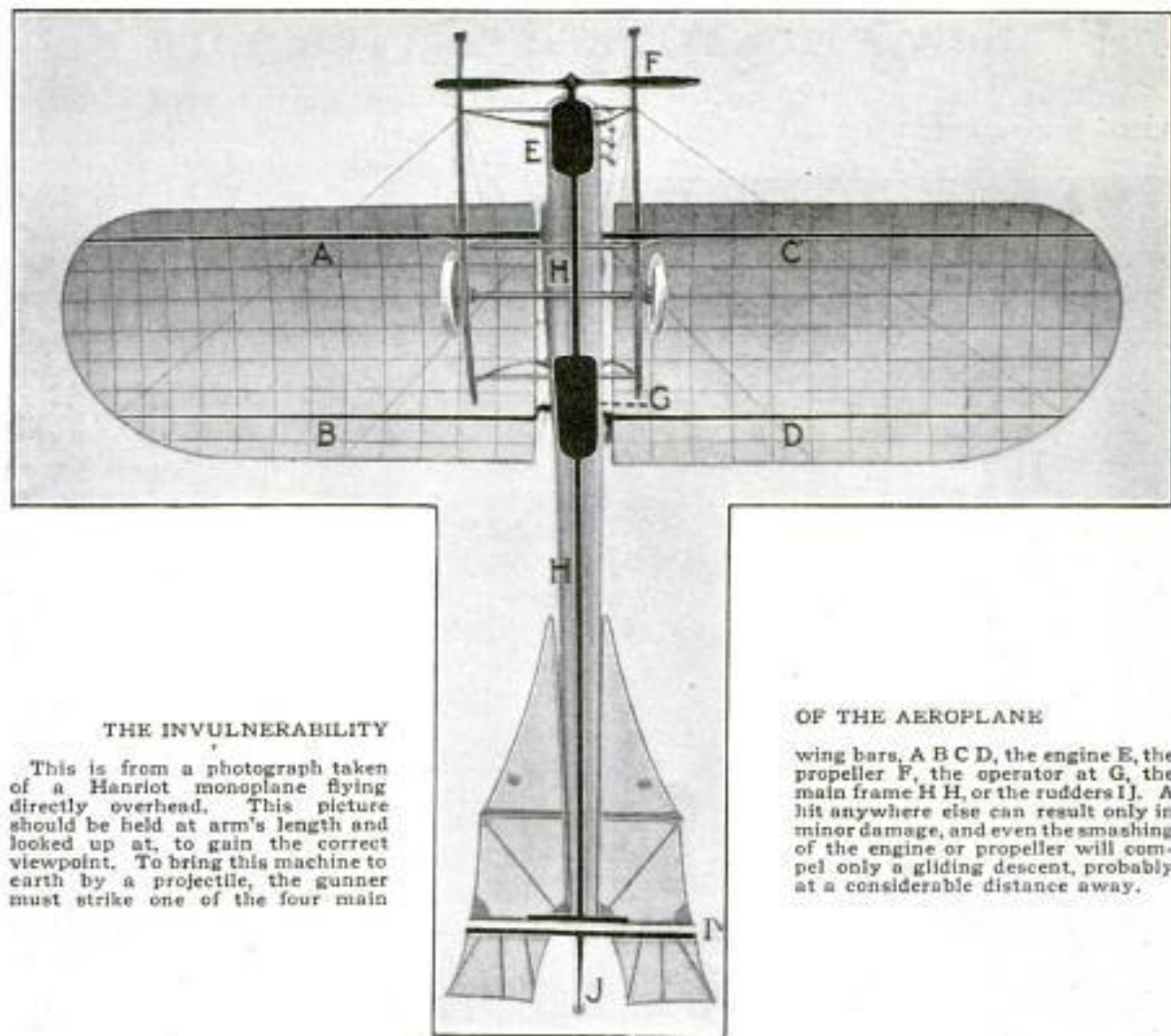
ROLL'S BI-PLANE CIRCLING OVER THE SEMAPHORE BUILDINGS AT SANGATTE, FRANCE

In the course of his flight from England to France and back again, he did not land on French soil, though he dropped a letter addressed to the Aero Club of France. During this flight, some 60 or 70 miles were covered in one and a half hours, affording an excellent line on the future ability of the war aeroplane to maneuver effectively at some distance from its floating base of supplies.

Even on the darkest night, a person above the earth's surface has every advantage over those below him in the distinctness with which he can make out contrasts so clear as the looming mass of a great vessel, silhouetted against the waters around it.

It has been proposed to maintain protective nets high in the air, support-

of destruction, it nevertheless has been developed for combat with its own kind rather than with a new and special device which is not exactly or even closely comparable with any other means of offense that ever before has existed. Moreover, formidable though it is supposed to be, it is ever to be remembered that the distinctly modern



THE INVULNERABILITY

This is from a photograph taken of a Hanriot monoplane flying directly overhead. This picture should be held at arm's length and looked up at, to gain the correct viewpoint. To bring this machine to earth by a projectile, the gunner must strike one of the four main

OF THE AEROPLANE

wing bars, A B C D, the engine E, the propeller F, the operator at G, the main frame H H, or the rudders I J. A hit anywhere else can result only in minor damage, and even the smashing of the engine or propeller will compel only a gliding descent, probably at a considerable distance away.

ed by captive balloons, to intercept missiles cast on the decks. In such a case, the first business of an attacking force directed by reasonable intelligence would not be an attempt to break through the nets, but the readily accomplished puncturing of the captive balloons.

In conclusion, while it is true that the battleship has been advanced until it embodies great defensive power, and is a wonderfully developed engine

battleship is in a large measure a theoretical development, and never has been tested conclusively for the reason that there has been no recent war involving naval conflicts between equally matched fleets.

The aeroplane is not simply the addition of a new device, it is much more than this. It is the addition of a new field of operation. There are and always have been three and just three possible media through or over which

man can travel—the land, the sea, and the air. And all down the centuries man has been compelled to keep to the first two of these. Now, by the conquest of the air, there is added the only medium of travel that is all-pervading, the only one that permits movement in all directions and over all surfaces,

and under conditions that make such movement so easy to conduct in absolute secrecy and with tremendous celerity, that nothing earthbound or waterbound can by the wildest stretch of the imagination be expected either to anticipate or meet the harrying attacks from aloft.

NEW AUTOMATIC DRINKING FOUNTAIN

A Santa Ana, Cal., inventor has devised a new automatic drinking fountain



Penny in the Slot for Filtered Water

tain, ten of which have already been installed in different sections of Los Angeles and are meeting with success. By simply inserting a one-cent piece in one of the slots of the fountain and pressing down a lever, one will receive a glass of ice-cold filtered water automatically filled just to the brim.

If the prospective imbiber has no cent piece, he can insert a nickel in another slot and receive four cents change. Again, if he has no money at all, he presses a button marked "city

water" and gets a free glass of water. Ice is placed in a space beneath the fountain on several iron coils which run up into the machine. The water flows through these tubes and becomes cooled. The machine will not accept substitutes for money, but immediately returns slugs and smooth coins.

THE NAMING OF AMERICAN WAR VESSELS

When the Navy Department began the construction of the "new navy" in the 80's, the rule was to name the battleships for states and the cruisers for important cities. But the acquirement of battleships was then slow and a number of cruisers were named after some of the most important states, with the result that the plan has not worked out quite right.

New York, together with California, Colorado, Maryland, Montana, Nevada, New Mexico, Arizona, North Carolina, Oklahoma, Pennsylvania, South Dakota, Tennessee, Washington and West Virginia, have no battleships named for them. Most of them, however, have armored cruisers named after them, so that to set matters aright would mean the renaming of many ships, which is always a sort of nightmare to naval men.

London's new general postoffice, constructed of reinforced concrete and completely lacking the massive steel girders so familiar in modern building construction, is said by a British technical publication to be guaranteed to stand the ravages of weather and London smoke for a thousand years.

CUNARDER SUNK AT DOCK TO SAVE HER FROM FIRE

The Cunard liner "Lucania" was sunk at her dock in Liverpool recently to save her from fire which had threatened to work complete destruction. The interior of the hull had been burned out before the drastic measure of immersing the whole ship was taken. The fire was extinguished, but the vessel's position in the water, with her funnels and upper works protruding, constituted a menace to navigation, and it was necessary to raise her at once. Steam pumps removed 28,000 tons of water from the hull before it rose to the surface, but even then there was a dangerous list to port, caused by the presence of water in parts that could not be reached by the ordinary type of pump. A special device was employed to do the remainder of the pumping, pipes being lowered for this purpose down the ventilators and ashhoists. When finally cleared, the vessel was removed to the company's quay, where the process of refitting her commenced.

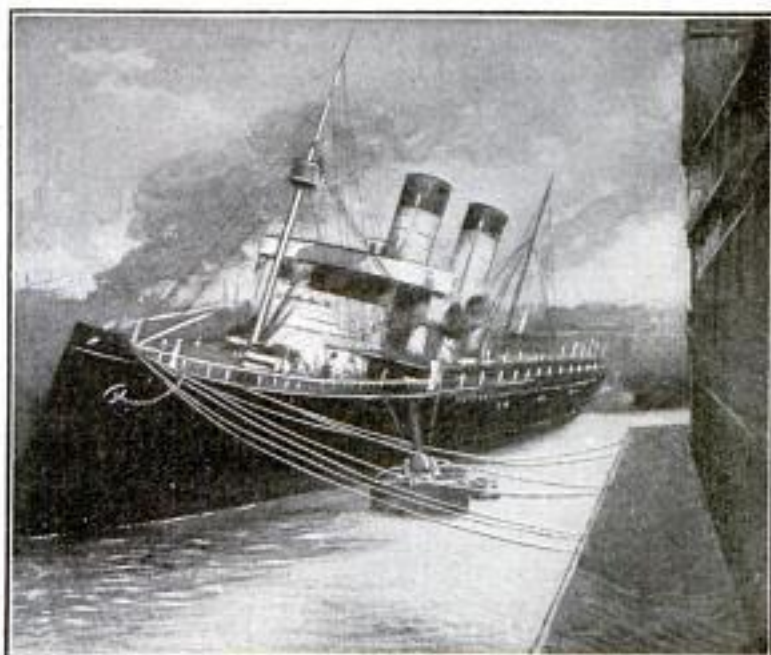
The "Lucania" is 620 ft. long, with an extreme breadth of 65 ft. 3 in., and her depth from the upper deck is 43 ft. Her gross tonnage is 12,950.

AERIAL CHARTS TO SHOW AIR CURRENTS

Aid to air pilots is to be offered by the Blue Hill Observatory, outside of Boston. Experts there are at work on a series of air-current charts, the material for which has been accumulating at the observatory for years.

Blue Hill has for a long time made a specialty of high altitude observations, kite-flying and investigations with sounding balloons. It has accumulated a lot of material which is now

being worked into air-current charts. These charts are intended to do the same for the airman or balloonist as the current charts of the hydrographic office do for the sailor. But they will be vertical instead of horizontal.



Steamship "Lucania" as She Appeared when First Raised

There are more or less constant currents of air at different altitudes, and if an aerial voyager can strike one going his way, he has the advantage of its added speed. These currents vary in different localities and at different altitudes. There may be a west wind blowing over Chicago at a given hour at an altitude of 500 ft., and at the same time there may be a steady east wind at an altitude of 2,000 ft.

Observations have shown that these air currents are remarkably constant, and the meteorologists want to set down on charts all that is so far known about them. Of course, there is a chance for an infinity of other observations all over the country, but the Blue Hill Observatory is taking advantage of what is already known and putting it in shape to be of use.

ⒸThe Municipal Assembly of Tokyo, Japan, has rejected a proposal to build elevated railways in the Japanese capital.

"AMERICA II" SETS NEW RECORD FOR BALLOON FLIGHT

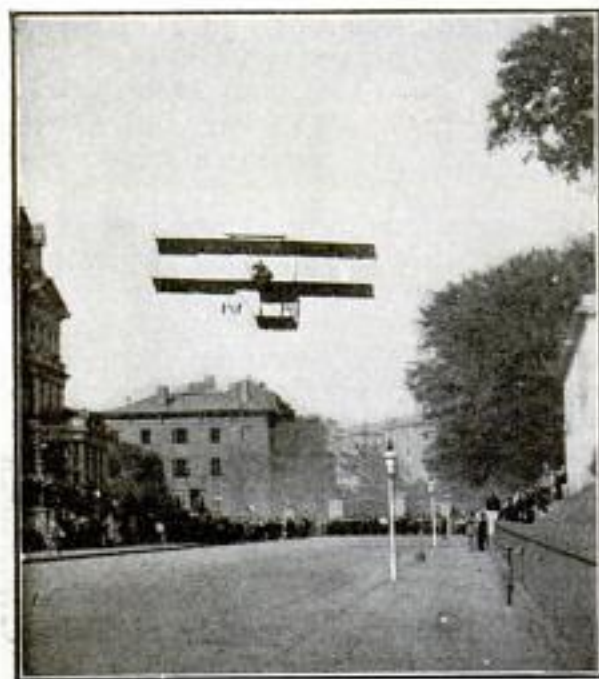
Setting a new world's record for distance, the balloon "America II," with Alan R. Hawley as pilot and Augustus Post as aide, won the international balloon race, which started from St. Louis on October 17, by drifting 1,355 miles to Lake Tshishtigama, near Peribonka, in the province of Quebec, Canada. The two balloonists were lost to civilization exactly one week. The governments of the United States and Canada and the officials of the aeronautic clubs of the two countries were organizing a hunt for the balloon through the wilds of Northern Quebec on the day the aeronauts announced their safe landing, after a thrilling trip through the Canadian woods.

The "Düsseldorf II" and the "Germania," both German balloons, were accorded second and third place in the race, with credits of 1,230 miles and 1,190 miles, respectively. Both of these balloons also broke all previous records, the longest distance previously accomplished in a balloon flight being 1,183 miles, made by Count de la Vaulx from France to Russia in 1900. The longest

flight ever made before in an international race was 871.26 miles, credited to Herr Erbsloeh in 1907.

Ten balloons started in the race, representing the United States, Germany, France and Switzerland. Several of the balloons were made of a new cambric fabric instead of rubber, the new material being reputed lighter than the rubber and having as great durability. It is a peculiar outcome of the race that the three balloons that won the prizes were all made of the rubber, while cambric structures all came down within 36 or 40 hours of the start. This is not regarded, however, as due to the material, as the balloons would probably have lasted as long as the "America II," "Düsseldorf II" or "Germania," had other conditions been equal.

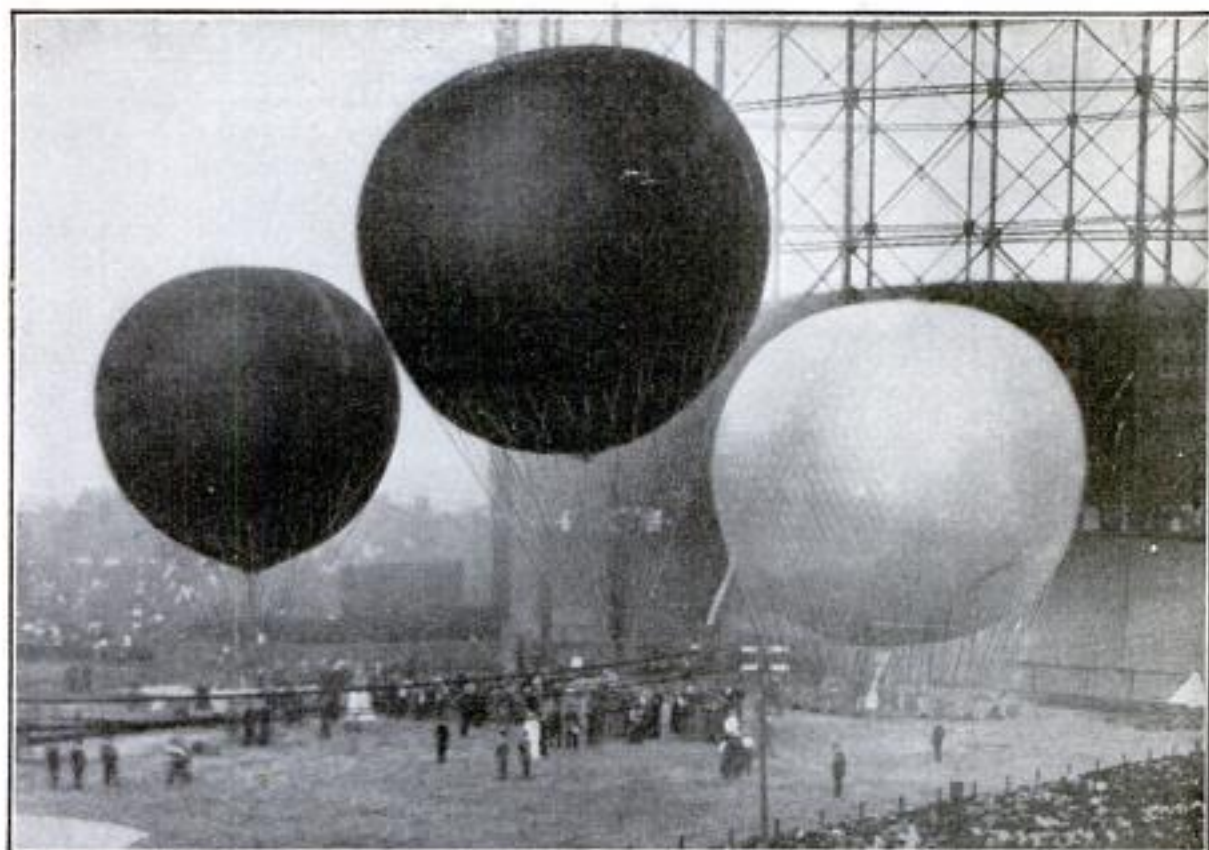
The balloons drifted slightly east of north the first few hours of the flight and then were wafted in a more easterly direction during the remainder of their stay in the air. The "America II" remained in the air 46 hours.



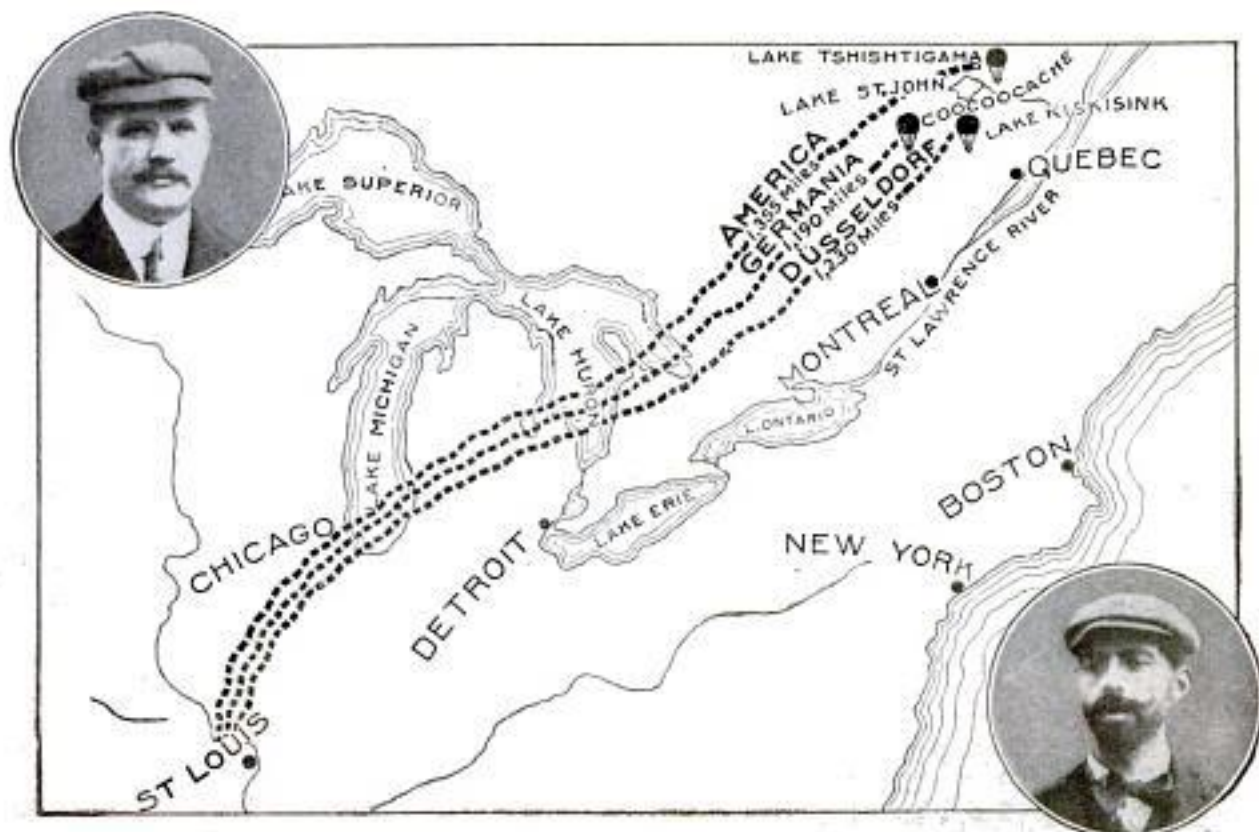
Grahame-White Departing on Washington Visit—War Department on Left, White House on Right

AIRMAN VISITS WHITE HOUSE IN AEROPLANE

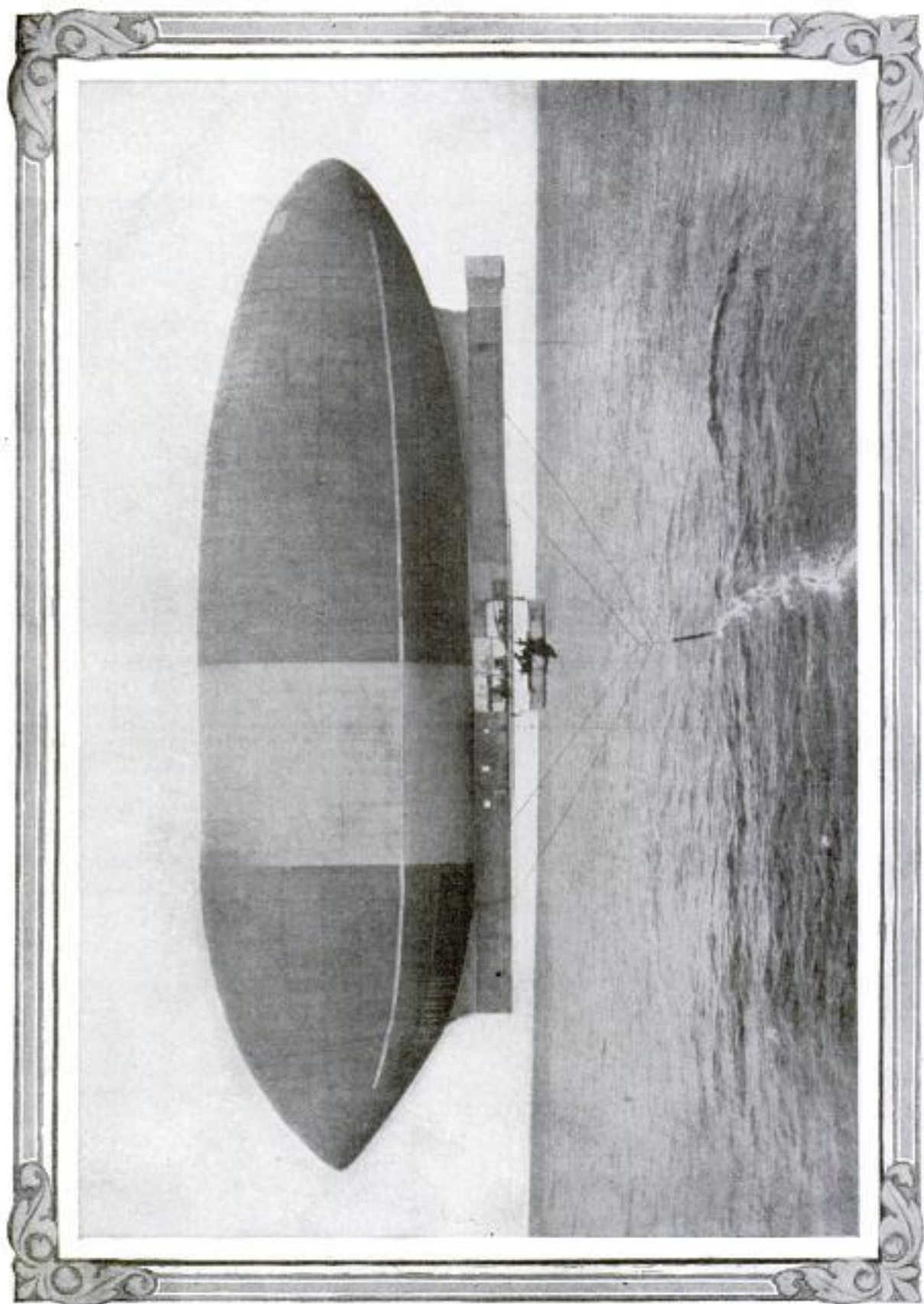
Claude Grahame-White astonished the people of Washington, D. C., October 14, by flying from the Benning race course, just outside the city, to the War Department building, where he alighted in the narrow street between the White House and the big war office, which also houses the State and Navy Department forces. Admiral Dewey, Major General Wood, Assistant Secretary of War Oliver and a host of minor officers and employes of the government were on hand to greet the aviator. After calling at the White House, and on the heads of the military and naval establishments, the airman mounted his machine and returned to his starting place.



Balloons "America II," "Düsseldorf II" and "Germania"—"Düsseldorf II" Starting from St. Louis



Map of the Flight of the Three Prize Winners—Alan R. Hawley (in the upper left-hand corner) and Augustus Post (in lower right-hand corner), the Pilot and Aide of the Winning Balloon, "America II"



Copyright, Pictorial News Co.

"America" Drifting Broadside at Rate of 15 Miles an Hour—Note Wake of Equilibrator

THE WELLMAN-VANIMAN ATTEMPT TO CROSS THE ATLANTIC

By J. Q. ROBERTS

ENTHUSIAS-
TIC as are
Walter Wellman
and Melvin Vani-
man, partners in
the attempt to
cross the Atlantic
in the airship
"America," both
bow to the prowess
of the wind.
The attempt was
indeed creditable,
yet it served to
demonstrate the
inability of a man-
made machine to
cope with distance
and the elements
at this stage of the
development of
aerial craft. Their
hope lies in the
same direction in
which the builders
of the aeroplane
are now looking—
the improvement
of the gasoline
engine, greater
horsepower with
smaller consumption
of fuel, and decrease
in weight.

Undaunted by the
first rebuff, they de-
clare they will try
again, building an-
other airship in the
construction of
which they will pro-
fit by experience.
Both are sincere be-
lievers in the ulti-
mate triumph of the
dirigible, adhering to
the theory that the
aeroplane will never



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Preparing Breakfast on the "America"



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George
Grantham Bain

Walter Wellman

be a craft of great
carrying capacity,
and that the diri-
gible will be the
freight and pas-
senger carrier of
the future. There
is to be no com-
bination of the
two types. In this,
the Wrights, and
other aeroplane
experts agree with
them. Each type
must work out its
own destiny, de-
veloping along its
own lines like the
locomotive and
the automobile.

They realize
that an "enlarged"
airship means
added susceptibil-
ity to the winds,
but they rely on
improved and
stronger motors
as their salvation
in future attempts.

Mr. Vaniman,
strong as is his faith
in the dirigible, will
not say that the air-
ship, in the near fu-
ture at least, will
reach a stage of de-
velopment where it
can defy a gale.

In the opinion of
Mr. Vaniman, his
creation, the equilib-
rator, proved its
worth. It consisted
of a steel cable on
which 30 steel tanks,
concave at one end
and convex at the

other, were strung, so that when placed end to end they formed a flexible string. These tanks were filled with gasoline. As the supply ran short, tank after tank was hauled into the balloon and used. At the end of the gasoline tanks, a series of 40 wooden blocks was strung, each of these blocks 20 in. long, the entire length of the equilibrator, tanks and wooden blocks being 330 ft.

This equilibrator took the place of ballast. Under ordinary conditions, the dirigible sailed at a height of about 200 ft.; with the lower end of the equilibrator trailing in the water. When the gas began to expand, and raised the balloon, the weight of the equilibrator became greater. When the gas contracted, and the balloon began to settle, more of the equilibrator rested on the water, thus relieving the balloon of weight. Day by day, the leakage of gas decreased the lifting power of the balloon, but the consumption of gasoline from the equilibrator tanks kept apace.

The balloon itself was 228 ft. long, 52 ft. in diameter, and had a lifting power of nearly 12 tons. The gas bag was flexible, but rigidity was secured by a long car of steel tubing slung under the gas bag. The car was 156 ft. in length and was

attached to the bag by means of rope connections and bands formed on the envelope. A steel tank, 75 ft. long, used for the storage of gasoline, was secured to the under part of this framework.



Copyright by George Grantham Bain
Melvin Vaniman and the Cat Which Made the Aerial Trip

Three gasoline engines were carried, two being used for power, while the third served for general utility purposes. The former were rated as between 80 and 90 hp. Instead of using planes to direct the airship upwards and downwards, the two propellers of the after engine were so mounted as to be capable of an adjustment giving

it an angular motion either up or down. The rudder at the rear of the car consisted of three planes, vertically arranged. One of the features of the airship was the utilization of ballonets, six of them being placed in the

lower part of the gas bag. As the hydrogen gas in the great bag became gradually exhausted, these ballonets were inflated more and more to keep the great bag taut. Mr. Vaniman utilized these bags at the time of the rescue to

point the nose of the airship downward, allowing the air to escape from a ballonet at one end of the bag. One of the illustrations shows the dirigible in that condition.



Copyright, the Pictorial News Co.
The Lifeboat in the Atlantic City Hangar, and View of the Equilibrator as it Lay on the Floor

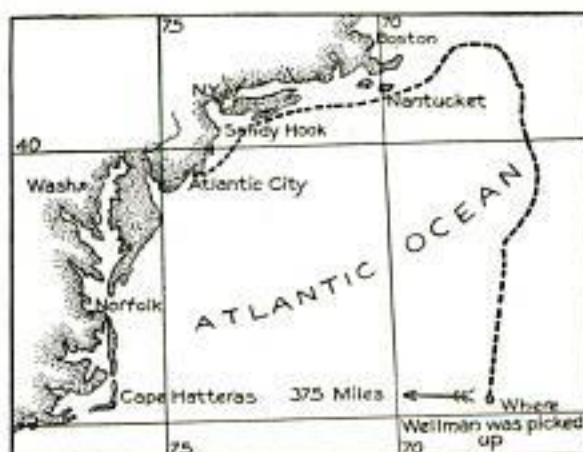
The lifeboat, which was attached to the under part of the framework by ropes, had received careful attention and thorough study. It served its purpose well. It was 30 ft. long and had bulkheads at either end and a cockpit in the middle. The wireless outfit was carried in this lifeboat, as were also the supplies for the crew.

The engines used on the trip were the same with which Mr. Wellman made his attempt for the Pole from Spitzbergen. The gas bag itself, con-

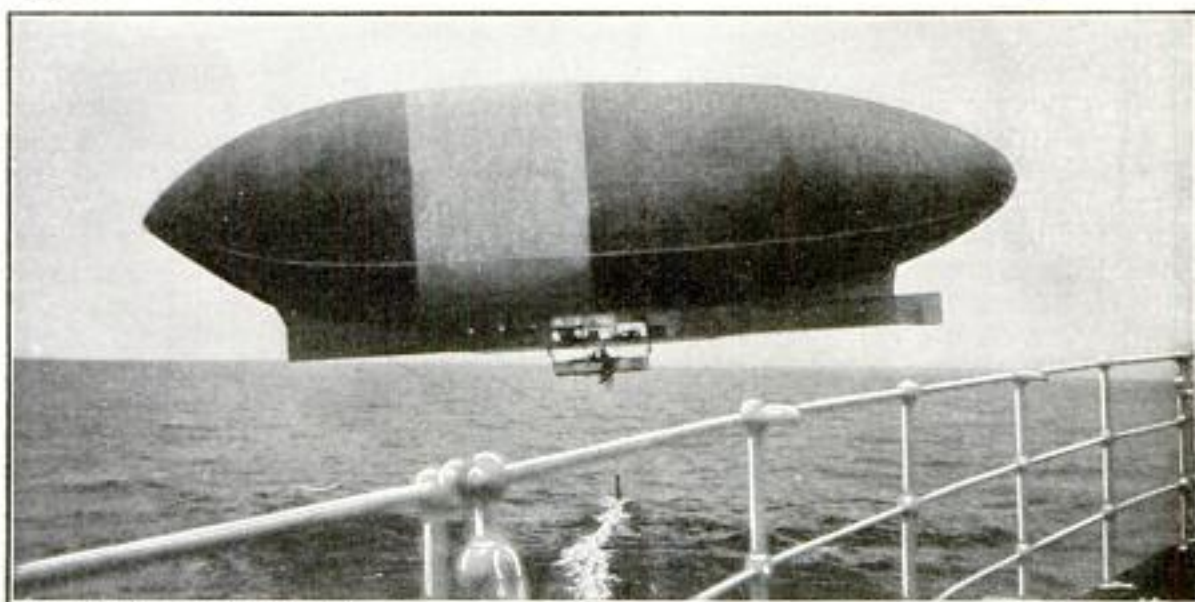
The nearest approach to danger of wreck came when the airship had a narrow escape from colliding with a schooner. A quick turn of the rudder was all that saved it from destruction.

It was very natural that the navigators should be under an intense strain. Hardly one of them slept the first night, but the second night, says Mr. Vaniman, he slept as soundly as if in his bed at home.

Because of the lack of a flywheel, the keys of the bevel gear of the



Map Showing the Course of the "America" from Atlantic City to the Place Where the Dirigible Was Abandoned



Copyright by George Grantham Bain
This Photograph of the Airship Was Taken by a Passenger on the Steamship "Trent" from the Deck of the Ship. It Shows the "America" Maneuvering to Launch Its Lifeboat

siderably lengthened, had also seen service in the polar expedition.

It had been understood by the six men who were to make up the crew that when the dirigible was taken out of the hangar at Atlantic City, an attempt would be made to cross the Atlantic immediately. The ship was taken out Saturday morning, October 15, and immediately started to sea. For several days, the aerial explorers kept in touch with the shore by wireless.

crankshaft leading to the aft propeller slipped, and the aft power plant was put out of commission. This brought about serious complications. The loss of the propellers interfered with the control of the dirigible, as they were relied upon to steer the airship upward and downward. A freshened wind set up a surging motion of the equilibrator, thus pulling the airship down until it almost touched the water. Then the dirigible swung upward, clearing the

entire equilibrator. Next the equilibrator was swung forward like a pendulum, dragging the balloon down again, and this performance was repeated continually. It was natural that this would tend to strain the framework. The inability to use the aft propellers because of the failure of the engine was held responsible, however, and not the equilibrator itself.

"We realized before we had been up very long that there was little hope of reaching Europe or Africa after the wind began to carry us southward," said Mr. Vaniman to the writer. "Therefore, when we sighted the 'Trent' on Tuesday morning (October 18) we realized that to continue our voyage would be useless and probably suicidal. We were sailing out of the beaten track of steamships, and it would only be a question of days before, because of lack of gasoline, we would be buffeted helplessly by the wind.

"Just before we left the ship, we discussed whether we should allow the 'America' to drift on in the air. We decided that if it got back to land, the long equilibrator would be a menace should it pass over a city, and just before we deserted it, I tied a heavy can of gasoline on the valve string, allowing the gas to escape. Of course, we were sorry to lose the ship, but there was nothing on it we could have used in another. The equilibrator has vindicated itself and several other hitherto

untried theories have been given a trial. We do not know, ourselves, along just what lines the new ship will be built.

"We had made two records for dirigibles. We had been in the air 71½ hours in contrast to the previous record of 37 hours made by Zeppelin. And we had traveled 1,008 miles. The former record was 850 miles."

The operation of lowering the lifeboat into the water was a dangerous one, and was accomplished with considerable difficulty. The airship at the time was drifting broadside to the wind at the rate of 15 knots. This meant that the lifeboat had to be launched sideways also. Relieved of this weight, the balloon shot upward and the heavy equilibrator, striking the boat stove a hole in its bow. Wellman and Vaniman both declare they will yet cross the ocean in a dirigible balloon. With them, it has become almost a fetich. Both are men of dogged determination, but they approach the culmination of this ambition of their lives from different viewpoints. Mr. Wellman primarily is an explorer, Mr. Vaniman is essentially an engineer. As a boy, he worked on a farm in the middle West, but he wanted to see the world and traveled all over it, finally locating in Paris. His experimental work with dirigibles attracted attention there, and he is now considered one of the few men who are doing creative work with lighter-than-air craft.

ANOTHER TRANSATLANTIC TRIP PLANNED

Joseph Brucker, a German-American journalist, has planned to make, this winter, a transatlantic voyage in a dirigible balloon of his own design, starting from the Canary Islands and landing in Cuba or Bermuda. Mr. Brucker has been an American citizen since 1876 and was for many years connected with the German press of Chicago and New York. He will use a dirigible balloon, 200 ft. long, with a gas capacity of 8,500 cubic meters. The machinery

will consist of two 200-hp. gasoline motors which will turn two propellers. The balloon will also carry a 35-ft. lifeboat equipped with a gasoline motor. The aeronaut is counting on the northeast trade winds to help him in his voyage.

To overcome the effects of the sun's heat on the balloon, Mr. Brucker will utilize water which he will pump from the sea, through a long hose, by means of an automatic pump, into tanks which

will be kept filled during the day and emptied at night. In this way, he expects to do away with the use of any other system for maintaining an even keel and a uniform height. The start will probably be made early in February. The balloon in which the attempt will be made, known as the "Suchard," has been very carefully constructed under the personal direction of Mr. Brucker. He at first intended to start from Cadiz, Spain, and then changed his plans by making Teneriffe, in the Canary Islands, his base. If he succeeds in reaching Cuba or Bermuda, it is his intention to continue the voyage to New Orleans.

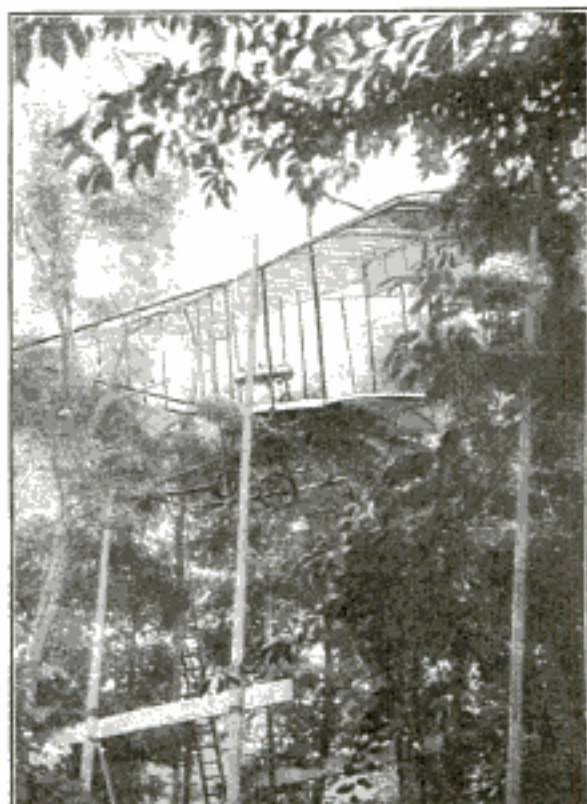
FIVE AIRMEN KILLED IN OCTOBER

The aeroplane was responsible for five deaths in October, four of the victims being European Army officers. Haas, a German, fell while engaged in a cross-country distance competition from Treves to Metz, October 1, and was instantly killed. In Russia, two officers of the army met death in experimenting with machines recently purchased by the government. Capt. Macievich fell from an altitude of 1,640 ft., October 7, and almost every bone in his body was broken. A day or two later Lieut. Matsievski, with whom Capt. Macievich had been competing in an altitude race the day he was killed, met his death in the same way, falling a distance of 1,500 ft. In France, October 23, Capt. Madiot of the French army, fell a distance of 100 ft. while making his first practice flight, and was crushed under the motor; and in Italy Lieut. Saglietti was instantly killed, October 27, at Rome, while maneuvering with a military aeroplane.

EXTRAORDINARY ACCIDENTS BEFALL AIRMEN

Comedy rather than tragedy attended the series of accidents encountered by Mahieu and Loridan in their efforts to win the prize of 25,000 francs (\$5,000), offered by the munici-

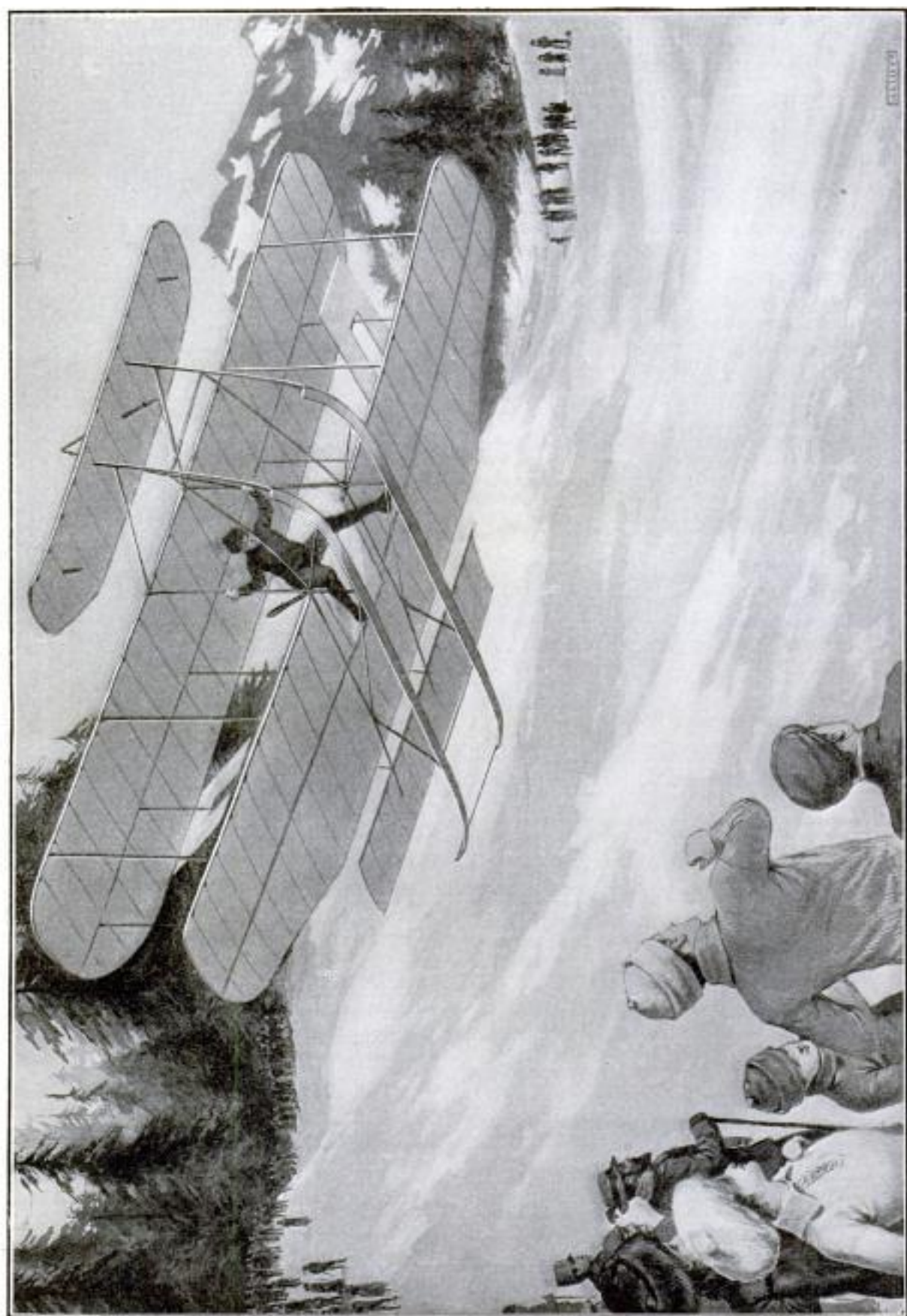
pal council of Paris for a flight with a passenger from Paris to Brussels on the occasion of the council's visit to



Aviator Loridan's Aeroplane Caught in a Tree

the Belgian capital. Mahieu was unfortunate enough to arouse the anger of a large dog as he was about to alight near Bagatelle, and the animal sprang at his aeroplane with such ferocity that he broke the propeller. Near Saint-Quentin, Loridan, for a reason wholly unaccountable, dropped with his machine straight down into a tree where he was very comfortably propped, but was unable to release himself. The fire department was called out, and the aviator "rescued" from his amusing plight by the use of hastily constructed scaffolding and extension ladders.

☞ Kaiser Wilhelm has ordered a fleet of 40 monoplanes for the German war office, to be delivered next spring. The German army has also placed an order for six Krupp aerial guns to be mounted on motor cars of 60 hp. and to have a range of 12,000 ft. Shells will be used that have a detonating force sufficient to wreck any airship within 100 yd. when they explode.



Winged Sleeking a New Sport

AERO-SKEEING

Skeeing, the winter sport almost akin to flying, has now become a real flying sport in some parts of Europe, through the development of an aeroplane-skee or glider, provided with skee-like runners. A snow slope like those used for skeeing, but without the rise at the bottom which starts the jumper into the air, is provided. Down this the glider rushes at a rapidly increasing speed, until sufficient momentum is gained. Then the operator manipulates the elevating rudder and the machine soars off into the air.

**SMALL METEOR STARTLES
OHIO FARMER**

A small meteor of cylindrical shape, weighing but 3 lb. 2 oz. and measuring but 12 in. in length, fell recently on the



farm of Daniel Lawyer near Westerville, Ohio. Mr. Lawyer saw the meteor fall during the night and describes its flight through the air as appearing like a streak of fire. The meteor was found the next morning. It was light gray in color,

of irregular surface and appeared to be covered with patches of sulphur and flint. Underneath the outer coating, it looked like pure white marble. It had broken into two pieces by the force of its fall and was partly buried in the earth. The two pieces were temporarily united so that a photograph apparently showing it unbroken could be taken.

LOCKET UMBRELLA HANDLES

An interesting novelty in umbrella handles is shown in the accompanying illustrations, in one of which the handle is shown with the locket closed, and in the other the head of the handle with the locket open. The idea was worked out as a means of adding to the value of umbrellas as Christmas gifts.

**BALLOON-LIKE LIFE
BRACE AWARDED
PRIZE**

The Anthony Pollock prize for the best life-saving device for ships invented during the year has been awarded to a French invention known as a "life-brace." It is provided with air pockets of material such as is used in the making of strong dirigible balloons and is worn with suspenders. A single touch to the cartridges filled with liquefied carbonic acid, which are connected to the brace, causes it to swell instantly into taut balloons. These fit in such a position that the upper part of the body of the wearer is held out of the water, and will keep him afloat for 36 hours.

**SEVENTY LIVES LOST BY AN
EXPLOSION ON GUNBOAT**

Seventy lives were lost by the sinking of the Haitian gunboat "Liberté" after an explosion off Port au Prince, October 26. Ten of the victims of the disaster were generals of the Haitian army who were on their way to attend military maneuvers in the northern part of the island. Twenty persons were saved from the wreck, but none of them could tell whether the explosion was due to defective boilers or powder in the magazines.

NEW INCANDESCENT LAMP

A new process and apparatus for producing incandescent lighting from kerosene has been patented by a Chi-



Harvesting Grain by Motor Truck

cago inventor. The kerosene, which is a mixture of hydrocarbons having different boiling points, is delivered in the form of a spray or mist mixed with air, and this mixture passes through a heater tube, in which it is converted into a perfectly combustible gas.

The heating tube, provided with a catalytic lining, becomes red hot but does not ignite the mixture. The new lamp is said to be different from other lamps for hydrocarbon incandescent lighting in that the heat is applied to the oil while passing through a highly heated channel, instead of in an inclosed generating chamber. It is claimed that this method prevents the deposits of tarry or other solid matter which interfere with the continuous use of other types of incandescent kerosene lamps. The mantles are of the same type as those used for gas-lighting.

And now there is an "aerial post card." It is to be dropped from an aeroplane, and bears a printed request that the person finding it on the ground mail it at the nearest postoffice.

ELECTRIC TRUCK ON FARM

The electric truck shown in the accompanying illustration is in use on a farm a few miles from Rochester, N. Y.

During the harvesting season, it transports loads consisting of as many as 617 bundles of wheat. The usual two-horse load consists of about 260 bundles. The truck is of 3½ tons' capacity.

**TRAINED RESERVE
PLANNED FOR
ARMY**

An enormous reserve army of from 90,000 to 100,000 men to supplement the present fighting force of the regulars and militia is being planned by Maj. Gen. Leonard Wood, chief of staff, and other officers of the War College.

It is the plan of the department commanders to recruit this new force from the ranks of the regular soldiers who have been honorably discharged, and from state militiamen who have served their time and failed to re-enlist.

Every year thousands of soldiers in the regular army are discharged. They have served their three years and again resume their pursuits in private life. These men are highly trained. They were educated in military work by the government, and it is this training that the War College officers now want to take advantage of.

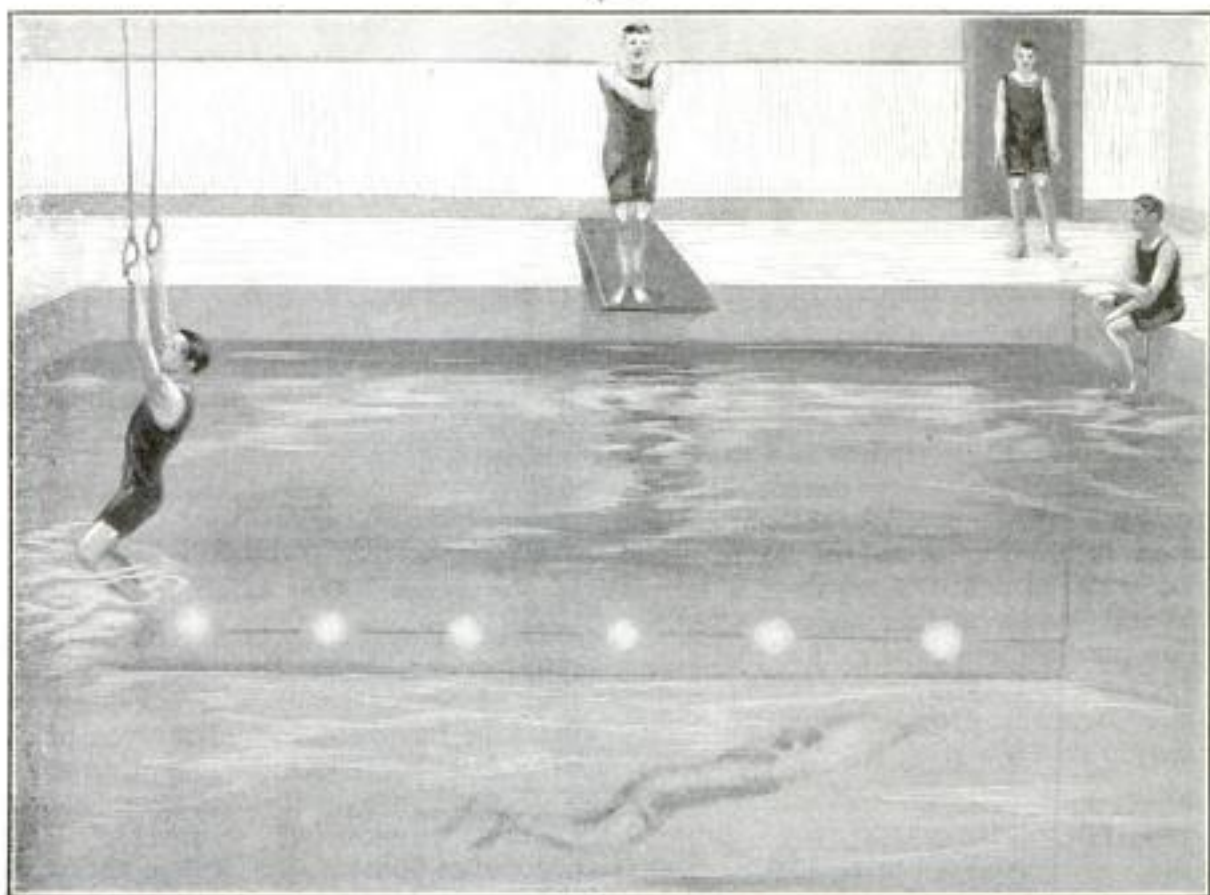
The plan as proposed by General Wood and his associates provides that the reserve force join in the annual maneuvers of the regular army and the militia. This would serve to keep the discharged men in a state of fair efficiency.

An enterprising London café proprietor has adopted the scheme of projecting motion pictures on a wall opposite his place of business, thus providing free entertainment for his customers.

LIGHTS UNDER WATER IN NEW NATATORIUM

A novelty in natatoriums has been introduced in Chicago in the form of a swimming-pool with a row of brilliant electric lights placed at the bottom of its deepest portion. The pool was recently completed for the Oak Park Y. M. C. A. and is of regulation size and construction, except in the particular of having the water illuminated from beneath. The lights are 32-cp.

danger of drowning, should he be seized with cramps and sink to the bottom of the tank unnoticed. With the lights shining through the water, such an accident should be practically impossible, as a swimmer can easily be located all the time he is beneath the surface, whether diving, swimming or sinking through loss of control of his faculties.



Manner of Illuminating Swimming Pool as Safeguard against Accidents

tungsten lamps and six in number. They are placed in hermetically sealed glass fixtures, resembling the ordinary fruit jar, which are securely fastened to the bottom of the tank at the extreme end of the deep-water section. When the current is turned on, the lights give the water a soft phosphorescent glow. The idea originated in a desire on the part of the managers of the natatorium to safeguard the swimmer against the ever-present

PADDED JACKETS FOR AVIATORS

Among the many devices for the protection of aviators in case of fall exhibited at the recent International Congress of Aerial Leagues at Boulogne was a padded jacket and headpiece. The headpiece protects the head, neck and lower part of the face, only leaving the eyes and nose exposed.

In the tests, the inventor of the

jacket hurled himself, head first, against a rough stone in one of the city's walls and suffered no harm from



Front and Rear Views of Safety Suit for Aviators

the impact. The outfit, however, is very cumbersome, as the padding of the jacket and headpiece is 6 in. thick.

Another interesting device brought forward was a parachute which will open fully after a fall of 30 ft. The old style parachutes required a fall of several hundred feet before opening. The possibilities of the new parachute were personally demonstrated by the inventor, who dropped from an elevation 30 ft. high with it.

"AUTOMUSICOGRAPH" FOR COMPOSERS

After years of vain effort, Don Angelo Barbieri, an Italian inventor, claims he has succeeded in devising an "automusicograph" which is represented to give the composer the service a typewriter performs for an author. The device consists of a paper roll that is revolved by clockwork. The playing work of the composer at the piano is recorded on the roll in dashes of different length and on different lines, as the value or tone of the note recorded demands. After the composition has been thus recorded, the roll is detached and

with a graduated scale the musician is able to reproduce on ordinary paper, ruled for music, the exact phrase or combination of notes he has played on the piano.

WINNIPEG IS NOW AMERICA'S WHEAT CENTER

Winnipeg is now the wheat center of North America, according to the latest reports from the great grain districts. The August receipts of wheat in the Canadian city show an increase of 50 per cent over the same month last year and give her a total that exceeds those of Minneapolis, Chicago, Duluth, Kansas City and Buffalo. Exclusive of deliveries from Southern Manitoba, Winnipeg received 95,000,000 bu.; Minneapolis receipts totaled 81,000,000 bu.; Buffalo, 61,000,000 bu.; Duluth, 56,000,000 bu.; Chicago, 30,000,000 bu., and Kansas City, 35,330,000 bu. The statistics for oats show Chicago at the head of the list and Winnipeg second with 31,000,000 bu.

CONGRESS WAKING UP TO NEED OF AIRSHIPS

If the House Committee on Military Affairs can have its own way, the United States army will not long remain in its present predicament of an utter lack of aeronautical equipment.

"I shall use every endeavor at the coming session of congress," said Chairman John A. T. Hull of the committee, "to bring about an appropriation of at least \$500,000 for development of a balloon and aeroplane service in the army. The course that congress heretofore has pursued is nothing short of criminal negligence. The United States has been derelict, and there should not be a moment's hesitation at the session this winter to supply the army with funds that it may equip itself with this essential resource of war."

The present activities in the aeronautical field have aroused Chairman Hull to a renewed appreciation of the

situation that the United States army is in, and to a determination to do his utmost to correct it.

Congressman Hull had a conference with Major George O. Squier, of the Signal Service, learning from him just how aeronautic matters stand in the United States army and in the armies of other nations. Major Squier returned only recently from a visit to Europe, and has an intimate understanding of what is being done everywhere in the promotion of the balloon and, particularly, the aeroplane for war service.

Maj. Squier has been directed to get his plans in shape to submit them to congress so that he can enlighten both branches on the needs of the army and of the urgency of immediate action. With the facts before them, it is thought that the members of congress will be made to realize the plight of Uncle Sam's war men, and that there will be no delay about authorizing the appropriation.

HUDSON RIVER BRIDGE PLAN HAS BEEN ABANDONED

The plan to bridge the Hudson from New York to the Jersey side of the river has at last been abandoned. Railroad constructors who have been at work on the project have had but poor results from their experiments with foundation borings and have been forced to give up their work. In no instance have they discovered bed-rock within working depths below the water level. The indications are, however, that a tunnel between Manhattan and Jersey can be constructed at much lower cost than a bridge, and from the results obtained in the operation of existing subways, such a form of connection can be operated even cheaper than ferries.

¶ Henri Farman, who has a school for flying at Mourmelon, is a master of Esperanto, and every evening when the day's work is done, he hoists the Esperanto flag over his hangar and gives his pupils lessons in the language.

INSTANTANEOUS PHOTO OF UNUSUAL CLEARNESS

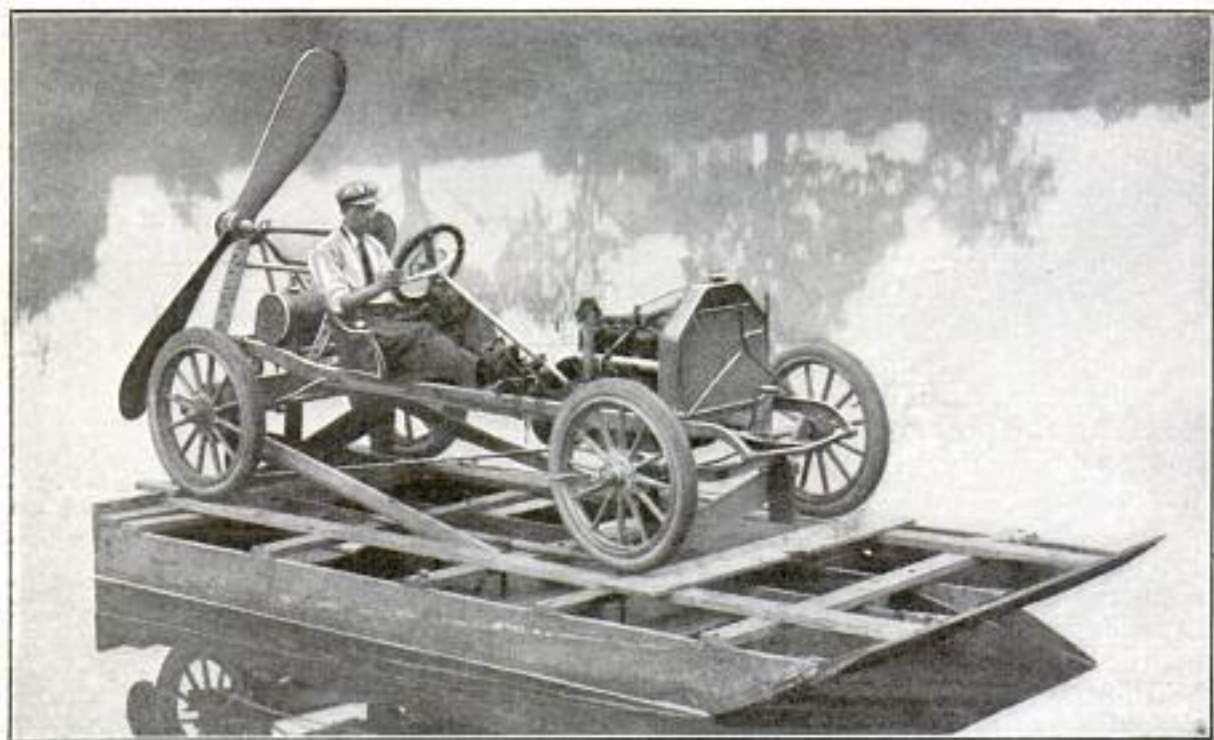
A remarkable example of accurate photography was obtained recently at the athletic meet held under the auspices of the Y. M. C. A. at Toronto,



Remarkable Photograph of Toronto Pole Vaulter

Canada. A picture of Alexander Cameron vaulting the bar at 11 ft. 9 in. was made, which shows the athlete just as he is topping the bar. Every detail of the scene depicted is shown with minute accuracy. The plate was exposed for only the very smallest fraction of a second.

¶ From experiments conducted in France with a 5,700-ton vessel, it has been calculated that a modern cruiser of 20,000 tons' displacement, running at a speed of 19 knots, if its engines were stopped, would, after continuing to run for 52 min. with decreasing speed, still retain a speed of 1 knot and would then have traveled 5 km. (3.1 miles).



Combination Wind Wagon and Boat

WIND WAGON THAT RUNS ON LAND AND WATER

The wind wagon, a picture of which was printed in *Popular Mechanics* for September, can be mounted on floats and travel on water as well as on land. Used as a wagon, the machine has attained a speed of 25 miles an hour with an aeroplane propeller. When needed as a boat, it is placed securely on a

barge, ropes are attached to the front wheels and the rudder, and the steering is done with the wheel, just as if the machine were on land. The power exerted by the propeller is so great that when the engine throttle is wide open, the barge is driven beneath the surface of the water.

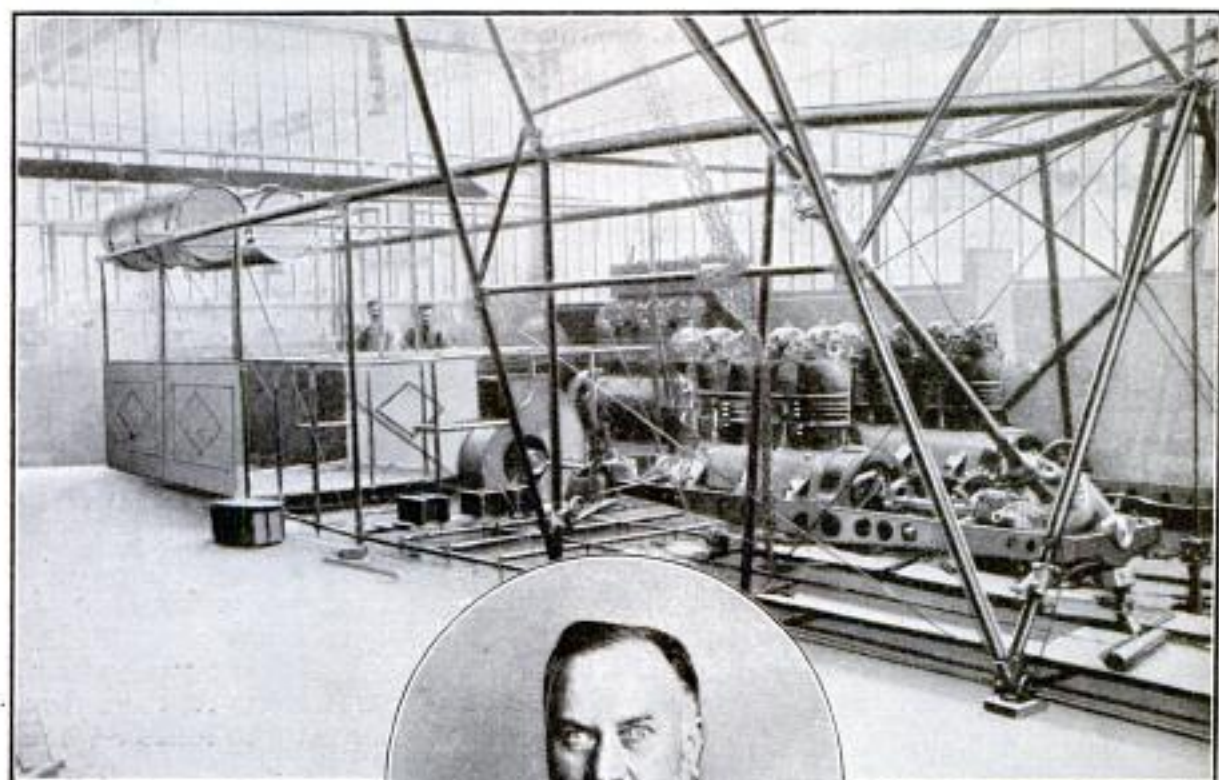
THE CLEMENT PARIS-TO-LONDON AIR PASSENGER SCHEME

By W. F. BRADLEY

M. GUSTAVE CLEMENT, the French automobile manufacturer who recently achieved the feat of sailing in a dirigible balloon from Compiègne, near Paris, to London, is convinced that a Paris-to-London airship service can be maintained as a regular feature of the tourist season during three months of the year, the vessel leaving the French capital in the morning and returning the same evening. His initial trip, made October 16, occupied six hours, beating the best time that can be made over the 195 miles separating the two great capitals by

fastest express trains from Paris and Calais and cross-channel steamers between Calais and Dover.

The "Clement-Bayard" was conveyed across the Channel by three French torpedo-boat destroyers, and, following the line of the railway from Folkestone to London, circled St. Paul's Cathedral, passed over the Houses of Parliament and finally made a landing at Wormwood Scrubs, the starting place in the London-to-Manchester aeroplane race. It was a thoroughly successful and uneventful voyage, made at an altitude varying from



The Two 150-Hp. Motors and
Clement Balloon for the Lon-

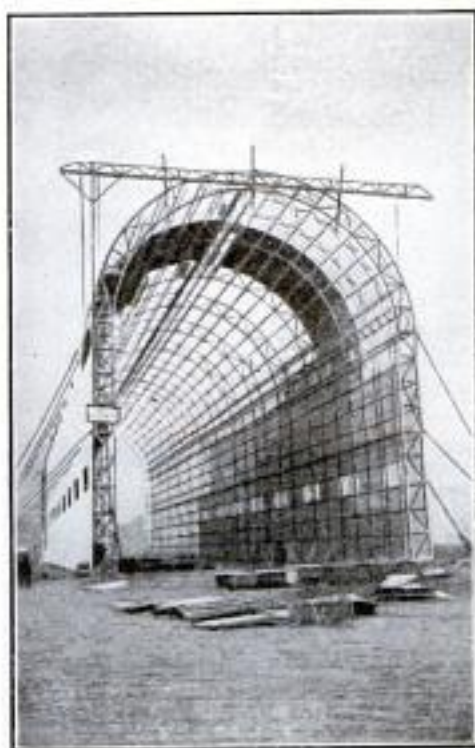
Steel "Nacelle" on Car of the
don-to-Paris Airship Line.



GUSTAVE CLEMENT

300 to 700 ft., and cheered by thousands of spectators gathered at points along the route, which was by way of Amiens, Abbeyville, Boulogne and Folkestone.

The engines worked perfectly, it is reported, and except for some slight rocking caused by gusts of wind, the air vessel rode steadily. In addition to Constructor Clement, in command, the engineer and designer, and two steersmen, the ship carried, as the only passenger, Mr. Arthur DuCros, M. P., representing the British Parliamentary Aerial Defense Committee. The craft is constructed to carry 39 passengers and the crew.



New Clement Dirigible Balloon Shed
in Course of Construction

M. Clement has a faith in the success of the proposed airship line, and the necessary fortune to make his faith practical. As one of the most successful automobile manufacturers in France, he has also at his command the requisite technical skill, the factories and the work-people for carrying out his ideas.

At the British terminus of the proposed air line, a shed has been erected by the London supporters of the scheme on an open plain in the east end of the city. Two other sheds have been constructed in France, one near Pierrefonds and the other at Issy-les-Moulineaux, in the suburbs of Paris and

only about two miles from the Clement factory. A hydrogen-producing plant has been erected where it will be possible to produce about 45 cu. ft. of gas for one cent.

Hitherto, French airship constructors have been handicapped by the difficulty of obtaining a sufficient quantity of hydrogen at a low price. A smaller gas plant has also been erected at Issy-les-Moulineaux with sufficient capacity for producing all the hydrogen needed for replacing the loss through leakage or other causes.

The Pierrefonds and Issy-les-Moulineaux sheds are each 860 ft. in length, 125 ft. in width, and 230 ft. high. The framework of the structure consists of a series of 14 steel arches, equally spaced and united by longitudinal girders. This gives a vast arched building, lighted principally from the sides, but also from the roof by a few small windows. The main object, apart from obtaining shelter from wind and rain, is to so construct the shed that a uniform temperature can be maintained day and night, without the use of artificial heating apparatus. This has been accomplished in the Clement sheds by covering the steel framework with sheets of corrugated galvanized iron in two layers, with about three-quarters of an inch of cork between them. The plates are each about 4 by 5 ft. Sandwiched between them are slabs of cork produced in a mold from scrap cork with glue as a binder, thus forming a layer quite as effective as sheets of natural cork and at a very much lower cost. The two galvanized iron plates, with the cork between them, are bolted together, then riveted to the framework of the shed. This covering prevents the penetration of the sun's rays and at night retains the heat of the shed.

All of the main arches are embedded in solid blocks of masonry, forming a foundation. In addition, the structure is anchored on the outside by a series of stout steel cables attached to U-irons sunk in huge blocks of masonry sunk several feet in the ground. With such a foundation, it is calculated that

the most violent gale will have no influence on the safety of the shed.

The floor is of cement, and in it are sunk three sets of rails for electric trains used for hauling the airship into its shed, as well as for carrying material to any portion of the *nacelle*. Telescopic ladders, mounted on bogies that run on these rails, allow convenient working on the lower portions of the gas bag and netting. One end of the shed forms the main entrance and is closed by two huge sliding doors running on upper and lower rails and operated electrically. Artificial lighting throughout is by means of incandescent electric lamps.

There are two motors for each airship, each motor developing 150 hp. and capable of driving the airship alone. The two running together drive it at a speed of about 30 miles an hour in still air.

Each of the Clement airships has a capacity of 290,000 cu. ft., as compared with 124,000 cu. ft. for the largest dirigible balloon previously built in France. It has a rigid body, considerably lighter than that of the "Zeppelin," and within which are six ballonets. Beneath the gas envelope is the all-metal *nacelle* on which the two motors are mounted side by side in the longitudinal axis of the airship. Each engine drives a large wooden propeller through bevel gearing. To prevent a disaster such as befell "La République," slow-turning wooden propellers are employed, with guards to prevent a broken blade from flying off and striking the gas bag. Such a breakage is very unlikely, however, with wooden propellers.

☞According to a recent report of the census bureau, over 4,000,000 cords of wood were used in the manufacture of wood pulp for paper-making in the United States in 1909.

☞The Grand Trunk Association has announced that aeroplanes will not be carried as baggage on any railroad in this country, but must be sent by freight or express.

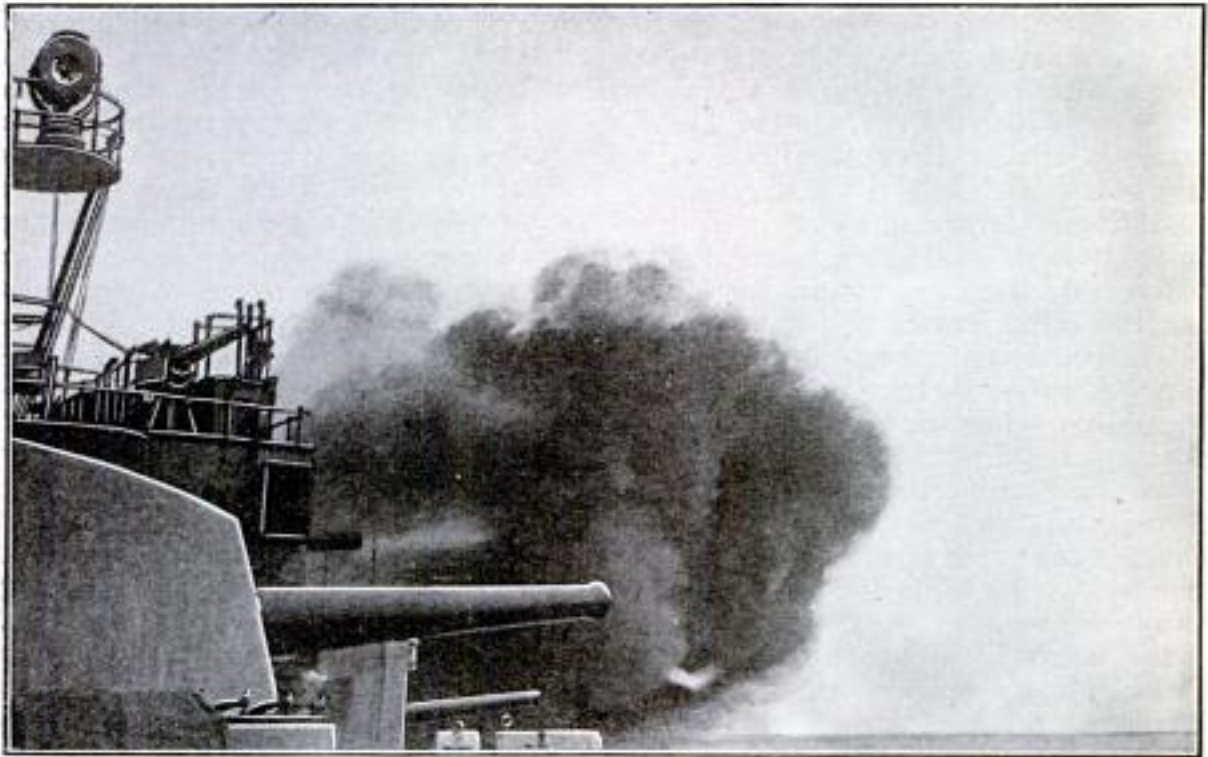
THE NAVY IN BATTLE PRACTICE

By L. WILLIAM THAVIS

FACING conditions as closely approximating actual war as is possible in time of peace, the Atlantic fleet of the United States Navy came through its first severe battle-practice test off the Virginia capes with brilliant success. In only one particular was a lack of efficiency even suggested. The wireless equipment of the ships did not,

behavior of the two dreadnoughts, the "Delaware" and the "North Dakota." These doubts were completely dispelled by the results obtained, which naval officers declare show the American ships to be without a superior in personnel and material.

The battle practice was conducted, it is believed, under conditions more exacting even than an actual battle



Firing a Broadside During the Battle Practice

according to unofficial reports, give the service expected and demanded of it. But this was the first time in the history of naval training that the apparatus had been subjected to so severe a test, and the deficiencies developed will be made good by the installation of improved appliances. The battle practice this year was on a larger scale than ever before attempted, and there had been some doubts expressed as to the ability of the commanders of squadrons and divisions of the fleet to carry out to the letter the instructions given them. There were also misgivings as to the

would present. They surpassed in that respect those under which similar practice is held in foreign navies. So far as known, the longest range of firing in similar maneuvers of other navies has been 6,000 yd., whereas the shortest range in the practice this fall was 9,000 yd., or nearly four and one-half nautical miles, and the greatest range, 12,500 yd., or more than six nautical miles.

All world's records for gunnery were broken by the crew of the battleship "Idaho" in the big-gun target shooting held between Capes Henry and Charles. The new marks set by the 12 and 7-in.

guns of the 10,000-ton sea fighter, which by the side of some of the recently-built dreadnoughts of Germany and England is a mere pygmy, are just now the talk of naval circles everywhere in the world.

During the practice in which she won her championship, the sailors of the "Idaho" shattered targets at 10,000 yd. distance. Had the little vessel been in battle, she would have shattered, in five minutes, a battleship at a distance of five miles, had she shot with the same accuracy.

To the "Idaho" has been given the red pennant which marks her as carrying the best gunners. This is by no means a reflection on the crews of the other ships that took part in the marksmanship trials. Every battleship distinguished itself. The "Vermont" and "Minnesota" were so close in results to the "Idaho" that it was several days before a decision was announced favoring the latter vessel.

Two years ago, the record made by the "Idaho" would have been an impossibility. For example, when the crew of the "Indiana" hit a mark 4 ft. square four times consecutively at a distance of 1,600 yd., the navies of the world were astounded. Yet the "Idaho" has hit a mark nearly 10 times as far distant. In 1904, the "Wisconsin" made a world's record that was thought equally astonishing, when at 1,600 yd. she hit a mark nine times out of 10 efforts.

During the same year, Yankee sailors, gunners on the "Kearsarge," hit a bull's eye 1,600 ft. distant, 10 times in five minutes with an 8-in. gun while moving at the rate of 10 miles an hour; and a few months after, a crew on the "Texas" made a new world's record by scoring 11 hits in 10 minutes with 12-in. guns.

The firings by day were made in three runs, the vessels shooting by divisions. In one of the runs, each division approached the targets at an angle to the course of the targets under tow, and in a direction generally opposite to the progress of the targets, the range and speed of the targets

being known only to the division commander, and unknown to the ships' captains. In another run, the conditions were similar, except that the ships approached in the same general direction as the course of the targets. In the third, the range, direction, and speed of the targets were unknown to anyone in the firing division. This program was calculated to test the effectiveness of the guns, turning-gear, range-finders and other appurtenances, as well as the efficiency of the personnel in handling them.

The night practice was planned with a view to ascertain the ability of the fleet to repel attacks by torpedo craft. The targets were anchored in two lines, 4,000 yd. apart, the vessels passing between the rows of targets and firing broadsides at them. It was found that the searchlights were not effective enough beyond a distance of 2,000 yd. As there are now torpedoes with a range of 4,000 yd., it is apparent that searchlights cannot be depended upon to discover attacking torpedo boats in time.

The naval view is that the only effective means for safeguarding a fleet against such attack is a sufficient number of torpedo-boat destroyers. Of these there should be six for every battleship and armored cruiser, five to accompany each vessel, and the sixth to allow for laying up for repairs, etc. As we now have 35 first-class battleships in service, under construction and authorized, and 12 armored cruisers, but only 42 destroyers in service, under construction and authorized, our navy evidently is far short of the requisite number of destroyers.

But the navy does not stop at developing efficient gunners. Careful consideration is given to that most important part of a warship, the propelling machinery, and methods are followed to insure economy and efficiency in other directions. Rear-Admiral Evans, while in command of the Atlantic fleet, was the first to arrange competitions for excellence in engineering and economy in expenditure of coal and other engineering supplies,

and his initiative led to competitions of a like character for all the different vessels which compose the fighting part of the navy. The first general engineering competition was held during the fiscal year which closed June 30, last; the "Nebraska" being announced as winner in the battleship class, and the "Preble" in the destroyer class. At certain periods during the year no records were kept of the competition.

The defects disclosed in the wireless telegraph apparatus will be productive of renewed efforts to perfect that service. The naval experts would be

ent stage. Under the rules of the battle practice, in the conduct of which Admiral Schroeder, commander-in-chief of the fleet, was considerably handicapped by the heavy seas that early interfered with the work of the 16 formidable battleships, the flagship and the vessels of the firing squadron had to be in wireless communication during each run.

The results of the experiments which were made by the fleet are awaited with considerable interest by officers of the navy, particularly in view of published reports that the wireless had proven too delicate for the war game,



Shells Exploding in the Sea around Targets after a Broadside from One of the Big Battleships

surprised to find any troubles not susceptible of improvement as the result of the experiments and the inventive ingenuity of its men, whether engaged in the practical operation of the system aboard ship or in researches looking to making the wireless—one of the vital features of navy efficiency—as reliable as possible.

So far, the Navy Department has received no word in the way of reports from the fleet, that would justify any conclusions as to the working fitness of the wireless plant at sea in its pres-

ent stage. that five minutes of big gun work had put it out of commission on one of the ships, and that, for several hours afterward, it had not responded to efforts of readjustment.

In the opinion of wireless experts, not alone in the navy, but in the army as well, where great strides have been made in achieving success with wireless work, the finding of defects at this time, under the strain of the heavy firing such as has occurred during the fleet's practice, is fortunate rather than otherwise, for it puts the government

in possession of detailed knowledge of obstacles, the surmounting of which should now become the aim of the experts. It is only a physical question, say these navy and army experts, and they add that they would be very much surprised were anything found to bear out the suggestion that the wireless could not be practically worked in time of war.

The Navy Department is working with the view of providing some method of obviating the exposure of the antennae aloft to the shots of the enemy. The object is to work out a

small portable wireless set, which would as much as possible eliminate the extreme exposure of the present high mast, but, of course, such a set—that is, a smaller mast apparatus—would mean cutting down its working distance, for the high mast is vital to the sending of the flashes over wide ranges. The small mast, however, might be carried for quick use in emergencies, where the enemy succeeds in dismantling the regular outfit, or where the latter might be put out of commission temporarily from any other cause.

HIS SATANIC MAJESTY ON THE BRIDGE

"The devil strode the bridge," was something more than an empty phrase to a big shipload of passengers who recently arrived in England after a long



Courtesy the Graphic, London
"The Devil at the Helm"

voyage. Aboard most ships making trips a month or more in duration, the officials of the line do everything in their power to relieve the monotony of

the long days and nights at sea, and on this particular ship a fancy dress ball was given. One of the officers elected to attend the affair dressed as "Mephistopheles." He was so engrossed in the pleasures of the dance that he did not watch the speeding moments, and his turn to go on watch came around before he had time to change his costume. The result was that he had to pace the bridge four hours in the picturesque dress, made by himself from signal flags, of the character he had represented in the ballroom.

LONDON-PARIS TELEPHONE A SUCCESS

London and Paris are now connected by telephone. By means of the new line which has just been completed, people in England are able to talk with the residents of cities in northern France and Belgium. The submarine cable used for the line has proven entirely satisfactory. The authorities hope soon to establish a regular service between London and Marseilles and the various cities of Germany.

¶The Japanese government has bestowed the name of "Chosen" on the new territory acquired by the annexation of Korea.

COMMENT AND REVIEW

CARELESS operation of electric interurban roads, which recently have occasioned accidents far exceeding in the number of fatalities similar wrecks on steam roads, has drawn the attention of authorities to the necessity for better supervision. The electrics, operating as they do almost entirely within the borders of a single state, have escaped the controlling arm of the Interstate Commission. Now the states are beginning to look to the operation of these lines. Wisconsin has already taken an active course, and will not permit the opening to traffic of an electric interurban until the state engineers have personally examined the track and rolling stock. If the roadbed is deemed unsafe, if dangerous curves or grades exist, if bridges or culverts are insecure or liable to washouts, the company must correct all these shortcomings before it can be used by the public. The natural result of such a regulation is that, in Wisconsin, a new road is more carefully built in the first place, and not constructed at lowest possible cost with the expectation of improving conditions later on, from earnings. This handicaps promoters, but safeguards passengers. The recent bad accidents referred to were due not to bad track but to an absence of some safety system at points where two cars approaching on single track were unable to be seen each by the motorman of the other. There are scores of roads throughout the country equally dangerous where the single track curves through cuts, or is hidden in such a manner as to invite disaster. Unless corrected, the day will surely come when some careless motorman will neglect to reduce his speed to the point of safety and, taking chances where he has always been lucky, will do so once too often.

* * *

EXPERT testimony as to the identity of handwriting has of late years lost much of its former value since the experts have increased to numbers permitting both the prosecution and defense to present testimony favorable to the interests of each. But in this case, as in so many others, scientific mechanics has now been invoked to tell a tale utterly devoid of prejudice, and mathematically correct.

Dr. Lindsay Johnson, a celebrated English specialist, has discovered that there is an individuality of heart beats which can be clearly discerned when the handwriting is projected, highly magnified, on a screen. These individual characteristics are pronounced in persons not physically sound, or writing under conditions of nervousness or excitement. Advantage is also taken of the fact that a person in signing his own name does so rapidly and mechanically, whereas a forger writes slowly, which not only gives abundant time for the heart irregularities to be recorded, but they consequently appear more often.

During the experiments at a London hospital, several patients with heart and kidney troubles were given the Lord's Prayer to write. The results of the abnormal pulsations were easily recognized in each case.

* * *

THE postmaster general is breaking the news to us gently, doubtless fearing the public could not stand the shock incident to the change from a \$20,000,000 deficit to 1-cent postage in less than one year. It really begins to look as if some of the needed business reforms which every good business man has recognized for years,

were being made. And the awful, terrorizing, rapacious deficit, which has been caused by carrying newspapers and magazines at 1 cent a pound, and by rural free delivery, and from year to year by various other and convenient scapegoats, is vanishing. Without in any measure wishing to detract from the credit due the postmaster general for his economic work, the fact remains that what has recently been done could and should have been done years ago.

It is now announced that 1-cent letter postage is a possibility of the future. This is desirable, but not the first consideration. The people are not clamoring for 1-cent letter postage, but they are insistent on a parcels post system. If the department has any concessions or reductions to make to the public, let it be in the form of a parcels post such as European countries have enjoyed for years. Two cents for sending a letter does not prevent any one from using the mails for that purpose. The present rate on fourth-class mail matter—merchandise—is absurd and largely prohibitive. We are years behind other countries in this respect. The argument that it can't be done is mere rot, ridiculous and un-American. We can do it, and the only reason we are not doing it today is because of the power and ability, in the past, of the express companies to prevent legislation. The people are thoroughly tired and disgusted with the puerile excuses of congressmen for failure to pass the necessary measures. Apparently the only way to get parcels post is to elect only such congressional candidates as positively pledge themselves to it. What other countries have done successfully for years we can do, and if any congressman tries to convince you to the contrary, one of two things is certain:

Either he does not know what he is talking about, or he will bear watching.

* * *

THE proposed aeroplane race from Chicago to New York, which was announced with so much assurance, turned out to be a first-class fizzle. The whole performance reflected no credit on either the newspapers who apparently tried to get some cheap advertising out of the scheme, or the aviators who allowed their names to be used as "contestants" for the \$30,000 prize. As late as the day previous to the start, those of the entrants who were yet on the ground were expressing confidence in their success. At the last minute, lots were drawn by three to determine who should go through the formality of making a start. The short stick fell to Eugene Ely who flew 11 miles before the gasoline feed pipe became "clogged". The landing was made with some damage to the machine. After repairs, a few miles more were made the second day with another bad landing and more repairs.

Three days "flying" had reduced the 980-mile trip by exactly 21 miles. An average of only 133 miles a day for the remaining seven days allowed, would still have won the prize. Some of the aviators complained at the size of the prize and say \$250,000 would have been none too large to warrant the contest, and refer to the \$50,000 offered by the London Daily Mail for a 1,000-mile flight in England. In view of the records for single-day flights recently made in this country and abroad, there should be nothing impossible in a 10-day flight of 1,000 miles. If the course were planned with pre-arranged stopping places, a man would have to fly only 100 miles in 24 hours, which would give him 20 hours at each station in which to rest, and abundant opportunity for his assistants to inspect and overhaul his machinery. There seems no good reason why our American-built engines should not be equal to a service of this nature and duration.

TO continue the subject—for this appears to be an aeronautic number—chief interest seems likely to center on transatlantic flights. Now that Wellman and his intrepid assistants have made the start, renewed effort may be expected on both sides. Already is building, in Germany, a dirigible in which Brucker hopes to fly from Cadiz to the Bermudas or Cuba early in the coming summer. Inasmuch as Germany has specialized in dirigibles, having at present some 400 in all, we may expect a notable effort. Brucker hopes to get into a westerly trade wind on which he counts to carry him a large part of the distance. If, as believed, there are upper currents flowing continuously in a given direction over a defined course, like the Gulf and Japan currents of the ocean, air voyaging would be greatly simplified. Already scientists are at work attempting to chart these air currents. Inasmuch as experience has demonstrated local air currents moving in opposite directions, one a few thousand feet directly over the other, it seems reasonable to hope for satisfactory results in the search for permanent winds. It would seem, however, the part of good judgment for any transatlantic aeronaut not to stake his life and machine in an ocean voyage as its initial trial, but to first make an overland trip of a relatively equal distance or time.

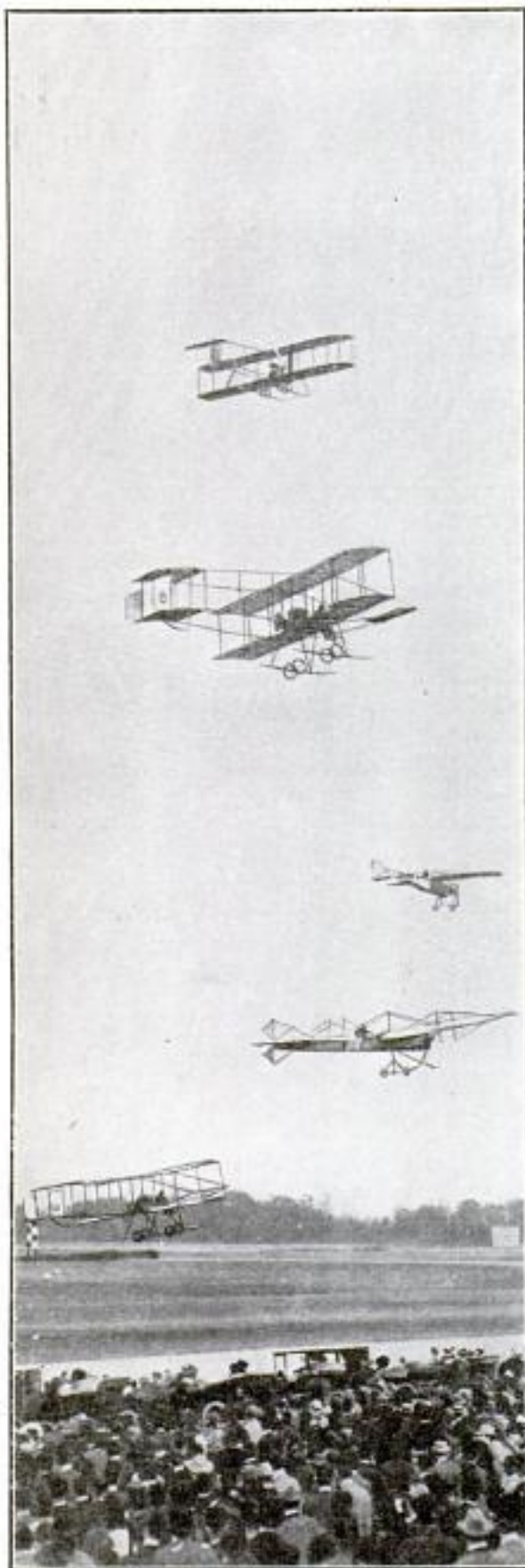
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AVIATION meets have proved so unprofitable to the promoters, that another year is likely to see fewer such events. On the other side, where they go in for such things on grand scale, spending as high as \$100,000 in preparing the grounds alone, for a single event, the announcement is made that there will be nothing doing in this line next year. The gate receipts are uniformly disappointing, the explanation being that the crowd hesitates to make a long journey and spend half a day with no certainty that the wind may not prevent a flight. It will be remembered that only within recent months have the airmen ventured aloft except under ideal conditions. Hence the public became over-cautious and refused to take chances. History makes rapidly in these days, and very soon the multitudes will have satisfied their curiosity, and will go to no more trouble to witness an aeroplane pass overhead than it now does to see an automobile or a locomotive go by.

The air contests of 1911 will be in long-distance flights, corresponding to endurance tests with automobiles. These tests will do even more to develop and perfect the airship than endurance runs have done for the motor car. Much depends on what development is made next year. The probability is that unless the aeroplane can be made a vehicle of reliability during 1911, it will not become adapted for passenger service for some years at least.

In fact, the prevailing sentiment among the foreign airmen at the Belmont Park meet was that neither the dirigible nor aeroplane will develop into passenger vehicles of any consequence. The dirigible, in order to carry any considerable number of persons, say in excess of 10 passengers, becomes unmanageable in gusty wind on account of its size. On the other hand, the tendency is to make the planes smaller rather than larger, which means only one, or at most two, passengers. The peculiar shape and construction of aeroplanes is such that any substantial extension of the planes means decreased strength and increased danger. While the thought is disappointing, the fact cannot be denied that the prospect at present is anything but promising for aerial transportation between given points with any degree of certainty or regularity. There are undoubtedly practical uses for the aeroplane—which seems likely to supplant the dirigible—but as a rival of surface trains and ships, the outlook is far less promising than one year ago.

H. H. WINDSOR



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Five Machines Caught in Air by Camera, at Belmont Park—Five Others Were up at Same Time, Making Total of Ten.



Moisant Circling over Statue of Liberty, New York Harbor.



Ralph Johnstone, Who Made World's Altitude Record of 9,714 Feet, Preparing to Go Aloft.

AEROPLANE DEVELOPMENT AS SHOWN AT INTERNATIONAL MEET

By JAMES R. QUIRK

ON a raw fall day, two years ago, a notable group of Senators, Congressmen, members of the Cabinet and Justices of the Supreme Court stood for many hours on the parade ground at Fort Myer, Virginia, eagerly awaiting a view of a flying-machine. In a small, hastily constructed house at one end of the field was Orville Wright with the biplane which was to undergo tests preliminary to its acceptance by the army. The notables waited patiently, praying that the wind might die down to permit a flight. When a gun boomed out the sunset hour, the silent Orville Wright emerged from the shed and gazed at some nearby trees. His sharp eye detected the slight vibration of a leaf as it was kissed by a gentle zephyr and he waved his hand, indicating that there would be no flight.

At Belmont Park, Long Island, a few weeks ago, a 40-mile wind was blowing across the aerodrome, chilling the few spectators who had not deserted the field rather than stand before the piercing wind. Yet five aeroplanes, including the largest and smallest, the "Antoinette" and the "Demoiselle," essayed to fly in the face of what was literally a gale; and two biplanes, built by the same men who had refused to fly two years before while a leaf stirred, climbed thousands of feet into the air.

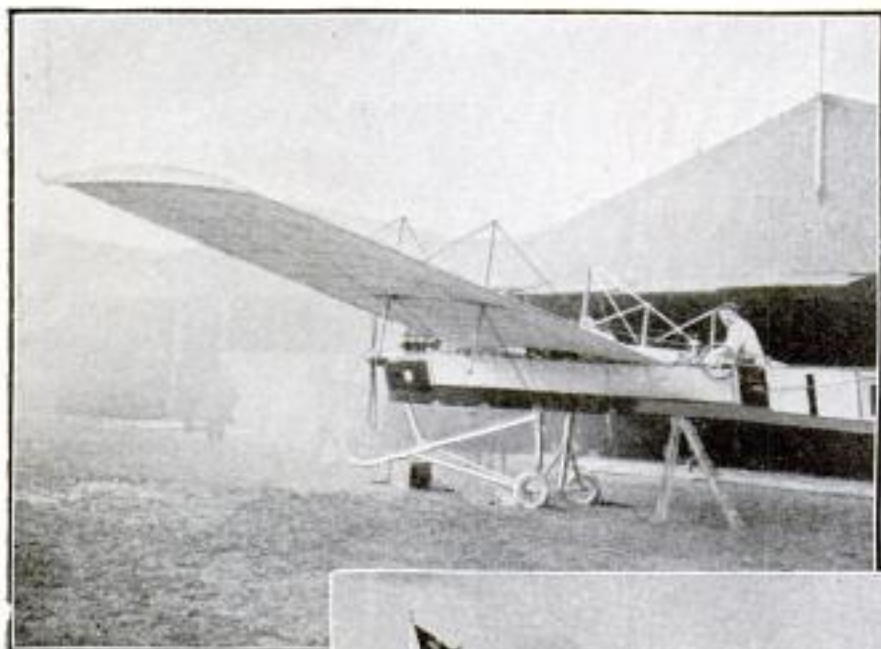
The contrast was made possible by the wonderful development of the aeroplane which has marked the last two years. Whereas, 24 months before, men journeyed thousands of miles to see a single aeroplane shot down a rail by a

weight and fly once or twice around a field, today the public hesitates to journey outside the city limits to an aviation meet, unless they are assured of witnessing a thrilling *vol plane* or are drawn by the prospect of a spectacular speed contest.

This was well expressed by Charles Hamilton, who made the flight from New York to Philadelphia and return, and who is credited by airmen with being one of the most daring of their profession. Hamilton was standing in front of his hangar at Belmont Park, when Frisbie, in his biplane, fell 50 ft. while rounding a pylon. As the machine dropped through the air, the spectators in the nearby grandstand rose to their feet, gasping with horror. When the biplane struck the ground, Frisbie crawled out of the wreck, uninjured, and walked across the field. Within a few minutes, the incident was forgotten by the spectators.

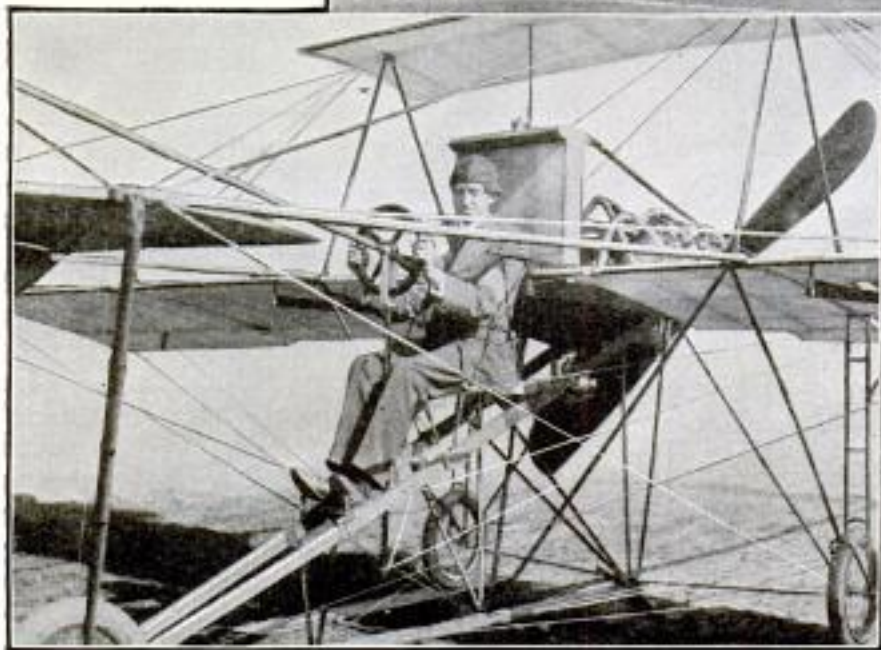
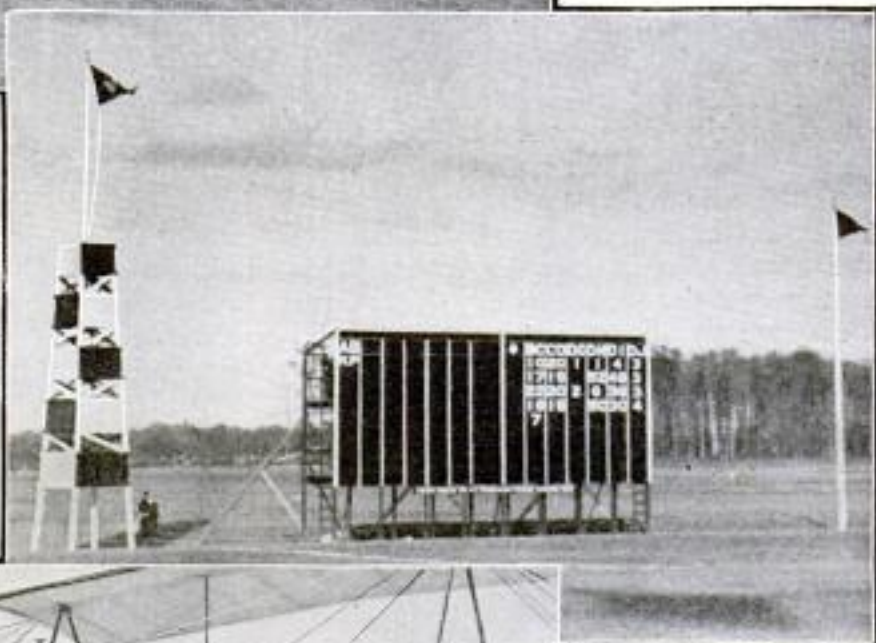
"I really believe," mused Hamilton, "that this game has gotten to the stage where they are disappointed if some one isn't injured or killed."

Those who favor the monoplane had expected that the Belmont Park meet would demonstrate the superiority of that type over the biplane, and, so far as the results go, the monoplane did carry off all the honors in the speed contests. Both the international cup contest and the statue of Liberty race were won by monoplanes, but a biplane succeeded in winning the grand altitude prize and broke the world's record, achieving 9,714 ft. Greater stability has been the claim for biplanes,

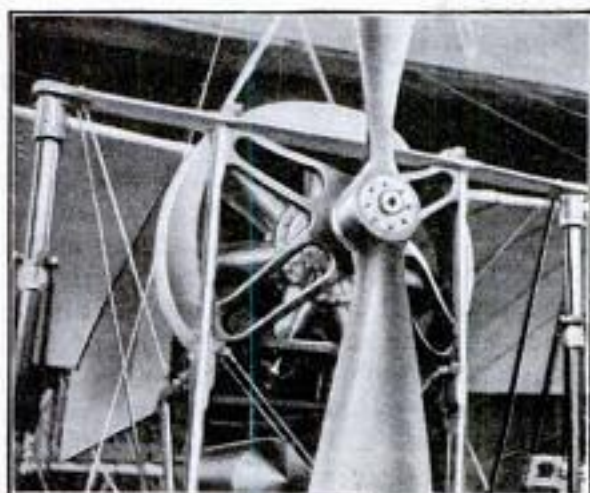


This Photograph Shows the Great Wing Surface of the Antoinette Monoplane, and the Manner of Bracing the Planes. It is Necessary to Use a Step Ladder to Reach Operator's Seat.

Pylon, Bulletin Board and Flight Flag, in Front of Grandstand at Belmont Park, Informing Spectators of Wind Conditions, Events in Progress and Machines in the Air.



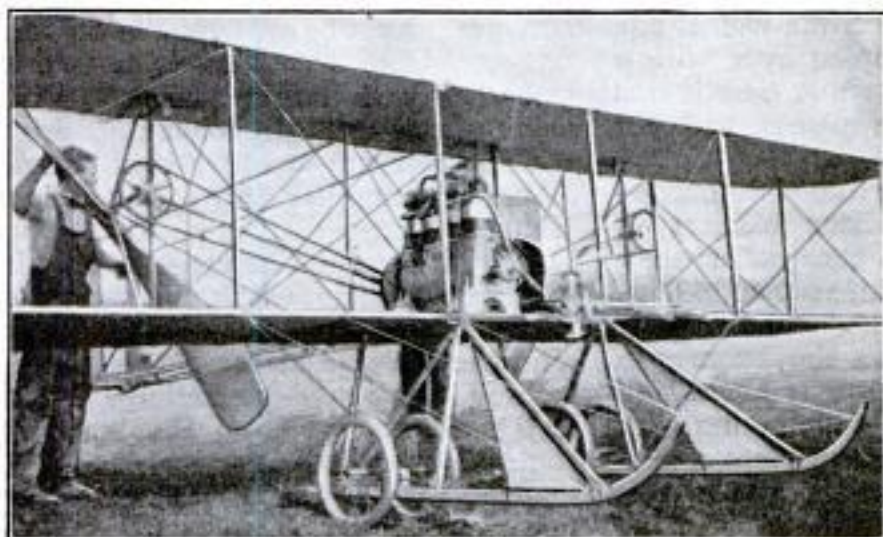
Ely of Curtiss Team in New Curtiss Machine, Built for Cup Race. It Was Not Completed in Time to Participate. Note Small Plane Superimposed over Main Plane. This is a Radical Departure from Curtiss Bi-plane Type.



How the Revolving Motor Is Housed in a Steel Covering on Latest Bleriot Monoplanes.

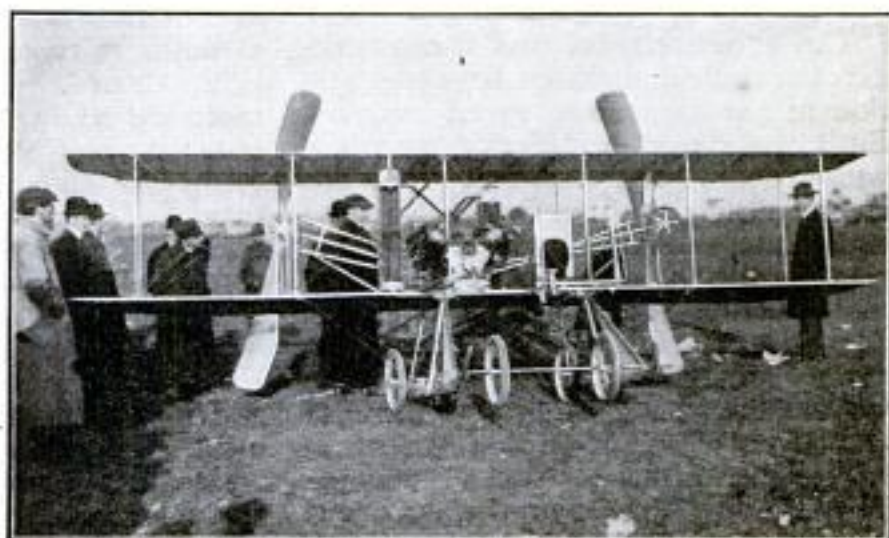


Manner of Securing the Barograph, Used to Measure Altitude, Between Planes of a Biplane.



The 26-Foot Wright Machine, in Which Johnstone Climbed 9,714 Feet. Note Comparative Size of Motor and Small Vertical Pieces in Front, to Aid Stability.

The "Baby" Wright Machine Which Made Remarkable Speed in Trials. Motor Troubles Kept It Out of Cup Contest, for Which It Was Built.



yet the Bleriot and the Antoinette machines proved as stable as the Wright, the Farman or the Curtiss biplanes. The greatest objection urged against the monoplane has been the difficulty of staying the wing surfaces, the truss construction which characterizes the biplane being unavailable. An inspection of the foreign monoplanes at the meet would seem to demonstrate the futility of this argument, for the methods adopted by the builders of the French monoplanes insure great strength. John Moisant's Bleriot, for instance, just as it was being hauled out of the hangar, was torn out of the hands of mechanics by a 30-mile wind and turned completely over. The wind caught it sideways and up-ended it until it stood vertically on the end of one of the wings. It toppled over with a smash. Yet within a short time it was in commission. The planes had not even been strained.

Many of the American aviators remarked on the superior manner in which the Frenchmen constructed their machines. Every detail seemed to have been thoroughly worked out. One of the illustrations shows the manner in which the Gnome motor is housed on a Bleriot. La Blanc, while racing with his 100-hp. Bleriot, crashed into a telegraph pole, yet the motor was practically uninjured; the steel housing saved it. It was about an even split between the two types as to the number of accidents.

The superiority of the foreign engines was demonstrated beyond question in the two great speed contests. Both were won by Bleriot machines with Gnome rotary motors. Moisant, an American, captured the second prize in the international cup contest and the prize of \$10,000 in the statue of Liberty flight, but in both events he used foreign-built machines with foreign engines. Hamilton had a fast biplane which showed a speed of over 70 miles an hour in trials. It had an American-built engine which developed 110 horsepower. The Wright brothers brought out a biplane, which was hardly half as long as the regular Wright machine.

This "baby" biplane, as it was called, was fitted with an engine which was supposed to give 60 horsepower. During some of the preliminary trials this, too, showed remarkable speed. Yet when the international race was called, engine troubles had placed these two hopes of the American airmen out of the running. The machine which won the grand altitude prize by climbing to the hitherto unreachd height of 9,714 ft., nearly two miles, was also a new machine. While the regular Wright biplanes are 39 ft. 6 in. long and 7 ft. wide, the smaller machine was but 26 ft. long and 3 ft. 4 in. wide. The performance of this machine, operated by Ralph Johnstone, disproved the theory that machines with small supporting surfaces cannot be sustained in the rarified air of the higher levels as well as machines with larger planes. While making this height, Johnstone drove the machine upward at a sharp angle, himself leaning far backward, as in a reclining chair.

It is the opinion of most of the airmen who participated in the meet that from now on the tendency will be to diminish the size of the planes and increase the power of the engines. While it is true that most of the machines could carry still heavier engines, it is realized that lighter and stronger motors are necessary to any great advancement in the science of flying. And not only must the engines be made lighter and more powerful, but they must be made more reliable.

M. Garros, who is considered the most expert operator of the "Demoiselle" type of machine, has decided to adopt the Gnome motor for the tiny flyer. He has experienced difficulty with motors of the horizontal-opposed type, and will build machines of the Santos-Dumont type next year, fitted with 30-hp. revolving motors. There were two of these machines at the meet and they elicited much favorable comment by their speed and the manner in which they rounded the sharp turns at the pylons.

Automatic stability is one phase of the heavier-than-air machine which has,



CLAUDE GRAHAME-WHITE

of England, Winner of International Cup Contest, the Highest Honor in the World of Aviation



JOHN MOISANT,

Whose Performances at the Meet Class Him as One of the Greatest of Airmen

for the present at least, been discarded by the men engaged in the manufacture and operation of the aeroplane. The gyroscope, the pendulum, and empirical electrical and compressed-air devices have been laid aside. It would be absurd, in the face of what has been done, to venture the statement that automatic equilibrium will never be achieved, but the men who are developing the machine in its present form have abandoned the search and are willing to leave to the operator the task of maintaining his stability in the air.

While they are not doing much talking about the future, being very much engaged in the present, the airmen are looking forward hopefully to a successful flight over the Atlantic. The adherents of the aeroplane are sure that the flying-machine will accomplish the feat before the dirigible. Moisant is confident that it will be done in five years, and La Blanc and Latham are of the same opinion.

Glenn Curtiss, the winner of the international cup at Rheims, France, in 1909, had constructed a machine of the monoplane type to participate in the race this year. It was unique in that a small plane was superimposed over the main plane in front. This is supposed to add to its stability. The machine has not yet been tried out, however.

Harmon had a "freak" in his hangar,

but it was never taken outside. It consisted of a central cylinder about 7 ft. in diameter, placed horizontally, with single planes on either side. The engine and propeller were located within the cylinder.

Claude Grahame-White, of the English team, who won the international speed contest; Moisant, who saved the Americans from humiliation in that race and the statue of Liberty contest, and Ralph Johnstone, a Wright airman, won the greatest laurels of the meet. When it seemed that the prize and the honor of winning the race from Belmont Park to the statue of Liberty in New York Harbor and back was going to a member of a foreign team because none of the Americans were prepared to enter, Moisant, the last man who would be expected to jump into the breach, because of the condition of his machine, paid \$10,000 for a Bleriot belonging to a Frenchman, and entered the race. He won it by a narrow margin. The machine which he had previously used in the cup contest was in a crippled condition when he entered, but he refused to stand by and see the prize taken from America without an effort. It has been said that toward the success of any flight the machine counts for 10 per cent, the motor for 15 per cent, and the man for 75 per cent. Moisant's work would seem to prove this.



Revolutionists Holding Avenue Against Loyal Troops—Hastily Constructed Barricades Were Thrown Up at Strategic Points in City and Defended by Artillery and Infantry



Effects of Shots by Artillery in Wall of Residence

ARTILLERY played the most important part in the drama in Lisbon, October 4, when the monarchy was overthrown and a republic was established practically over night. That the revolution, though quick and complete, was not without its grim features is shown by the deadly work of the gunners both in the streets and on the ships of the navy which raised the republican flag.

CALIFORNIA PIGEON FARM

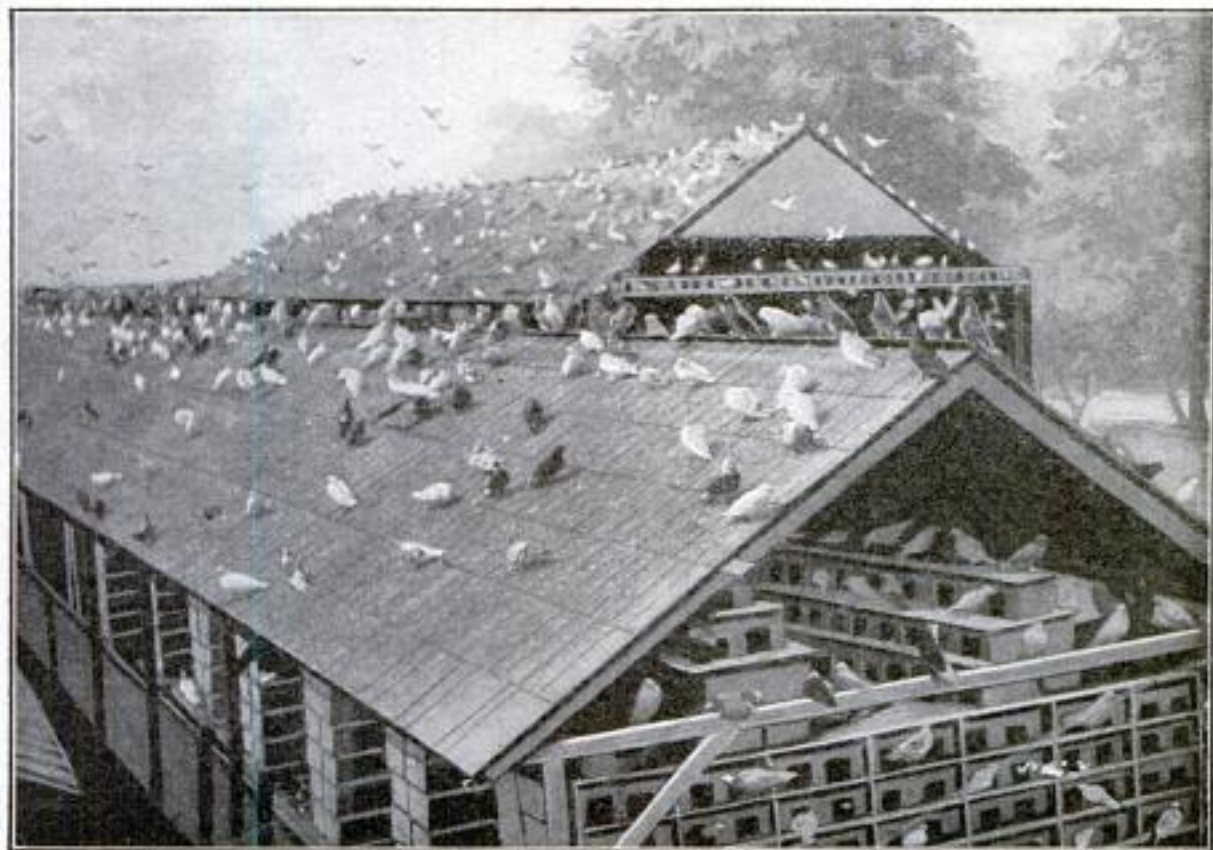
What is claimed to be the most productive pigeon farm in the world is located on the outskirts of Los Angeles, Cal. It consists of eight acres of sandy land, adequately provided with pigeon cotes. Its annual crop is more than 450,000 pigeons, and it is said that at no time is there less than 100,000 grown birds in the establishment.

Squabs sell at from \$2 to \$4 a dozen, but the percentage of profit is not as

building is banked up solidly with mating boxes, arranged in tiers, and narrow aisles give ready access to every nest.

ELECTROCUTION OF CATTLE

In the slaughtering house at Nantes, a French scientist, Dr. Leduc, has tried out a method of killing cattle by electricity. A spot on the forehead of the



Raising Pigeons for the Market

great as some may imagine, although as great as derived from many famous stock farms. The pigeons consume about 6,000 lb. of grain every day, a large force of employes being needed to keep the quarters clean and to kill and prepare the squabs for market. Unceasing vigilance is necessary to prevent rats, mice, owls, hawks, and insects from decimating the flocks.

The pigeons are housed in six large buildings, the main structure being 60 ft. long, 30 ft. wide, and 20 ft. high. The exterior and interior of each

animal and another on the back in the lumbar region, are shaved and the electrodes applied there. A current of 110 volts and 60 milliamperes has sufficed to kill instantaneously a 1,600-lb. steer.

ⒸWireless messages from Glace Bay, N. S., and Clifden, Ireland, are reported to have been received by Marconi at the new high-power station he has been erecting in Argentine Republic, an estimated distance of 5,600 miles.

TROLLEY CARS USED AS AN AID IN HOUSE WRECKING



New York Building Being Demolished by Trolley Cars

The building department of the City of New York is, so far as known, the first to adopt the trolley car as an aid in house wrecking. A building at the corner of Park Place and West Broadway collapsed suddenly, the outer walls giving way and the upper floors crashing through to the basement. The fire and building departments tried to pull down the toppling walls, but failed until they attached steel cables to the supports on the third floor and, hooking two trolley cars to the other ends of the cables, started the cars forward. Immediately the walls fell. The photograph reproduced herewith was taken at the instant the walls started to fall

in obedience to the pull from the cables.

ORIENTAL NARCOTIC OVERPOWERS FIREMEN

Hasheesh, the subtle narcotic of the Far East is held responsible for the temporary discomfiture of no less than 75 of Chicago's firemen. Fire in a harvester twine factory called out a number of the engine companies in that city recently. They were forced to go into a shed, where an immense quantity of hemp fiber was stored. The fire had attacked the bales of fiber and the fumes produced, when water was poured upon the burning hemp from a dozen lines of hose, overcame the men at the hose lines. Other men were sent to take their places only to succumb to the overpowering fumes. The firemen could not account for the situation, never dreaming that the piles of straw colored fiber

on which they were working contained the narcotic, that for centuries has been famous as a sleep producer. It was not until several hours after the fire had been extinguished and while it was sought to explain the soapy appearance of the water on the floor, that the mystery was solved.

After more than 700 years of existence, the silver mines at Freiberg, Saxony, are to be closed on account of the continued low price of silver. Up to the present time, they have yielded 5,431,348 kg. (11,948,965 lb.) of silver, representing a value of 972 million marks (\$243,000,000).

SUBMARINE HAULED ASHORE TO MAKE REPAIRS

An unusual photograph of a submarine vessel was recently taken in Portsmouth Harbor, England, when one of the little terrors of the sea, known as "No. 5," was run out of the water to make minor repairs. The ship is shown braced against the side of the dock with heavy cables to maintain it on an even keel. An excellent idea of its size and shape is obtained from the picture.

MUSIC HEARD BY TELEPHONE 500 MILES DISTANT

The transmission of music a distance of 500 miles over an ordinary telephone circuit was successfully accomplished recently in California. During a meeting of electrical experts in San Francisco, the members listened to a phonographic concert given in Los Angeles, the horn from the phonograph being placed against a similar horn screwed to the mouthpiece of a telephone transmitter. There were 12 ordinary receivers placed in multiple at the Coliseum in San Francisco, these instruments being "plugged in" on the long-distance wire to Los Angeles. The concert continued two hours, and every number was heard in San Francisco with perfect reproduction of the tones and shadings.

HOT WIRE USED TO FELL TREES

Felling trees with hot wire is being done with considerable success in Germany, where an inventor has recently

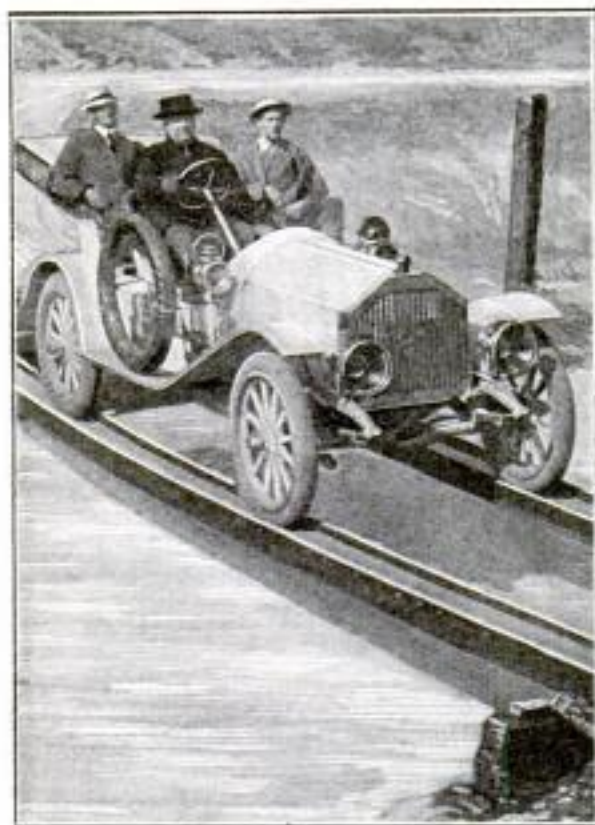


Submarine as it Appears out of the Water—Not a Wreck, but Run Aground for Repairs

perfected a device for utilizing the method economically. The wire is carried to and fro by an electric motor, the heat caused by the friction of the metal thread against the tree trunk being sufficient to burn through the timber, the result being a cut that is smoother and cleaner than can be made with a saw. A tree 20 in. thick can be cut through in six minutes, and the cut can be made wherever the operator desires. The motor which actuates the wire is installed outside the range affected by the fall of the tree. In the absence of electric current, the necessary power can be generated by a 10-hp. gasoline motor and dynamo.

STEEL BEAMS USED FOR TEMPORARY BRIDGE

Two 12-in. steel I-beams served the people of Wallace, Idaho, as a



Crossing the Bridge of I-Beams

bridge for automobiles over the south fork of the Coeur d'Alene river after the forest fires had destroyed the wooden structure that formerly spanned this stream. The beams were laid across the river, a span of 35 ft., on abutments built of railroad ties. The width of the beams was found to be ample for machines of standard tread. Motorcyclists also used the bridge.

TELEPHONE EXCHANGE ACTS AS OFFICE BOY

In connection with the main telephone exchange of Christiana, Norway, is an office whose mission is to receive incoming calls to the subscribers at times when they are not present to answer themselves. The exchange thus acts as office boy for subscribers who do not have office attendants, and

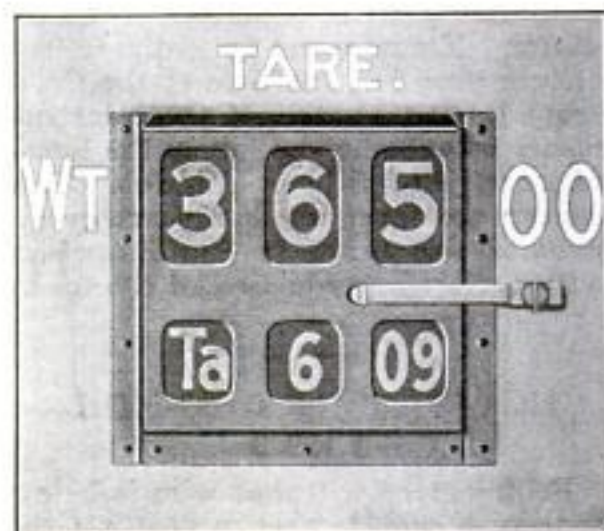
is proving especially accommodating for physicians, lawyers, selling agents, and cabmen.

When a subscriber returns to his office, the receiving exchange will, on request, tell him who has called during his absence and read the notes taken down. The charge for this accommodation is \$16 per year. The subscriber, on leaving his office, switches his telephone onto the receiving exchange by pressing a key.

METAL FIGURES ON FREIGHT CARS

The Atchison, Topeka & Santa Fe Railroad now designates the weight of its freight cars, as well as the symbol of the station at which the weighing is done and the date, by metal figures instead of by painting. This new method, patents on which are pending, does away with the delay incident to the painting and also saves the cost and bother of switching to the painter's track.

The device consists of a metal holder, 8½ in. wide by 7½ in. high, nailed to the side of the car. The figures and letters are inserted into this holder and show through the openings provided. Tampering with the holder is prevented by means of a self-locking progressively numbered seal, or by the ordinary car seal.



Metal Numbers in Holder

THE RIDDLE OF THE OIL WELL

WHENCE come the great volumes of oil issuing from the many gushers of the California oil fields which have made fortunes for many and lost large sums of money for others? How long will they continue to flow? Will the gushers cease spouting tomorrow or will they continue to furnish man with nature's bountiful supply of petroleum for months?

Geologists, engineers, and oil operators,—all are puzzled when it comes to furnishing answers to these questions. Some operators may



By HAMILTON WRIGHT

claim that their wells are practically inexhaustible. But they do not know. Nobody knows. All the gushers of the great California fields are evidently above the same subterranean source. The puzzle involved has presented many angles, according to the occupations of those who have attempted to solve it. The greatest puzzle to geologists has lain in the difficulty of ascertaining the exact nature and extent of the formation in which the oil is sustained or from which it flows; the oil which is spouted from these gushers may travel hun-



Lakeview Gusher Two Weeks after it Began Spouting—The Derrick Shown is 84 Feet High



Great Gusher after 90 Days of Spouting

dreds of miles before it reaches the wells. The problem which faces the engineers is that of determining the probable quantity of oil that will be delivered, for the huge output has not only taxed their resources to the limit, but has occasioned the expenditure of more than one



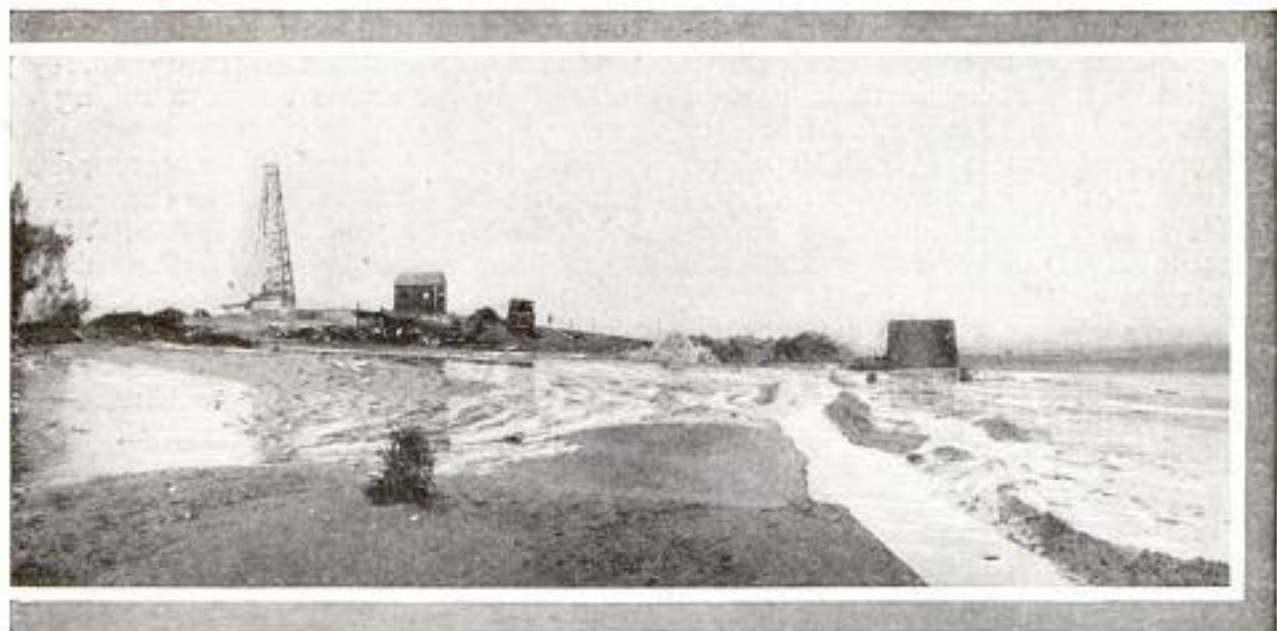
Engineer and Assistants at the Lakeview Gusher

million dollars in order to provide storage and shipping facilities.

For those who are concerned with the mechanical phases of the case, there has been the pressing question of how to store the oil most economically with the least loss through seepage, and with the greatest precau-



Thousands of Dollars' Worth of Oil-Well Supplies at Taft, Cal., an Oil Boom Town in



and after It Had Destroyed the Derrick

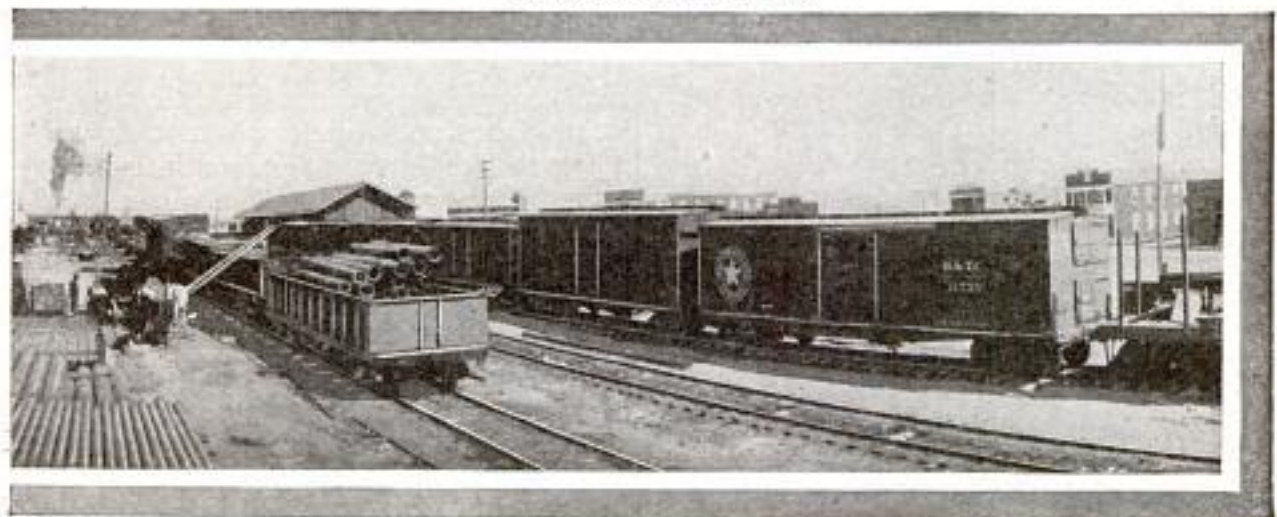
tions against fire, which is an ever imminent and well recognized danger. The question which has baffled experienced drillers and operators throughout California is, why the first great gusher, from which the oil flows with intense force from a depth of 2,225 ft., has not "sanded up"



Coalinga, a Model Oil Town

as has most other gushers. Usually the velocity of the flow forces sand into the pipe and this clogs the well or places the demolished casing at right angles to the vertical line of the well.

Lastly, there is the pressing problem of the oil marketing concerns—how to dispose of this oil.

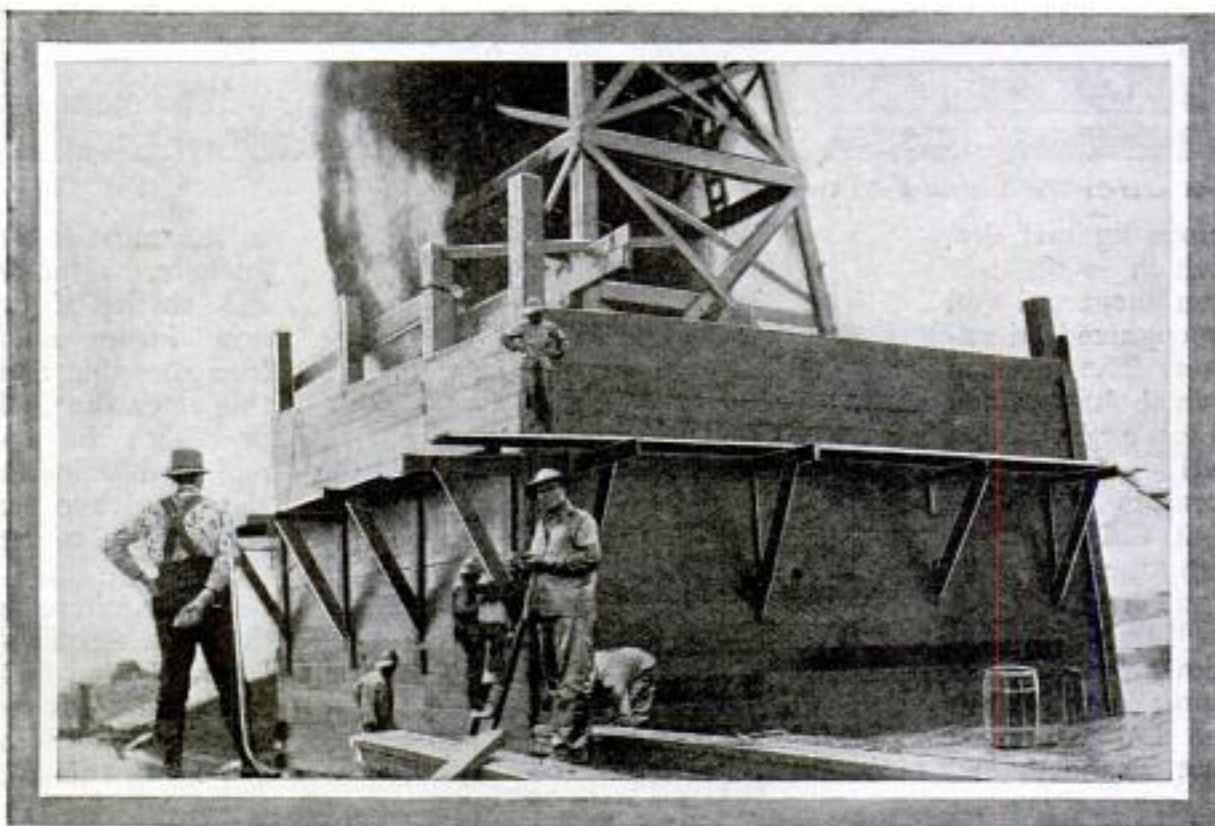


the Gusher District. The Drilling of Many Wells Has Threatened an Over-Production

Although the Lakeview gusher has delivered probably over \$3,500,000 worth of oil to date, a considerable part of which has been saved, the owners of the property have as yet declared no dividend, for the enormous output was entirely unexpected and came in advance of any market that could have been arranged for. The production of this one well has cost or, when completed, will have cost the owning company more than \$500,000 for storage, transportation and caretaking. This

course, this would be a difficult feat, for the mouth is some 40 ft. in diameter and the oil comes out as a raging geyser.

No one knows the underground source of the well, but various theories are held as to this source. S. W. Morsehead, an authority on the subject, has advanced the theory that the oil is influenced by the waters from the sea, which is 60 miles distant, but may communicate with the flow through subterranean channels. In support of



Trying to Get the Lakeview Gusher under Control. Oil Spouts from the Ground in a Stream Ten Feet in Diameter

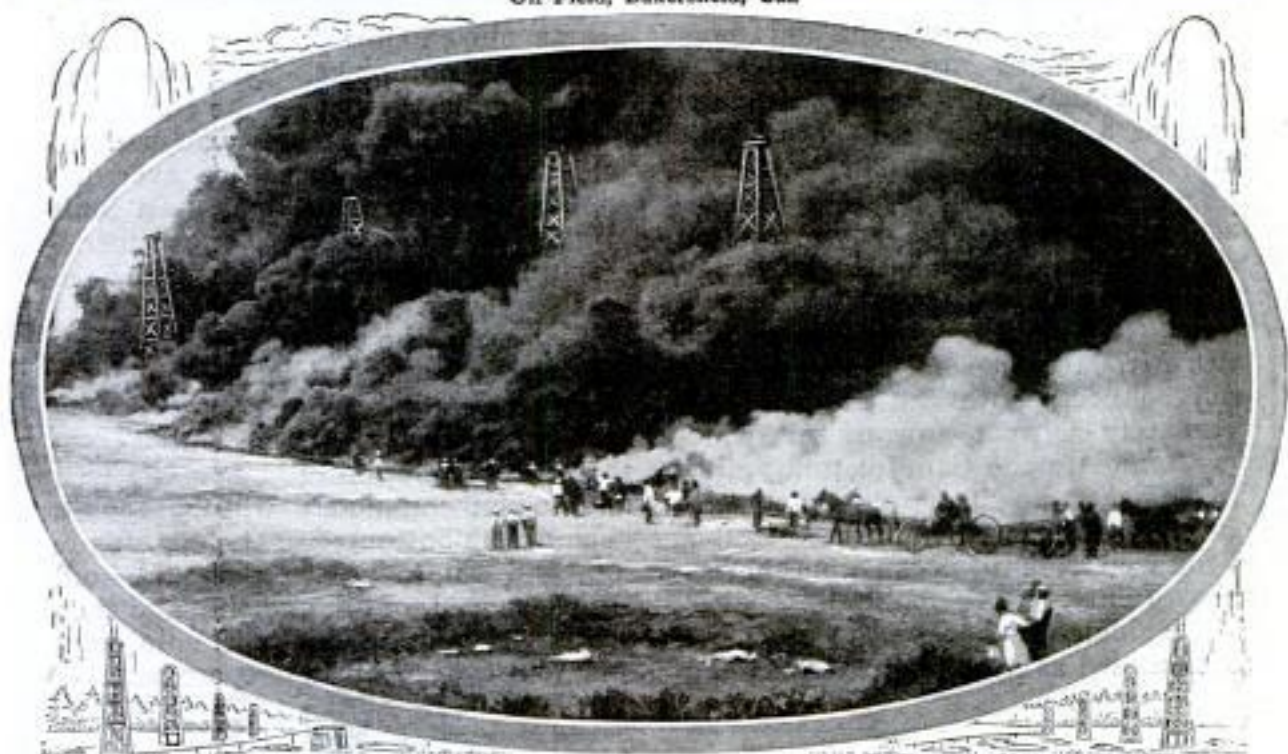
well is located in the Maricopa oil fields.

Many of the questions which have been excited by this wonderful crop of gushers will probably forever remain unanswered, particularly those relative to the source of the oil flow and the extent and formation of the so-called "oil sands." All that oil operators know of the well here referred to, is gleaned from their observations of the output after it reaches the surface of the earth and through the hitherto unsuccessful attempts to cap the well. Of

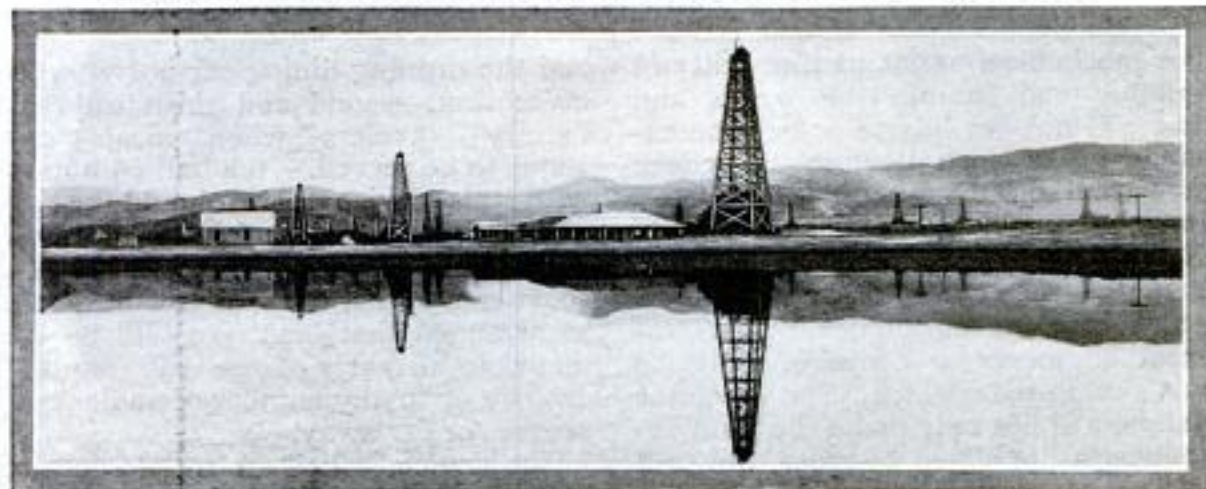
this theory, he points out that the greatest gusher, which now comes up in geyserlike form, varies in intensity with the rise and fall of the tides. As against this theory of direct connection with the sea through subterranean channels, other authorities urge that there is no such connection, and that the same influence which causes the ebb and flow would also cause the rise and fall of a huge subterranean lake of oil. J. Willway Treadwell, an engineer, who believes in the diatomic origin of oil, that is, that a constant process of for-



Oil Field, Bakersfield, Cal.



Fighting an Oil Fire at Bakersfield. It is Feared the Lakeview Gusher May Take Fire



A Lake of Oil at Coalinga, California

mation is going on beneath the earth through the pressure upon countless diatoms, expresses the opinion that the flow may continue indefinitely or, at least, as long as the well affords a free exit for the oil that is, according to this theory, thus constantly being formed. Other engineers have expressed the view that the gusher is tapping a huge pool or lake of oil, which is fed by flowing streams or seepages of oil coming through crevices that may perhaps lead for hundreds of miles. In other words, the source of this gusher may be hundreds of miles distant from Maricopa. The oil, at its source, may be held in suspension in sands or shales and forced by gas pressure into the crevices in which it may run almost as water through a hydrant. Still others hold that the oil is an "artesian flow," that it lies far beneath the earth on the surface of a huge body of water and that when the oil is exhausted, it will be followed by an enormous flow of fresh water. This theory closely corresponds with Mr. Morsehead's theory that the well connects with the sea and that ultimately a great flow of salt water may inundate the San Joaquin valley. On its face, the theory does not seem plausible because of the great distance of the well from the ocean and the presence of intervening mountain ranges.

The final outcome of the gusher is as unknown as its source. Its ultimate

evolution is hidden in mystery for which there are no precedents nor guide stones. The well has cast up shark's teeth and fossils of the tertiary period.

The attempts to control the gusher and store the oil have led to remarkable engineering efforts. Only a short time ago, men might have been seen wading almost naked with the waving lake of oil almost up to their shoulders. They were removing an obstruction, which had become lodged in a 10-in. pipe serving to conduct some of the oil from the escarpment to the sump holes, or catch basins. On other occasions, one might have seen huge 12 by 12-in. beams hurled into the air as though they were toothpicks. The beams had been bolted together in the form of a huge raft, and an attempt was made to pull this raft-like structure over the top of the crib which had been built around the well. But it was unsuccessful. Crib and all were destroyed by the gusher.

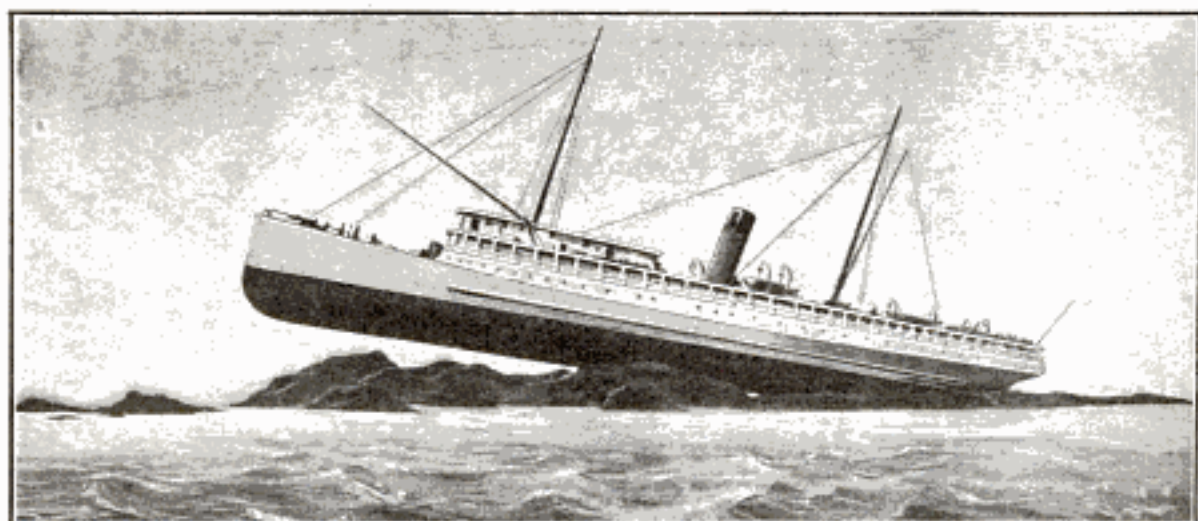
At present, the engineer in charge of the well is undertaking the construction of a dam to provide storage for its output. This dam will be built across the gully in the foothills near the well and, when completed, will be 150 ft. long at the bottom; 250 ft. long at the top, and 75 ft. high. It should hold 16,000,000 bbl. of oil, and the lake thus created would be one-half mile long and 100 ft. deep in its deepest part.

TELEPHONE DESIGNED FOR TRAIN ANNOUNCER

A mechanical assistant that will not mumble and jumble the words and that will not get hoarse or become exhausted has been devised to relieve the deep-voiced, much-tried railroad employe whose particular mission in life has heretofore been to call the trains as they were ready to depart. At a recent convention of railroad electrical engineers in Chicago, a device was exhibited which, its inventor claims, will not only make the train announcer's life a bed of roses, but will also render useless the page in hotels,

and the droning dining-car porter who gives first, second and third calls to hungry travelers when meals are about to be served. In a hall equipped with this device there should be no trouble hearing a speaker in all parts of the hall, no matter how poor the acoustics may be, the mechanism being so arranged that his voice will be directed to all parts of the hall simultaneously or to any number of audiences, present or far away.

The device, called an automatic announcer, is in reality a loud-speaking



Stranded with Bow High Out of Water

telephone and consists of a transmitter and one or more reproducers. It has been perfected after several years of experiment and, in outward appearance, closely resembles the telephone. The transmitter is like a desk-telephone stand without the receiver attachments. When the apparatus is placed on the market, the reproducers will be encased in small tubes about 5 in. long and 2 in. in diameter and equipped with small megaphone horns. During the demonstration before the electrical engineers, the reproducers were enclosed in small hardwood boxes, 8 in. long, 3 in. wide and 3 in. deep. There were four of these hung on the walls of the large assembly and exhibition room, just below the ceiling. The operator placed himself in a corner of the room and, from time to time, announced the proceedings of the convention. He spoke into the transmitter in an ordinary conversational tone, which could not be heard 10 ft. away, but the reproducers instantly rendered his communications in a voice loud enough to be heard above the noise in the room and in every part of it. The inventor claims that his device reproduces with perfect clearness the sibilant sounds that are so often confused in the ordinary telephone transmitter. The "s," "z," "c" and "th" sounds are given their correct value and can easily be distinguished as can also the "d," "b" and "v" sounds.

STRANDED HIGH ON ROCKS

The singular position in which the Canadian Pacific Railway Company's Alaska liner "Princess May" was left, after stranding on the north reed of Sentinel Island, Lynn Canal, Alaska, is shown in the accompanying illustration. At low tide there was 12 ft. of water under her stern, but her bow was 25 ft. above sea level. The vessel, on striking, scraped the rocks until she reached amidships, then slid back 5 ft.

SCRUBBING AND PAINTING STOOL

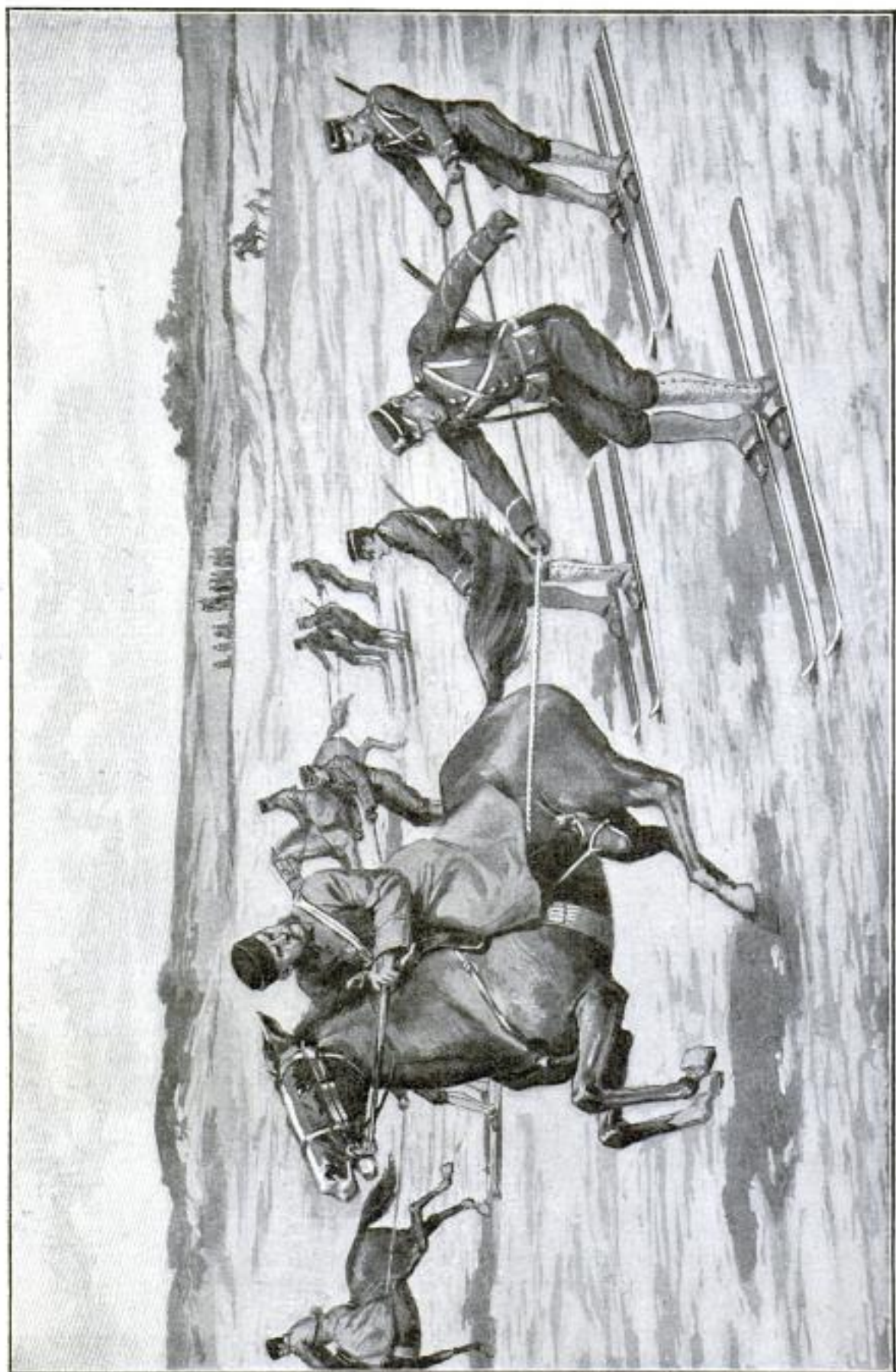
A stool, designed expressly for the use of scrub-women and for use in oiling or painting floors, is shown in the illustration. Its bottom is provided with six casters, and its top has padded hollows for the knees and receptacles for soap, cloths, and brushes.

The users of the stool generally start work in one corner, scrub or paint a



A Stool for Floor Work

convenient space, then push themselves and their stool backward into a new position.



Cavalry and Skies



Architect's Drawing of Washington City Postoffice

NORWEGIAN CAVALRY-SKEE CHARGE

The rapidity with which a skee-shod infantry regiment of the Norwegian army may charge into action with the aid of cavalry, is a revelation to army men of countries where the skee plays no part in war maneuvers. One horse is capable of drawing several infantrymen over a snow-covered stretch of country at considerable speed, provided, of course, that the depth or softness of the snow does not make cavalry progress difficult. The infantrymen grasp hold of lines that stream out behind the flying horses.

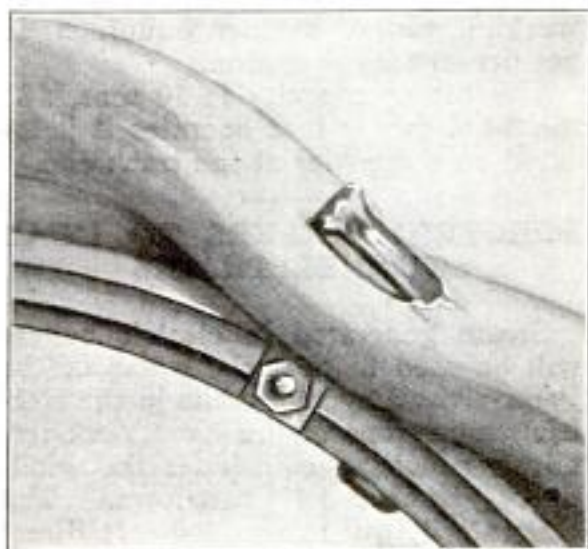
WASHINGTON TO HAVE HAND- SOME POSTOFFICE

Plans for a city postoffice building for Washington indicate that the Capital City will have one of the handsomest structures ever built for that purpose. Its architecture will conform with that of the new 50-million-dollar Union Station, which it will abut on the west, and to which it will be connected by an arched corridor. The new postoffice will face and line with the Union Station on the vast park adjoining the grounds of the Capitol building, Congressional Library, and Senate and House office buildings. On the right, immediately across the street, is the Government printing office. Congress has already authorized the ex-

penditure of \$3,000,000 for the structure, but when completed its cost will probably exceed \$5,000,000. The plans have just been approved by President Taft and the postmaster general.

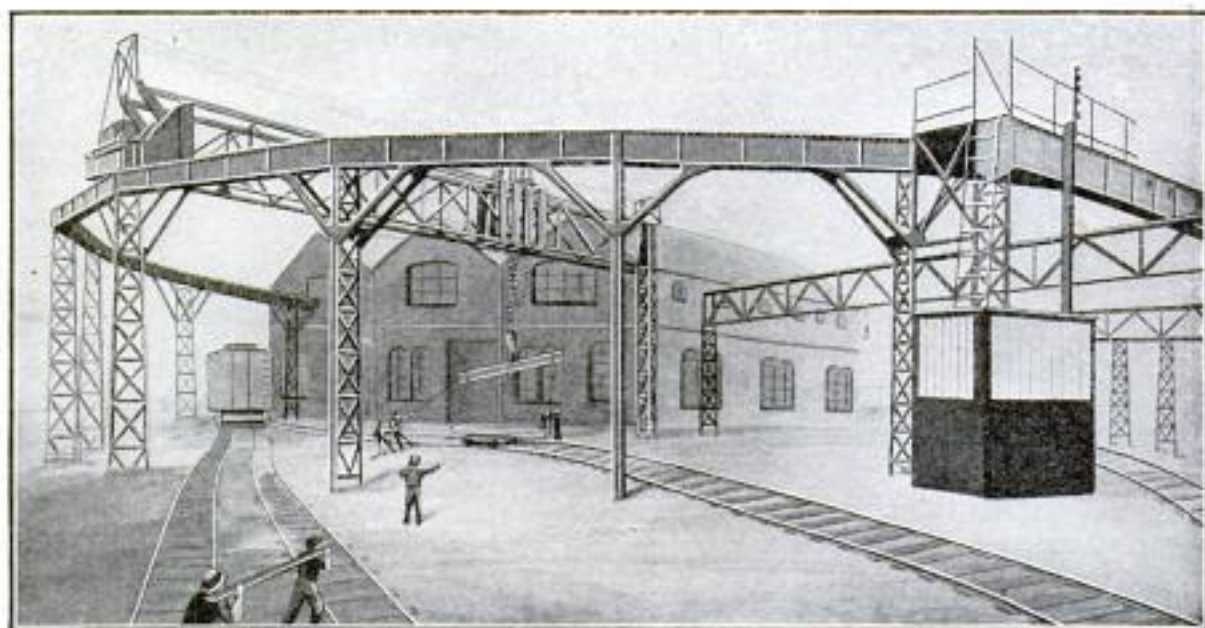
TIRE PICKS UP RAILROAD SPIKE

There appears to be no limit to the possibilities of damaging automobile tires when running "on the rims," with the tire deflated. In this condition a tire is soft and pliable and will attach to itself almost anything in the road with a point or edge sharp enough to



A Result of Deflated Tires

penetrate the casing. An excellent illustration of this was recently given when a deflated tire "picked up" a railroad spike.



Novel Crane Used by French Concern

UNIQUE FRENCH CRANE

A crane of unusual design, erected by a concern in France, is shown in the accompanying illustration. The long girder on which the carriage is carried swings on an iron standard at one end and runs on a circular elevated railway at the other end. The apparatus is economical of operation, takes up but little space, and has a wide working range, as low buildings do not prevent its operation.

The lifting capacity is 10 tons, and the 3-hp. motor that operates it is located on the girder at the track end.

ELECTRIC BOILERS TO HEAT TUNNEL TRAINS

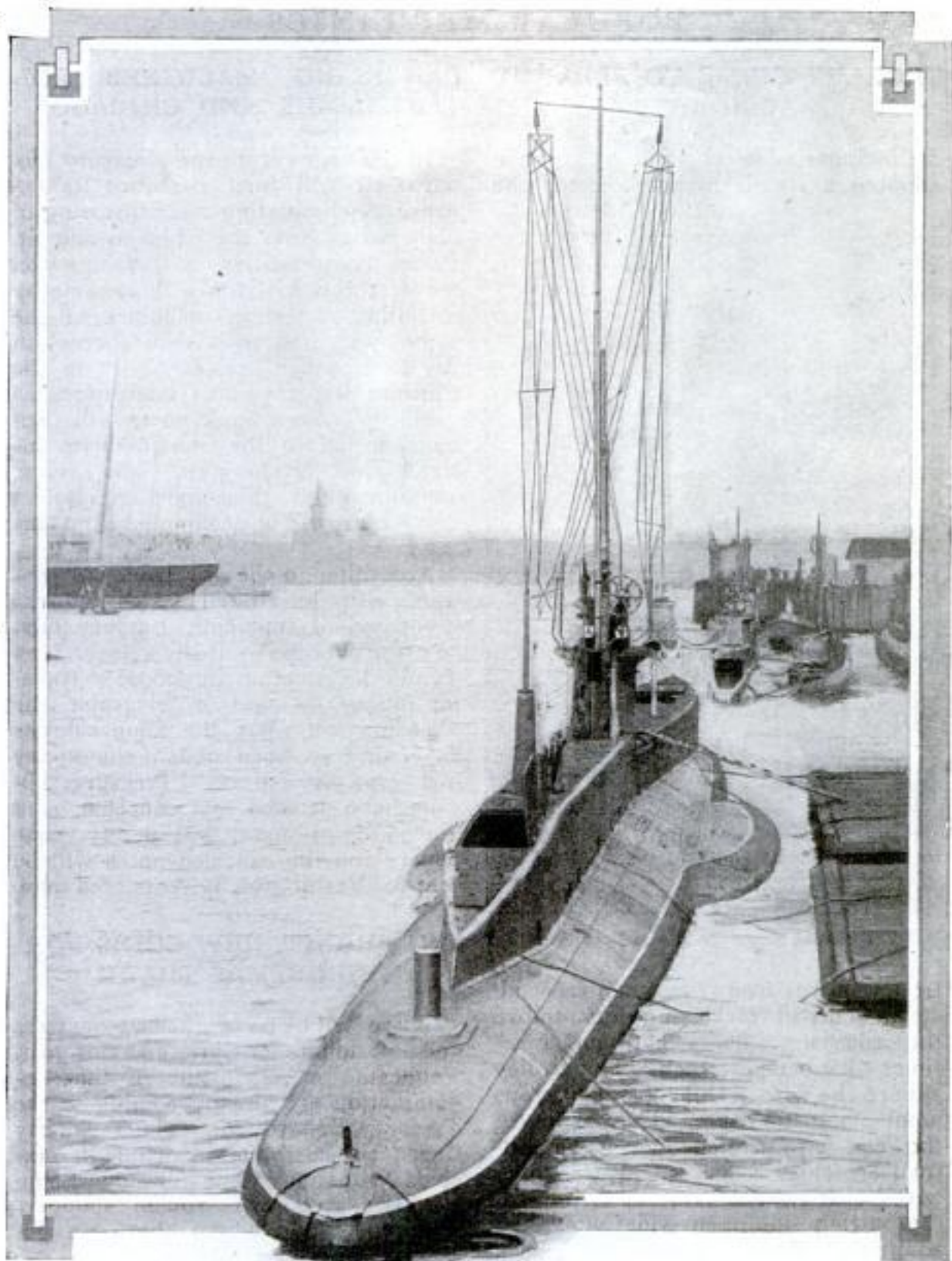
Steam generated in electric boilers will be used to heat the trains of the Pennsylvania system while in the electric tunnel zone of the New York terminal, which zone includes the wind-swept Hackensack meadows. The boilers will utilize the 600-volt direct current from the third rail, and will be capable of generating 1,000 lb. of steam at 80 lb. pressure, each hour. This steam will be directed into the regular train steam line as soon as the steam locomotives are disconnected.

MARBLE QUARRYING IN SPAIN

The marble quarries in the Macael district of Spain date back to the time of the Moorish dominion, and the method of extraction has not differed from that time to the present day. The marble, which is white in color, coarse-grained, with straight gray or blackish markings, is obtained by cutting grooves in the rock with hammer and chisel, and then, by a number of small wedges driven into these grooves, the pieces are split off.

Some time ago, an immense deposit of white marble of a faint bluish tint was discovered in the mountain of Chercos. This is now being quarried by a group of English capitalists, and the equipment is the most modern. Power is obtained from two 80-hp. gas engines, and wire saws are used for cutting the masses from the mountains as well as for squaring the same into blocks. Machinery is on hand for handling masses up to 70 tons, and for supplying finished blocks up to 15 tons.

“Bank” is a new aeronautical term, coined to designate the action of an aeroplane in tipping at an angle while rounding turns.

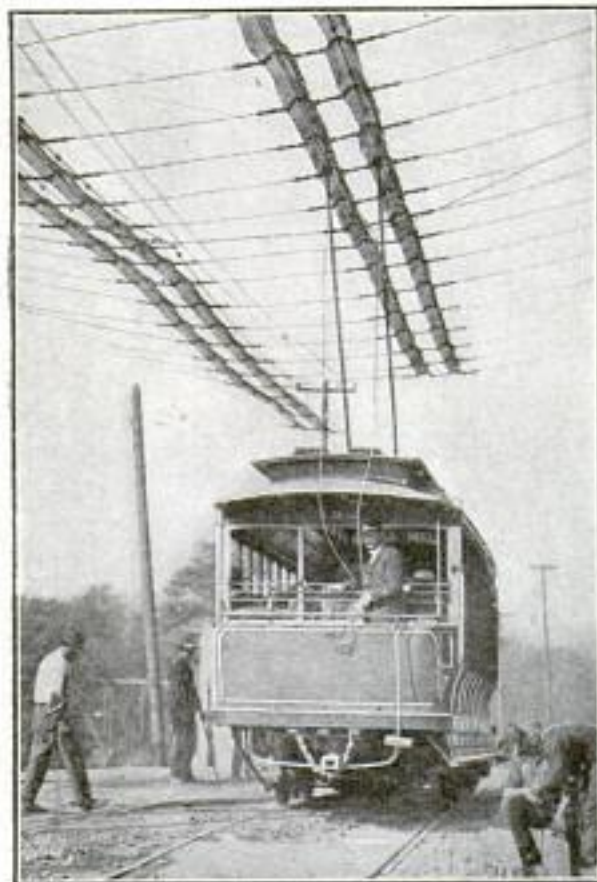


SUBMARINE PROVIDED WITH WIRELESS EQUIPMENT

REMARKABLE wireless experiments carried on by the British admiralty tend to encourage the belief that submarines may be equipped in the near future to communicate with vessels riding on the surface while they themselves are submerged. The submarine "D 1," while running submerged, established communication with the cruiser "Bonaventure." During the tests only the upper half of the aerial was above water.

TROLLEY GUIDE TO PREVENT ACCIDENTS

Cincinnati street railways have adopted a simple means to keep the



Wire Netting Keeps Trolley on Feed Wire

trolley on the feed wire when crossing steam railroad tracks, and thus remove the cause of accidents that have sometimes happened when the trolley slipped the wire at this most dangerous point along the route. The portion of the feed wire stretched over the railroad crossing is encased in a strip of wire netting, bent over the wire with the bottom side open wide enough to admit the passage of the trolley wheel. With this device in place, no matter how much the car is jarred in crossing the steam road's rails, the trolley, if it leaves the wire, is guided back immediately, so that there is no danger of the car being stalled in front of an approaching train, as has frequently happened.

CANCELING MACHINES FOR ST. LOUIS AND CHICAGO

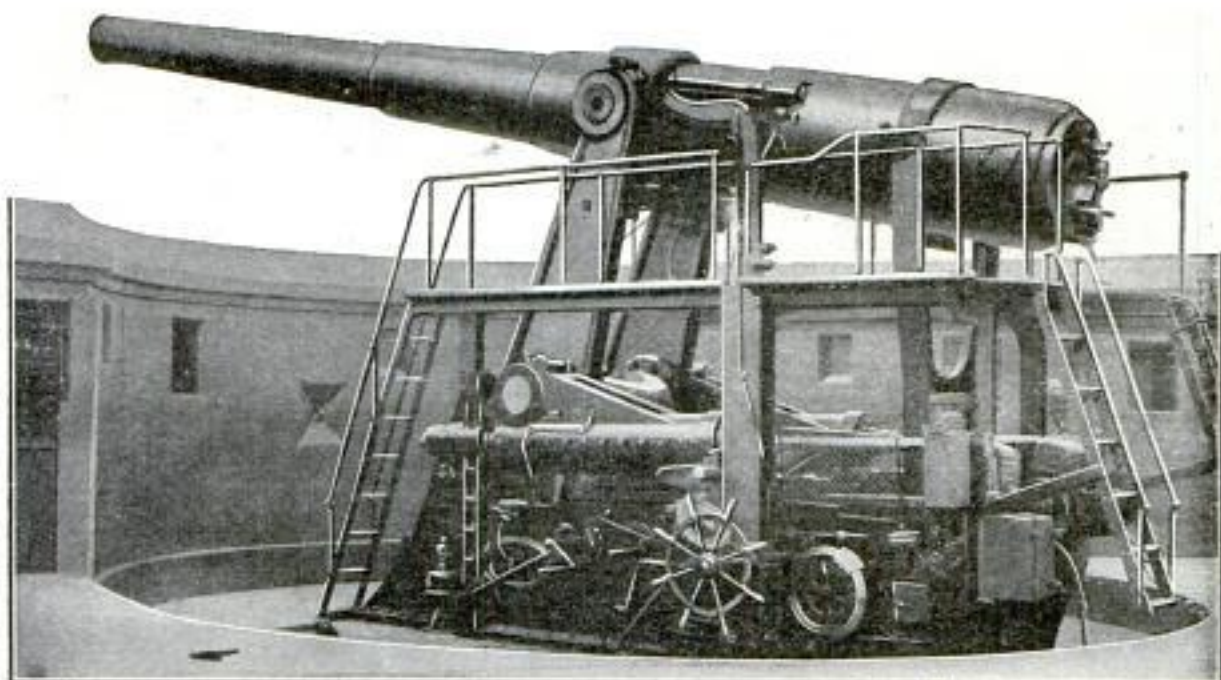
In the near future the Treasury Department will further reduce its expense by eliminating the expressing of bank notes from the Chicago and St. Louis subtreasuries to Washington for destruction. This will be done by installing canceling machines of the same type used with such success in the subtreasury in New York in the Chicago and St. Louis institutions as well. Worn-out bank notes will then be canceled in the subtreasuries instead of at Washington. The saving, amounting to thousands of dollars every year, will be accomplished in this way.

According to the government's contract with the United States Express Company, all shipments of money must be made over the company's lines. Even should the government choose to transfer money by mail or telegraph, the Treasury must pay the same charges as would have been made if the money had gone by express. Treasury officials have decided that canceled bank notes are not money, but merely waste paper; and the canceled notes will be sent to Washington by registered mail.

NO BRIGHT, NEW COINS FOR CHRISTMAS TRADE

There will be no bright new quarters and half dollars for Christmas this year. Requests for new coins of that denomination are already coming to the Treasury Department. The banks say their large customers demand the new coins at holiday time for advertising purposes, and that women shoppers prefer to trade where they can get them.

It is because the Treasury has a stock of \$20,000,000 in quarters and half dollars in the vaults that it has been decided not to coin any new ones this year. The mints are now busy to their capacity coining gold which will be needed to meet the increasing demand for gold certificates.



Post-Card Photograph Showing Details of American 12-In. Coast-Defense Gun to be Found on News Stands, Two for Five Cents

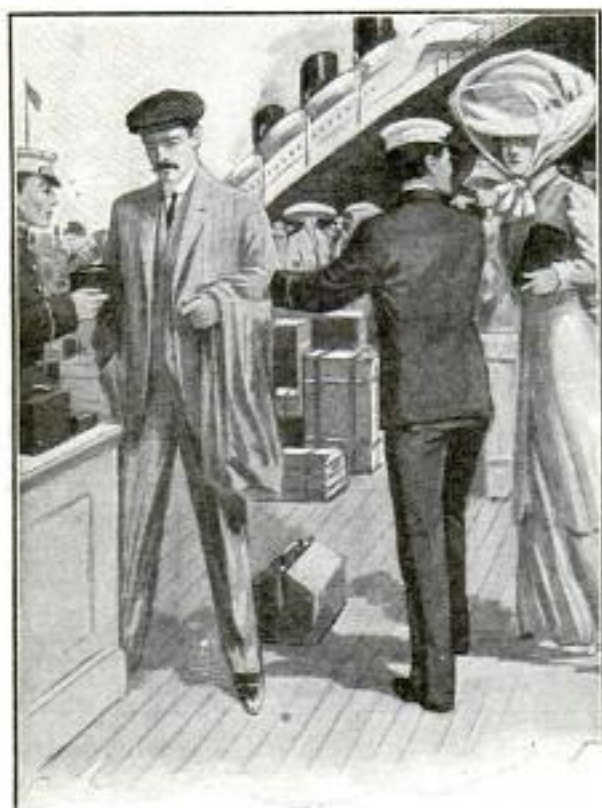
UNITED STATES A KINDERGARTEN FOR SPIES OF OTHER NATIONS

By GARDINER MACK

THE Japanese military spy, becoming a national bugaboo through the efforts of the sensational press, ready at all times to seize upon and enlarge any incident that seems to have even a remote bearing on the relations between the Mikado's empire and the United States, is probably the easiest to detect and frustrate of all the international secret agents at work in this country and its possessions. So at least say the experts who have given their time and labor to devising schemes for outwitting these crafty gentry. There is no country in the world that has not a well organized system of gathering military information; of discovering and recording those secrets of state deemed vital to the interests of all countries. While an apparent frankness regarding the strength, the armament and effectiveness of all armies and navies seems to

exist among the family of nations, it is nevertheless true that each little kingdom or republic has, and carefully guards, secrets as to resources, special appliances, etc., which only become public property through the work of men employed to ferret out just such matters. The development of the art of photography and its general adoption as a pastime by peoples of all climes and countries, has made it increasingly difficult to protect these military secrets. But the fact remains, there are secrets, and they are given every protection possible by the nations that own them.

In only one country in the world is there no law against the publication and sale of all information relating to military and naval matters—the United States. The other great powers make the punishment of spies as drastic as possible. The Dreyfus case in France



In Japan—A Polite Government Official Relieves Tourists of Their Cameras at Nagasaki

gives an excellent idea of the manner in which a supposed secret agent is treated. Only recently a naval spy was captured in France—a man believed to have secured secret naval plans. His punishment was as quick, as sure and as severe as that administered Captain Dreyfus. Frequent sights in port towns of Europe are signs in several languages warning tourists that no photographs may be taken within certain limits, the metes and bounds being carefully stated. At Gibraltar, the English government will not permit tourists to land with cameras. Neither will the Japanese at Nagasaki. In fortified towns, visitors are permitted only in certain specified districts. Beyond that heavy armed guards bar progress.

Contrary to the general belief, the military and naval attachés of the diplomatic corps are not in any sense spies of their governments. They are anything but that. They are assigned to duty for the purpose of gathering in all the information regarding their professions that can be obtained in a legitimate manner. The slightest indica-

tion of undue activity on the part of such officers will not only secure their recall but make necessary most abject apologies on the part of the government to which they claim allegiance. The United States government was called upon to severely reprimand and recall one of its most brilliant officers a few years ago because of his zealous work in Europe while a military attaché. He came into possession of some information of a valuable character which he sent to Washington. The government to which he was accredited heard of it and demanded his recall and an apology, both of which were promptly forthcoming. Because the prosecutions of arrested spies in Europe and the Orient are carried on in such a quiet manner, the public seldom hears of them. But there are such prosecutions and, as stated, the punishments given are most severe. Every spy knows this, but is willing to take all the risks, as the pay he receives is usually great.

The first step after the arrest of a spy is made is to present the facts to the government for whom he is supposed to be working. That government with great promptness invariably disclaims all responsibility for its alleged agent's work and usually repudiates him as a citizen. This permits the offended country to do with the prisoner as it will. It usually wills to put him at hard labor in some remote prison or prison colony. In Japan, the convicted spy is set to work on the public roads, heavily chained to prevent all possible escape. The usual sentence is 15 years.

How different is the situation in the United States! Any tourist can secure practically all the information he wants about the armament and equipment of the army and navy. The newspapers, the government bureaus, the magazines and public libraries are at the disposal of the visitor. Military attachés of foreign embassies are welcome guests on board battleships. American sailors and soldiers, especially militiamen, take pride in exhibiting the latest and newest devices for improving their effi-

ciency. Application at the War Department or the Navy Department will produce maps, books, charts, tables and elaborately written explanations of almost every piece of equipment used in the two war branches of the public service. The Department of Agriculture, through its road bureau, has a mass of statistics relative to the roads and bridges in the country which are at the disposal of anyone who takes the trouble to address the proper official. And when a spy is caught at his work in this country not only can nothing be done with him, but should he be subjected to the slightest inconvenience through the action of the authorities, he has the right to enter suit and recover damages. Officers of the government in the Philippines have adopted the scheme of quietly deporting people caught as spies. They do so at a great risk, however, as there is no law to cover the subject, except that relating to undesirable aliens. When the spies happen to be enlisted soldiers or sailors, they can be punished for violation of the army or navy regulations and may get a year or two in a military or naval penitentiary.

When asked what he would do with a Japanese caught making a map of the Philippines not many years ago, a high official of the army smiled in a rather sickly way and asserted that he would feel more than compensated for the trouble it took to capture the man, if the spy would only exchange his very extensive information relative to the islands for the very limited supply on hand at army headquarters.

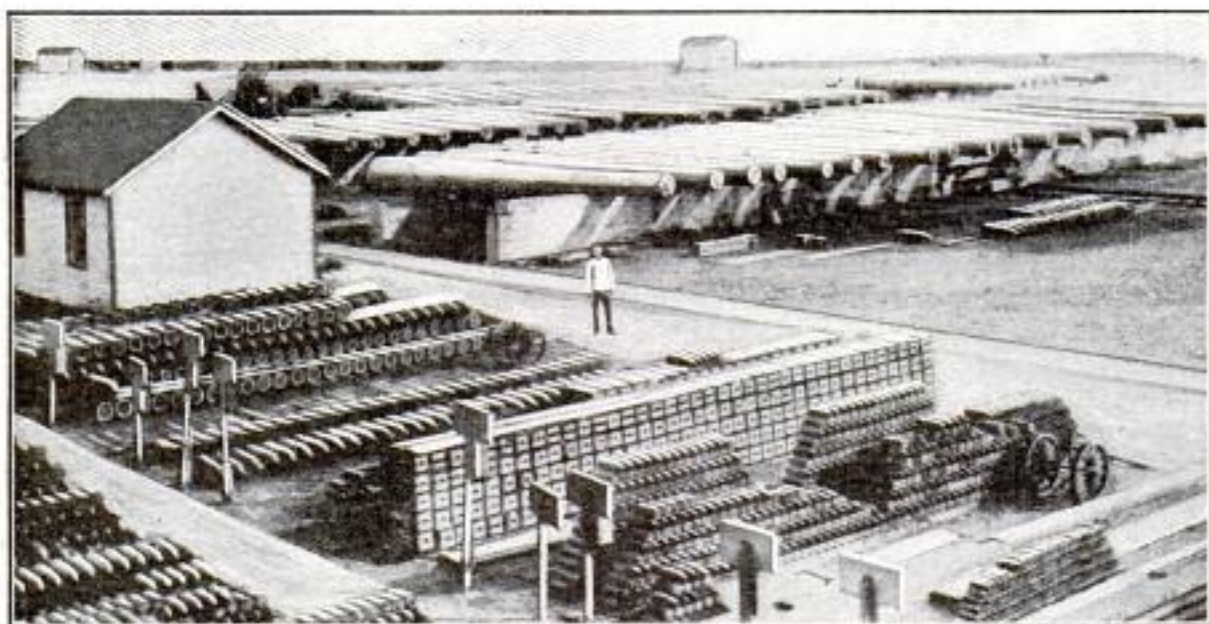
An apt illustration of the difference between the United States and the European nations in this particular occurred in Gibraltar only a short time ago. England, some years since, adopted a policy of mottling her light artillery with daubs of paint of various colors that were likely to enter into the backgrounds nature would provide in the field. An American interested in such things happened to be walking along Europa Point at Gibraltar and saw, about 150 ft. from him and toward the beach, what appeared to be



In America—A Gallant Army Officer Takes Pleasure in Pointing Out Best Views at Fort Monroe

a water battery of guns of the 8-in. class, the only one of which visible showed mottling very plainly. He did not know the process had been extended to coast-defense batteries and wished to examine this work merely from curiosity. He had advanced a few paces from the road for this purpose, when no less than three guards came forward to warn him away. It might be mentioned that this one gun and the big rifle mounted at the peak of the rock were the only pieces of modern ordnance outside of the saluting battery this American saw during a stay of ten days at the English stronghold.

Returning to the United States, he was much surprised to find in towns near coast-defense fortifications, not only uninterrupted passage throughout the fortified works, but picture post cards on sale at drug stores and news stands that showed photographs of the batteries just as they stand, the interior of range-finding stations, detailed views of big guns and shells showing the

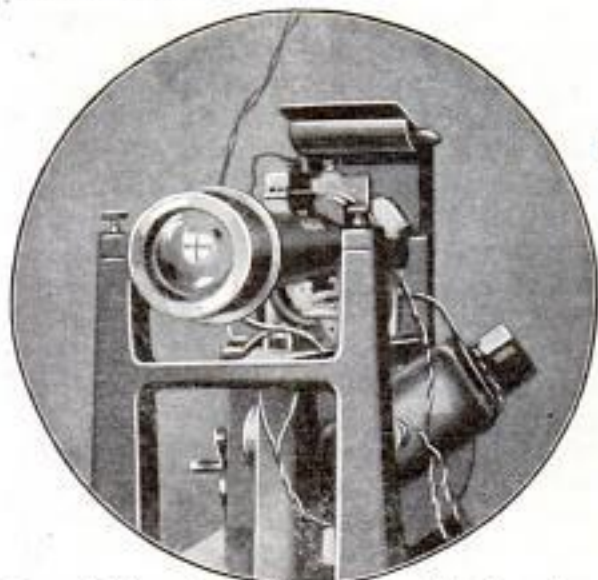
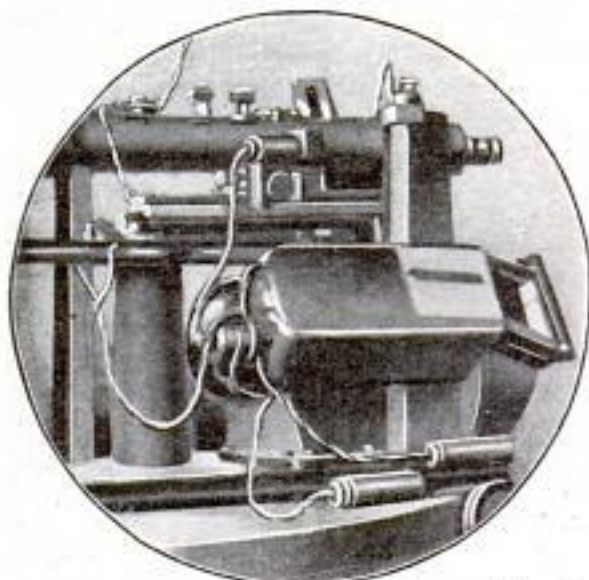


Another Two-for-Five-Cent Post-Card Picture, Showing Guns and Ammunition at Sandy Hook Proving Grounds Where All New Devices Are Tried Out

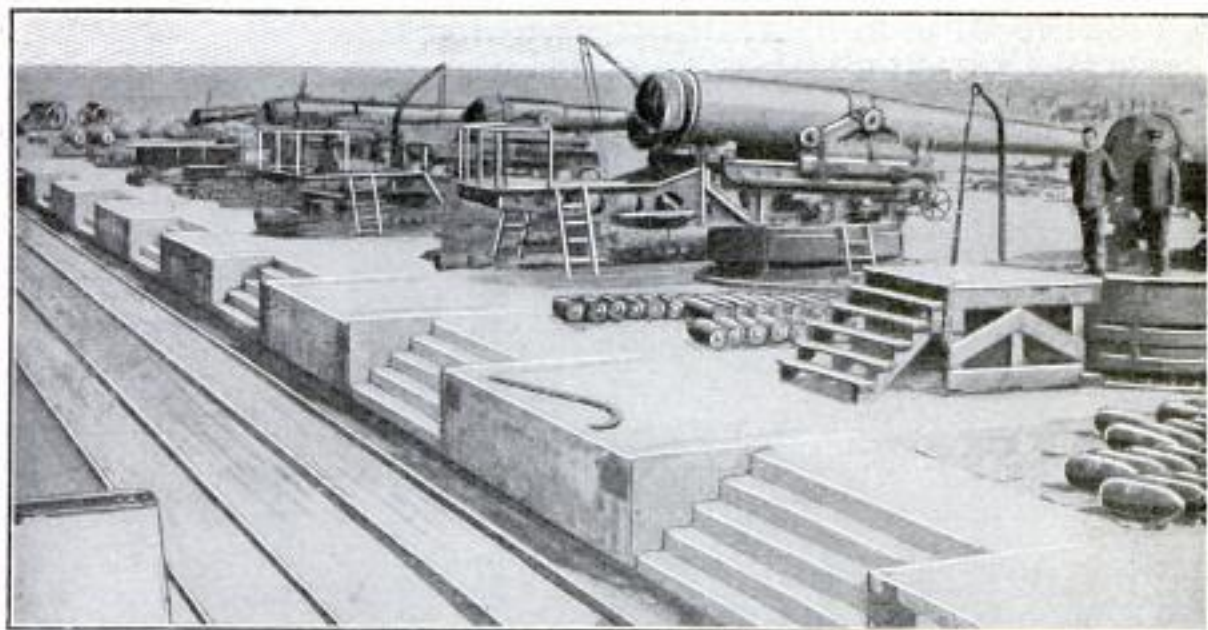
ranges, size of charge and quantity of explosive used. Not alone was this free distribution of information countenanced, but in an article on modern coast defense published in an American semi-technical paper with an international circulation, illustrations were given outlining in full the plans of defense of American forts with accurate drawings showing the ranges of the guns, the danger zone for ships, the methods of signaling, the manner of plotting ranges, with descriptions of the instruments used and a complete plan of the system for exchanging sig-

nals from the battle commander to the battery commander and from this latter to the gun captains.

The United States does have a few secrets. There are plans of imaginary campaigns, figures relating to target practice with great guns, drawings of the sea coast fortifications and mine fields, and the plans and fortifications of other countries carefully put away in the vaults of the War College and the various special service schools. But compared with other countries there is little or nothing to be learned in the United States.



Photographs, Showing Different Views of American Coast Artillery Range Finders, Are Printed on the Two-for-Five-Cent Post Cards



No Picture Post-Card Collection of Military Subjects would be Complete without a View of the Sandy Hook Proving Battery, to be Had at News Stands, Two for Five Cents

The greatest difficulties in the constant warfare that is waged here on spies are not encountered in warding off the agents of Japan, however. There are at least two other nations that have a far more complicated secret service and one that is much more difficult to frustrate than Japan. These are Germany and France. While the Japanese have a certain native capacity for spying, that enhances their value to their country, they learned from their German military instructors most of what they know of the elementary principles of getting guarded information without the knowledge and consent of the guardians. The Japanese spy is the easiest to detect for the reason that he is almost always a Japanese—different in race and, only in rare instances, associating as a social equal with the people upon whom he lavishes his arts. It is not so great a task to prevent a Japanese from obtaining secrets.

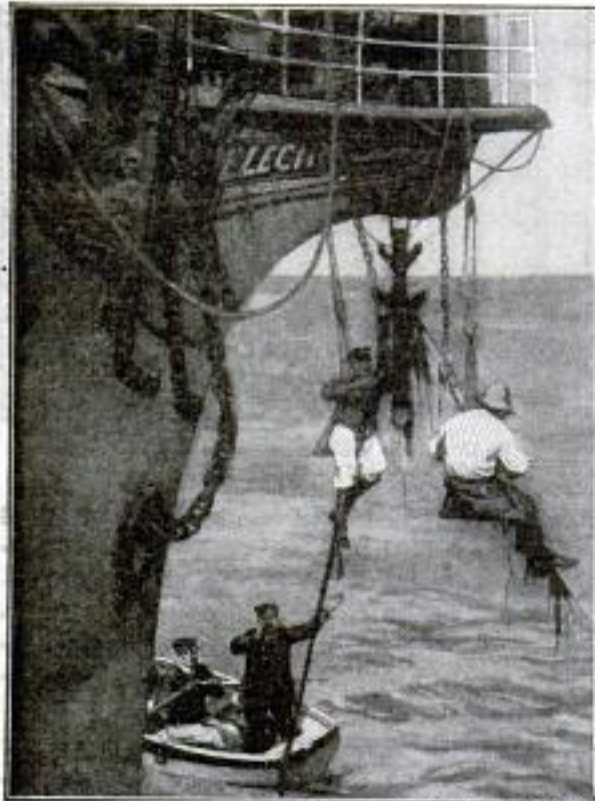
On the other hand it is exceedingly difficult to prevent the well-educated, cultured German, French or English spy from working his trade. One may be found as an enlisted soldier or sailor in the army or navy, or he may be employed by officers entrusted with the country's secrets in a more or less intimate capacity. It is almost impossible to guard against such eventualities,

and in all sections of the United States there are men employed today in various capacities who are in secret correspondence with the foreign governments—men whose nationality is never suspected and whose loyalty is never questioned.

A military expert has said that for one Japanese spy found gathering information in the United States there are ten that manage to avoid discovery. He further states that for every Japanese who remains undiscovered there are two German, French, Russian, Italian, Mexican or Austrian secret agents at work here. Furthermore, it is related, so little esteem is placed upon the ability necessary to wring from America her military secrets that this country has become a sort of primary school for these gentlemen, and the real experts, the past masters in the art, are engaged in those countries of Europe where the game is larger and the risks greater, where detection means degradation and imprisonment. From this it can be gathered that the real experts of Japan are not wasting their time on the United States but are going after bigger and more difficult tasks while the work here is left to aspiring amateurs, a system all the great powers have found to work with charming effectiveness.

PICKING UP A SUBMARINE CABLE

When accident befalls a submarine cable far out in the depths of the ocean, a cable ship is sent out to locate the



Hauling a Submarine Cable to the Surface

trouble, bring the cable to the surface, and make repairs. The finding of the trouble often takes many tedious weeks, but the bringing of the cable to the surface is not difficult. When the cable has been located, the grapple is lowered and hauled across its track. This grapple is a steel rod with metal prongs projecting from it.

The illustration shows a cable hauled to the surface by such a grapple. The two men clinging to the cable are freeing it from barnacles and seaweed.

TRANSCONTINENTAL LINE IN FAR NORTH PLANNED

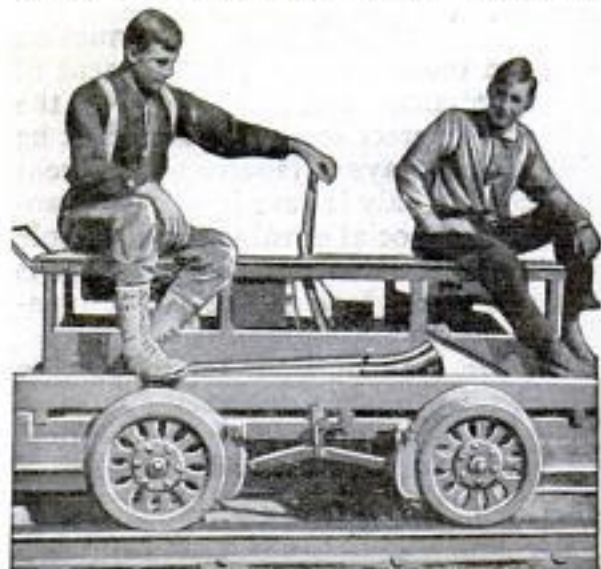
Surveys now going on, if followed by the construction contemplated, will not only serve to increase the prosperity of one of the northernmost of Pacific ports, but will materially shorten the distance between the com-

mercial centers of the United States and Canada, and the Orient. The route under consideration is an extension of the present line of the Canadian Northern Railway from Edmonton to Stewart, at the head of Portland channel. During the summer, a pass was discovered in the mountains, and favorable reports have been made by engineers engaged in the survey. If built, this will be the northernmost railroad across the American continent, the port of Stewart being on the boundary of Alaska.

RAILWAY FOREST-FIRE PATROL

An effective forest-fire patrol, operating a motor-propelled handcar, is maintained by the Laramie, Hahn's Peak and Pacific Railway Company on its 14-mile stretch of line between New Albany and Foxpark, Wyoming. Two trips a day are made down and back over the line, and during June, July, and August, 25 fires caused by engine sparks were extinguished.

Of the two men, making up the patrol, one is employed by the railway and the other by the forest service. The fire-fighting equipment consists of three shovels, three axes, one maddox, and a 10-gal. can of water. The daily



Forest-Fire Patrol

trips are maintained until winter interrupts them.

GROWING PUMPKINS ON A TRELLIS

The pumpkin pergola may become popular, if amateur gardeners follow the lead of an enthusiast in a California city who has erected a trellis in his back yard and trained pumpkins to grow over it. These pumpkins are full size, heavy orange colored specimens that dangle invitingly, awaiting the President's Thanksgiving proclamation.

Cautious visitors refuse to walk down this arbor in fear that one of the choice specimens may come crashing down upon their heads. Californians, however, are so accustomed to unusual doings in the vegetable world that they

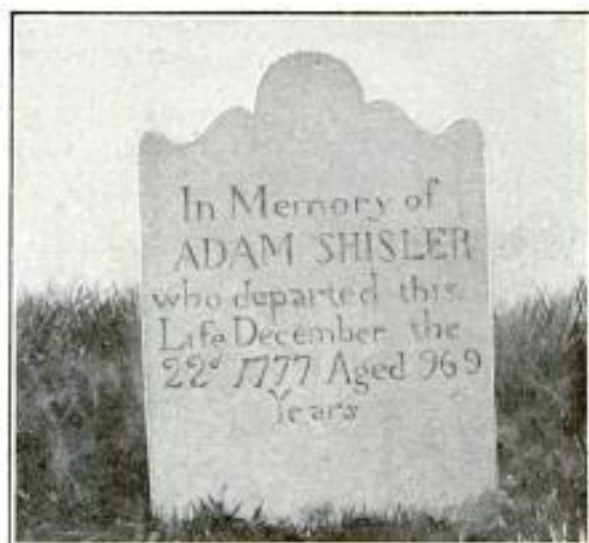


Full-Sized Pumpkins Ripening on Trellis

are not particularly surprised at having to get a ladder to pluck their pumpkins from the vine.—C. L. Edholm, Los Angeles, Cal.

WEATHER REVEALS ANCIENT STONE MASON'S ERROR

The action of the weather in wearing away a small section of cement filling revealed an odd error in the work of the stone cutter who made the tombstone that marks the last resting place of Adam Shisler in a Germantown, Philadelphia, cemetery. The stone sets forth that Mr. Shisler "departed this life December 22, 1777, aged 969 years." The stone cutter was instructed to make it 69 years and in some manner he reversed the figures making them 96. When the error was called to his attention he corrected it by cutting another figure 9 after the figure 6 and



Tombstone That Makes Philadelphian Rival Methuselah

filling in the first figure 9 with cement. While the original stone weathered the storms of the 123 years that have elapsed since it was set in place, the cement filling loosened and gradually fell away.

SIREN AS AERIAL RACE- STARTER

During a recent aviation meet near Berlin, the racing aeroplanes were started by the noise of a siren instead of by a pistol shot. The siren was

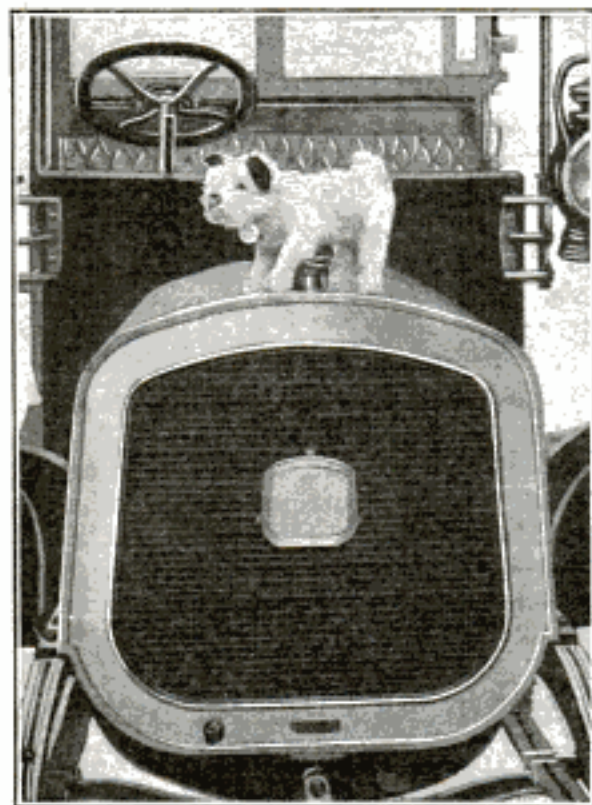


Starting Aerial Races

mounted on top of a post, and the starter turned the crank rapidly at the moment of the send-off.

"CAESAR" DOG RIVAL OF THE "TEDDY" BEAR

In the "Caesar" dog, English toy dealers believe they have a feature that



Caesar as the Motorists' Mascot

will displace the "Teddy" bear entirely in the British isles. The new toy is supposed to be a replica of the late King Edward's favorite dog which attracted much attention when it was led by a Highlander in the funeral procession behind the gun carriage on which its master's body was conveyed to its last resting place. Toy "Caesars" immediately became popular and the dog was adopted by automobile owners throughout England as a mascot.

A DIVER'S NERVE

Herman Schleman, a Detroit diver, employed by the constructors of the new Cherry Street concrete bridge at Toledo, Ohio, has been given the title—"The Nerviest Man On The Great Lakes."

Schleman's regular helper had gone away on his vacation and Schleman

was left the alternatives of taking a vacation himself or breaking in a new helper. He decided on the latter course. He had been working at the bottom of the river for some time when he noticed his supply of air was becoming low and he gave the signal to pump more air. The helper became confused and instead of sending down more air cut off the supply entirely. Schleman was 22 ft. below the surface of the river and was fast losing consciousness.

"He's got mixed up in his signals," thought the diver, and he quickly gave the signal to shut off the air. Immediately the oxygen was forced down the tube and Schleman breathed again.

WIRELESS TELEPHONES FOR TRAINS

What is said to be the first really successful wireless telephony test ever carried out on a rapidly moving train, took place recently in England on one of the fast trains running between London and Brighton. For the purpose of the experiment a double line of wire was laid along the sleepers, and telephones were placed in one of the coaches, in the signal station and at Three Bridges. Conversation was carried on as clearly and easily as if the train had been stationary and completely connected with the station by wire.

The chief feature of the system tried out, which was evolved by a German inventor living in England, was the means of overcoming the induction from the telegraph wires running along the railroad right-of-way, which was accomplished by placing a band or bridge of wire completely around the coach. The ends of this wire bridge were connected to the telephone, and the current, passing from the wires strung along the sleepers, through the open air space between the wires and the bridge, establishes the circuit. This open air space, which makes the expression "wireless" applicable, was 18 in. wide.



The Rose Route in Rhode Island

RAMBLER ROSES ABATE DUST ON RAILWAY

An experiment, successfully conducted in Rhode Island, may result in ending the dust nuisance on steam railroads. The New York, New Haven and Hartford road, finding that a stretch of its shore line route from Boston to New York through Apponaug, R. I., was exceptionally dusty during the summer months, sought a method of overcoming the nuisance.

New rock ballast was laid between the rails, but the dust from the banks of the cuts still remained to be dealt with. Engineers figured and planned, until a landscape gardener ventured a "guess" that some kind of growth along the sandy banks might be the desired solution of the problem.

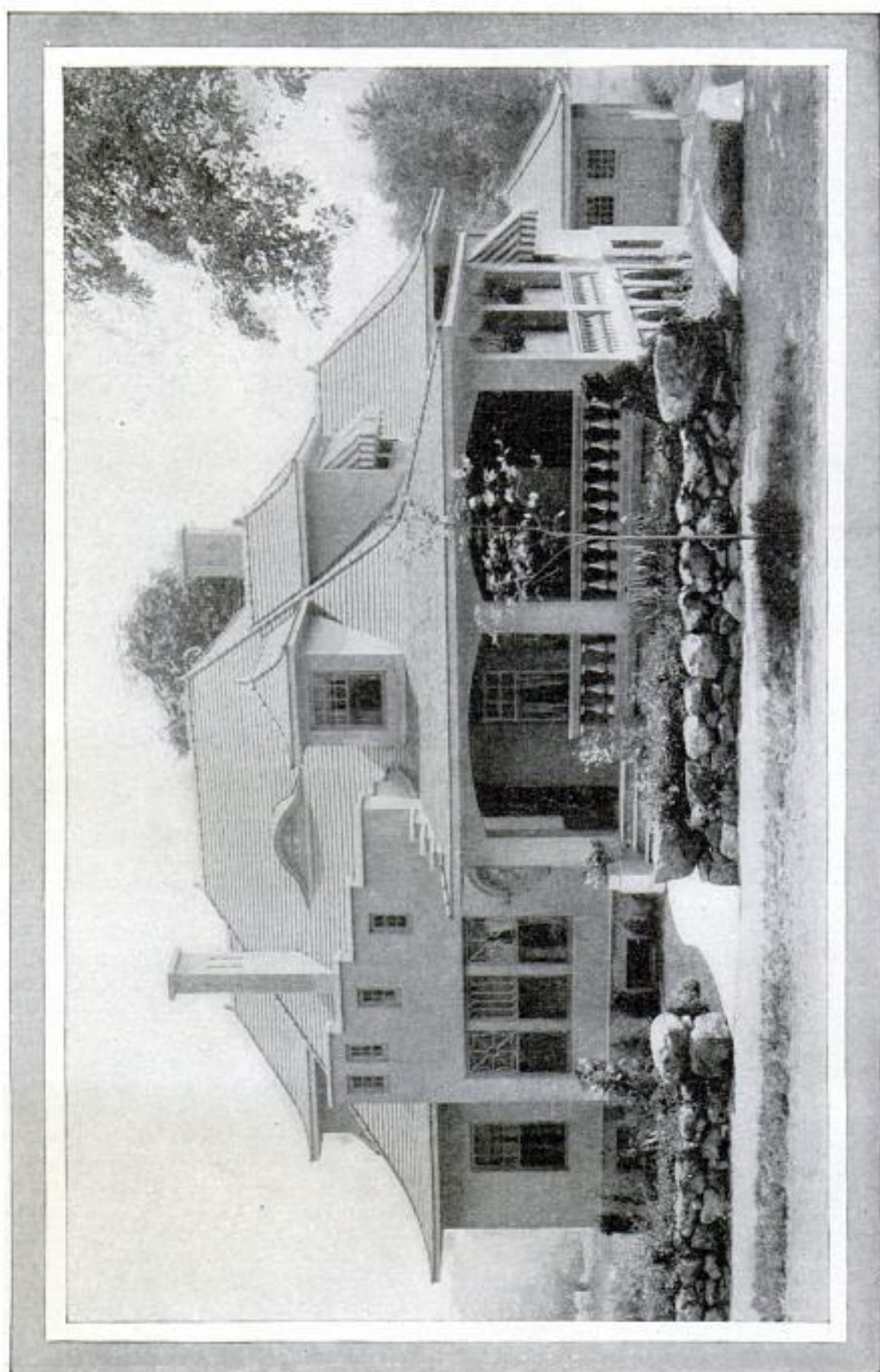
Horticulturists were consulted to find a bush that would grow in sand, that would not catch fire from the sparks from the locomotives, that would grow year after year, and that would act as a blanket to hold down the dust. After a long study of the matter the

gardeners suggested a species of rambler rose.

The dust nuisance was so bad that the suggestion was given a trial. The road planted 1,300 rose bushes on the Apponaug cut. Each bush was placed in a separate hole filled with loam. The experiment was successful, and by the end of the summer the bushes had grown over 18 in., making a thin but steadily growing blanket over the sides of the cuts.

It is believed that in another year, when the runners have spread out the entire distance between plants and have taken firm root, that the dust nuisance will be solved in a manner both beautifying and practical. The plants seem to thrive in the dusty soil.

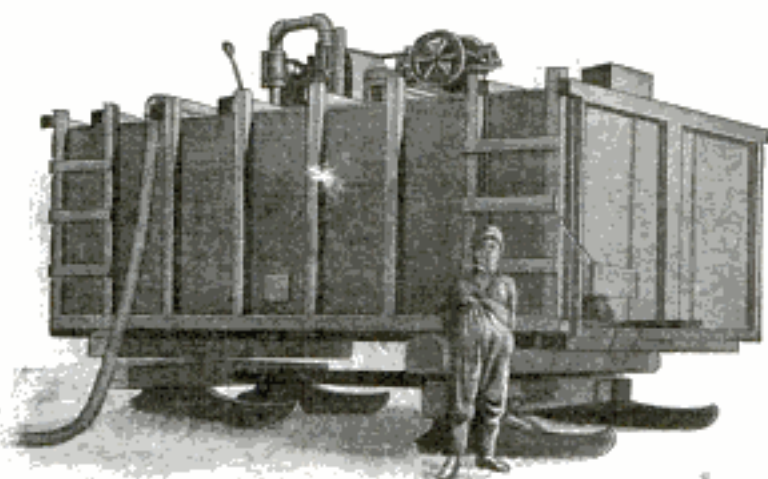
Waldemar Poulsen, the Danish inventor, is reported to have succeeded in lighting incandescent lamps by the wireless transmission of an electric current.



Story-and-a-Half Home of Distinctive Design on Clark Street, Newton Highlands, Mass.

ICING LOGGING ROADS IN WINTER

A remarkable outfit for icing lumber roads for log skidding has been devised by a lumber company at Oconto, Wis., and used with perfect success. It consists of a water tank 25 ft. long, 10 ft. wide, and 6 ft. high, mounted on runners. On top of the tank is a 10-hp. gasoline engine geared to a centrifugal pump. This furnishes a stream of water, which is played over the roadbed while the outfit is being dragged along by a steam traction engine. The icy surface thus provided is excellent for skidding purposes.



Road-Flushing Apparatus for Logging Camps

GOLD FIELDS DISCOVERED
BY SCIENTISTS

The Porcupine gold fields, situated almost due west from Matheson on the Temiskaming & Northern Ontario railway, now being worked with great energy and profit, were the discovery of government geologists instead of prospectors. Geologists noted gold at Porcupine as far back as 1898, but dismissed the subject with casual references in their reports, following out the rule that it is the province of the geologist to determine the chances of locat-

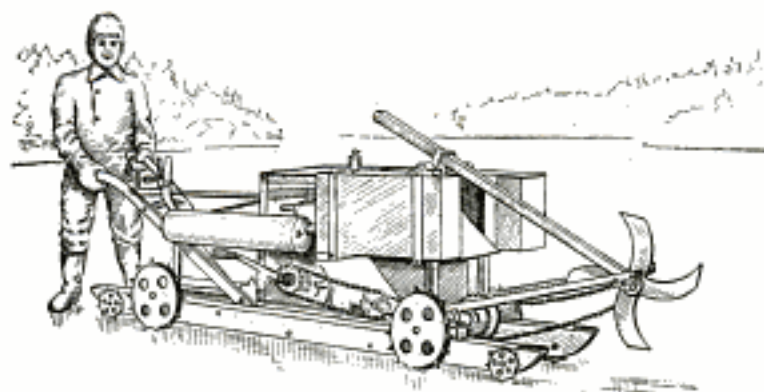
ing mineral in a given section, not to find mines.

Until two or three years ago the Porcupine area was difficult of access, and little prospecting was done in it. The information concerning it was practically all contained in the reports of geologists who took part in the base-line work and the township surveys.

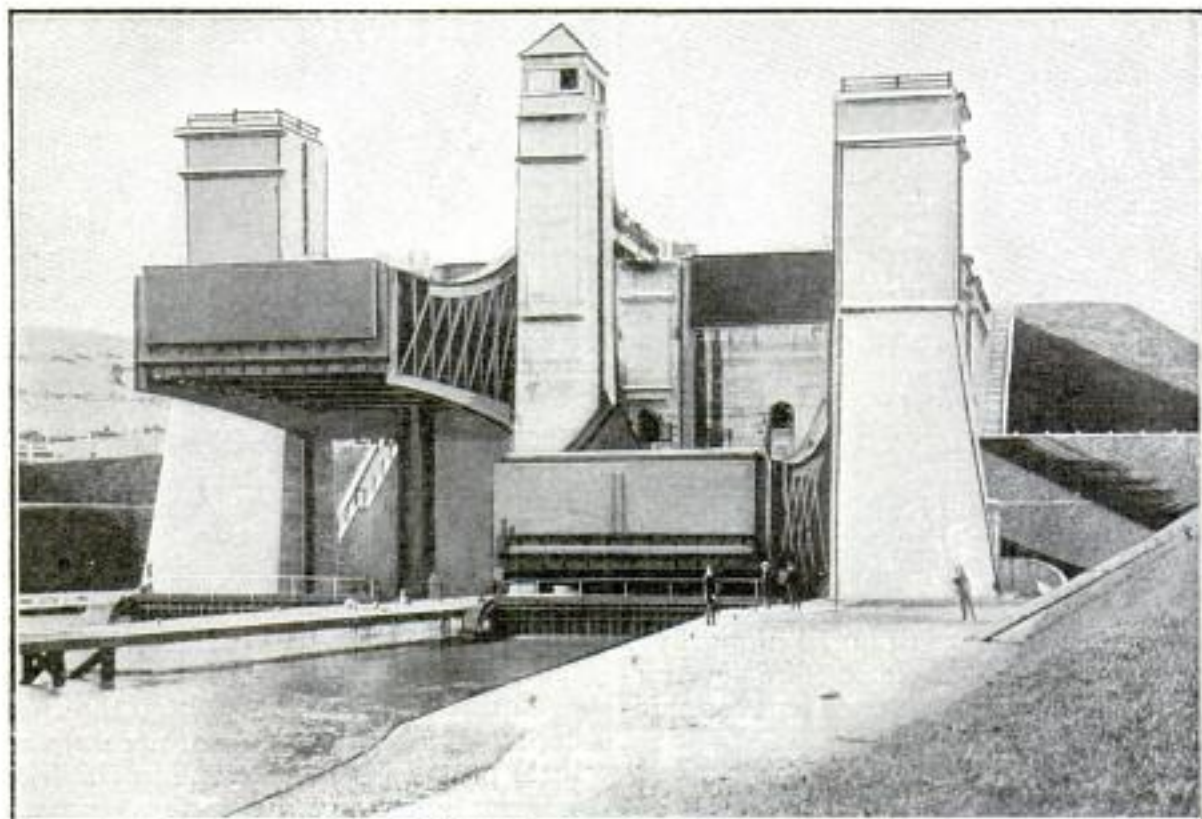
It remained for a man named Wilson to turn to account the information on record stating that "the district gives promise as a gold field." The result was what is known as "the Dome" property, and many other finds.

MOTOR ICE HARVESTER

The superintendent of a Boston ice company has brought this motor ice harvester to a stage of development in which it has proved itself practical. It weighs but 650 lb., and is driven by an 8-hp. engine. The four-bladed cutter is geared to make 1,800 revolutions per minute, traveling 9,000 ft., while the traction wheels, which engage with the ice and force the machine along on its runners, make $10\frac{1}{2}$ revolutions per minute, in which time the machine travels $52\frac{1}{2}$ ft.



Motor Ice-Cutting Machine



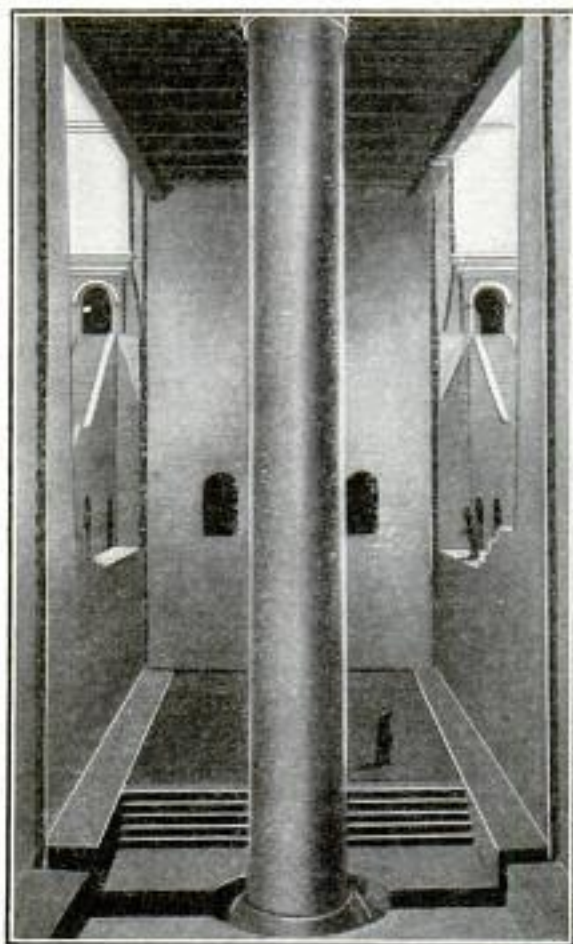
Petersborough Hydraulic Lift Lock

CANADIAN HYDRAULIC-LIFT LOCKS

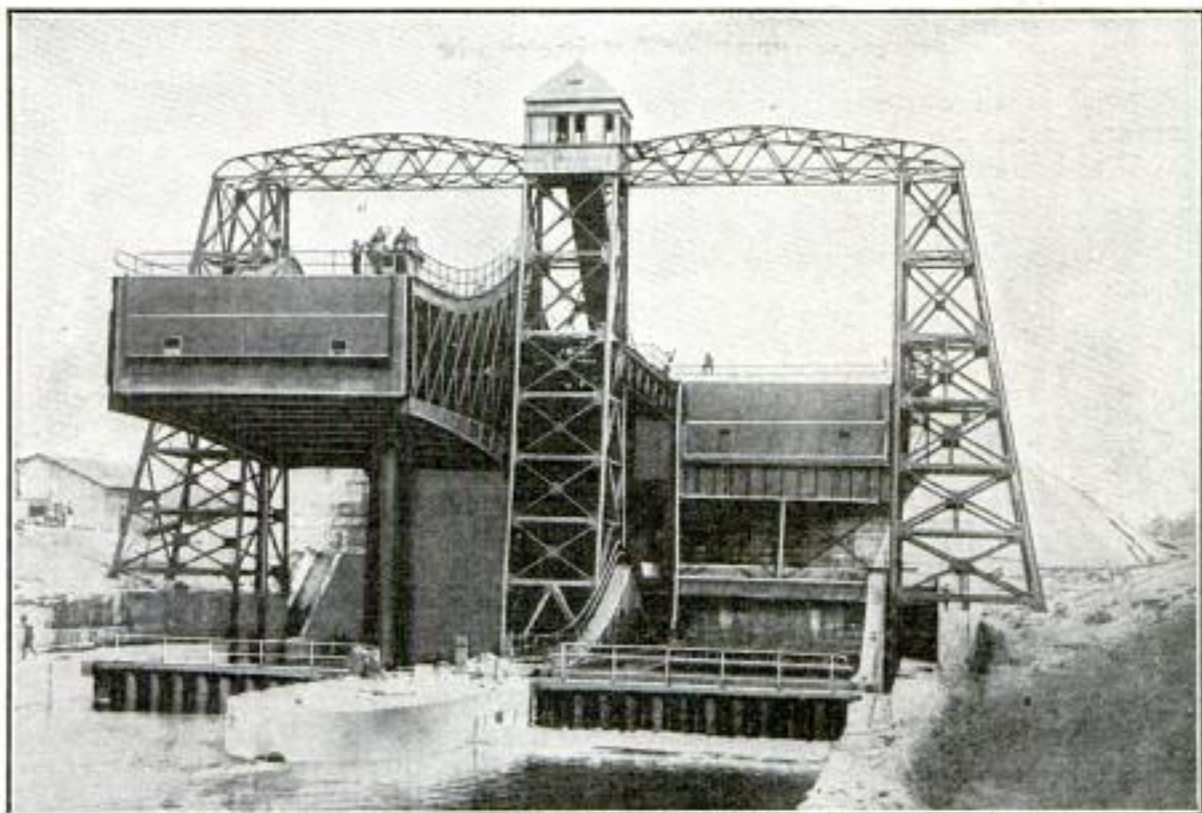
Canada has two great hydraulic-lift locks, located on the Trent Canal system, one at Petersborough, and the other at Kirkfield. It is said that there are only five locks of this type in the world, the remaining three being in England, France, and Belgium, but none of these approaches the Petersborough lock in size.

This lock cost the Canadian government \$800,000, and some idea of its immensity may be gained from the illustration, showing one of its main rams, the men also seen in the picture giving a basis for comparison. Each ram is 90 in. in diameter, and has a working stroke of 65 ft.

The Kirkwood lock, which cost \$600,000, was constructed some time after the Petersborough lock was put in commission. It has a lift of 50 ft., and each chamber is 133 ft. long, 33 ft. wide, and holds 9 ft. 9 in. of water. The descending chamber weighs 1,800 tons, and the ascending chamber 1,700 tons. The lockage is accomplished in



One of the Main Rams—Figures of Men Furnish Comparison Showing Height of Ram



Chambers of Kirkfield Lock at End of Stroke

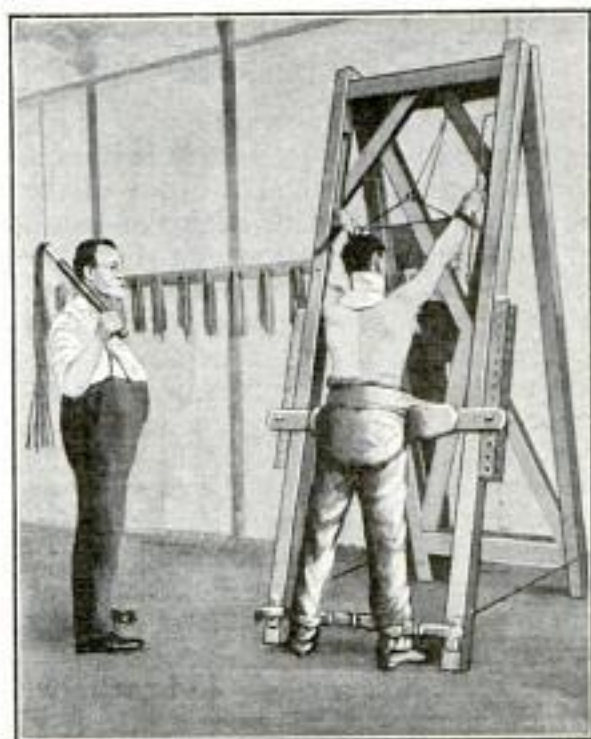
two or three minutes. The pit for the chambers of this lock was excavated out of solid rock, and has an average depth of 30 ft., a length of 160 ft., and a width of 100 ft.

FLOGGING IN LONDON PRISONS

Flogging, claimed by some to be a survival of barbarism in England, is given credit by others of being the most potent factor in ridding London of petty criminals and assuring public safety. Many criminals become so familiar with the prison routine as to lose all horror of it. In fact, life is so wretched for certain classes of undesirables in London that they would commit petty crimes as a means of gaining entrance to a prison, were it not for the wholesome fear of floggings.

The cat-'o-nine-tails used for the floggings, has been deprived of its knots, and is not laid on as strenuously as in the old days, while, with young offenders, the birch rod is brought into play. A physician is always on hand to stop the flogging should the culprit

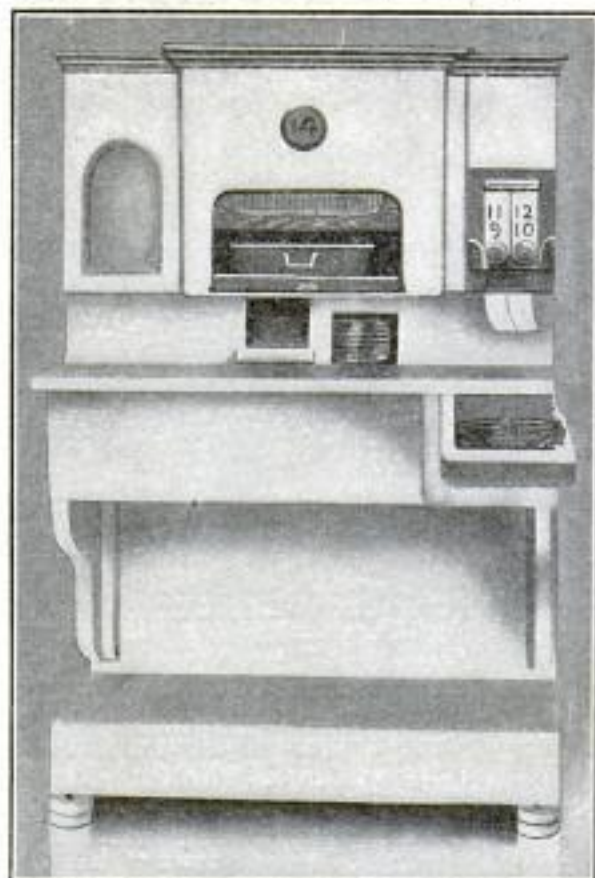
evince signs of fainting. Although the flogging punishment has thus been mitigated, it does not seem to have lost its effectiveness.



Flogging as Conducted in London Prisons

MECHANICAL WAITER-SERVICE FOR RESTAURANTS

A mechanical waiter-service for restaurants of the quick-lunch order, designed to increase serving capacity and



Mechanical Waiter Table

to dispense with the wages of waiters, is proposed by a New Jersey inventor. The patron seats himself at one of the tables, and indicates his choice of dishes by punching a ticket, which, together with cash to cover his order, he places in a money box and drops through an opening in the table. This box is carried to the kitchen by means of a conveyor, the order is filled, placed on a tray, and automatically delivered to the table designated by the number on the order box. Change, if any, is returned on the tray with the food. When the patron has finished, he places the soiled dishes on the tray, and starts it back to the kitchen again.

The system is composed of sectional units of single tables, one of which is shown in the illustration, and may be

arranged in rows against the walls, or back to back in the center of the room. The openings for the receiving of the food trays and the returning of the soiled dishes are clearly shown, as is the arrangement for punching the tickets.

OILED PAPER UMBRELLAS OF THE JAPANESE

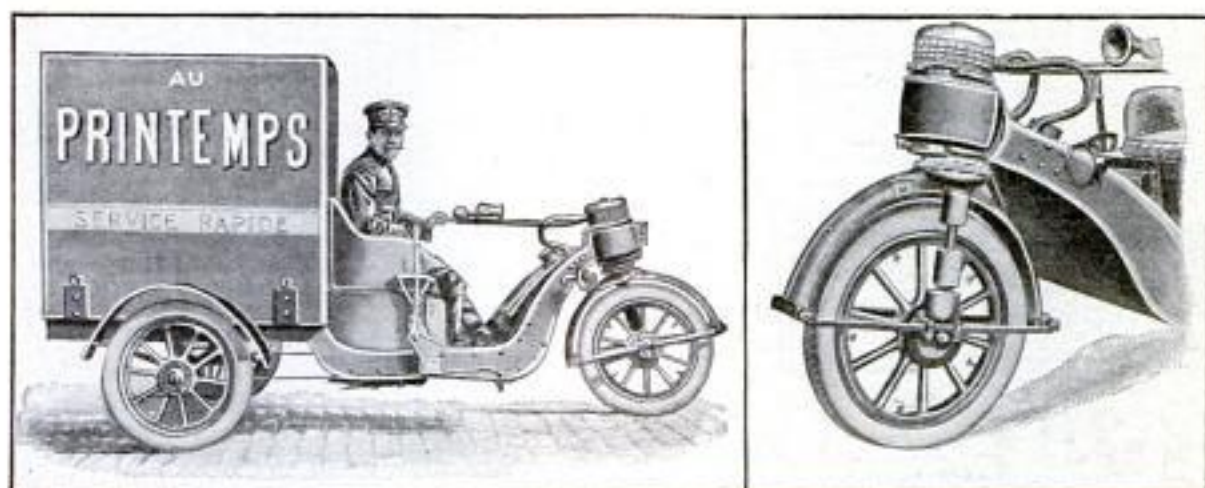
The umbrellas used by the Japanese are similar in all respects to the paper parasols that are common in this country, except that the Japanese treat their material with a vegetable oil which renders it impervious to moisture. The oil is obtained from the seeds of a plant (*Perilla ocimoides*) cultivated in some parts of Japan. A bushel of the seed produces about a gallon of oil, and the crop amounts to 350,000 bu. annually. The oil is boiled and, when cool, is applied to the paper umbrellas with a piece of cloth or waste. The umbrellas are then exposed to the sun for five hours.

The oil-paper is also used in making lanterns and for window panes. The paper lantern is in common use in Japan for lights on 'rickshas and wagons, and as a hand lantern like the tin lanterns here. Oiled paper is used instead of window glass in practically all of the native houses throughout the empire.

THREE-WHEELED ELECTRIC DELIVERY AUTO

The little electric delivery automobiles, installed by a large department store in Paris, have several unique and remarkable features. They are three-wheeled machines, with the front wheel used for both steering and driving, the motor being mounted on the vertical pillar just above the wheel, which, by the way, has neither forks nor springs.

The chassis frame, made of pressed steel, has a considerable drop for the portion reserved for the driver, and the two sections sweep upward and inward until they join at the front. It is at



General Appearance of Machine

Front Wheel with Motor Mounting

this point that the electric motor is carried, with its drive taken to the front wheel through encased gearing, a vertical propeller shaft with universal plunger joint at its base, and a bevel gear meshing engaging with the crown bevel on the wheel hub.

The motor receives its current from batteries located beneath the driver's seat. The speed is 12 miles an hour, with a radius, on one charge, of 60 miles. The machine was devised to worm its way through traffic that would cause a stoppage of ordinary vehicles. The front wheel being of caster type makes it possible to turn the machine with ease within its own length.

companies to provide emergency lighting, but is a further improvement in that each lamp has its own battery.

MOTORCYCLE WITH THREE REAR WHEELS

An inventor in Camden, Maine, has attached two extra wheels to the rear of his motorcycle, converting it into a unique, but, according to him, very practical four-wheeled motorcycle. The two extra wheels are held half an inch above the central wheel, so that, when on a level, smooth stretch, they do not come in contact with the road. In rounding corners, two rear wheels

EMERGENCY LIGHTING FOR THEATERS

The management of a Chicago theater proposes the installation of a storage battery of several cells to furnish lights for exit lamps, thus making the equipment for each exit complete in itself. Each exit sign will also be provided with two lamps, the second of which is automatically switched on if, from any cause, the first goes out. By connecting the exit-lamp circuits in series by a tie-wire, the batteries can be charged from the regular source of energy during normal operation, while any interruption to this supply leaves each lamp fed by its individual battery.

The idea is similar to that adopted by one of the Great Lakes' steamship



Four-Wheeled Motorcycle

and the front wheel, of course, carry the machine, and on rough or soft roads, all three rear wheels come into action.

CHEROKEE INDIAN CLAIMS TO BE OLDEST MAN

That he is almost as old as the United States is the proud claim of James Sur-



James Surret, Who Claims to be 120 Years Old

ret, a Cherokee Indian living in Bland County, Va. Surret has passed his 120th birthday anniversary and is one of the oldest inhabitants of the American continent. He is also one of the curiosities of his neighborhood, and has lived for years in one of the log cabins, which are so common in the mountain districts of the South.

ⒸA school for dairying is to be established at Buenos Aires, where the manufacture of cheese and butter has assumed enormous proportions.

HYPOCHLORITE PLANT MADE FOR QUICK SERVICE

The state board of health of Minnesota has adopted what it believes to be an effective means of preventing unnecessary delay in sterilization of water when disease threatens small municipalities of the state, by the construction of a small portable hypochlorite plant which can be set in operation in any part of the state within 24 hours. The plant consists of a mixing tank, storage tanks and an administering device. The mixing tank is to be 30 in. in diameter and the two storage tanks or barrels will hold 50 gal. each. From these the fluid is to be fed to the administering box, from which it is drawn off into the water supply at the desired rate. It is estimated that this plant will easily treat a water supply of 1,000,000 gal. per day, this being the maximum consumption of the smaller municipalities of Minnesota.

SWITCHES CLEARED OF SNOW BY STEAM HEAT

A system of steam pipes is utilized at the New Jersey Terminal of the Erie Railroad to keep the switches clear of snow. The steam is led from the power house in the yard through a 2-in. main, and is carried by 1-in. pipes to each switch, two lines of pipe being placed between the ties under the switch points. During the severe storms of last winter, the operating of the terminal interlocking system was uninterrupted. The snow melts as it falls, and no attention to the switch points is required.

ⒸThe Navy Department is experimenting with electric cooking apparatus on war vessels, the gunboat "Dixie" having recently been equipped with electric ovens and ranges, and plans are being drawn for similar installations on practically all the battleships and cruisers.

H E A T

By J. GORDON OGDEN, Ph. D., *Professor of Physics, Fifth Avenue High School, Pittsburg*

PART XI

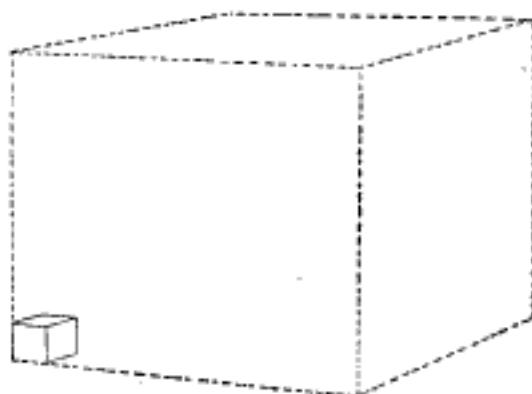
STEAM, BOILERS AND ENGINES

IF fire be ranked as the most useful acquisition made by man, surely the application of it in the production of steam as a source of power marks the advent of the supremacy of mankind over the forces of nature. When one sees a locomotive drawing hundreds and thousands of tons of freight across a continent, or looks upon a gigantic "Mauretania" forcing its irresistible way through a mighty ocean against wind and tide, it is hard to realize that the tiny wisps of steam, occasionally escaping into the open air, are responsible for all this wonderful service.

Here is the secret of it all. A cubic inch of water when heated sufficiently will give about 1,700 cubic inches of steam, almost a cubic foot. This steam is made up of little molecules, moving backward and forward, up and down, in every conceivable direction, like tiny pendulums. The striking of these little hammers upon a restraining surface produces what is termed "pressure." If the cubic foot of steam derived from the cubic inch of water be confined in a space of say, one-half cubic foot, these hammers, bombarding the restraining walls, will strike with twice the force, and the pressure will be twice as great; if the space be made one-fourth, then the pressure will be four times as great.

Man has learned this simple secret just as the magician of old learned the magic word which enabled him to open the treasure house in the mountain side, and make himself rich. Nevertheless it has taken the world a long time to understand all this. The first man who dimly perceived it was the Marquis of Worcester, an Englishman, confined in the gloomy tower of London, owing to his loyalty to the ill-fated Charles I. This nobleman, in the weary days of

his imprisonment, noticed that if a weight were placed on the lid of a tea-



One Cubic Inch of Water Gives 1,700 Cubic Inches of Steam

kettle, the enclosed steam would at regular intervals raise the weighted lid, and escape. The full significance of this phenomenon, however, escaped the distinguished observer, as he had not the slightest conception of its possibilities.

Worcester made an ingenious contrivance for the utilization of steam pressure, but in no sense was it an engine, as the term is used to-day. As a matter of fact, although Worcester is occasionally spoken of as the inventor of the steam engine, he had no thought of obtaining mechanical motion from steam power. This distinctive feature was in all probability applied, even if it was not discovered, by another Englishman, Thomas Newcomen, who made the first steam engine that was practical and "did things." The model of Newcomen's engine had been in possession of the University of Glasgow for over fifty years, and was used in the department of natural philosophy of that institution as an important aid in the teaching of this new and interesting subject.

One day in the year 1763 the model broke, and it was sent for repairs to a young workman patronized by the University. The workman, who was no other than James Watt, was delighted with the opportunity thus afforded him of making a careful study at first hand of this wonderful machine. He repaired the model, but made such additional improvements that it was practically a new engine. If the credit of the discovery of the modern steam engine can be given to any one man, then that man is James Watt. In 1782, Watt

Water is the raw material for steam, and, fortunately, it is the best and cheapest material that can be used in the formation of vapor. Water has the highest temperature at the limit of pressure of practically all available fluids, and is therefore the most economical fluid as a vapor source, while its abundance, comparative purity, and cheapness place it far beyond any other liquid that might rival it as a vapor producer.

Water has a very high specific heat, and an enormous amount of heat energy is needed to change it at 212° F.

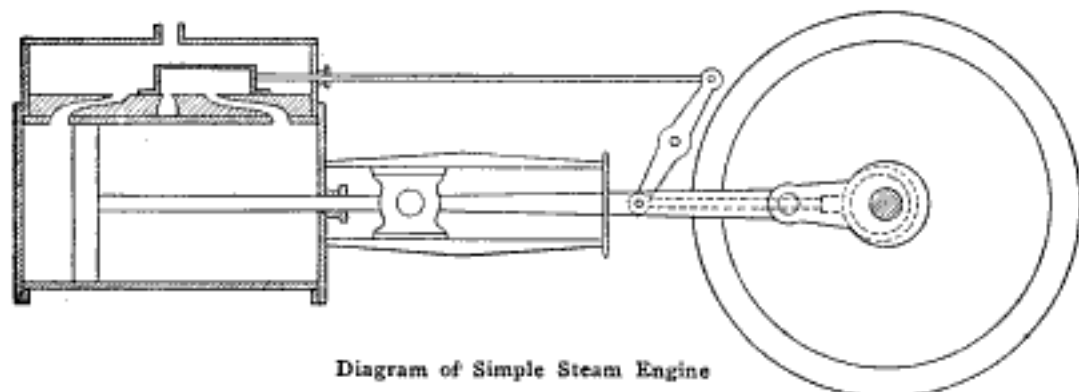


Diagram of Simple Steam Engine

patented his invention of the double-acting steam engine and the cut-off gear for making steam work expansively. Watt was also the first man to adapt the steam engine to the production of rotary motion, as he was the inventor of the crank in its application to the steam engine. Watt invented the governor, throttle valve, parallel motion, and the power indicator. As a matter of fact there has been only one great improvement in the steam engine since his time, namely, that of compound expansion.

By slow degrees the steam engine has developed into the almost perfect mechanism of today. Many brains have studied it, many hands have worked upon it. There are almost as many different types and forms of engines and boilers now as there are days in the year, but all of them owe their efficiency to the tiny little molecules causing pressure by everlastingly hammering away at steel restraining walls, some of which are fixed and immovable, and others that slip back and forth in their grooves of polished steel.

into steam at the same temperature, no less than 966 British thermal units. In other words the energy needed to transform a pound of water at the boiling point into steam at the same temperature would raise almost a half of ton of water one degree in temperature. After water has become steam, it heats more readily, as only .48 heat units are required for each degree the temperature is raised. Steam is not energy. Like electricity, it is simply a carrier of energy from the fuel to the machinery that does the mechanical work.

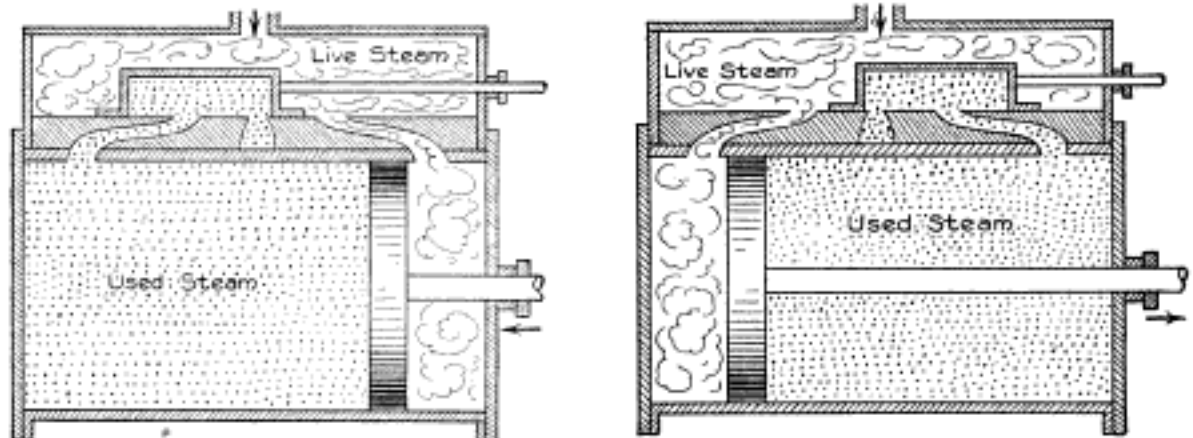
Saturated steam is the term applied to steam that is given off by boiling water, and is, of course, invisible. The familiar white cloud we see emanating from a steam pipe owes its color to the partial condensation that has taken place. Saturated steam owes its temperature to its pressure, and may be either wet or dry. Superheated steam, now coming so commonly into use, is steam that is heated to a temperature above that due to the pressure, and this heating must be done outside of the pressure of the water from which it

was generated. Superheated steam, of course, contains more energy than the saturated form.

There is a limit to the heating of steam, however, as it will disassociate into its constituent gases, oxygen and hydrogen, beyond a certain point known as the critical temperature. One great advantage possessed by superheated steam is the fact that it cannot condense until it has lost all of its superheat and is reduced to the saturated form. As there is always a loss of heat by radiation where steam is conveyed in pipes, this loss in the case

type of to-day is extremely interesting, and in every respect it has more than kept pace with the development of the engine. A modern boiler is distinctively a work of art and a triumph of science. Whether the material used be malleable iron, cast iron, wrought iron, steel, copper, or various compositions such as bronze or nickel steel, every part of it is tested for tensile strength, compression strength, torsional strength, shearing strength, and resistance to bending.

So far as construction is concerned, boilers may be classed into two general



The Simple Steam Engine, Showing Typical Positions of Slide Valve

of superheated steam will simply lower the temperature of the superheat, but not enough to cause it to become wet, as in the case of saturated steam. Dry steam, of course, has a much higher efficiency than wet steam. Superheated steam is clearly indicated in the use of turbine engines, as the energy of the steam is transformed directly into velocity.

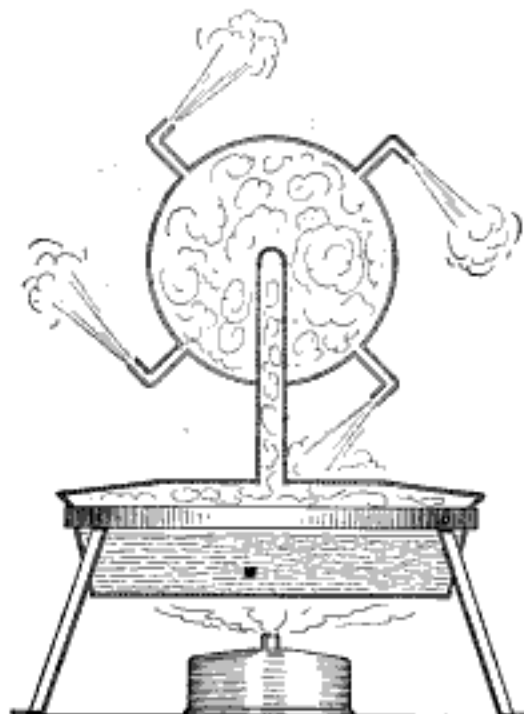
Were there any condensation, the water would interfere with this result, and would also produce corrosion and wearing away of the blades. The extra fuel required for superheating is comparatively slight, as 250 degrees of superheat may be secured at a cost of only 20 per cent. additional fuel. One disadvantage in the use of superheated steam, in the case of turbines, is the tendency to produce warping in the blades due to high temperature.

The evolution of the boiler from the simple box used by Hero of Alexandria, about 130 B. C. to the modern tubular

divisions. The water-tube type, and the fire-tube type. As has already been indicated in the course of these articles on Heat, water is an extremely hard matter to heat. The old type of "tea-kettle" boilers, where the water is confined in one mass, is far from economical, at least as far as the time required to "get up steam" is concerned. It was soon perceived that the mass of water in the boiler must be divided, in order to obtain more heating surface. Therefore, practically all modern boilers are either of the fire-tube or water-tube form. In the fire-tube type, as the name would indicate, the hot gases are forced to travel from the firebox to the chimney through tubes surrounded by water. In the water-tube boilers, the tubes are filled with water and are completely enveloped by the hot gases passing over and among them, in the journey from firebox to chimney. In both types, practically the same result is obtained, namely, the exposure of

relatively small quantities of water to abundant heating area.

Which of the two forms is the more economical and efficient is a mooted



The First Turbine Engine Constructed by Hero of Alexandria

question among engineers. There is no doubt but that the water-tube form is safer, especially when steam above 150 lb. is used. The water-tube form also takes less time to raise steam, due to the better circulation obtained than in the fire-tube. The rapid circulation in a water-tube boiler is due to the fact that as the water in the tubes in the hottest part of the boiler turns into steam, it is rapidly replenished by the rising of the cold water.

In practice, it has been found that a fire-tube boiler requires from two to two and one-half hours to raise steam to its working pressure, while steam may be raised to the same point in a water-tube boiler in less than an hour. If the time element is to be considered, the water-tube is therefore the more advantageous of the two. Unfortunately for boiler practice, it is hard to procure pure water. Even the purest of natural waters contains some mineral constituents, and the constant distillation of the water to form steam leaves these mineral salts as incrustations and sediments that interfere not

only with the steaming capacity of the boiler, but also with its life. In a former article, the effect of dirt and grime on the outside of the boiler was mentioned, and the serious loss of fuel efficiency due to this cause was commented upon. The incrustations within the boiler have even a greater effect upon the efficiency. It has been estimated by conservative engineers that a layer of scale one-fourth inch in thickness causes a loss of 35 per cent. in fuel, while half an inch of scale will result in a loss of from 55 per cent. to 65 per cent.

An ordinarily good water will contain about 25 grains of mineral matter to the gallon. A stationary boiler of about 160 hp. capacity will evaporate 600 gal. of water per hour. This would mean a deposit of 15,000 grains per hour, or, as there are 7,000 grains in a gallon, $2\frac{1}{7}$ lb. of mineral matter will be left behind by the steam every hour. Suppose the boiler were worked a month of 25 days of 10 hours each, without cleaning; the hard scale and sludge formed would produce the enormous total of over five hundred pounds.

The corrosion produced in boilers by certain impurities such as acids, grease, gases, organic matter and so forth, greatly weakens the shell, and is a frequent cause of explosions. Numerous safety devices for boilers have been patented, and many peculiarly constructed boilers have been put on the market, guaranteed to be absolutely explosion-proof, but as a matter of fact, there is no such thing as a boiler that cannot explode. The only safeguards are first-class material, careful and frequent inspections, and competent attendants who make it their business to watch carefully the needs of their charges. A boiler, like a human being, has a normal life, and experience tells us that while certain types may last for 20 or 30 years, other forms, such as locomotive boilers, rarely last six years.

Steam engines may be classified in several ways. First, as regards speed; second, as regards number of cylinders; third, the method of exhaust; fourth, the position of the engine, whether it

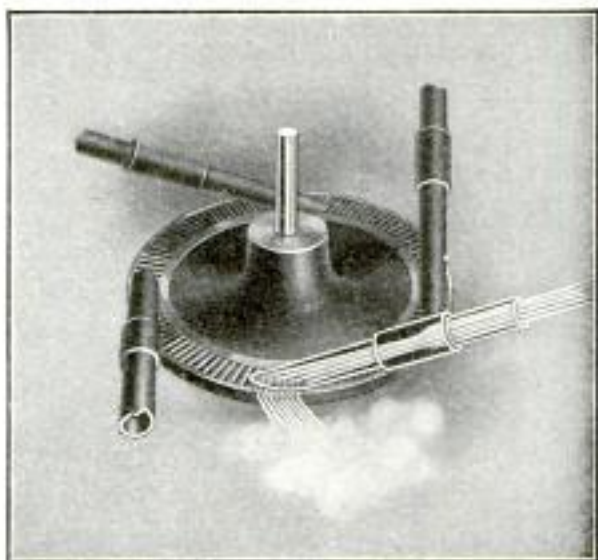
be horizontal or vertical. A slow-speed engine has a long stroke but comparatively few revolutions per minute, while the high-speed type is distinguished by the shortness of its stroke and the greater number of revolutions per minute. A simple engine is one that has only one cylinder, and the steam is therefore used but once. If the exhaust steam is turned into a second cylinder and used a second time, the engine is a compound form. If a third cylinder be added, and the steam, originally at high pressure, passes through two other cylinders at successively lower pressures, the type is known as a triple-expansion engine. The cylinders of a compound engine may be placed in a direct line with each other and have a common piston rod. Such an engine is known as a tandem compound. If the two cylinders are placed opposite each other, the engine is known as a cross-compound, or cross-connected. A compound engine is of course more efficient than a simple engine, due to the fact that the energy still remaining in exhaust steam is utilized. With the same amount of fuel, the compound engine will develop more power than the simple type.

An engine that exhausts directly into the air against the atmospheric pressure is known as a high-pressure engine, and must work against an air pressure of 15 lb. to the square inch. A condensing engine, as its name would indicate, is one that condenses the exhaust steam, relieving the back pressure and adding that much to the efficiency of the engine.

The work done by an engine is calculated in horsepower. A horsepower is the ability to raise 33,000 lb. one foot in one minute, or 550 lb. one foot in one second. The horsepower of an engine may be calculated by using the formula $\frac{PLAN}{33,000}$, in which P represents the effective pressure, L is the length of stroke, A is the area of the piston in square inches and N is the number of strokes of the piston rod per minute.

Considering the question of power given to work done, a steam engine is

an extremely wasteful device. The ordinary non-condensing engine rarely has an efficiency of more than 10 per cent, and is generally far below that



Simple Turbine Engine

percentage, and consumes from two to three pounds of coal per horsepower hour. The introduction of the compound, triple-expansion, and quadruple-expansion types of engine has raised the efficiency considerably, lowering the consumption of coal to one pound per horsepower hour. Nevertheless the greatest efficiency yet obtained in a steam engine does not exceed 25.5 per cent., and this is obtained in the Nordberg quadruple-expansion engine.

The steam turbine, which is really a modified waterwheel driven by steam instead of water, is rapidly coming into favor, especially on ocean-going vessels. The turbine occupies less space than the ordinary reciprocating engine, is practically free from vibration, and has the great advantage of uniform and high angular velocity. Its efficiency as compared with the best reciprocating engine is about the same, but owing to the advantages named is gradually supplanting the older types of engines.

Planters and manufacturers in the Federated Malay States are experimenting with oil made from the seeds of the rubber plant and believe it can be developed into a valuable product.

GUN THAT SHOOTS WATER AS DIVER'S WEAPON

European divers are testing the effectiveness of a new type of gun that shoots jets of water instead of bullets as a protection against the monsters of



Diver Using Water-Jet Gun to Kill Attacking Shark

the deep that make dangerous the work of the men who labor on the floor of the ocean, according to the London Illustrated News. A German is the inventor of the gun, which resembles an ordinary rifle in all its outward aspects. Compressed air is the power used, the air being contained in a cartridge covered with India rubber. The water is shot from the gun barrel with an enormous velocity and is said to have remarkable penetrating power. Its inventor claims to have pierced armor plate of medium thickness with a jet from his gun. Heretofore, divers have been forced to depend on the knife to defend themselves against attack, all previous efforts to devise a submarine gun having been futile.

JAPANESE EARTHQUAKE-PROOF SKYSCRAPER

A business firm in Tokyo is contemplating the construction of a skyscraper building on lines similar to the plans used in the reconstruction of San Francisco, which are expected to provide against destruction from earthquake. Japan is a country of earthquakes, and the officials of the Tokyo concern believe that the new building should be earthquake-proof, since it is a skyscraper—six stories high.

People familiar with the height of American skyscrapers may smile at the idea that a six-story building is considered a skyscraper in Japan, but such an office building, of modern American construction, would, comparatively, loom as high above a Japanese street as would a 40-story skyscraper surrounded by 20-story skyscrapers, height being largely a matter of surroundings.

FIRE ESCAPE OF FOLDING PLATFORMS

Folding platforms, fastened to endless chains, capable of bearing a weight of 7,000 lb., are a feature of the revolving fire escape patented by a Danville, Ill., man.

In this endless carrier device, the platforms, which are placed 7 ft. apart, fold as they start upon their return trip and then drop into a horizontal position as they reach the top of the building. From eight to ten persons can stand upon each platform. The weight of a child will cause it to descend, but the speed of the descent may be regulated by merely pressing on the cable at the side, this acting as a brake. The platforms are provided with chain hand-holds, but may be enclosed if desired. As the platforms fold, the device can be placed within two inches of the wall. It can be raised as easily as it can be lowered and, it is thought, will prove valuable as an aid to firemen when ladders are not available.

FRENCH AUTOMOBILE-SLEIGH

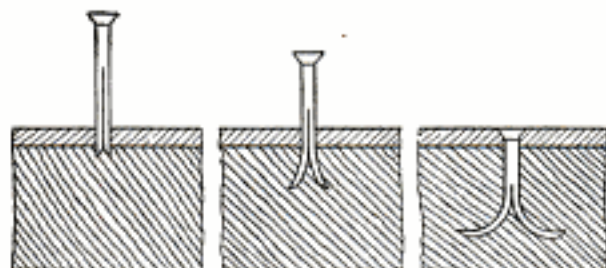
An automobile, which can be converted from a wheeled vehicle into an auto-sleigh in 15 minutes, is being manufactured by a French concern for use in countries where frequent snows make such a type of machine desirable.

The runners are attached to the spindles of the axle-trees in the same manner as wheels. The means of propulsion is a revolving drum placed beneath the front seat, and connected to the engine shaft by chain gear. The engaging surface of the drum consists of notches or teeth spirally disposed, which prevents the snow from sticking. The drum is hung in a manner that makes possible the climbing over of ordinary bumps or ridges in a road. By means of a screw gear the driver can regulate the amount of pressure the drum exerts on the roadbed.

In changing from sleigh to wheeled vehicle, all that is required after the wheels have been substituted for the runners is to disconnect the chain gear running from the engine shaft to the drum, and fasten the latter in its highest position.

A NON-PULLABLE NAIL

A nail that once driven into place resists all ordinary efforts to pull it, has been patented by a French inventor. The point of the nail is slit through its



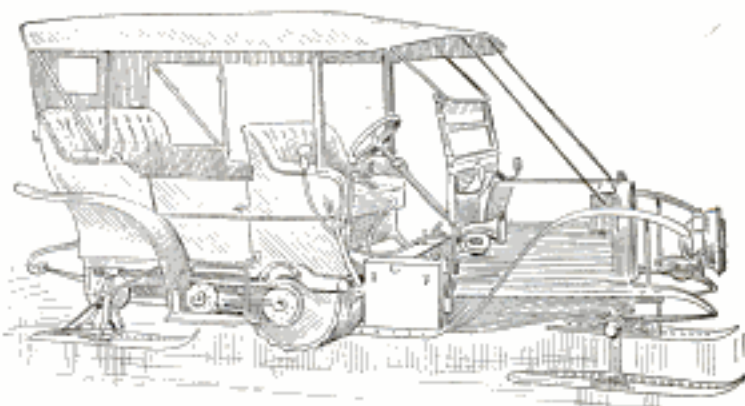
The Action of the Nail

center to nearly two-thirds the distance to the head, like a cotter pin, and as the nail is driven, the two parts curl into the wood.

IRRIGATION IN SWITZERLAND

Irrigation canals of insignificant size, but built under great difficulties, have been used for many years in the valley of Zermatt, Switzerland, for the fertilization of the soil rather than for the watering of the fields.

The valley lies at an elevation of nearly 5,000 ft. above sea level, near the famous Matterhorn, and the flanks of the high peaks are covered with glaciers.



Prepared for Travel over Snow or Ice

The water which flows from these glaciers into the Visp River and its tributaries is made almost milk-white by a fine sediment ground from the rock by the glaciers; and it is this sediment that the water disposes over the land as fertilizer.

The canals into which the water is diverted from the stream by means of crude wooden troughs at the head of some fall or rapids, run along embankments and are temporarily dammed by means of flat stones at points where it is desired that the water overflow into the fields.

AUTOMOBILES AS FEEDERS FOR ELECTRIC LINE

Automobiles as feeders for an electric interurban railway are being given a practical test in connection with the Indianapolis, Newcastle & Toledo railway in Indiana. The service connects Greenfield, located a few miles away, with the line, and was started with one 14-passenger automobile. It was necessary to increase the service the first day.

A PREVENTIVE OF POLE-CLIMBING

The number of deaths and injuries resulting from unauthorized climbing of poles supporting high tension

electric wires in Switzerland, has caused the Swiss Association of Electrical Engineers to recommend the use of porcupine rings as a preventive.

The steel spines, arranged on a ring for round poles, and on bars for poles of the lattice type, are placed in such position as to make climbing above them impossible. The rings or bars are detachable only by means of socket keys, which are furnished to no one but employees.



NEW ALLOY IMPERVIOUS TO RUST

The discovery of an alloy of chromium and cobalt that combines the hardness and malleability of the best tool steel with a resistance to corrosion not possessed by any of the steel products, has been announced as the result of a long series of experiments by Elwood Haynes, an Indiana manufacturer, whose particular hobby and recreation is chemical research. Since 1895, Mr. Haynes has been experimenting with cobalt in his private laboratory. He first tried an alloy with nickel, but had indifferent success. After a lapse of years he took up the experiments again a short time ago and finally obtained, by forming an alloy

containing 25 per cent chromium and 75 per cent cobalt, a metal which is as hard as the best tool steel and which showed an unusual resistance to nitric acid and hydrochloric acid. Solutions of caustic alkalis were totally without action upon it, even when the alloy was boiled in them for hours, and the alloy was proof against all atmospheric influences, whether the air be moist or dry, retaining its brilliance and luster under the most severe conditions.

The advantages possessed by the new metal are admitted by scientists throughout the country, although they are skeptical as to the ultimate commercial value of the discovery of Mr. Haynes, because the two elements that enter into its composition are among the most expensive known to chemistry. There is but a limited quantity of each known to exist in the entire world, and it is estimated that a penknife made from them, while it would wear forever and would never rust, would cost from three to five times the price now paid for a steel knife.

CUSPIDOR FOR CARS

A new cuspidor, especially designed for the smoking compartments of passenger cars, but just as serviceable for office or factory use, has several practical features. It is so constructed that



Improved Cuspidor

it can not tip or be kicked over, may be stepped on without the foot being caught, and is easily cleaned.

Electric locomotives are to be used on trains passing through the famous Hoosac tunnel.



Courtesy the Upholsterer

Stencil Pattern on Coarse Cotton or Linen

THE STENCILING OF FABRICS

The stenciling of fabrics for interior house decoration is a pleasant and fascinating work which requires only ordinary ability and can be turned to good use in making the home artistic. The effects often obtained in stenciling on burlap, denim, coarse cotton or linen fabric, and thin silk, are very pleasing and the cost is usually far below that of portieres and curtains, which can be bought already made up. The fabrics that will successfully take stencil ornamentation include heavy woolen material with close or fluffy surface, canvas, linen, all varieties of cotton goods, velours, velvet, and silk.

Success in stencil ornamentation, however, requires some knowledge of the method of working on the different materials. Consequently, a few pointers given in a recent issue of the *Upholsterer* will be of interest.

Oil color can be used on all materials except velours and velvet, which must be worked with dyes. In designing for heavy woolen goods, it is well to avoid elaboration of detail. The forms should, for the most part, be large, and when it is necessary to introduce small shapes they should be simple in contour. With goods of this kind, having rough or fluffy surfaces,

oil colors are the most satisfactory, and the oil paint must be let down to the consistency of thin cream by admixture of turpentine and a little quick-drying Japanese gold size, in the proportion of one part gold size to six parts turpentine. The heavier and

fluffier the fabric, the more paint it will take, and the color should be kept correspondingly thin. Large brushes are best for this work, as much dabbing spoils the effect. The charm of variety can be secured, even when



Tea Cloth Design for Very Thin Silk

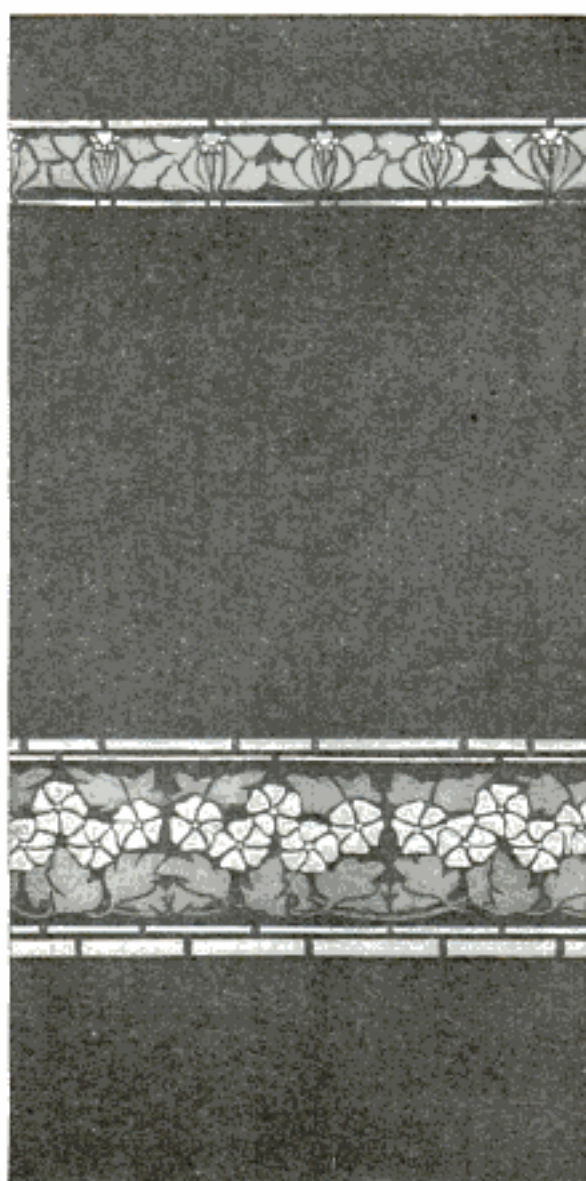
using only one color, by working some parts with a brush which is nearly dry and the others with a brush kept well filled.

The thinner the material, the more difficult it is to manage the color, but such material allows the most elaborate designing. When the fabrics are transparent, however, great precision of detail is difficult, and the design must aim at a pleasing effect in simple forms. Linen requires special care, as the long, straight threads tend to lead the color along, resulting in an irregular and even blurred contour. Small brushes are desirable for work on thin fabrics, and very thin work may be laid over blotting-paper with advantage.

In using dyes, some binding substance is required to make the material

washable. White of egg is the best for this purpose, well mixed into two tablespoonfuls of water. This is used instead of plain water to dilute the dyes, if they are liquid, and also serves as the binding medium, if the dyes are in powder form. Work done with dyes must be steamed, when dry, in order to make it fast. This is accomplished by laying a damp cloth on the back of the work and pressing a hot iron over it until dry, thus creating sufficient steam to set the fixative.

In stenciling on velours or velvet, the brush must not be dabbed, but drawn over the surface as in painting. The color must be laid on with thin, flat hog-



Heavy Serge Portiere with Stencil Decoration

hair brushes, such as are used for oil painting, not with the ordinary stencil brushes. In the case of velours, it is necessary to saturate the fabric thoroughly with water and let it dry before working upon it. This lays the nap and flattens out the creases. After the work has been steamed, the nap can be raised again by brushing with a soft brush.

A new Scranton, Pa., hotel has a "Celtic palm room," with original Irish decorations, and a "coalmine cafe." The entrance to the latter is between two columns of ebony. The interior is furnished with modern copies of early English oak furniture.

CHRISTMAS-TREE ILLUMINATION

By A. E. ADAMS

A great many would, no doubt, be glad to light their Christmas tree by electricity if they only had the proper instructions for connecting the lamps to the supply mains. Let us assume first that you have a 110-volt lighting circuit in the building and that you want to operate your miniature lamps from this circuit.

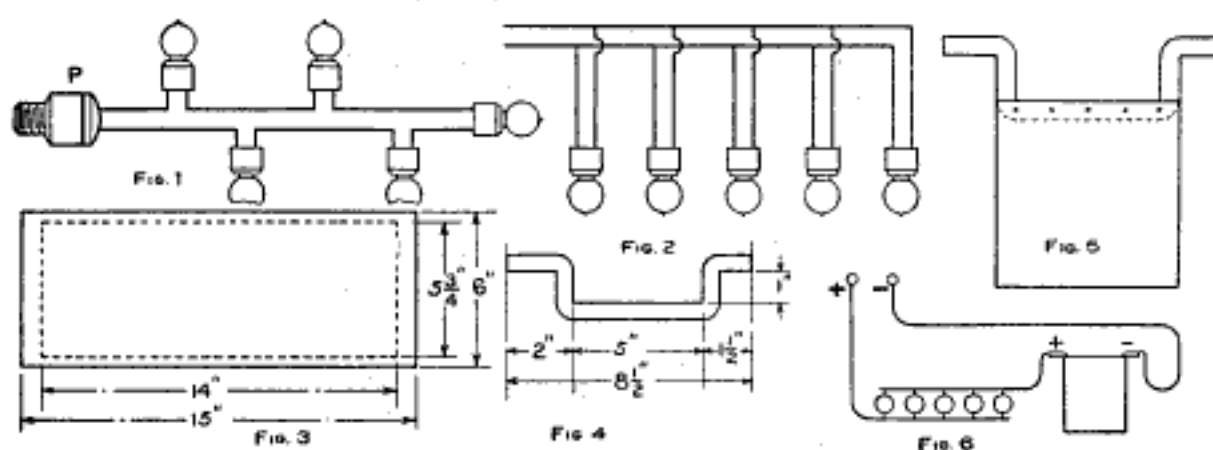
There are two ways the lamps may be connected. In Fig. 1 are shown all

the small lamps connected in "series" and in Fig. 2 they are connected in "parallel." The lamps in these two figures are represented by the circle. In the first case, the 110-volt pressure of the supply mains is distributed over all of the lamps, each lamp having a certain portion of the total. The value of this electrical pressure over each lamp will depend upon the relation between the resistance of the lamp considered and

the total resistance of all the lamps. The electrical current is the same through each lamp and all of them must be perfect; otherwise the circuit is not complete and the lamps will not light. If it is desired to operate, say, 10-volt lamps, then there must be eleven of the lamps connected in series and all these must be of the same candlepower. If they are not of the same candlepower

and tied in a knot to prevent its pulling out.

Starting now, say, 15 ft. from the plug, cut one of the wires and fasten the two ends to one of the small sockets (See Fig. 1). The remaining sockets can now be equally spaced between the first one and the ends of the cord, a socket being placed at the end to join the two wires and thus com-



Details of the Battery Plates and Wiring Diagrams

they will not have the same resistance, and the higher resistance lamps (lower candlepower) might be burned out, due to the excessive current.

If you want to use lamps of any other voltage than 10, the number of lamps you should have in the circuit must correspond as near as possible to the quotient obtained by dividing the total voltage by the voltage of one of the miniature lamps. The material required for an outfit of this kind will consist of the following items: 30 ft. of green silk-covered lamp cord, one standard Edison plug, a number of miniature lamps with sockets. Connect the plug to one end of the lamp cord, as shown by P, Fig. 1, the connection being made as follows: cut the cloth and rubber insulation off the ends of the wires to a distance of about $\frac{5}{8}$ in. and twist the small strands, forming each part of the cord, together. These two ends should now be placed under the heads of the two brass screws inside the plug, the cord being first passed through the insulating bushing on the back of the plug

and complete the circuit. The small lamps are then screwed into place and a lamp removed from the lighting fixture to make room for the plug attached to the end of the cord. The circuit can be controlled by means of the switch in the socket of the lighting fixture.

In the second case, each lamp is connected directly to the supply mains independent of all the others and the electrical pressure acting upon it is the total pressure of the source of supply. Lamps of different candlepower can be used in this case, but they must all be constructed to work on the same voltage. The material required for this outfit is the same as that needed for the first one, except that the lamps must be of the same voltage as the line upon which they are to operate. Any reasonable number of lamps can be connected to the cord, and each socket should be connected to both wires instead of cutting one side of the line and connecting the sockets as in the previous case. A piece of lamp cord, 4 or 5 in. long, may have one end connected to the socket and the other ends of

the wires soldered to the two wires forming the main circuit. These soldered joints should be thoroughly taped to prevent the wires from coming into electrical contact with each other. Neatly designed small lamps of various colors can now be obtained, and the effect produced will prove very pleasing. Some of them are made in the shape of candles and the effect is practically the same, while the danger from fire is practically eliminated. The sockets may be attached to wires with a weight on one end so as to hold them in an upright position.

If there is no electrical current available when it is desired and you must provide some means for supplying it temporarily, a small battery of dry cells would operate a number of lamps satisfactorily for a short time, but its output is too small to make its use practical. A storage battery, however, will give excellent results and is convenient because it can be carried from place to place.

The storage battery is one that is charged from some source of electrical supply by sending a current through it, in the opposite direction to that in which it flows when the battery is being discharged. It usually consists of two sets of lead plates immersed in a solution of sulphuric acid. Such a battery has a much greater current capacity than the dry battery, and its capacity can be increased almost indefinitely by increasing the size of the plates composing it. A 6-volt battery that will give a current of one ampere for 60 hours can be purchased for from fifteen to twenty dollars. As, however, some of our readers may prefer to construct their own battery, we give the following description of a very simple and inexpensive one.

You should first obtain a rectangular glass jar, 7 in. by 3 in. wide and 7 in. deep, that is to serve as the containing vessel for the plates and acid. Next procure three sheets of very thin pure lead, 15 in. long and 6 in. broad. Lay these sheets on top of each other and drill as many $\frac{1}{8}$ -in. holes as there is room for inside of the dotted lines

shown in Fig. 3. Take three pieces of $\frac{1}{8}$ -in. lead, $\frac{1}{2}$ in. wide, and bend them into the form shown in Fig. 4. The lead sheets should now be bent over a $\frac{1}{8}$ -in. board and the ends riveted to the pieces. The completed plate is shown in Fig. 5.

Mix red lead and sulphuric acid into a thick paste in an old dish. (Acid having a specific gravity of about 1.1 should be used—always pour the acid into the water.) Fill one of the plates with this paste and bend down the edges until they touch so as to hold the paste in place. Any paste that may be forced out through the holes should be scraped off, and the plates put aside to dry. Fill the remaining plates with a mixture made in the same way as that just described, except that litharge or yellow lead should be used. Place these two kinds of plates alternately in the containing vessel, starting with one filled with litharge. The long lugs of one set should project on one side and those of the other set on the opposite. All the long lugs on each side should be connected, thus forming the two terminals of the cell. The surfaces of the plates should be about $\frac{1}{8}$ in. apart. Fill the vessel with acid of about 1.2 density until the plates are just covered. Connect the cell to a direct-current circuit with a suitable resistance and pass a current of five amperes through it for about 10 hours—discharge it and then recharge it, repeating the operation a number of times. The connections for charging, with the polarity indicated, are shown in Fig. 6. The plates filled with red lead are positive. Fully charged, this cell should give 2.2 volts and supply a current of four amperes for about 10 hours.

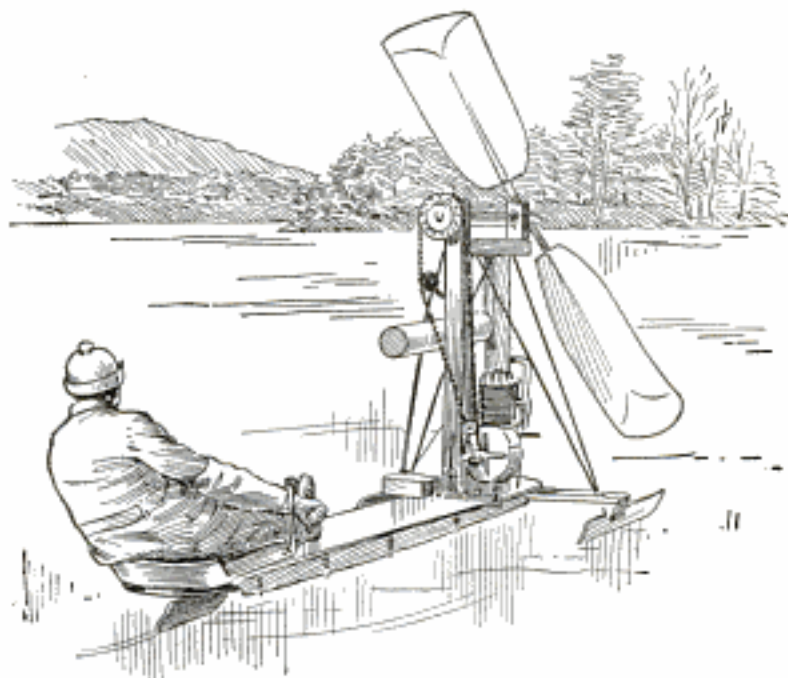
The voltage can be increased by connecting several cells in series. The total voltage being the sum of the voltages of the individual cells.

☞Chicago has a newspaper trolley car constructed for the purpose of transporting newspapers to various parts of the city for distribution.

AIR PROPELLERS AND THE ICE-BOAT

Motor ice-boats, drawn by aerial propellers, will create interest on many of the lakes and rivers of the United States this winter. Some of them will be crude, experimental machines, capable of medium speeds, and some will probably attain speeds as high as 50 or 60 miles an hour.

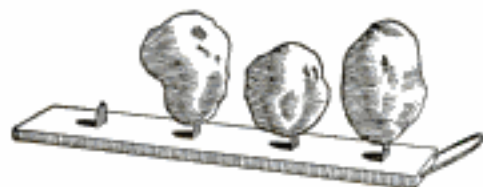
The illustration shows a boat built by an ice-boat enthusiast on Lake Placid, New York. The propeller blades are 4 ft. long, with a 10-ft. swing, and are driven by a 4-hp. motor. The speed is only 10 miles an hour on fair ice, partially due to the fact that the machine weighs 150 lb. more than is necessary, and about one horsepower is lost in chain play.



Home-Made Air-Propeller Ice-Boat

STAND FOR BAKING POTATOES

A support or stand for potatoes while baking has been placed on the market. It consists of a tin, 15 in. long by $2\frac{1}{2}$ in. wide, with sides turned so as to raise the body up from the oven, thus permitting a free circulation of heat.



Handy Potato Baker

Spurs, formed by cutting out sections on the top of the tin, make supports for the potatoes. In this position they are exposed to an even heat on all sides.

☞The new Brazilian battleship "Minas Geraes," one of the largest afloat, bears the name of one of the most populous and progressive of the Brazilian states.

AMUSING "STUNTS" FOR AUTOMOBILISTS

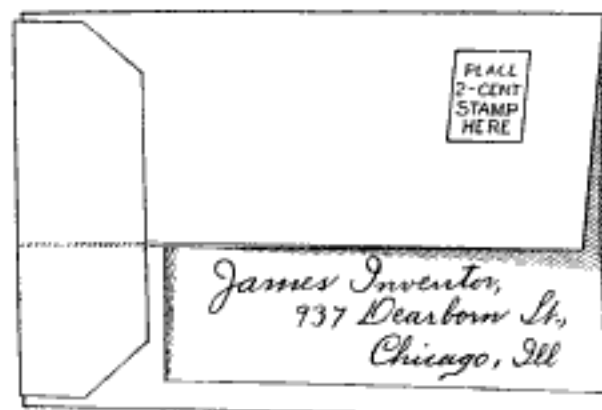
That a gymkhana, the name under which such sports as climbing the

greased pole, catching the greased pig, the fat men's race, etc., are generalized, is amusing when automobiles are used as accessories is demonstrated continually.

Such an event was recently held by the Eastbourne Automobile Association in England, and the program proved very enjoyable to onlookers and participants alike. Among its features were a bun-pegging event, a slow race, blindfolded race, costume race, bending race, and an "organ-grinding" race. In the latter the competitors had to propel their cars, with the engines dead, a distance of 20 yd. by turning the starting handle. The bending race consisted in running along a crooked lane without touching the poles marking the boundaries. The blindfolded race went to the entry who could negotiate the distance from one end of the field to the other first. Several of the drivers turned their machines completely around and did not finish at all. Riding with each blindfolded driver was a companion authorized to take a hand if collisions threatened.

USING THE POSTOFFICE AS A NOTARY PUBLIC

A unique scheme by which inventors may make the government, through the medium of the postoffice, do the



Appearance of Letter Sheet When Folded

service of a notary public in proving priority of an invention, has been patented by a Chicago inventor.

When an inventor conceives an idea, he makes a sketch of his invention, describes it, and dates it, then has a notary public witness the signing. This is necessary because the question of priority may arise and must be proven.

The combined envelope and letter-sheet idea, however, is claimed to have many advantages. The inventor fills out the sheet, which is printed in regular legal form, and writes his own

the postoffice it is stamped like all letters, showing the exact day, hour and minute it arrived, and then, as the inventor has addressed it to himself, is returned to him through the regular channels. In this way the government gives a date on the invention for the price of a two-cent stamp, and the old method of having to disclose the invention to a notary public is avoided.

RED GUM WOOD BECOMING POPULAR

Builders of handsomely finished houses and apartments, the manufacturers of fine furniture and the consumers of good lumber generally throughout the United States are gaining a greater respect for the old red gum tree, which is now producing wood that is known throughout Europe as "commercial Circassian walnut" and is there regarded as the natural successor of oak in all branches of the woodworking trades. In the United States the timber has only recently been utilized, a prejudice having heretofore existed against it, based upon the now exploded theory that it was given to warping, twisting, curling and otherwise behaving in a manner that rendered it undesirable.

American lumber producers, assisted

TO WHOM IT MAY CONCERN:—	
Do it know that I,	A citizen of the United States,
residing at	in the county of
and State of	and State of
..... have this day	Year
..... and I do declare the following to be a description of my invention	
<small>Write your name and address in space below.</small>	
<i>James Inventor, 937 Dearborn St., Chicago, Ill</i>	
<small>Make sketch and write description of your invention on space below.</small>	

Interior of Letter Sheet

name and address opposite the transparent opening. He then makes a sketch of his invention and describes it on the space below, folds up the sheet, seals and stamps it, and deposits it in a mail box. When it arrives at

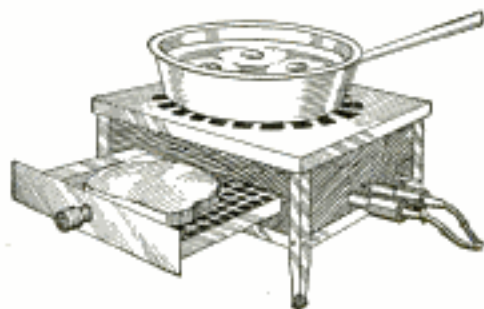
by the Forest Service, have carried on a series of experiments with the gum, however, which resulted in exposing the fallacy of the theories formerly held and have brought the wood to the fore as one of the most useful of the

American forest products. Care must be exercised in curing the timber, and the preparation of the tree for its future use must begin immediately on its being felled.

The heartwood of red gum shows a wide range of color and figure, resembling, in many respects, newly cut mahogany, though somewhat darker. It is found in abundant quantity throughout the South, especially in the deep, rich soil of the bottoms, and it is one of the most inexpensive of the woods used for general purposes. It has been extensively used in New York and Pittsburg, and the new La Salle Hotel in Chicago is finished with red gum throughout.

COMBINATION ELECTRIC TOASTER AND COOKER

By the use of a combined electric toaster and cooker, the breakfast eggs

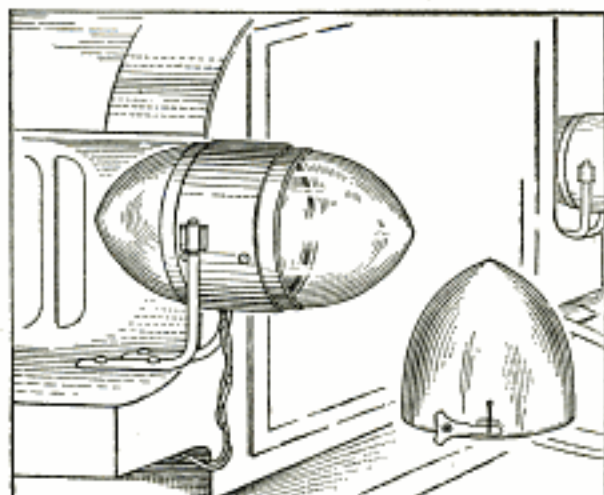


Toasting Bread and Poaching Eggs at the Same Time

or cereals may be cooked on top of the stove while the toast is browning in the toaster. One operation does not interfere with the other in any way, as the heating coils are underneath the openings in the top of the stove and above the toaster, which is in the form of a drawer.

TORPEDO LAMPS FOR AUTOS

The so-called torpedo type of automobile body has led to the designing of a novel lamp of the same shape. It was first used on a famous British make of car during the competition for the Prince Henry trophy, and like the automobile, is given this form in order to offer as little resistance to

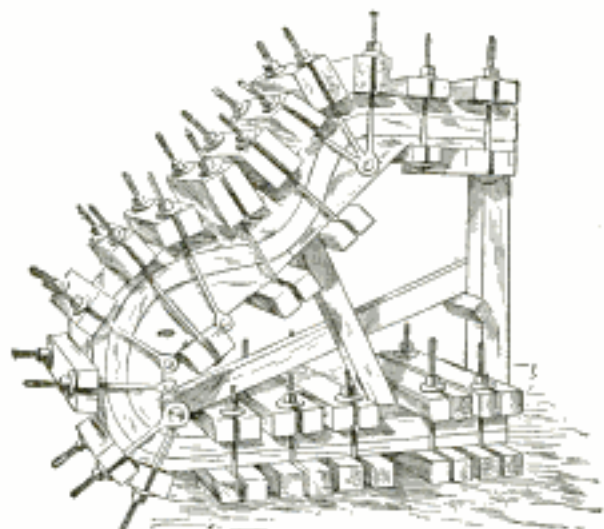


Torpedo-Shaped Auto Lamp and Cover

the wind as possible. When the lamp is not in use, its torpedo-shaped glass front is protected by a brass cap, which gives it a neat and unusual appearance. The cover also fits snugly over the back of the lamp.

GLUING A PIANO CASE

An important stage in the making of the cases of grand pianos is shown in the illustration. By this method so-called one-piece cases are made. The clamp is kept in a vertical position while the work is progressing, the caul boards or blocks being divided into sec-

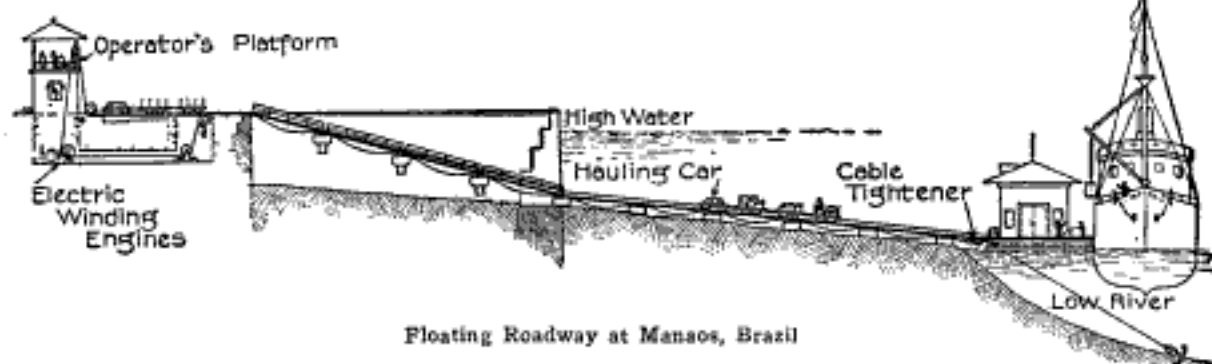


Forming the Case of a Grand Piano

tions and placed in position successively as the veneered stock is bent and glued in place.

FLOATING WAREHOUSE AND ROADWAY

Manaos, one of the great rubber centers of Brazil, situated on the Rio Negro River near its union with the Amazon, has a unique floating warehouse



Floating Roadway at Manaos, Brazil

and roadway for the transferring of cargoes. The depth of the river varies to the extent of 40 ft. because of the tides, and for this reason the harbor company decided to anchor an immense steel warehouse-float in permanently deep water.

This float is 600 ft. long and carries several warehouses. It is connected with the shore by a roadway of 13 spans, 42 ft. long, each span made up of 10 fish-belly plate girders, the ends of which are formed into hooks that fit over shafts running transversely to the length of the roadway. The shafts are supported on steel floats of nearly rectangular cross-section. At high water the roadway is level for its entire length, and afloat, but as the river recedes, the floats fall until each finds a resting place. The first four floats are then supported by steel girders, while the remaining floats rest directly on the beach.

The roadway is 60 ft. wide, and its grade at the steepest part is 12 per hundred. An electrically driven tail-rope system of haulage has been adopted for transferring cargo from the ships and floating warehouses to the shore.

CA new use for the vacuum cleaner was discovered by a Chicago electrician who freed his dog of fleas with one of these modern machines.

CONDUIT MOVED WITHOUT INTERRUPTING SERVICE

During the reconstruction of the traction tunnel under the Chicago River at Washington Street, it became necessary to move 370 ft. of a 42-in.

duct line, containing electric transmission cables. It was at first proposed to abandon the conduit temporarily, but the electric company's engineers decided to move the entire length at the same time by means of jack screws. The distance it was moved was 3 ft. at one end and 9 ft. at the other. The conduit was raised, timbers were placed underneath, and rollers, consisting of short pieces of pipe, set in position. The actual moving operation was accomplished in less than two hours, and at no time was service interrupted.

A MUSEUM OF ILLUMINATION

Munich has a remarkably interesting public museum in which the various stages of development in illumination may be studied. Passing through the exhibition rooms, the visitor can trace the gradual development of lighting from the pine splinters of centuries ago to the newest lamps of the present day. No stage is lacking from the pine knots, grease swabs, candles, and oil lamps to the most recent inverted incandescent gas burners and electrical fixtures.

A special section of the museum is devoted to the development of street lighting, the gradual transition from the early beacons and oil lamps to high-pressure gas lamps and flaming electric arcs of today being shown. Old prints

showing the application of the crude lighting fixtures of the past ages will also be on exhibit.

Intensely interesting to visitors is the fact that the fixtures, old and new alike, are not locked away in inaccessible glass cases, but that most of them may be lighted up, so that an impression may be readily gained of the actual illuminating power.

CRUDE OIL ERADICATES GRASSHOPPER PEST

By the exercise of a little ingenuity, J. O. V. Wise has rid his Canfield, Colo., farm of a pest of grasshoppers and provided himself with more than 200 bushels of feed for his chickens during the winter. The alfalfa fields on Mr. Wise's place were overrun with grasshoppers during the past summer. The pest became so great that some means of eradicating it was necessary. Mr. Wise devised a drag equipped with a trough which he partly filled with crude oil into which the grasshoppers were brushed as the contrivance was dragged across a field. With the use of nine barrels of oil, more than 200 bushels of grasshoppers have been gathered in. Mr. Wise piled them in the open field to dry and intends feed-



Grasshoppers Stacked for Drying

ing them to his chickens during the cold winter months when there will be no bugs or worms.

NEW KIND OF CLOCKED STOCKING

Clocked stockings of black silk are considered very correct, even for for-



A Suggested Fad

mal dress, but the clocks referred to are not of the variety here shown. This is a British suggestion for the "faddy" season. The strap is of the same kind used for wrist watches, but is longer.

ANALYSIS OF WATER BY ELECTRICAL APPARATUS

Pure water is known to be a very imperfect electrical conductor, but small quantities of dissolved substances greatly increase its conductivity. Therefore, electrical tests of water are being made in England, not to get a precise measure of the degree of hardness, or of other impurity, but a sufficient measure to indicate whether further analysis is needed.

The water to be tested is introduced into a special V-tube containing platinum electrodes, and the electrodes are connected to a direct-reading conductance indicator. By a suitable choice of the dimensions of the V-tube, the

conductance of the water is decimally related in a simple manner to the conductivity, so that the latter can be read off the scale by a shift of the decimal point.

The system is used in the supervision of steam plants and water-softening plants. A very fair estimate of the degree of purity in boiler water can be made, and the danger of priming may thus be foreseen and avoided.

Pure water, according to the prevailing theory, is virtually an insulator

because of the powerful chemical union of the atoms which compose its molecules. The atoms are tied up in molecular groups, and are not free to wander with their electrical charges under the influence of an impressed difference of potential. On the other hand, a small quantity of any electrolyte, common salt dissolved in water, for instance, is immediately ionized or split up into separately electrified atoms, which are free to move in the water and to carry their electricity with them.

THE MAKING OF ARTS-CRAFTS LAMPS

By JOHN D. ADAMS

PART V—Reading Lamp

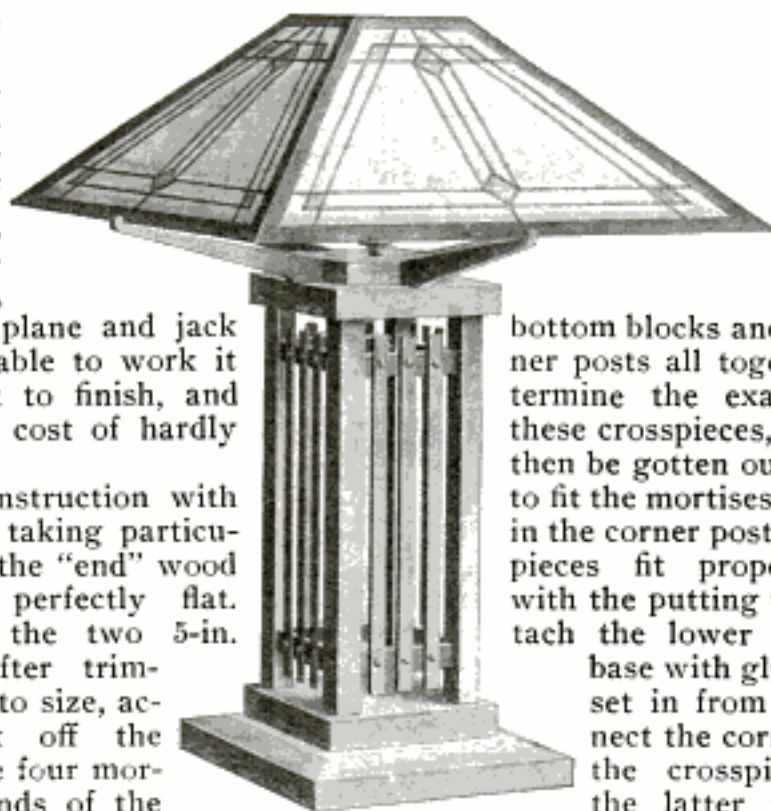
WHILE the making of this lamp will require some little time and considerable care, there are no particularly difficult features or anything requiring the use of special tools, and the amateur craftsman, with his saw, plane and jack knife, will be able to work it out from start to finish, and that at a total cost of hardly one dollar.

Start the construction with the baseboard, taking particular care to get the "end" wood smooth and perfectly flat. Next prepare the two 5-in. blocks, and after trimming them up to size, accurately mark off the positions of the four mortises for the ends of the four corner posts. These four posts should now be smoothed up, cut to a length, and a tenon formed on each of the ends to fit

the mortises already made. Four little mortises should then be cut in each of

the posts to receive the ends of the eight crosspieces to which the small vertical slats are attached. Fit the top and

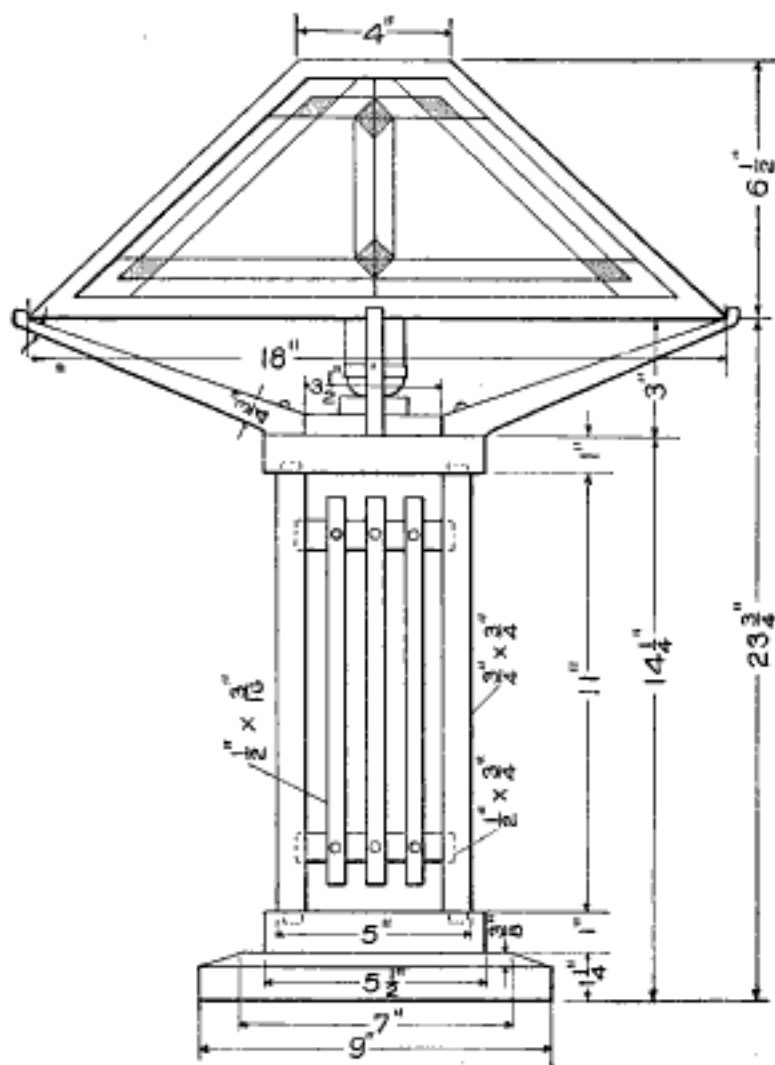
bottom blocks and the four corner posts all together, and determine the exact length of these crosspieces, which should then be gotten out and tenoned to fit the mortises already made in the corner posts. If all these pieces fit properly, proceed with the putting together. Attach the lower block to the base with glue and screws, set in from below. Connect the corner posts with the crosspieces, and fit the latter to the lower block, after which the top block should be placed in position. Use glue and a few small wire nails at each connection. The



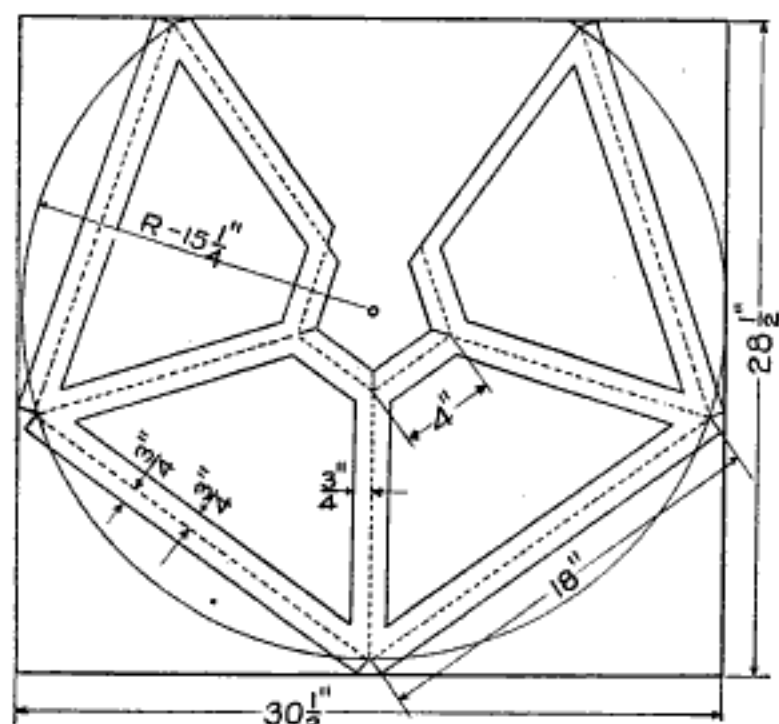
Electric Table Lamp

three slats for each side should now be attached, using a large headed brass nail at each end. On top of the whole, fit a block measuring $\frac{1}{2}$ in. thick by $3\frac{1}{2}$ in. square, and make the four bracket arms that support the shade, which are then to be fastened with glue and a screw in each one.

In order to make the cardboard frame for the shade, it will be necessary to have a sheet measuring $28\frac{1}{2}$ by $30\frac{1}{2}$ in. The pattern is very simple, and after drawing the large circle on the cardboard and spacing off four chords of 18 in. each, the remaining lines can be drawn in in a few moments. If the cardboard is rather light, the reader may exercise his ingenuity in working out a design requir-



Detail of the Reading Lamp



Layout for the Shade

ing the use of several cross strips, which will materially stiffen the framework. As in the previous drawings, the dotted lines indicate those that are to be merely scored for bending, while the full lines are to be cut clear through. After giving all the angles a preliminary bend over the sharp edge of the table, connect the first and last sections with glue, holding the connection firmly with weights for an hour or so.

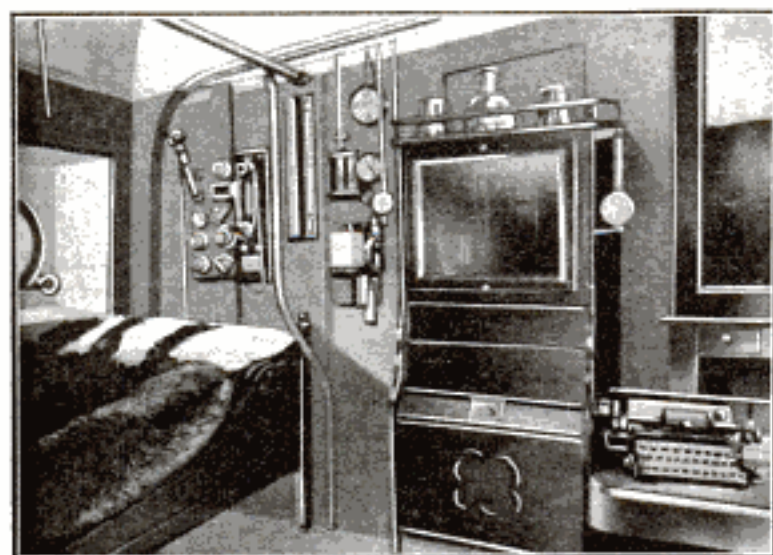
When set, bind this and the other three edges with passe-partout tape, after which bend the

extra strips at the top and bottom inward to a horizontal position, and connect them with a paper fastener at each corner. After binding all the angle edges, paint a dull black. The colored paper should now be shaped up and receive whatever design is desired. As previously suggested, a heavy drawing paper with the design worked out in water colors presents

an excellent opportunity for artistic treatment. On a large surface, such as a side of this shade, always use paper that comes in sheets, so that there will be no unevenness. One or more lights, as desired, may be used, the cord from which should be run down the center and out to one side through a groove in the bottom of the base.

COAL DUST IGNITED BY ELECTRIC FLASHES

The use of electricity in mines makes the experiments recently carried on in England to determine the danger of coal dust explosions through electric flashes, of much interest to mine oper-



A Chief Engineer's Cabin

ators. The experiments show that dry coal dust in bulk is a non-conductor, but when made into a paste with water may cause a short-circuiting flash, if placed between electrodes.

If a flash is produced, as by opening a switch in a cloud of dust, an explosion may be produced. The character of the dust cloud and the strength and voltage of the current broken, affect the readiness with which the dust is ignited. At medium voltages, direct current appears to be more dangerous than alternating.

CHIEF ENGINEER'S CABIN ON GREAT LINER

That the chief engineer of a great ocean liner cannot get away from his machinery, even when in his cabin for rest, is demonstrated in the accompanying illustration of one of the cabins.

Neatly fitted, so as not to appear too obtrusive, but as ornamental as possible, are a great number of instruments and indicators.

In the corner above the bed is a switchboard on which is placed a pilot lamp, with controlling switch; a fuse box; a telephone to the captain's room; switches for motor to drive a small lathe fitted in the cabin, for an electric heated kettle, for the telephone, and ventilating fan; a bell push to mess room and pantry, and a telephone to the pantry. The electric

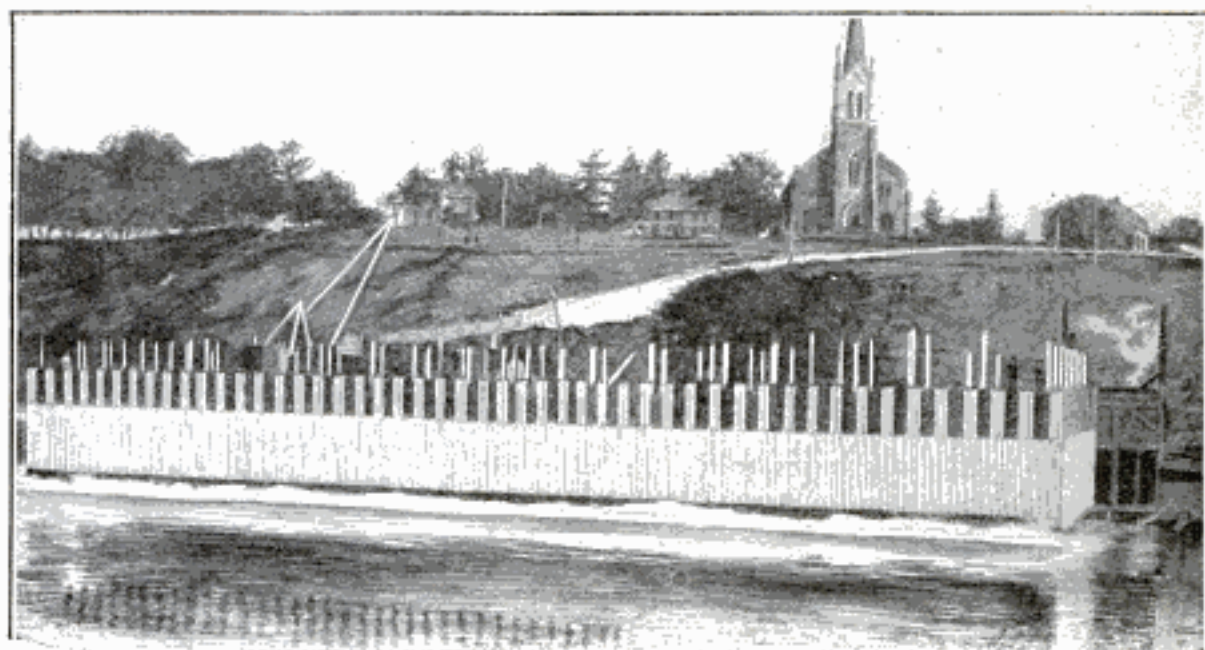
kettle and the connections with the pantry are for obvious purposes having to do with the engineer's inner machinery.

Adjoining the switchboard is the speaking tube to the engine room, a standard thermometer for testing the working set, a gauge showing the fan pressure in stokehold for the forced draught steam-pressure gauge, and a recording instrument for indicator paper to show the diagram of each 12 hours' work in fluctuations of boiler pressure. Then there is an instrument

which makes a record of the movements of the doors into the provision chambers, found useful in many cases where the attendant does not realize what the frequent opening of a door into a frozen-meat chamber means to the machinery and those in charge of it; a hydroscope for testing the humidity of the air, which is very useful when chilled meat is carried at a critical temperature; and an instrument for showing the temperature with percentage of moisture, critical point of moisture deposit and weight of moisture in the atmosphere, etc.

9 ft. more was added. The walls were then increased in height as the work of sinking progressed. For the purpose of launching, a false bottom of 3-in. planking, as thoroughly calked as the seams of a wooden ship, was put in place at the top of the shoe, and the working chamber filled with air to prevent its grounding.

The walls of the caisson were built of timbers 1 ft. square, and are about 60 ft. high. The interior is divided into 18 working chambers approximately 20 by 25 ft. in area. All seams and joints, in both roof and walls, are



Launching of the Caisson

CAISSONS OF THE NEW QUEBEC BRIDGE

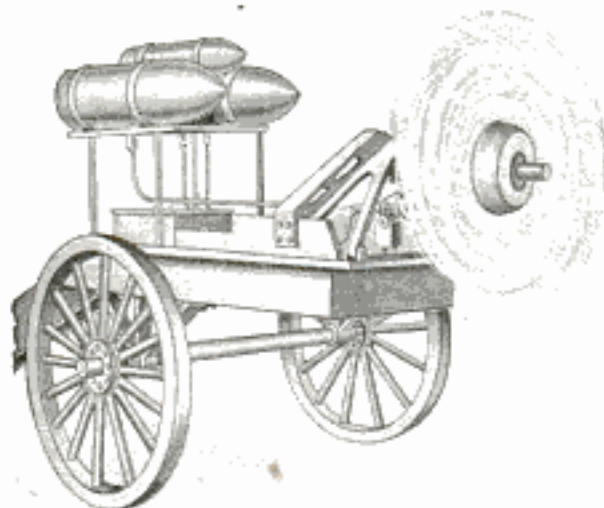
The caisson for the north main pier of the New Quebec bridge was launched recently and the work of sinking it into position is well under way. The size of the caisson, which is 180 ft. long, 55 ft. wide, and displaces about 7,000 tons of water, made the launching a most important feature of the work, and as prominent a part of it as is the launching of a ship.

At the time of the launching, the walls of the caisson had been built up to a height of 22 ft. 9 in. above the shoe, and immediately afterward some

calked with oakum, pitch and tar. Bracing bulkheads extend to a height of 25 ft. above the shoe, and beyond this point and to the required height the walls are braced against external as well as internal shear by means of a concrete retaining wall, battered out from the top towards the foot. This arrangement makes further exterior timber bracing unnecessary and permits the filling of the caisson with a solid block of concrete. When the caisson is finally placed in position, its bottom will rest about 97 ft. below extreme high water, which is said to be as deep as work of this character has ever been carried.

POWERFUL FOURTEEN-CYLINDER AERIAL ENGINE

One of the most remarkable engines for aerial craft ever devised is here illustrated. It has 14 cylinders and

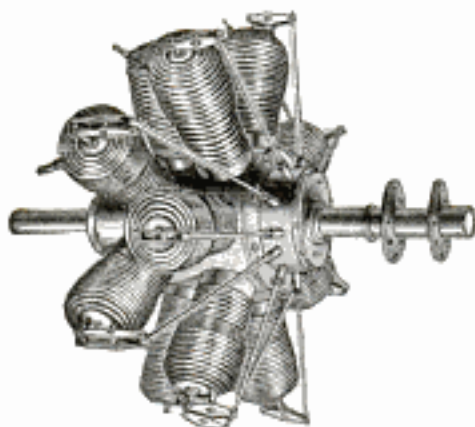


Special Carriage for Testing Gnome Motors

easily develops 100 hp., yet weighs only 260 lb.

It consists of two sets of seven cylinders each, mounted on a crankcase, one set being staggered in relation to the other. Except for the fact that they are mounted on a common crankcase, and revolve together around the same shaft, the two sets are independent, as each one has its own magneto and its own lubricating pump.

The operation of the engine at a speed of from 1,100 to 1,500 revolutions a minute makes a draught so great that



Side View of Engine Mounted on Shaft

it is almost impossible for a man to stand near it, and the sound is one continuous roar instead of a series of explosions, as in the ordinary motor.

A remarkable feature of the engine is the entire absence of vibration. The 7-cylinder model of the same engine, the Gnome, which has already proved its ability in many aerial flights, gives seven explosions every two revolutions, while the 14-cylinder model gives seven explosions for each revolution. Because of the fact that these engines revolve with the shaft, the gasoline supply is taken through the hollow crankshaft.

SHOOTING FLYING FISH ON THE WING

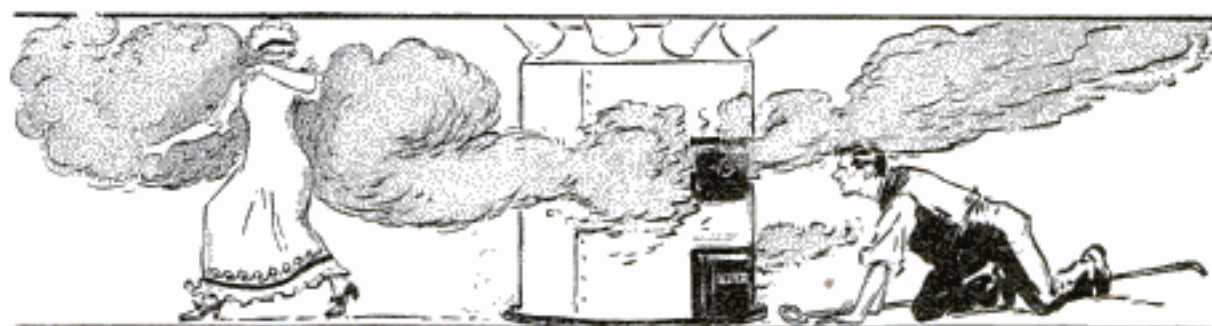
Fishing with a shotgun is the newest sport the people of Honolulu have devised. Flying fish are the targets toward which the shot is directed and it requires no little skill to get a good bag of game.

The hunters use a steam launch and carry shotguns of their favorite bore. The fish are "flushed" by the launch as it tears through the water and make short flights of from thirty to a hundred feet. There are different sizes of the fish, the larger kinds being found further out from the shore. The height of their flight varies with their length, the average being from a foot to three feet above the water. The utmost skill in handling the gun is necessary. The refraction of light on the water, the motion of the boat and the swift flight of the scaly game, all tend to make the shooting difficult. After the fish are shot, they are brought into the boat with a dip net.

¶The people of Texas have \$45,000,000 invested in automobiles, according to statistics compiled by the bankers of the Lone Star state.

¶A post card, 36 in. long by 38 in. wide, and weighing a fraction less than 4 lb., was recently mailed from Enid, Okla., to a firm of lawyers in Austin, Texas, the postage costing \$1.20.

What's the Matter with the Furnace?



By ALBERT E. PARSONS

THE chill fall breezes carry echoes of this query wherever resort is had to hot-air heating to raise the temperature of the home and office above that of the bleak outside atmosphere. "It smokes." "It does not give off sufficient heat." "It gives off too much heat." "It eats up too much coal." "The fire goes out unless watched every minute." These are only a few of the tales of woe to be found on the repair order pad of every furnace man, and his days and nights are filled with toil, beginning about September 1 and lasting well into the winter.

Aside from the fact that each furnace in operation is a distinctly individual plant with conditions governing its use and operation that might be totally different from the factors that play an important part in the use of the duplicate plant next door, there are several simple rules to be followed that will make economical operation easy. Cleanliness is the first rule to be observed around the firebox, the pipes and flues, the ash-pit and the coal bin. Hard coal, such as is used in house-heating almost entirely, produces little soot, although there is a small accumulation to be cleaned out. The five principal causes for complaint that are quoted are those the furnace repair men most frequently hear, and common-sense methods will, in the majority of cases, eliminate all of them.

Some smoke is inevitable when the first fire is kindled. The heat generated

by a furnace is part of the force used to send the smoke up the chimney. In the summer, the chimney and flues get cool and damp, and the first heat that comes from the fire goes to dry them out. It does not furnish enough force, therefore, to perform its office of driving out the smoke, and part of this comes into the house by backing out the feeder doors and other openings. The most common cause of constant smoking after that is too much draft. The average man in making up a fire opens his draft wide to make the wood he uses as kindling burn freely. He should leave them open but a few minutes, long enough for the wood to catch fire well, and then reduce them to a volume necessary to keep the wood burning. Wide-open drafts make the wood burn fast and produce such a vast amount of smoke that the flues cannot carry it off. It naturally backs out of the first opening in its course and spreads through the house. Wide-open drafts are also one of the causes of insufficient heat, though not the main cause.

If the furnace is of the right size for the house to be heated, and is properly installed, there are two other important things that can give rise to complaint—the accumulation of ashes in the ash-pit and the mistaken idea many people have that the fire should be banked with cinders at night—the time when most of the troubles of this character arise. A dirty furnace also causes poor heating. Ashes should never be al-

lowed to accumulate. If banked up they choke the draft, permitting little or no air to reach the firebox from beneath. This is also the cause of the melting of the grate bars. As no cold air can get through the bars to equalize their temperature the fire simply melts the casting. The use of ashes, from which all the heat has been extracted in the previous burning as coal, serves no purpose other than to choke the fire from above and thereby reduce the heat.

The consumption of coal is governed largely by the kind of furnace in which it is used, although there are certain general rules that may be followed. If there are no spaces between the lumps of coal, there can be little air in the firebox, and combustion will be poor. It is necessary, therefore, to use a size of coal suited to the particular firebox. Proper coaling is largely the secret of success with hot-air furnaces. They should be coaled but twice in 24 hours except in extreme weather.

In maintaining the fire, two sizes of coal should be used. The larger coal is first put on after the fire has been leveled in the firebox. The firepot should be filled with the larger coal, and over this should be placed enough of the smaller coal to cover. Care should be taken not to use coal that is too small for this purpose, as small pieces will fall through and fill up the space between the larger chunks and thus defeat the very purpose of its use, which is to check slightly—but only slightly—the burning of the larger pieces.

In mild winter weather only one coaling is necessary and in zero weather it may be done three times in 24 hours. Householders are usually informed by

the manufacturers of their furnace as to the best size of coal, and their directions should be followed. Many people make the mistake of putting on more coal every time the volume of heat coming through the registers is reduced, instead of cleaning out the ashes and regulating the heat by the drafts and dampers. More coal will be burned when it is fed by the single shovelful than when the firebox is well filled.

Much trouble with furnaces is caused by improper care during the summer. The collection of moisture during the period the plant is lying idle is sure to have more or less effect. Furnaces should be carefully cleaned immediately after the fires have been allowed to go out for the summer. Every part should be gone over thoroughly and put in condition for work during the winter. If repairs are needed they should be made immediately. It is well during the summer to burn a quantity of paper in the firebox from time to time to dry out the flues and pipes. This would eliminate much of the smoke nuisance that follows the first firing in the fall. It is also well to look carefully after the ventilation of the cellar during the summer. It should be kept closed during the day to prevent the warm, moist outside air from coming in contact with and condensing on the metal, thus forming rust which eats through the pipes. Plenty of fresh air can be obtained by opening the windows at night when the outside atmosphere is cooler and the danger of condensation is less. The doors of the ashpit should be left open also in order that there may be a circulation of air through the grate to the chimney, to prevent dampness.

PAPIER-MACHE MODELS OF TOWNS

Making papier-maché models like the one shown in the picture might seem at first thought to be rather childish business, but the fact is that there are factories employing a large number of workmen which build nothing else.

The construction of a model is no child's play when it is required to be a perfect miniature reproduction of the area it represents. Indeed, it is often the result of elaborate field work which includes a topographical survey and



Model of Steel Trust's New Model City in Alabama

the taking of photographs of the prominent buildings or other landscape features.

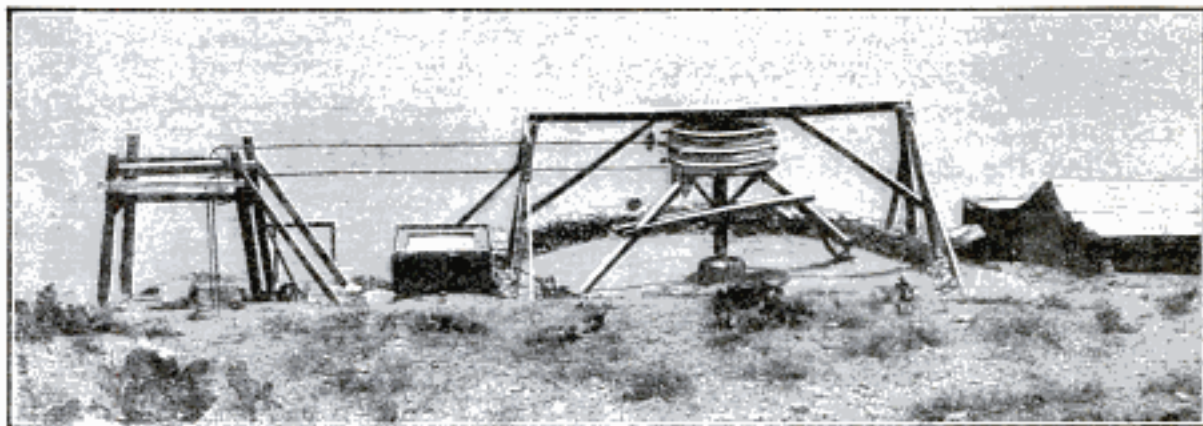
These models are mounted on frames of steel wire, woven together like a screen. This gives perfect rigidity coupled with the necessary lightness. The process of making a model is similar to that of making an iron casting. A "negative" or mold, is first made out of plaster of paris. From this mold any number of "positives" can be struck off by simply filling the mold with papier maché and applying pressure. The surface of the model is then varnished and painted to represent roads, grass, etc. Tiny models of the buildings are then constructed of wood and paper and mounted in their proper places. Fields of grain, cotton or tobacco, and miniature orchards, are reproduced in the exact proportions in which they actually occur.

The cost of a model such as that

shown, a model of the newest model city of the steel trust, in Alabama, is about \$650. The models are used by real estate companies to show irrigated lands or city lots which they are placing on the market, and by large manufacturing concerns to advertise the extent and excellence of their factories at fairs and expositions.

MEXICAN MINE HOIST

This picture, taken at Zacatecas, a mining camp in central Mexico, shows a type of mining hoist still in use at many Mexican mines. The cable from the shaft passes over a sheave and is wound horizontally about the barrel. Horses, attached to the suspended stakes, furnish the motive power. These hoists are quite effective and operations to a depth of several hundred feet are carried on with them.



A Horse Furnishes the Motive Power for This Mine Hoist

ODD COLLECTION OF BUSTS AT PENSION BUILDING

For more than a quarter of a century 250 plaster busts have ornamented the great court in the Pension building at Washington and baffled art critics in their attempt to identify the celebrities. No one seemed to know who were the individuals represented by these casts. The other day an official order went forth that they

Slidell, United States Senator from Louisiana; Gen. Montgomery C. Meigs, architect of the Pension building, his father and his wife.

The casts of the Indians were found to be of unusual value, as they are of the few ever made from living Indians. The maker of the casts informed officials of the National Museum in a let-



"Fallen Heads" at Pension Building in Washington

should either be sold at auction or go to the junk pile, and immediate action for their removal was taken.

During the removal, manuscripts identifying the faces were found, romantically concealed beneath the busts. Among them, it was then found, were life-masks of Indian prisoners once in custody at Fort Marion, near St. Augustine, Fla., and Indian children at the Hampton (Va.) Indian school. The few white faces represented were those of Sir Walter Scott; Alexander Hamilton; John

ter written in 1884, that the Indians had a superstitious fear of being "imitated" with pencil or camera, and stood in almost deadly terror of the application of plaster in making life-masks. Consequently, the Bureau of Ethnology will preserve the busts, and they will be placed on exhibition in the National Museum.

This weird collection of "art" has decorated the cornice in the central hall of the building, where the inaugural balls of many presidents have been held.

A THREE-WHEELED ROADSTER

Preparations are being made by a Hartford, Conn., automobile company to place this three-wheeled roadster on the market next year. As shown in the illustration, the little machine, which weighs only 475 lb. and is designed to meet the requirements of a moderate bank account, has but one rear wheel. This wheel is the drive wheel, and it is the absence of a rear axle, with its differential, driveshafts, and housings, that is the chief feature of economy.

The front wheels and the mountings are like those of the early type of runabout, and are used for steering. The suspension at the rear is through two quarter-elliptic springs, anchored direct to the side of the frame by four clips which extend rearward to the axle of the rear wheel. A two-cylinder opposed engine mounted under the seat furnishes the power, which, it is said, will drive the car at 25 to 30 miles an hour. The gasoline capacity of 6 gal. is claimed to be sufficient for 180 miles.

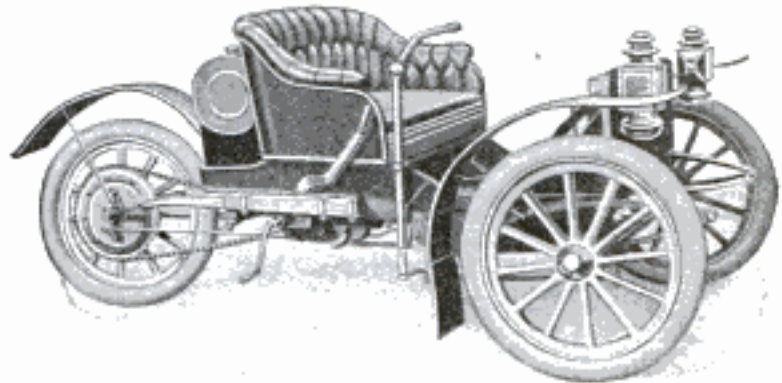
Any danger of the rear wheel tilting is offset by a simple device, located in the forward part of the car, consisting of a cross rod, which extends from one side of the frame to the other. To each end of the rod is attached a lever, and at the ends of the levers are connecting rods coupling with the axle. This arrangement makes the front springs move up and down together, which tends to prevent tilting.

STEAMER EQUIPPED TO COPE WITH MOSQUITOES

The mosquito evil is so great on the Rio Madeiro, a tributary of the Amazon, that a new ship of the Booth Steamship Company, of Liverpool, has been equipped with special mosquito screens. Entire crews of boats plying

on this river have often been laid up with malaria.

The portholes of the new ship are provided with screens so adapted that the portholes can be screwed down without removing them. The ventilator pipes in the cabins and corridors



Automobile with but One Rear Wheel

are protected by wire gauze, and at each side of the ash-shoots, which are necessarily open, are extra sets of screen doors. The entrances to the main deck, as well as the cabin doors and windows are also screened.

ANTI-DRIP STRAINER FOR COFFEE POTS

A tea or coffee strainer that will not drip has been invented by a Wisconsin man. The device consists of a small metal cup with a spout that, normally, is somewhat higher than that of the coffee or tea pot.



The cup is attached to the pot by a strong wire clamp. Inside of the cup and shaped to fit it is the strainer proper of fine wire mesh. The device is attached to the pot by means of a strong wire clamp and when the coffee or tea is poured, the drippings fall into the cup of the strainer.

White pearls that bring a high price have been found growing on cocoanut trees on the Malay peninsula. They are formed by accretions of calcium carbonate beneath the shell.

MAPLE TREE TAKES ROOT IN REDWOOD STUMP

In addition to being in the heart of the big tree country in California, the



Maple Tree Growing from Remains of Ancient Tree town of Scotia claims another natural wonder in the form of a full sized maple tree growing in the center of a redwood stump. The stump is 18 ft. in diameter and is estimated to be 4,000 years old.

SMOKING CHIMNEY CAUSED BY LOW WATER

Low water as the cause of an anti-smoke ordinance violation was the unique plea for extenuation offered by the manager of an electric light plant in a western city. The water in the river running through the city was at such a low stage, especially when diverted by a water-power company a few miles up-stream, that the intake for condensing water was put out of commission, thus necessitating the running of the plant non-condensing. This, in turn, involved the firing of cold boilers, and it was this operation that produced the offending volume of smoke. The judge imposed the minimum fine after listening to this explanation.

PENNY-IN-THE-SLOT STREET LIGHTS IN SAXONY

People who stay out late in Joketa, Saxony, and are afraid to go home in the dark must light their own way home. The municipal authorities have given them consideration by the establishment of penny-in-the-slot street lamps throughout the town. This is a new idea and may be adopted elsewhere in Germany. All the street lights in Joketa are extinguished at 11 o'clock. By an ingenious arrangement, current can be supplied to any individual lamp, however, for the benefit of people who have the price. The slot machine is attached to the electric light pole and is connected with a switch which turns on the light of that lamp for a short period.

HOW TO MAKE A BUFFET

The accompanying sketch and detail drawing show a design of a buffet wherein refinement of outline and harmony of details are conspicuously regarded. Quarter-sawed oak is the most suitable wood for this handsome piece of mission furniture. The material should be ordered from the mill ready cut to length, squared and sanded. Following is a list of the stock needed:

- 2 back posts, 2 by 2 by 47 $\frac{3}{4}$ in.
- 2 front posts, 2 by 2 by 45 $\frac{1}{2}$ in.
- 4 rails, 1 $\frac{1}{2}$ by 1 $\frac{1}{2}$ by 50 $\frac{1}{2}$ in.
- 2 end rails, 1 $\frac{1}{2}$ by 1 $\frac{1}{2}$ by 18 $\frac{1}{2}$ in.
- 4 end rails, $\frac{3}{4}$ by 4 by 18 $\frac{1}{2}$ in.
- 4 pieces for end panel, $\frac{3}{4}$ by 3 $\frac{1}{2}$ by 21 in.
- 2 panels, $\frac{3}{8}$ by 12 by 21 in.
- 1 top board, $\frac{3}{4}$ by 17 $\frac{1}{2}$ by 47 $\frac{3}{4}$ in.
- 1 back board, $\frac{3}{4}$ by 11 $\frac{1}{2}$ by 47 $\frac{3}{4}$ in.
- 1 shelf board, $\frac{3}{4}$ by 2 by 46 in.
- 2 brackets, 1 by 2 by 7 $\frac{3}{4}$ in.
- 4 pieces for doors, $\frac{3}{4}$ by 4 by 11 in.
- 2 panels, $\frac{3}{8}$ by 11 by 17 $\frac{1}{2}$ in.
- 1 piece for drawer, $\frac{3}{4}$ by 8 by 22 $\frac{1}{2}$ in.
- 1 piece for drawer, $\frac{3}{4}$ by 7 $\frac{1}{2}$ by 22 $\frac{1}{2}$ in.
- 1 piece for drawer, $\frac{3}{4}$ by 7 by 22 $\frac{1}{2}$ in.
- 2 pieces, $\frac{1}{2}$ by 8 by 19 $\frac{1}{4}$ in.; soft wood.
- 2 pieces, $\frac{1}{2}$ by 7 $\frac{1}{2}$ by 19 $\frac{1}{4}$ in.; soft wood.
- 2 pieces, $\frac{1}{2}$ by 7 by 19 $\frac{1}{4}$ in.; soft wood.
- 1 piece, $\frac{1}{2}$ by 8 by 19 $\frac{1}{4}$ in.; soft wood.
- 1 piece, $\frac{1}{2}$ by 7 $\frac{1}{2}$ by 19 $\frac{1}{4}$ in.; soft wood.
- 1 piece, $\frac{1}{2}$ by 7 by 19 $\frac{1}{4}$ in.; soft wood.
- 1 bottom board, $\frac{3}{4}$ by 17 $\frac{1}{2}$ by 47 $\frac{3}{4}$ in.; soft wood.
- 2 partitions (several pieces), $\frac{3}{4}$ by 20 by 24 $\frac{3}{4}$ in.
- 2 front pieces, $\frac{3}{4}$ by 2 by 23 in.
- 2 back pieces, $\frac{3}{4}$ by 2 by 23 in.; soft wood.
- 2 side pieces, $\frac{3}{4}$ by 2 by 21 $\frac{1}{2}$ in.; soft wood.
- 1 back (several pieces), $\frac{3}{4}$ by 25 by 46 in.
- 1 mirror frame (to suit mirror).

Start to work on the four posts by squaring them up to the proper length

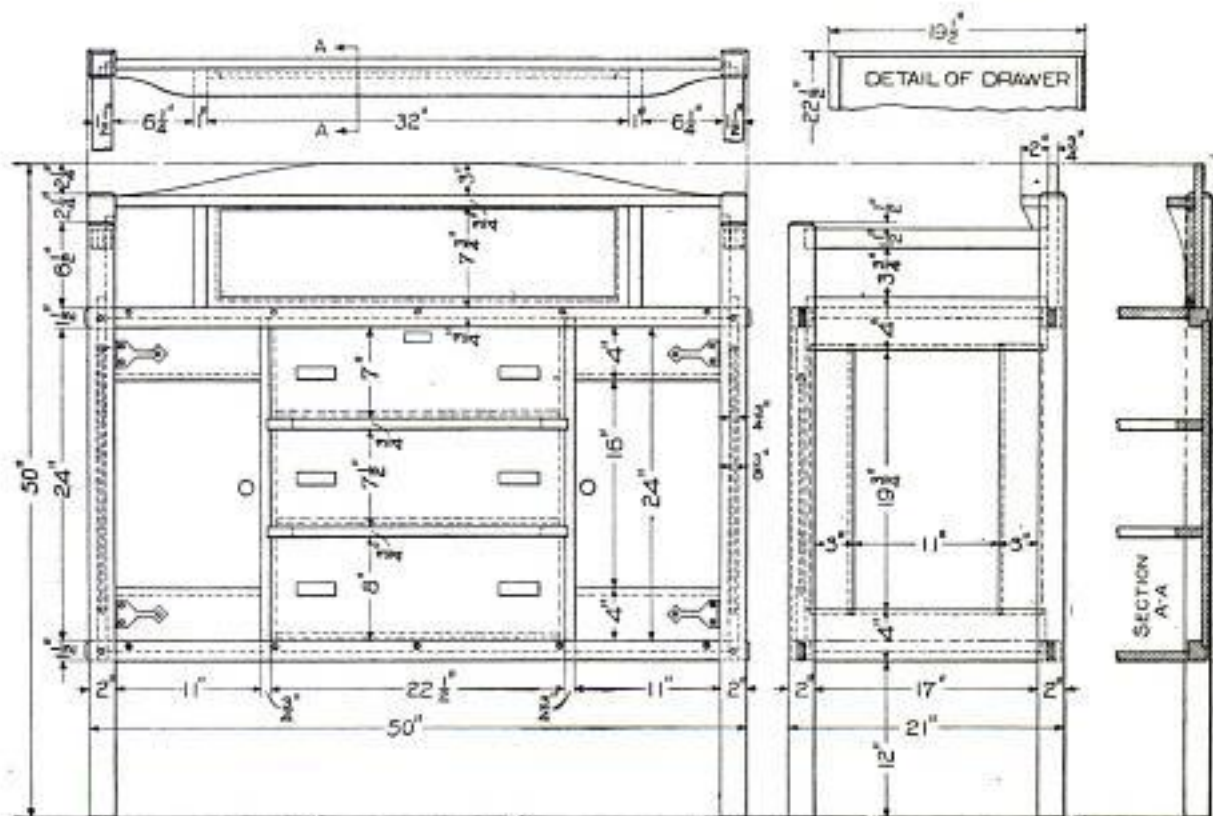
in pairs and beveling the tops as shown. Clamp all four pieces on a flat surface with the bottom ends even, then lay out the mortises for the rails and panels on all four pieces at once with a try-square. This insures getting the mortises all the same height. The back posts also have a mortise cut in them at the top for the back board as shown. Lay out the tenons on the ends of the front and back rails in the same manner. Cut them to fit the mortises in the posts, also rabbet the back rails for the backing. Cut tenons on the end rails and rabbet them and the side pieces for the panels.

Lay out the top and bottom boards to the proper size and notch the corners to fit about the posts. These boards are fastened to the 1½-in. square rails with dowels

and glue. They can now be glued together and set away to dry. The top



Finished Buffet



Details of Buffet

board is of oak, and be sure to get the

best side up, while the bottom one can be made of soft wood if desired.

The partitions are made of several boards glued together. Be careful to get an oak board on the outer edge. The drawer slides are set into the partitions as shown and are fastened in place with screws from the inside.

The top back board has a tenon on each end that fits into the mortises in the back posts and is rounded at the top as shown. The shelf is also rounded at the ends and is fastened to the back with screws.

A plate glass mirror should be provided for the back. This is fitted to the back board as shown, then the brackets put up at the ends of the mirror frame.

The main parts are now ready to be assembled and glued together. Before applying any glue, see that all the joints fit together perfectly. The end rails and the panels are glued together first and allowed to dry. Be very careful to get the parts clamped together perfectly square and straight, else you will have trouble later on. When these ends are dry slip them on the tenons

on the front and back rails which are already fastened to the top and bottom boards.

The back board and the partitions must be in place when this is done. Pin and glue the joints and clamp the whole together square and leave to dry.

The doors are now made by mortising the top and bottom pieces to take the $\frac{3}{8}$ -in. panel which is glued in place. The drawers are made as shown in the sketch. The front board should be oak, but the remainder can be made of soft wood. The joints are nailed and glued. Suitable hinges for the doors and handles for the drawers should be provided. Antique copper trimmings look very well with this style of furniture and can be secured at most any hardware store.

The back is made of soft wood and is put on in the usual manner. Scrape all surplus glue from about the joints, as stain will not take where there is any glue. Finish smooth with fine sandpaper, then apply the stain you like best. Many mission stains are supplied by the trade for this purpose.

FLOATING MARINE SAFE

A buoyant safe, which, in case of disaster, will float to the surface as the ship with which it is equipped sinks into the depths of the sea, has recently been invented by four mechanics in the Puget Sound Navy Yard at Bremerton, Wash., who have devoted their spare time in the past six years to perfecting the device.

The safe consists of a large cylinder of steel which is divided into two compartments, the upper one an air chamber that will give the required buoyancy, and the lower a receptacle for the ship's papers, registered mail and such valuables and money as are usually placed in the care of the purser by passengers. The device will rest in a shaft alley, one deck in depth, on either side of which will be angle bars to guide the safe out of the vessel as it founders.

The bottom of the shaft and the bulkheads surrounding are constructed so as to admit the water under the safe as the invading flood rises in the hull. The safe door is watertight and fastened with a regulation combination lock.

The possibility of the device becoming obstructed in its passage from the shaft has been eliminated by the simplicity of the invention. It will be attached to the ship by a cable, one to three miles in length, that will run out as the boat sinks, and in this way the safe will indicate the point at which the boat lies on the submarine floor.

As viewed from the deck, the appearance of the safe will be similar to that of a manhole in the street. The top of the air-compartment alone will be visible.

SHOP NOTES

Bit in a Partition Removed with an Electro Magnet

While I was doing some electrical work, a very valuable bit slipped out of the brace and fell 12 ft. inside of a partition. I did not want to lose my bit, but I could not make a hole in the partition large enough to remove it. I had several sizes of wire with me and among my tools was a piece of wrought iron. This I readily bent into the shape of a horseshoe, wound with about 100 ft. of small wire, and connected in series with a 32-cp. lamp on a direct-current circuit. I lowered this improvised magnet into the partition by a string and, on pulling it up, was much pleased to find my bit clinging to it.—Contributed by G. H. Dalton.

Shooting Large Game with a Shotgun

The average hunter going out for small game carries only shot cartridges, but, if occasion demands, he



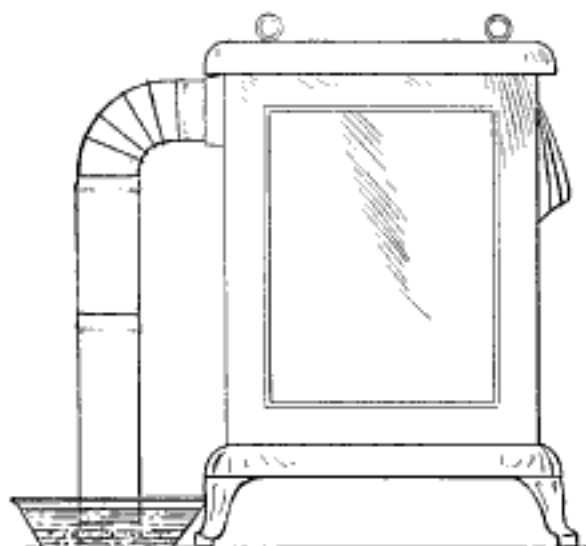
can also kill large game, if the paper shell is cut as shown in the sketch. The perforations are made on the line of the wadding between the powder and the shot, usually about 1 in. from the cap end. In shooting such a shell, the end holding the shot will go out in one piece and with enough force to penetrate a 2-in. board.—Contributed by R. S. Gordon, Los Angeles, Cal.

☞The lathe ways should be kept clean and oiled.

☞Waterproof show cards are made with Japan color.

Disposing of Fumes from a Gas Heater

In many houses there is some distant room that the furnace will not heat properly. For this reason a small



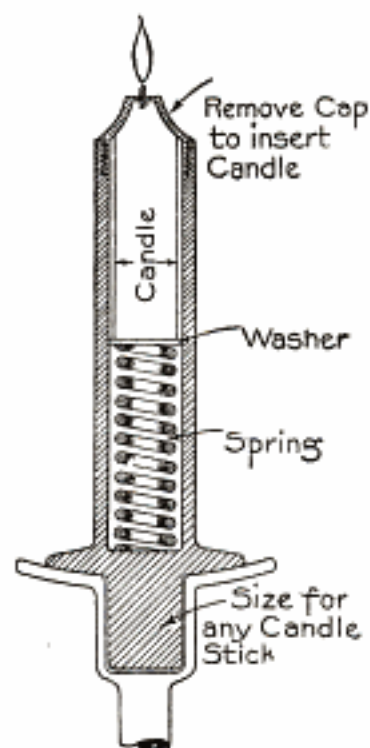
Pipe in Solution

gas stove is often used in such a room, but if there is no flue, the air soon becomes disagreeable and even dangerous to breathe, and water will collect on the windows and doors, causing the woodwork to warp and the windows to have a coating of frost. This may be remedied by connecting an elbow and a short length of pipe to the heater so that the end barely clears the floor. Place under this end a pan of water to which has been added a little slaked lime.

Illuminating gas contains carbon and hydrogen. The oxygen of the air combines with them forming carbon dioxide and water. The lime in the water combines with the carbon dioxide and forms calcium carbonate, a form of chalk, and the steam is condensed by the cool water in the pan.—Contributed by Harold Cadwell, Kansas City, Mo.

Automatic Feeding Candlestick

The sketch shows the parts of a candlestick that make up a self-feeding arrangement to

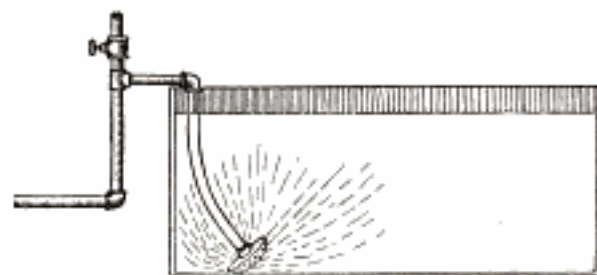


make the candle appear at all times full size. The main body of the stick is cast in one piece and bored to receive a common tallow or wax candle. The top end of the stick has a removable cap for inserting the candle, and the bottom is fitted with

an open spring. The base of the stick is made to fit any receiver, and the entire outside surface covered with a coat of white enamel to make it resemble a candle.—Contributed by Louis Cooperstein, Bremerston, Wash.

Agitator for Hardening Baths

An effective apparatus for agitating a brine bath is shown in the accompanying sketch. Air from the relief valve of a gas furnace is introduced into the bath through a system of



Bath Agitator

pipes, which causes the brine to circulate freely around the die and carry away the coating of vapor liable to

form on its surface. The air also has a tendency to keep the bath at a lower temperature. The apparatus has given good results on large work, especially drop forging dies, when a brine pumping system or running water is not available. The union between the pipes and the furnace is of a type that makes connection and disconnection easy.—Contributed by Martin R. Heath, Binghamton, N. Y.

Preventing Oil Drip of a Can

The oil used in a steam plant is often kept in galvanized or tin tanks having a cock attached to them for drawing off the oil. After the cock is closed, the oil remaining in the opening drips out into a tin or other dish provided for that purpose, but if the drip dish is moved out of place, the oil drips on the floor.



A method used by one of the men in a steam plant remedies this. The can is fitted with a pipe as shown in the illustration. The pipe joints are tightly fitted, yet so that the long piece can be turned down. No cock is then necessary, as the oil can be drawn by turning the pipe down. When the pipe is turned into its upright position again, the oil cannot drip from the pipe or can.—Contributed by James E. Noble, Toronto, Canada.

An Improvised Ladder

I had occasion recently to put a new glass into a transom in a house two miles from town. When I reached the house I found it vacant and no means at hand to reach the transom. As I did not want to go back for a ladder I improvised one in this way: I removed two doors from their hinges, placed one across the doorway with the edge

up and the other flatwise on this, with one end resting on the floor, into which I drove a couple of nails to prevent the door from sliding. Thus I had as good a platform as one could wish. Taking off my shoes so as not to mar the varnish, I walked up the door, removed the transom, put in the glass, and was on my way home in less time than it would have taken to procure a ladder from the city.—Contributed by W. A. Lane, El Paso, Tex.

Repairing a Coal Pail

If small holes have been worn in the coal scuttle, they can be repaired in the following manner: After scraping and removing all dust and dirt and drying the metal thoroughly, pour enough melted asphaltum into the scuttle to cover the surface and worn places and allow it to dry and harden thoroughly.

If the holes are too large to be mended in this way, put a piece of tin, iron or zinc over the worn part and hold it in place with a stick, as shown in the sketch, until the patch is covered with the asphaltum. When the asphaltum is dry and hard, remove the stick, and the pail will again be serviceable.—Contributed by J. C. Englehart, New York City.



Belt Hook Former for Round Belts

Certain kinds of manufactured goods are made on light machines where the parts are driven by round belts, the ends of which are joined by means of wire hooks. Where a quantity of these hooks are used they can be made in the shop, but a former for the bends is necessary.

The illustration shows a home-made

former, cut from the head of an ordinary bolt. The head of a 2-in. bolt is shaped and grooves filed, as shown

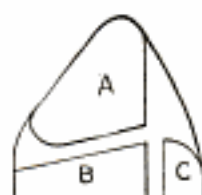


FIG 1

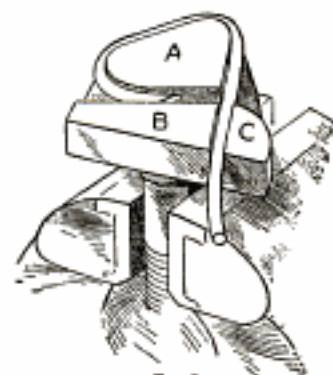


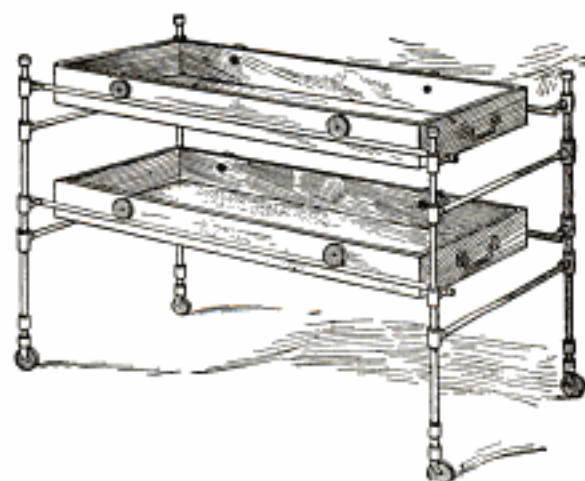
FIG. 2

Form on a Bolt Head

in Fig. 1. The raised portions A, B and C should have the thickness of the wire used. The bolt is clamped in the jaws of a vise and the hook formed around the raised part A. The straight part of the hook is shaped by a light stroke of a hammer.—Contributed by Chas. F. Matzek, Milwaukee, Wis.

Carrier for Hardware Stores

The carrier shown in the sketch is similar to those used in banks to carry large books. The frame is built of $\frac{3}{8}$ -in. gas pipe and fittings. The boxes are made of oak with grooved side-wheels, so as to be easily removable. The carrier is handy for transferring

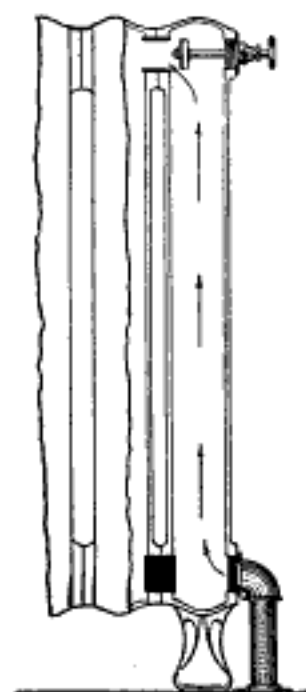


Light Parcel Carrier

small bundles, etc., from one end of the store to the other, or to the shipping room.—Contributed by Maurice Baudier, New Orleans, La.

A New Radiator Valve

The inventor of a novel hot-water radiator valve gives the following description of his device in

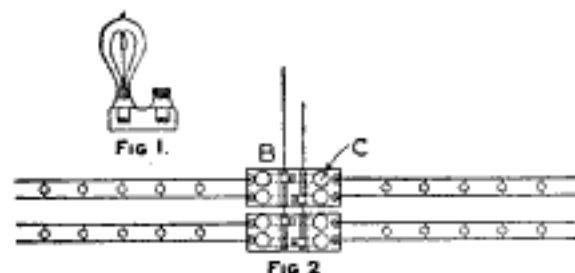


Work, London: In the sketch is shown the end loop of a radiator with the valve fitted at the top. The bottom opening between the first and second sections of the radiator is stopped by a solid plug instead of by the usual tubular nipple. This causes the first section to act as a rising pipe

from the bottom connection to the valve at the top. The valve, almost wholly consisting of a screwstem and collar, has the top of the radiator loop for its body. Its seating screws down on the nipple which joins the first and second sections of the radiator at the top. This puts the valve within easy reach without stooping.

Locating Short Circuits

All modern installations of low voltage electric-lighting systems have a fuse block as shown in Fig. 1. These fuse blocks are installed in wood or



Fuse Block Connections

iron boxes usually placed in a partition. When short circuits occur, the melting of the fuse protects the wire,

cord and sockets composing the circuits against over-heating. Short circuits can only be located by disconnecting one side of the circuit at each outlet. To avoid blowing fuses, and also to determine if the short has been cleared, screw a lamp into one side of a cut-out and a good fuse plug into the other side as in Fig. 1.

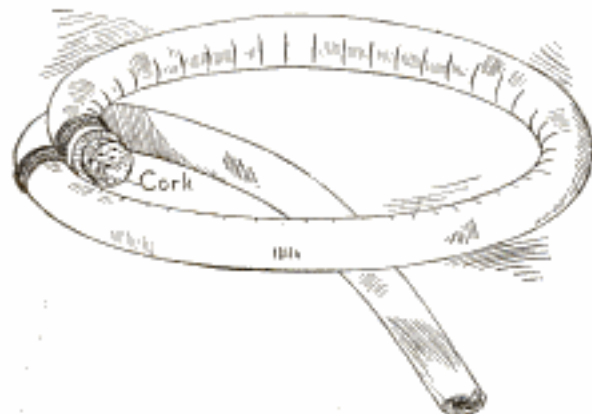
Suppose a short circuit exists at some point in the circuit shown by the upper right-hand lines in Fig. 2. If a lamp is screwed into the socket C and a good fuse plug into the adjacent receptacle, the lamp, being in series with the short, will burn with its full brilliancy and will go out when the short is disturbed. If the short is cleared and one lamp is turned on, the lamp at C will burn at about half its normal candlepower, as the two are in series. If additional lamps are turned on in the circuit mentioned, the lamp at C will burn brighter, while the lamps connected to the circuit will grow dimmer. The current received by the lamps connected to the circuit is only the amount that can flow through the lamp at C, which is one half ampere through a 110-volt, 16-cp. lamp. This current would be divided between all the lamps turned on in this circuit. It is assumed that the lamps are the same candlepower and voltage.

In case the old style link fuse block is used, connect a short piece of cord to a socket and place this in the block instead of the blown-out fuse, i. e., connect the two free ends of the cord to the screws to which the fuse was connected, and if the other fuse was also blown, replace it, then locate the short as in the preceding method.—Contributed by John S. Swanson, Duluth, Minn.

Hard putty for carriage work is made of equal parts dry and keg lead, mixed with equal parts of rubbing varnish and gold size japan, which must be mixed perfectly by kneading or pounding with the pigment material. A still harder putty can be made by omitting the keg lead. Keep it in water when not in use.

Home-Made Bath Spray

A very good and inexpensive bath spray can be made of 6 or 7 ft. of $\frac{3}{8}$ -in. rubber tubing by tightly plugging one end with a small cork, and cutting small V-shaped holes about $\frac{1}{2}$ in. apart along the tubing with the points of a pair of scissors. Begin at the plugged end and cut the holes for a length of about 36 in. Form a ring of this part, so that the plugged end will come about $\frac{1}{2}$ in. from the last hole, and tie the hose together at this point with tape or string. Do not tie hard enough to compress the tubing, nor wind all of the tape or string outside of both tubes, but make a turn around one tube then back between



Slits Cut in the Hose

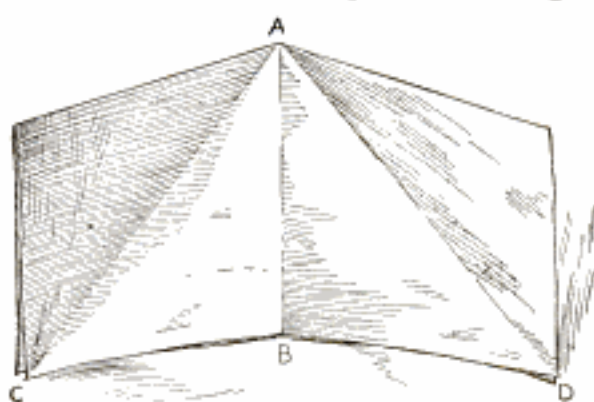
the tubes and around the other tube. This will prevent the tubes from sliding through the string.

Cutting the holes V-shaped will produce a fan-shaped jet of water. The spray coil can be put over the limbs, around the neck or held over the head.—Contributed by C. G. Carlstrum, Rochester, N. Y.

Squaring and Mitering without a Square

Anyone caught without a square or miter, when doing a common carpenter job, can make one quickly from a piece of paper—an old newspaper will do. Fold the paper in the middle, thus making a straight side, A, then fold again in the middle at right angles to the double straight side, AB. If the edges are carefully kept straight, this

will make a perfect square. By folding the square in the shape of a triangle,

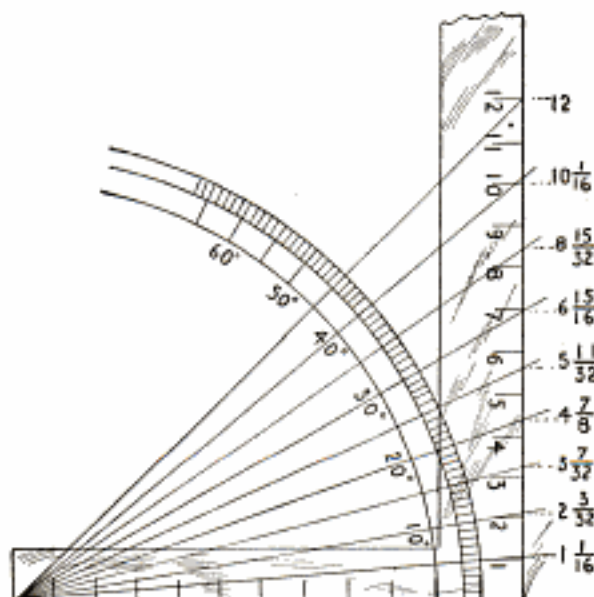


Folds in the Paper

ABC, you will have a perfect miter with a 45-deg. angle.—Contributed by L. H. Atwell, Atlanta, Ga.

Carpenter's Square Used as a Protractor

While the 45 and 90-deg. angles are easily found by the carpenter, other angles between these two are not so easily obtained. If the short end of a common square is taken for a base, the markings on the long blade, as illustrated, indicate the different angles



Angles on a Square

by intervals of 5 deg. up to 45 deg.—Contributed by Urban A. Towle, Portland, Me.

⚠ Never use a file without a handle.

An Emergency Babbitt and Nails Pinion

A mill in an isolated section of the country was obliged to shut down because a small gear about 3 in. in diameter had been completely ruined.

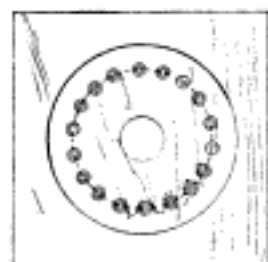


FIG. 1

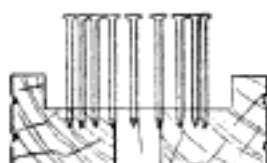


FIG. 2

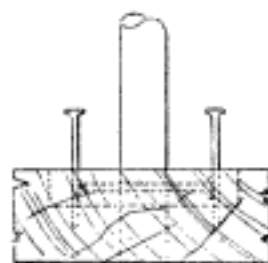


FIG. 3

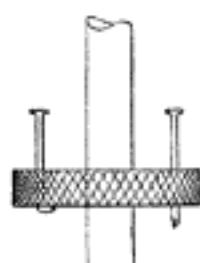


FIG. 4

Stages of Making the Gear

There was no foundry or machine shop accessible, and the plant could not afford to be idle for the 15 or 20 days required to secure a new gear from the factory. The engineer, therefore, made a temporary gear that gave good service for three months, or until the mill was shut down for general repairs.

The manner of making the temporary gear is illustrated in the accompanying sketch. A $\frac{3}{4}$ -in. hole, the size of the shaft, was bored in the center of a block of cypress plank, 2 in. thick and 6 in. square, and a depression made $\frac{3}{4}$ in. deep and 4 in. in diameter, as shown in Fig. 1. The shaft hole was plugged and centered, a circle scribed $\frac{1}{8}$ in. smaller all around than the ends of the gear teeth, and the distance from center to center of the gear teeth spaced off on this circle. A 10-penny common wire nail was driven about $\frac{1}{2}$ in. into the wood in each of the marks, care being taken to keep them vertical and at right angles with the face of the block, Fig. 2. This size nail fitted the spaces between the teeth of the old gear neatly.

A hole was then drilled through the shaft $\frac{3}{8}$ in. from where the edge of the old gear was located, a nail driven through it for a key, and the shaft put through the hole in the block and adjusted, so that the bottom of the old gear space came just level with the top of the hole or face of the block, as shown in Fig. 3.

The shaft was then gripped vertically in a vise so the block, with the 4-in. circular depression up, was level and melted babbitt poured in, filling the space around the shaft and nails. When the metal had cooled, the wood was removed and the nail points turned over or clinched, as shown in Fig. 4. It took only a little over two hours to make this gear.—Contributed by J. W. Brelsford, Houston, Tex.

Removing Ice from Sidewalks with Steam

A bank occupying large quarters with considerable sidewalk surface provided the janitor with an ingenious device for removing ice and packed snow with steam. The device consists of a box similar in appearance to a carpet sweeper, except that it is mounted on runners instead of wheels.

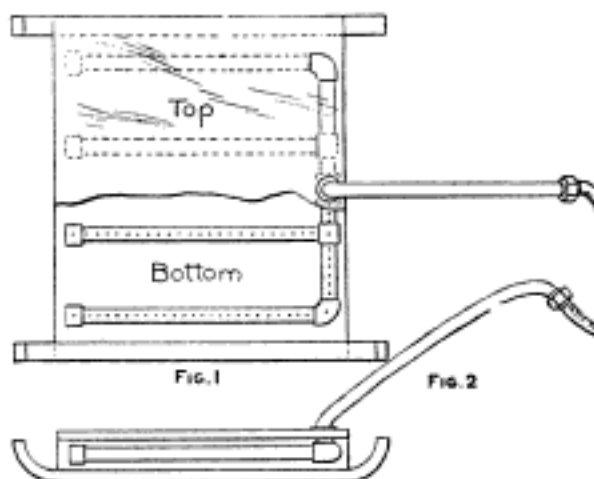


FIG. 1

FIG. 2

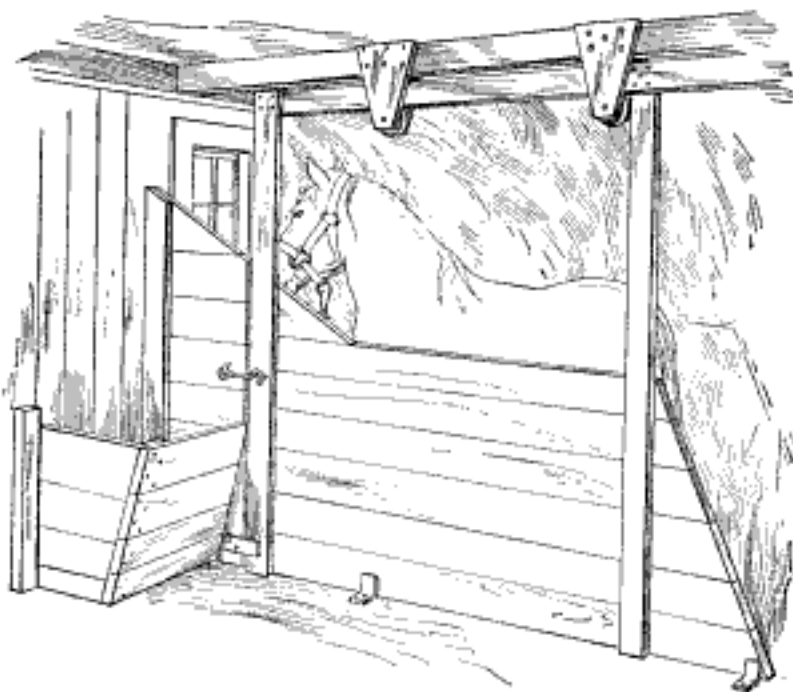
Detail of Coil

The box contains a coil of pipe in the underside of which a number of small holes are drilled. Steam is fed to the coil through the handle from the

steam heating plant of the building, and jets of steam are directed through these holes against the ice, which crumbles so speedily that a man with a shovel has all he can do to keep up with the melter.—Contributed by J. J. O'Brien, Buffalo, N. Y.

Sliding Stall Partition

The sliding partition shown in the accompanying illustration provides a safe way to approach the head of a kicking horse to feed it or put on the harness. It does away with the necessity of entering the stall from behind and the risk of being kicked. The partition reaches as far as the manger, and the entire framework and boards are carried on two rollers attached to a joist above. Small metal clips are fastened to the floor on each side of the partition to keep the bottom in place and guide it in sliding back.—Contributed by C. C. Brabant, Alpena Mich.



Partition Separates at Manger and Slides Back

How to Harden and Temper Small Springs

The following methods will be found very good for hardening and tempering small springs for gun and novelty work and will apply equally well on coil springs or those that are flat or irregular. The first thing to be considered is the fire, which must be well burned down if the forge is used. A gas or gasoline fire is the best for work of this kind. A blow torch will answer well for the smaller springs. The first method is to heat the spring evenly, until it shows a light red, after which plunge it into a bath of lard oil, or tallow. This hardens the spring and by holding it over the fire, dripping from the bath, the oil takes fire and burns off, after which it is plunged in

a bath of clear water. This will produce a good temper. A very good plan is to hang the small springs on a copper wire when dipping, as tongs will prevent the metal from hardening properly.

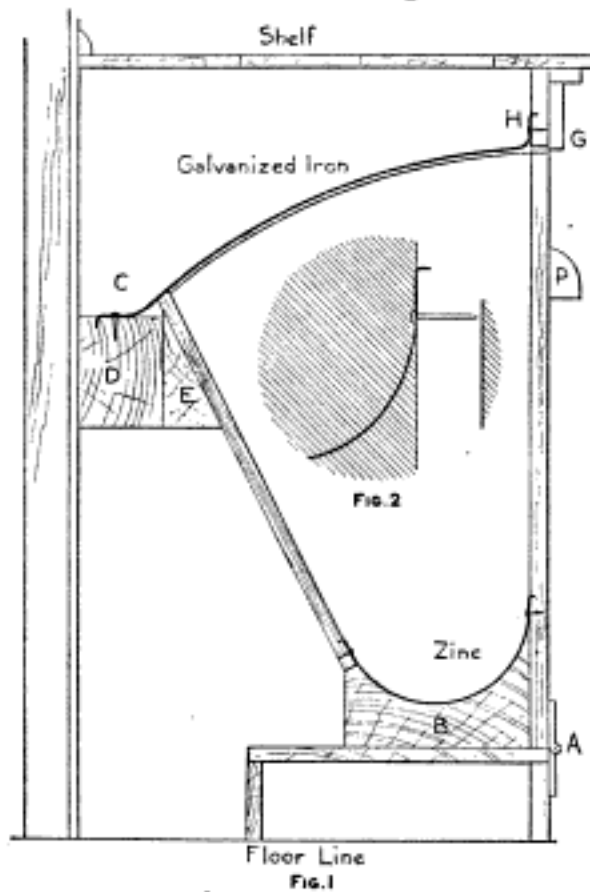
The second method is to heat the spring to a light red (in the shade) and plunge into warm water. This will

give very good results and is quick and cheap. The third method is to heat the spring to a cherry red and plunge in a bath of brine. This will make the metal as hard as glass. Polish the spring and lay it on a flat piece of sheet iron. Then place it over the fire and as soon as the color draws to a light grey, remove it from the fire and let all cool together. If the spring is too hard to be cut with a sharp file, it is too hard for use and should be tempered over again. The fourth method is to heat the spring to a bright red and plunge into a bath of raw linseed oil and leave it until cool. The spring will have the proper temper without drawing.—Contributed by J. N. Bagley, Webber, Kans.

CA lathe chip box is not the place to throw cotton waste.

Mouse-Proof Flour Bin

The ordinary flour bin in a kitchen cabinet is not always protected against mice or water. In making such bins,



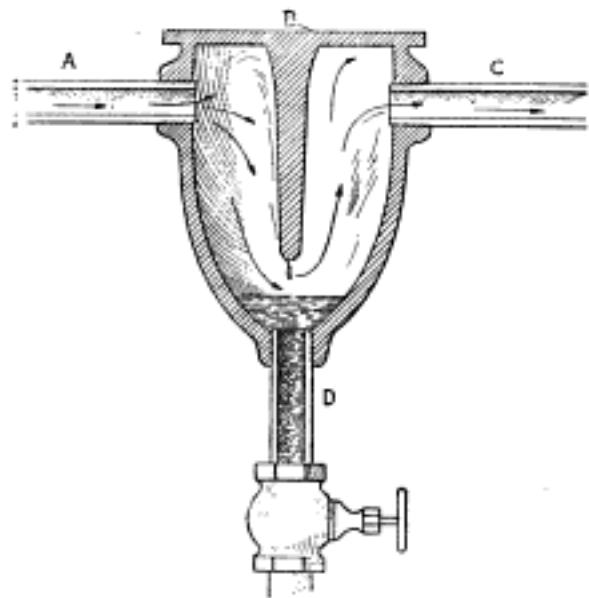
Bin with Metal Cover

it is best to provide a covering, as shown in Fig. 1. The bin with its front panel made of yellow or sugar pine, is set on a platform 4 in. high. The center of the hinge A should be taken as a center point, and the arc CH scribed with the trammel for the sides of the bin. Make the bottom end of each side a half circle and fit a sheet of zinc on the edges, turning the zinc over $\frac{1}{8}$ in. and inserting it in a knife cut, as shown in Fig. 2. The zinc is well nailed to the circular bottoms of the end boards. A block is cut to fit under each side and then nailed securely in place. Put a block across behind the top, as shown at D, and a beveled buffer E, on the bin. Cut a sheet of galvanized iron to fit the top and bend the ends to fit the face board H and block D.—Contributed by E. E. Harriman.

Steam Separators for Ships

There are few steamers in which the steam is so "dry" that occasional trouble is not experienced, either from condensation of the water in the cylinders, or too high a water level in the boiler, or both. This decreases the efficiency of the engine and creates danger of an overflow of water which may more than fill the clearance space in the ends of the cylinders and cause a break of the cylinder head.

The average steam plant, having ample boiler capacity, the best feed water obtainable and all precautions against "priming," provides a steam separator in the pipes. This device has not come into use in steamships where the conditions are never as favorable as in the average steam plant. I have more than once, while overhauling a piston, discovered fractures which seemed to be caused by the shock of the piston striking the water in the end of the cylinder. The separator, unless it drains back to the boiler, should be fitted with a steam trap, as the separator arrests the water, but does not dispose of it. The accompanying sketch shows a sectional view of a separator, which, al-

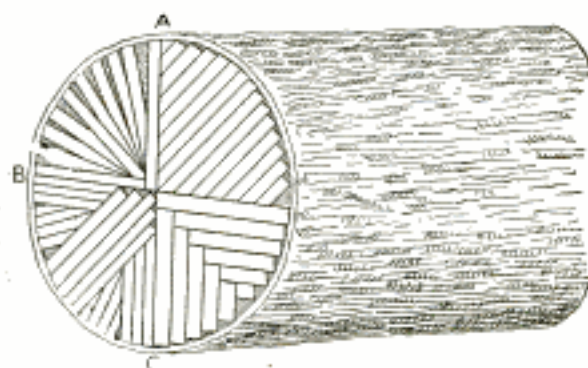


Steam Trap with Baffle Plate

though very simple, has proven entirely satisfactory.—Contributed by Joseph E. Guillon, New York City.

One Method of Quarter-Sawing

If the saw is large enough to reach through the log, saw first line down the center of the log, leaving enough timber at the back end to gig back outside half, dropping it on log deck. Turn the remaining half flat face to headblocks and saw second line down the center, leaving enough timber at the end to gig back outside quarter, dropping same on log deck and leaving on carriage the last quarter, which is ready to be cut up into lumber by one of the four methods, says the Wood-Worker. The method shown between A and B gives the best results, if full-faced grain is wanted, but the waste is greater. The method shown between B and C is next best. If the log is too large for the saw, run the first line down the center of log,



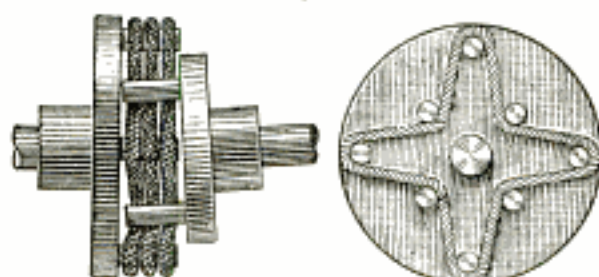
Method of Quarter-Sawing

gig back and quarter-cant the log from you; then saw second line down center, taking out a quarter of the log. Get the second quarter in the same manner. The log must be securely dogged.

A Flexible Coupling

I was in need of a coupling to drive a shaft at an angle, so I tried the following method which proved quite successful. A casting 18 in. in diameter, having four lugs 3 in. long and 2 in. in diameter, was keyed on the end of the engine shaft. A smaller casting, 13 in. in diameter and fitted with the same number and size lugs was keyed on the end of the shaft to be driven. The connection between these two castings to

transmit the power consisted of three strands of 1-in. manila rope. After determining the length needed, the



Driving Shafts at an Angle

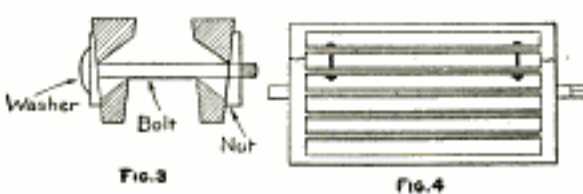
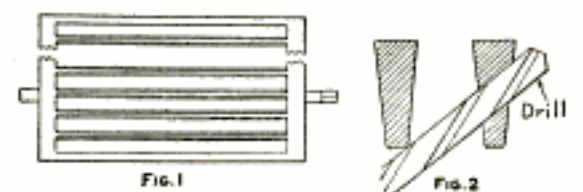
rope was cut and spliced, and put in around the lugs as shown in the illustration. This coupling will transmit power on shafts set at a 30-deg. angle. —Contributed by Robert E. Quinn, Brooklyn, N. Y.

Repairing a Stove Grate

When a stove grate breaks as shown in Fig. 1, a good repair can be made with a couple of bolts.

Drill two holes through the ribs at an angle as in Fig. 2. This allows the use of a short bolt instead of drilling through all the ribs and using a bolt longer than the width of the grate. Bevel the washers, as shown in Fig. 3, so as to secure an even pressure on the outside of the ribs. The finished repair is shown in Fig. 4.

This repair, if properly made, will save much inconvenience and give the

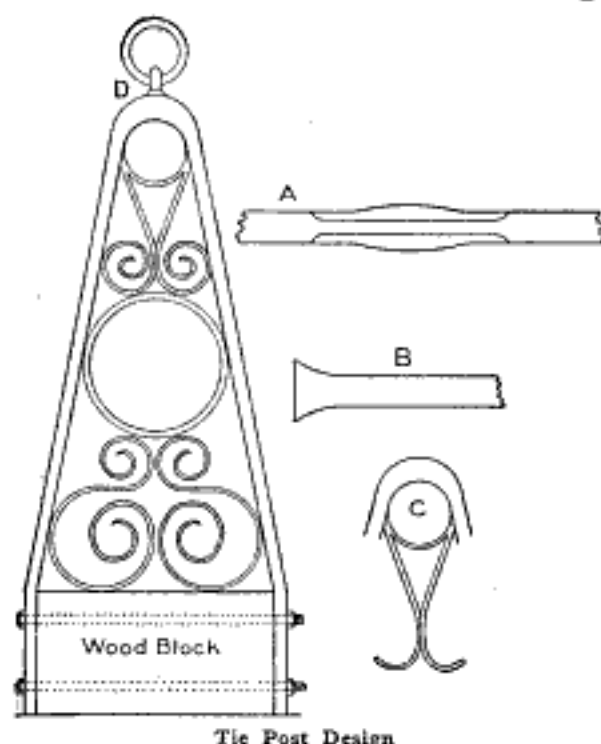


Grate Bolted Together

stove man plenty of time to get you a new grate.—Contributed by James M. Kane, Doylestown, Pa.

An Ornamental Tie Post

A tie post like the one shown in the sketch will be found more attractive than a cast-iron post, says the American Blacksmith. There is something



about iron and steel, with its clean, sharp corners, in conjunction with the fact that the article had been made with the hammer and tongs, that gives to a hand-forged post a certain distinction that a casting never possesses. Cast iron will never take the place of wrought iron or steel where these can be used and a first-class article is required.

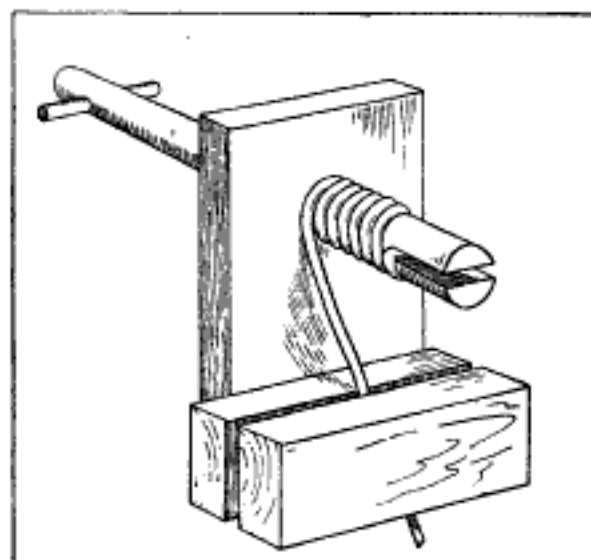
The post here shown was made of $\frac{1}{2}$ by $2\frac{1}{2}$ -in. soft steel in the following manner. For the frame, a piece $8\frac{1}{2}$ ft. long is required. Center punch it in the middle and heat it, draw out on each side of the mark A in the sketch, and put in swedge, hollowing the inside slightly. Heat and bend to the radius which you desire for the top of the post. Flange the part that was spread into a rounding shape, driving it in from the outside with the hammer and making the top appear heavier, as shown. The bottom is then fitted to go over a piece of timber or a short post, or the ends can be

turned in so as to be embedded in concrete. Forge a bolt with a ball on it, drill a hole through the center and weld it in the ring to be riveted in the top of the post. The scrolls and ring are made from $\frac{1}{4}$ by $1\frac{1}{4}$ -in. stock, flattened at the ends similar to B in the sketch. Cut this off straight across the end and bend. When bending, guard against kinks and make the curves as graceful as possible. The top scroll is made like C. Set this up in the top so that it resembles a ring. The remainder is so easily made that no explanation is required. The whole is then riveted together with countersunk rivets and painted black.

A Simple Spring Winder

The man without a lathe is just as apt to want to wind a spring as the man with one, but often experiences considerable difficulty in accomplishing the operation. A remarkably efficient method, which will turn out springs in competition with the lathe, is illustrated in the accompanying sketch.

Procure a rod, of the diameter de-



Coiling a Spring

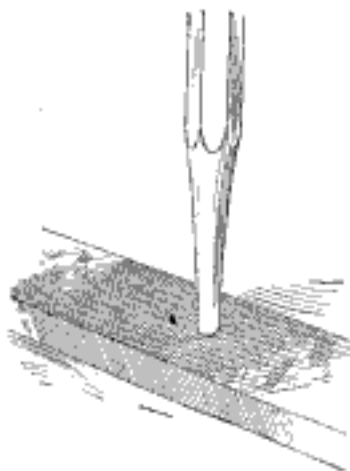
sired for the spring or a trifle smaller, cut a slot as wide as the diameter of the spring wire in one end and drill a

hole in the other. Insert in this hole a peg that will keep the rod from turning in a carpenter's brace. In a heavy piece of sheet-metal strap or wood, drill a hole in which the rod fits snugly. Secure this in a vise. Insert the rod in the brace, allowing the slotted end to project through the hole in the strap. Stick the spring wire through the hole in the other end of the rod and make a couple of turns around the rod to hold the wire securely. Lead the wire down between the two pieces of wood which have been clamped in the vise, both on the same side of the metal strap.

Begin turning the brace and pulling back so that the wire, as it winds on, will be under pressure between the metal strap and the spring already wound. The pressure of the two wood pieces on the wire should be as great as possible so that the tension will produce a tightly wrapped spring.—Contributed by C. W. Nieman, New York City.

A Non-Slipping Nail Set

Form the punch to the desired size and shape, and allow it to anneal by

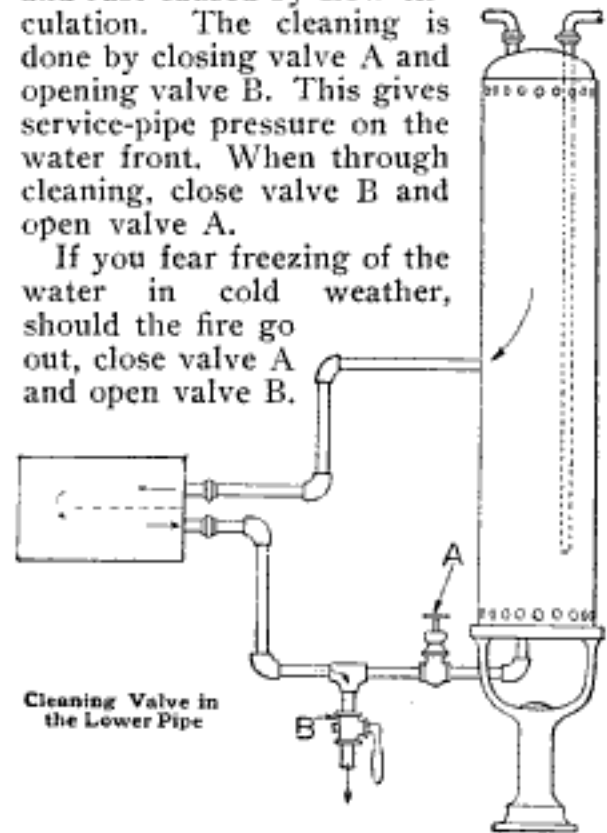


cooling slowly. After it is annealed, hold the punch end vertically on an old flat file and strike a sharp blow with a hammer. Turn the punch one-quarter turn and strike another blow. This will produce a nicely checkered end which will have the exact impression of the file teeth. The punch is now ready for filing to shape and tempering. A good demonstration of the whole operation may be made by taking an impression on the file with beeswax.—Contributed by W. A. James, Rockford, Ill.

Pipe Connections for Cleaning Hot Water Fronts

The system here illustrated provides a way to clean out water fronts which have become clogged with sediment and rust caused by slow circulation. The cleaning is done by closing valve A and opening valve B. This gives service-pipe pressure on the water front. When through cleaning, close valve B and open valve A.

If you fear freezing of the water in cold weather, should the fire go out, close valve A and open valve B.



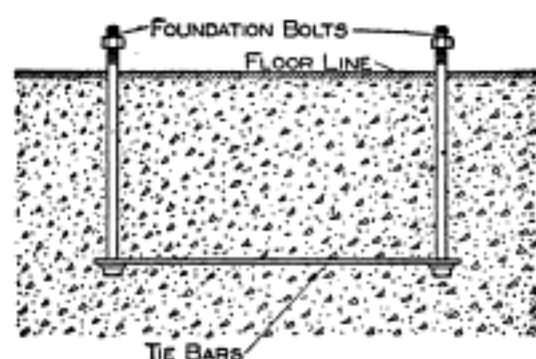
With this precaution you will know that it is safe to make a new fire.—Contributed by C. E. Weisgarver, Altoona, Pa.

Cleaning Gauge Glasses

Close the upper and lower valves and open the pet cock to empty the gauge glass of water. Hold a cup or other suitable receptacle containing muriatic acid of ordinary strength under the pet cock. Open the lower valve sufficiently to cause the acid to be drawn to the top of the glass. The alternate opening of the lower and upper valve causes the acid to be drawn up and repelled. Two or three applications will clean a dirty glass thoroughly.—Contributed by W. M. Gardiner, Brooklyn Hills, Long Island.

Small Engine Foundations

Many people have occasion to set up small or medium sized gas engines and dynamos and wish a solid foundation

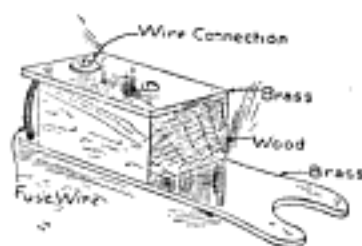


Bolts in the Cement

and the means to hold the engine or dynamo securely to it. Concrete answers all the requirements for the foundation. The fastening shown in the accompanying sketch is one of the best, and can be made from the stock found in any blacksmith shop. The tie straps should be cut to suit the holes in the base of the engine and are placed in the concrete in the form of a square or a rectangle with the bolts through the ends as shown. This fastening is cheap and quickly made and is absolutely reliable.—Contributed by Donald Hampson, Middletown, N. Y.

Battery Terminal Fuse Blocks

A storage battery for ignition and electric lights is usually supplied on automobiles. If a short circuit occurs in the wiring, lamps or ignition apparatus, the battery will be ruined in short order. The illustration shows a



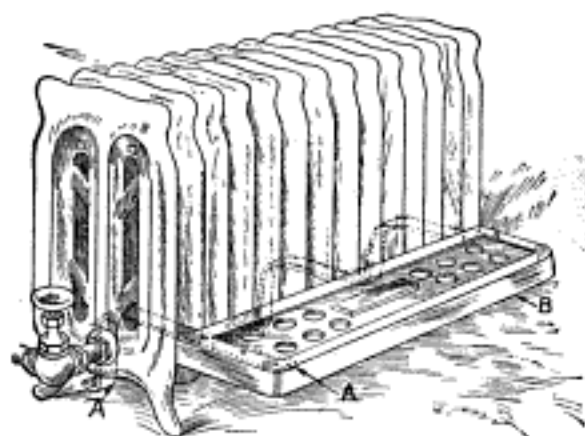
fuse block that will effectively protect the battery in case of a short circuit.

Each fuse block is made by cutting two pieces of heavy brass for the sides of the fuse holder. Mount the brass pieces on a small hardwood block with round-headed wood screws, as shown, tak-

ing care that the screws do not pass through the block and make a contact with the opposite plate. Procure a small piece of 6-ampere fuse wire and solder this to the two pieces of brass, as shown. Connect one of the wires from the battery to the fuse block by means of one of the wood screws and a small washer, and fasten the block to the battery terminal. The current from the battery passes through the fuse wire and should a short circuit occur, the wire will melt and break the circuit.—Contributed by John Sedelmaier, La Salle, Ill.

Foot Rest on a Radiator

A good foot rest for a radiator can be made of a rest taken from an old cook stove. It is attached to the radiator with pieces of $\frac{3}{4}$ -in. iron bent



Foot Rest Attached

to fit through the bottom part of the sections. The illustration clearly shows how this is done.—Contributed by Percy Strudwick, Bad Axe, Mich.

Balancing Pulleys

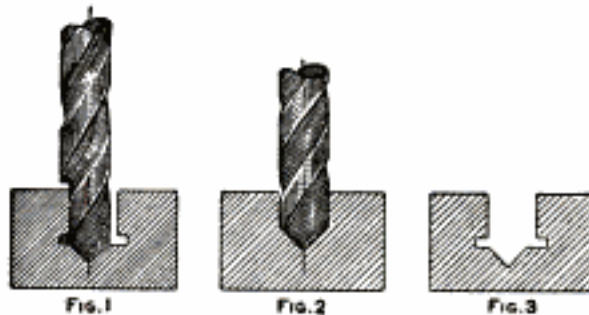
High-speed pulleys must be balanced. In the case of a solid web pulley this is easily accomplished by finishing it all over, but one having arms cannot be balanced in the same way. Such a pulley must be placed on an arbor, centered in a lathe and the side that turns down marked. Putty is then placed on the opposite side—or on two spots 120 deg. apart—

until the pulley balances well. Weigh the putty, cut off pieces of steel of equal weight and rivet them to the inside of the rim.

A pair of balancing ways are better than the lathe centers. These are made by fastening narrow strips of metal on the tops of two horses, placing them so that the arbor rests on each, and leveling the strips with a spirit level. This method produces little friction and a very close balance can be attained.

Drilling Holes Larger at the Bottom

A mechanic often has to drill a hole, which, when completed, should be larger at the bottom than at the top. This may be accomplished by grinding the center or point of the drill off to



Hole Drilled Larger at the Bottom

one side, as shown in Fig. 1. The drill can then strike a larger radius or diameter than that of a drill being used as in Fig. 2. In Fig. 3 one form of hole is shown which can be made by this method.—Contributed by Geo. W. Richardson, Chicago.

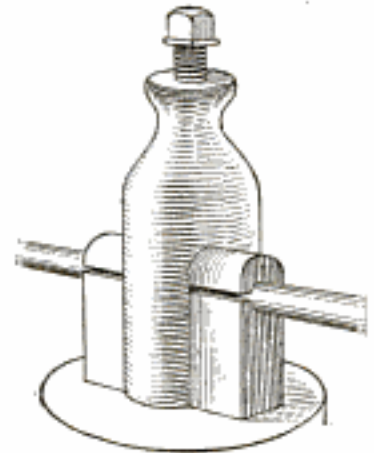
Filling Cracks in Walls before Painting

Instead of mixing plaster of paris in water to fill cracks in walls before painting, mix the dry plaster with the paint. Then the cracks will not show as they do if filled with the plaster of paris.—Contributed by F. L. King, Islip, L. I.

☞Automobile front wheels that "toe in" or "toe out" cause more wear on the tires than rough roads.

A Boring-Bar Holder

A good boring-bar holder for the lathe can be made in the following manner: Shape up a piece of steel so that it will fit in the slot of the tool post freely, allowing about $\frac{1}{64}$ -in. side clearance, and let it be about 1 in. longer than the shoe or slipper. Then set it in the tool post, so that it will be at right angles with the faceplate both ways, and tighten the screw so as to hold it firmly.



If you wish to have a boring bar made from $\frac{1}{2}$ -in. drill rod, place a $\frac{1}{2}$ -in. drill in the lathe chuck and drill through the holder, so as to leave about $\frac{3}{8}$ or $\frac{1}{8}$ in. on one side as shown in the sketch, then take it out and slot it on the milling machine or shaper through the opposite side, and case-harden. Holders for different sizes can be made in the same manner and are much stiffer and easier to set than other makes.—Contributed by Charles Homewood, Waterloo, Iowa.

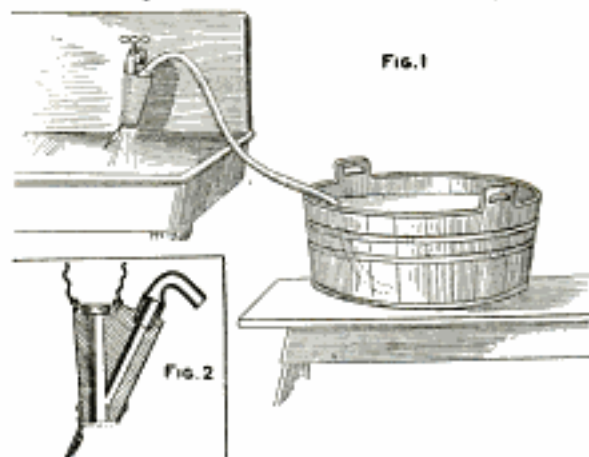


Courtesy American Vehicle

End Panel Design for a Heavy Border

Ejector for Emptying a Tub

Considerable difficulty is often experienced in emptying and refilling the common form of movable washtubs. Stationary washtubs are usually pro-



Ejecting Water from a Tub

vided with suitable plumbing connections whereby the water may be easily and quickly drained off, but with the ordinary form of movable wooden washtubs, the entire tub of water must be either lifted and carried to the sink or other drain to be emptied, or the water bailed out of the tub and carried to the sink or drain by the pailful, says Scientific American.

If the house be provided with running water at the sink, a very simple contrivance may be devised for utilizing the city water pressure for the emptying of the tub. By providing a simple form of ejector at the faucet and connecting one inlet of the ejector to a short piece of hose leading to the tub, the water may be easily drawn out of the tub into the sink, even though the latter be at a higher elevation.

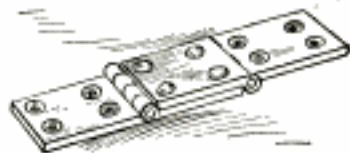
Such a simple contrivance is shown in the accompanying sketch, in which the ejector is formed of a block of wood adapted to be detachably secured to the faucet. The block of wood has two passages intersecting at an angle, both having a common outlet as shown in Fig. 2. One of these passages receives a stream of water under pressure from the faucet, and the escape of this water from the lower end of the ejector creates enough suction to draw the

water out of the tub, through the hose, and deliver it in the sink.

The same device can be used for refilling the tub. To this end, it is merely necessary to close the lower outlet of the ejector with a plug, or in any other suitable manner. The sketch shows a short rubber plug connected to a strap tacked to one side of the block. By inserting the plug in the lower end of the passage, and securing the free end of the strap to the button on the opposite side of the block, as shown by the dotted lines, the water will be forced to flow from the faucet down one passage, up the other and through the hose into the washtub.

Home-Made Hinge for a Double-Swing Door

Procure four butt hinges and rivet them in pairs, back to back, as shown in the sketch. The rivets should be even with the surface of the hinge, so the wings will lie flat when closed. Cut the mortise



or slot in the door deep enough to take in the extra thickness of the wings. Put the hinge on so it will fold up and lie in the mortise cut for it. Attach a spring to each side of the door to hold it in place.—Contributed by George Schuchman, Chicago.

A Substitute for Bristles on Waxed Ends

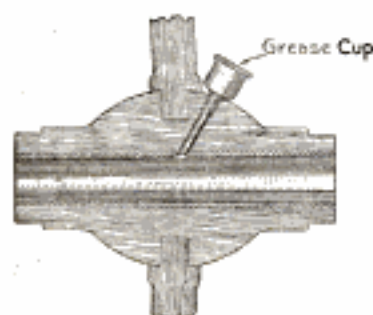
When it is necessary to sew up a small break in a shoe and no shoemaker's bristles are at hand, take a fine wire, about 16 in. long, from a wire screen, double it and twist both ends together for inserting through the awl hole. The wire can be bent to pass through a hole made with a curved awl.

Repairing a Bit-Brace Handle

Many bit braces may be found with the top handle broken off and repaired in a very unsatisfactory manner. Such a break can be mended substantially by removing the handle and cutting a thread on the end for a nut. Select a 1 $\frac{1}{4}$ -in. malleable pipe cap and plug, light and round. Bore out the cap endways and slip it over the threaded end of the brace. Next screw the nut on this threaded end, and the cap on the plug, and the job is complete.—Contributed by Frank Aagaard, Canyon Creek, Montana.

Grease Cup for Vehicle Wheels

By applying grease cups to the hubs of light delivery wagon wheels, as shown in the illustration, the un-



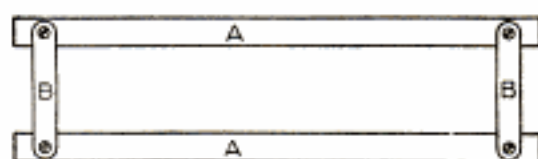
pleasant task of taking a wheel from the axle and lubricating it while mud covered and greasy is obviated. The grease cup is attached by simply boring a hole through the hub and skein and turning the screw end into the wood. Keep the cup filled with lard oil, and you will never have to remove the wheel again.—Contributed by Will Parker, Olaf, Iowa.

Replacing Piston Rings

Having had considerable trouble in replacing large piston rings on automobile engines, I tried many devices without success, but finally hit upon the following expedient. I encircled each piston ring with a piece of soft copper wire, twisting it tightly, after I had compressed the ring to its proper position. The cylinders then slid over the pistons readily, pushing the wires into the crankcase, from which they could be easily removed.—Contributed by Bryan W. Brown, El Paso, Texas.

A Parallel Rule

A parallel rule is a handy tool to have in the drafting room or machine shop. One can be made in a few min-

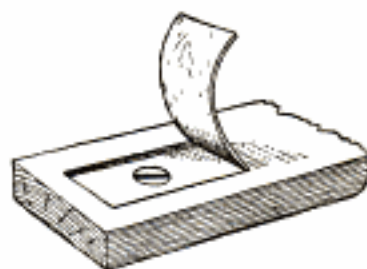


Home-Made Parallel Rule

utes by taking two perfectly straight strips, A, of any desired length and connecting them at the ends with two brass straps, B, as shown in the accompanying sketch. The straps can be fastened to the strips with small screws or rivets. Be careful to have the distance between the screw holes in the straps exactly alike and also to have the screws fastened in the center of the strips, else the tool will not do accurate work. By moving the top strip endways, lines parallel to the base and at any height within the scope of the tool, can be drawn.—Contributed by C. Purdy, Ghent, O.

Covering Screw Heads in Cabinet Work

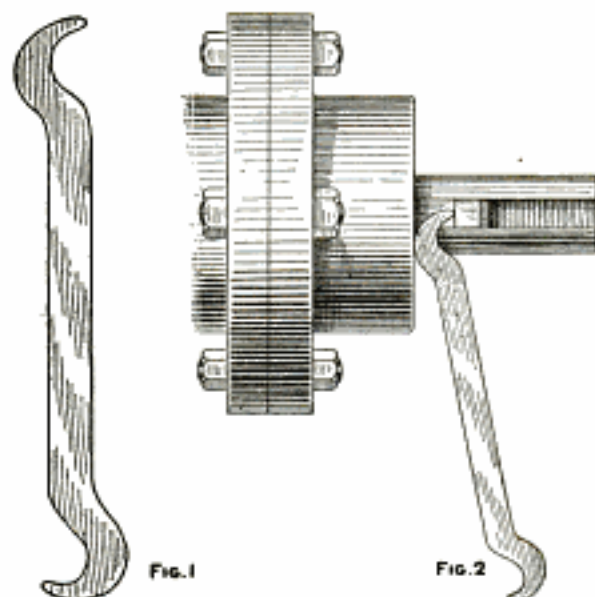
Cut a shaving with a sharp chisel over the place where the screw is to be turned in, using care not to sever the shaving from the main part of the wood. Turn the shaving up, make the hole for



the screw with a small drill, and countersink the hole to receive the screw head. Turn the screw in place, being careful to leave the head flush with the bottom of the groove. Apply glue to the main portion of the wood and also to the under surface of the shaving. Lay the shaving back into its original position and place it under pressure until thoroughly dry. When dry, sandpaper well and finish.

A Key Puller

In the illustration, Fig. 1 shows the shape of the puller, which has a thickness equal to the height of the pro-

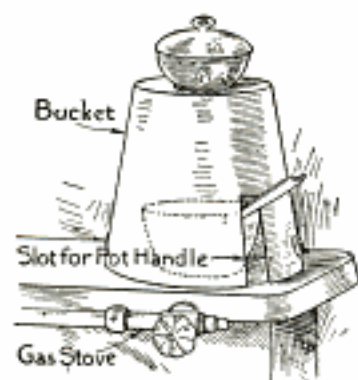


Pulling a Key

jection on the key. The puller is made of tool steel, the size of which depends on the size of the keys. The method of pulling a key is shown in Fig. 2.—Contributed by John Ramsay, Pearl River, N. Y.

Utilizing Waste Heat from a Gas Stove

An efficient way to boil water quickly on a gas stove is to cover the



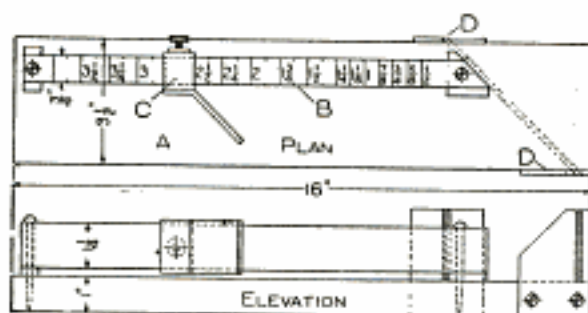
pan with an old iron bucket or large tin can which has had a suitable slot cut in its side to permit the handle of the pot to project through as shown in the sketch. The upper part of the bucket can be used as a hot shelf for dishes.—Contributed by A. P. Connor, Washington, D. C.

A Packing Cutter

Having seen several different kinds of gauges for cutting coil packing described in the past few months, some of which were quite complicated and costly, I will describe one I made some time ago, which is both simple and accurate, says a correspondent of the Practical Engineer.

The base A is made of pine, 1 in. thick, $3\frac{1}{2}$ in. wide by 16 in. long, and shellacked. The gauge bar B is about 14 in. long and made of a piece of wood fiber, but any hard wood will do. One end is cut at an angle of 45 degrees. The sliding block C is part of an old brush holder of a motor with a piece of $\frac{1}{16}$ -in. iron bent to an angle of 45 degrees and riveted to it. The bar B is made an easy sliding fit for the block which is clamped to it by the thumb-screw on the back side.

The knife guides D D are made of $\frac{1}{8}$ by 2-in. iron and are about 3 in. high, with the slots cut on an angle of 45 degrees and set so that the knife will



Gauge for Cutting Coil Packing

just clear the end of the bar. A common bread knife with a scalloped edge is used for cutting the packing.

The top of the bar B is graduated so that the distance from the knife to the stop, when set at a certain number, gives the length of the circumference of a circle of that diameter, plus $\frac{1}{16}$ -in. for expansion.

To lay off the graduations on the bar, get a table of circumferences of circles, which can be found in nearly every catalogue and handbook, and to the length of the circumference add $\frac{3}{16}$ in. for expansion up to 2 in. diameter, $\frac{1}{4}$ in. from 2 to 3 in. diameter and about $\frac{3}{8}$ in. for sizes above 3 in. After

measuring off their distances on the bar, stamp them with small figures or other suitable means. The distance from the knife to the 2-in. mark by this method is $6\frac{1}{2}$ in., the $2\frac{1}{2}$ -in. mark is $8\frac{3}{8}$ in., etc.

To operate, first get the diameter of the rod, which is, say 2 in., add the size of the packing, which in this case we will take as $\frac{1}{2}$ in., amounting to $2\frac{1}{2}$ in. This is the diameter of a circle passing through the center of the packing ring. Set the gauge at $2\frac{1}{2}$ on the bar, cut the first end on an angle in the slot, then butt the packing up against the stop and cut it off. This will be the proper length for a good fit with just the right amount of room left for expansion.

The reason that the size of the packing is added to the diameter of the rod is so that any size packing can be measured for any size rod and at the same time give the proper room for expansion.

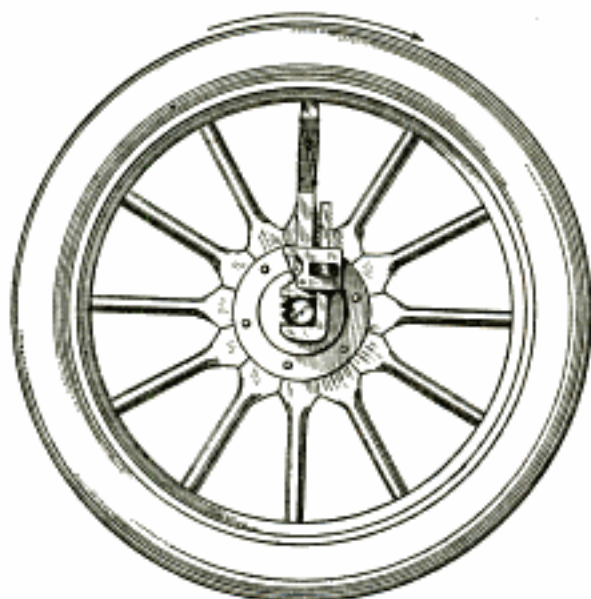
Cutting Firebrick

Firebrick is extremely brittle, a great deal more so than ordinary brick. When such bricks have to be shaped or cut to size, considerable loss by breakage usually occurs. They can be broken safely, however, if deep nicks on both sides and on the edges are first made. A still better way is to get an old handsaw and saw them to size. This will make nice smooth faces, but the set on the saw will be worn off quickly, and must be renewed. A buck saw can be used for the purpose.

Driving an Automobile with a Broken Hub

The hub casting in the rear wheel of an automobile had broken, but, still, the machine was taken home by its own power, as illustrated in the sketch. A pipe wrench was set tight on the axle and strapped to one of the spokes. This transmitted the power from the axle to the wheel. The wheel wobbled considerably, but could not get off or

loosen the grip of the wrench. The sketch clearly conveys the idea, and any one placed in a similar predicament, will be able to get home by utilizing this plan.—Contributed by A. G. Smith, New York.

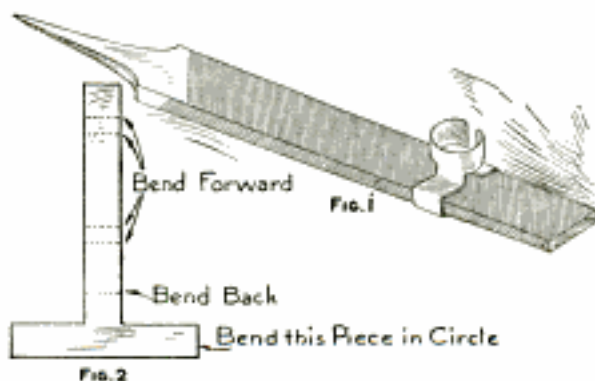


Wrench Tied to a Spoke

ment, will be able to get home by utilizing this plan.—Contributed by A. G. Smith, New York.

File Used for a Candle Holder

"One of the most useful articles in my tool bag is a candle holder made of an old file," says a telephone man. "I made the part for holding the base



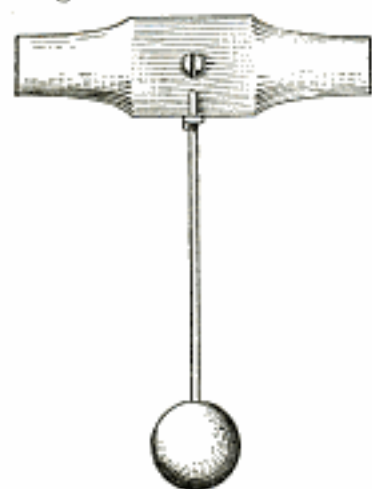
Tin Clip on a File

from a strip of heavy tin which I slipped over the end of the old file, as shown in Fig. 1. The shape of the tin and where it was bent is shown in Fig. 2."

⊕ Never guess the number of threads to be cut, count them.

Door Button Latch

Anyone who has had to take care of horses knows how easily they manage to get out of the barn by pushing and

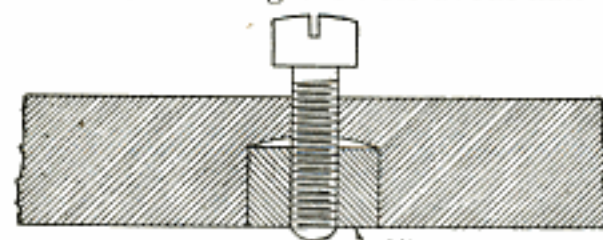


working at a door until the button becomes loose and the door opens. After our horse had done this several times, I hit upon a scheme to keep the button in place.

I procured a piece of wire about 7 in. long and a lead ball about 1 in. in diameter. One end of the wire I nicked with a cold chisel and drove it into the lead ball, the other end was fastened to the button as shown in the sketch. When the button was fastened on loosely, I had the satisfaction of seeing it hang perfectly horizontal, and it hangs that way no matter how hard a horse pushes on the door or how carelessly I turn the button.—Contributed by J. C. Inman, Eden, Canada.

Repairing a Bit-Brace Handle

It sometimes happens that a threaded hole gets so worn that the screw will not fit, or that it is drilled too large for tapping. Such defects can be remedied by the simple expedient of counter-drilling the hole about half-



NUT
Nut Soldered in Plate

way through with a large drill, and fitting a round nut tightly in the hole. The nut should be sweated with soft solder to prevent it from turning when tightening up the screws.

Cutting Teeth in a Rack by Hand

A workman, having a rack to cut on the edge of a piece of steel about 12 in. long, had no machinery at hand other than a lathe. The rack required 12 teeth to the inch and as they did not need to be accurate, he intended to file them in. But he did not like to mark out the 144 spaces. Therefore he put the piece in the lathe, geared the machine to cut 12 threads to the inch, and nicked one edge of the piece for its whole length. The piece was set a little off the center, so that only one side was marked.

Non-Skidding Chain for Bicycle Wheels

The accompanying sketch shows how I applied an old window weight



Chain Wrapped Around Tire

chain to a bicycle tire to keep the wheel from skidding. The chain was wound around the tire between each alternate pair of spokes. The ends of the chain can be joined together after the entire rim and tire are wound as described.—Contributed by Fred Friedl, Chicago.

The Proper Way to Shift a Lathe Belt

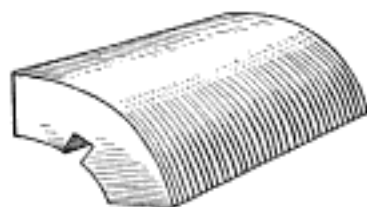
When handling a belt, first make sure that no wires, hooks or any fastenings are loose. Always shove the belt off from the cone first, so as to give a slack to the belt when you wish to throw it up onto the next step or to pull it down to a smaller one on the upper cone. Then push the belt on the corresponding step of the lathe cone.

If the belt is to be shifted to give

the lathe the highest speed, these instructions do not apply. It is then necessary to "sling" the belt up on the countershaft cone with considerable force, or use a belt stick. Never put the hand inside of the belt on the down running side of the pulley, but always on the edge. If the inside of the belt is touched at all, let it be on the upward running side.

Keying a Wood Pulley to a Shaft

Take a piece of iron equal in width to about one-third the circumference of the shaft, as long as the pulley is wide and thick in proportion. Make it



slightly tapering, shape it to fit around the shaft, and cut a keyseat on the inside. If properly fitted into the wood pulley, it makes a substantial place for the key. —Contributed by H. M. Toepfer, Mt. Carroll, Ill.

An Easy Way to Reduce and Enlarge a Rectangle

The illustration, Fig. 1, shows how to reduce any rectangle accurately and

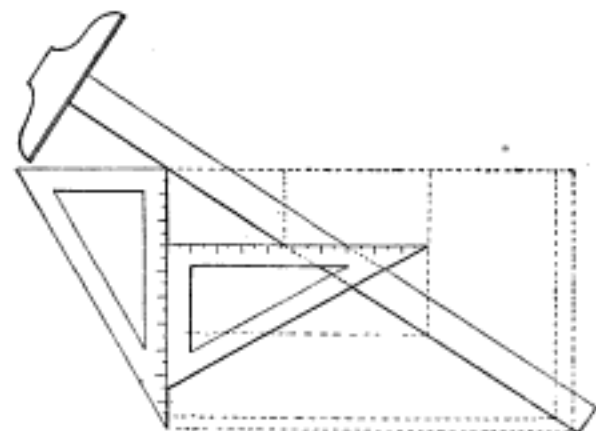


Fig. 1

Reducing a Rectangle

quickly, the dimensions of the reduced rectangle being shown on the triangles. It will be necessary to mark out a scale

on the triangles for this purpose, as scaled triangles cannot be procured.

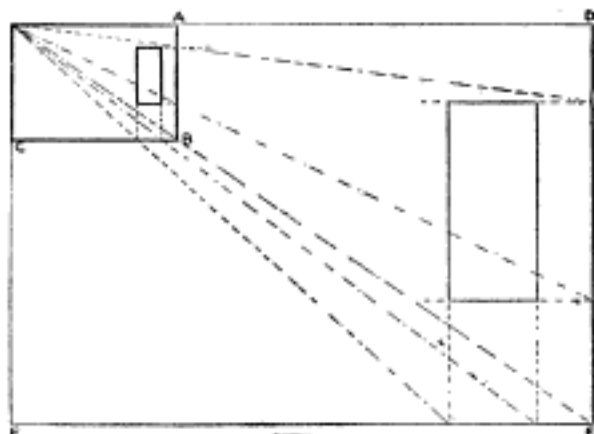


Fig. 2

Increasing a Rectangle

The method of enlarging one or more rectangles within a rectangle is shown in Fig. 2. The horizontal and vertical lines of the inner rectangle are continued to the outer angle A B C and running diagonally through the intersections, as shown at D E F. This will give the relative proportion of the rectangles.

Countersunk Riveting to Keep Rod from Turning

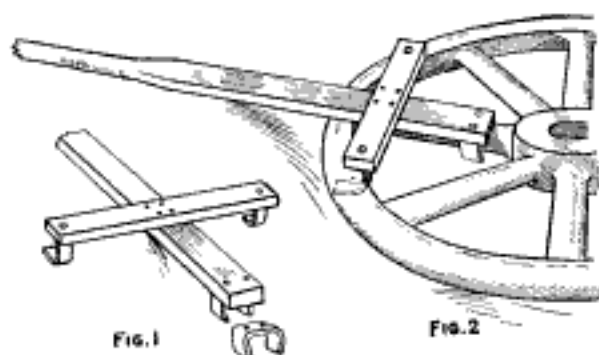
When a shaft or rod is riveted over in a countersunk hole, it is liable to work loose in time and turn around when the rod does not fit the hole closely. A rod may be kept from turning by cutting or filing one or more grooves in the bevel countersunk portion, and when riveting, by swelling the metal enough to fill the grooves. If desired, cut the grooves a short distance in the straight portion of the hole. This method is applicable to hot and cold riveting and with good sized grooves well filled, makes a job as secure against turning as if keyed in place. —Contributed by Donald A. Hampson, Middletown, N. Y.

Use a soft hammer for driving mandrels.

A "chattered" lathe cut cannot be made round by filing.

Valve or Brake-Wheel Wrench

Large valves, turned by a hand wheel, or large brake wheels are some-



Wrench on Wheel

times set so hard that it is difficult to turn them by hand and a bar or stick of wood must be used in the spokes of the wheel to give a leverage. The accompanying sketch shows a handy lever or wrench for this purpose. It is easily made and can be kept near at hand.—Contributed by W. A. Jaquythe, Richmond, Cal.

Cause of Explosion in Gas Generators

Acetylene gas generators, to give the service which may normally be expected of them, must constantly be maintained in good condition, says a correspondent of the Automobile. Private owners, as well as professional drivers, have a habit of permitting the generator to go unattended for several days after it has been used. Then, when the generator is opened, it is found to be more or less obstructed with the residue carbide that has become caked to the copper and is, accordingly, difficult to remove. The first thought of the average man is to take the nearest piece of metal, a file or a scraper, and set to work to remove the deposit. It is not generally realized that such a proceeding may lead to a serious accident.

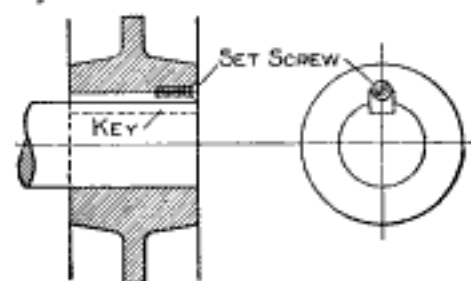
The residuum left by the carbide after the generation of acetylene gas, attacks the copper of the receiver and chemically combines with it, forming a new substance known as acetylid of copper. This is a highly explosive

product, which does not require much excitation to set it in action. Several instances are known where simply bending the copper tubing employed to conduct the acetylene gas from the generator to the lamps gave rise to a series of explosions of a startling nature. The whole interior of the tubing was coated with a light, hard film of copper acetylid and a report was heard every time the tube was bent.

In the case of a generator, striking the deposits with a tool or piece of metal of any kind is apt to explode this deposit, particularly as the residue frequently contains siliceous impurities that are hard and will either spark or generate considerable heat when struck. The violence of the explosion will naturally vary. The worst penalty of carelessness will probably be burnt hands or face. The best protection against this danger, naturally, is to clean the generator at a sufficiently short interval after using to avoid the hardening of the deposit on the copper surface; but when this has already taken place, the cleaning should either be done with a metal tool under water or a piece of wood.

A Key Lock

A handy method of preventing keys from working loose in pulleys on shafts is shown in the accompanying sketch. After the key has been driven home, drill a small hole and tap it for a set screw as shown. In case the pulley is to be hung at a point other than the



Key Holder

end of the shaft, it is best to drill and tap the hole before hanging the pulley.—Contributed by Geo. M. Harrer, Lockport, N. Y.

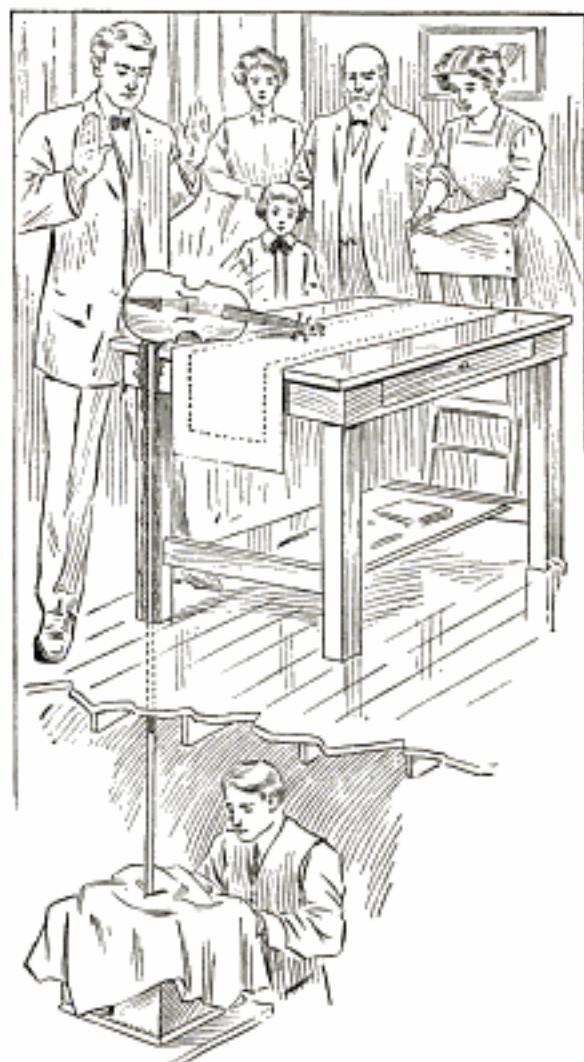
AMATEUR MECHANICS

Making "Spirits" Play a Violin

A very pretty trick, that can be worked in your own parlor, will produce as much sensation as a fake "medium." In all appearance, a violin, mandolin or guitar, placed on a table, will begin to produce music simply through stamping the foot and a few passes of the hands. The music will not sound natural, but weird and distant.

The trick is done by placing the end of a small stick on a music box in the basement of the house and allowing the other end to pass up through the floor and table top so it will project about $\frac{1}{8}$ in. The stick may be placed by the side of, behind or through the center of a table leg. Be careful not to have any obstruction in the way of the stick. The instrument is placed sideways on the protruding end of the stick. The "fake" work of invoking the "spirits" is performed and ended by stamping the foot, which signals the operator in the basement to start the machine, and the violin seemingly produces music without anyone touching it.

So impressive are the results, that many people really think the spirits of the departed are playing the violin with unseen hands. The music is transmitted through the stick from the music box to the violin.



Music Transmitted from the Basement

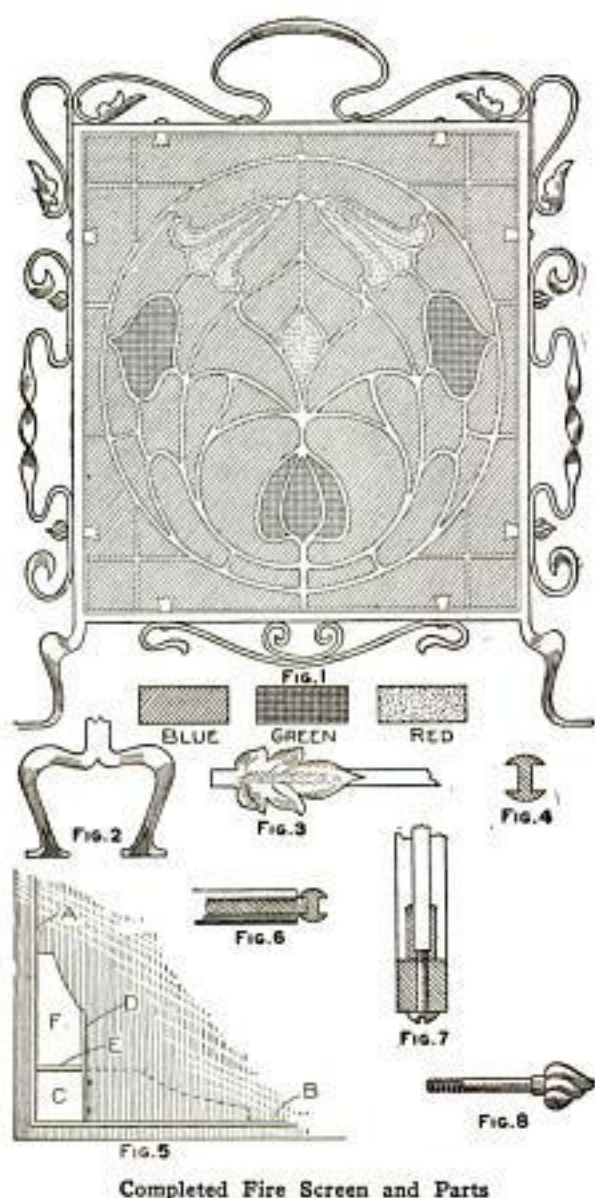
How to Make a Leaded Glass Fire-Screen

The main frame of the fire-screen shown in Fig. 1 is made from two pieces of $\frac{1}{2}$ -in. square bar iron. The longest piece, which should be about $5\frac{1}{2}$ ft. long, is bent square so as to form two uprights, each 28 in. long, and measuring 26 in. across the top. The

bottom crosspiece can be either riveted or welded to the uprights. Two pairs of feet, each 6 in. long and spread about 8 in. apart, are shaped as shown in Fig. 2. These are welded to the lower end of the uprights.

The ornamental scrollwork on the

frame is simple and effective, and is easy to construct, says Work, London. The scrolls are attached to the frame by means of $\frac{1}{8}$ -in. round-head machine screws. The leaf ornament at the ter-



Completed Fire Screen and Parts

mination of the scroll is shaped and embossed as shown in Fig. 3. The metal used for the scrolls is $\frac{3}{8}$ in. thick by $\frac{1}{2}$ in. wide. The leaf ornament is formed by turning over the end of a piece of metal and working it together at a welding heat, and then shaping out the leaf with a chisel and files, after which they are embossed with a ball-peen hammer.

The center is made from colored glass of special make for leaded work. The design is formed in the lead, of

which a cross section is shown in Fig. 4. Use care to give the lead a symmetrical outline. The design should be drawn full size on a large sheet of heavy paper and the spaces to be occupied by the lead cut out so as to leave the exact size and shape of each piece of paper the same as wanted for each piece of glass. These are used as patterns in marking the glass for cutting. The glass is cut the same as ordinary window glass. The glass, lead, border and special flux can be purchased from an art glass shop.

After the glass is cut, the work of putting the pieces together with the lead between them is begun. Secure a board as wide as the screen—several narrow boards put together will do—and begin by placing one vertical side border, A, Fig. 5, and the base border, B, on it as shown. Place the corner piece of glass, C, in the grooves of the borders, cut a long piece of lead, D, and hold it in place with two or three brads or glazier's points. The piece of lead E is cut and a small tenon joint made as shown in Fig. 6. While the piece of lead D, Fig. 5, is held by the brads, the piece E can be fitted and soldered. The soldering is done with a hot soldering iron and wire solder, using rosin as a flux, or, better still, special flux purchased for this purpose. After the joints are soldered, the piece of glass F is put in place and the lead held with brads as before until the cross leads are fitted and soldered. The brads are then removed, the glass piece as shown by the dotted lines put in, and the leads around it held with brads until the crosspieces are put in and soldered. This method is pursued until the glass is complete, then the two remaining vertical and top pieces of border are put on and all corners soldered.

The leaded glass is held in the iron frame by means of eight U-shaped clips, as shown in Fig. 7. A hole is drilled in the frame for the retaining screw, the latter being tapped to the base of the clip. Special screws may be made with ornamental heads, as shown in Fig. 8, and used for securing the side scrolls and clips together.

Detector for Slight Electrical Charges

A thin glass bottle is thoroughly cleaned and fitted with a rubber stopper. A hole is made through the center of the stopper large enough to admit a small brass rod. The length of this rod will be governed by the shape of the bottle, but $3\frac{1}{2}$ in. will be about right. The bottom of the rod is bent and two pieces of aluminum foil, each about $\frac{1}{4}$ in. wide and $\frac{1}{2}$ in. long, are glued to it. The two pieces of foil, fastened to the rod, are better shown in Fig. 2. Fasten a polished brass ball to the top of the rod, and the instrument is ready for use. Place the article which you wish to test near the ball, and if it holds a

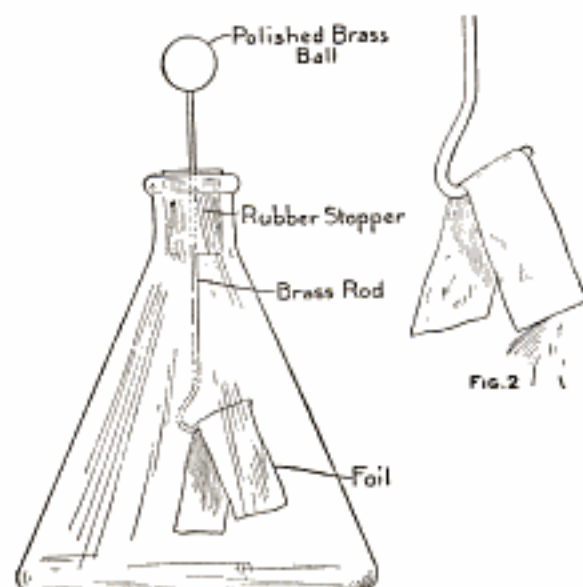


Fig. 1
Aluminum Foil in a Bottle

slight electrical charge, the two pieces of foil will draw together. If it does not hold a charge, the foils will not move.—Contributed by Ralph L. La Rue, Goshen, N. Y.

Fishing through Ice with a Tip-Up

The tip-up, used for signaling the fisherman when a fish is caught, is made of a $\frac{1}{4}$ -in. pine board, about 15 in. long, $2\frac{1}{2}$ in. wide at one end and narrowing down to about 1 in. at the other. At a point 6 in. from the smaller end, the board should be cut slightly wider and a $\frac{1}{2}$ -in. hole

bored through it. Two or three wrappings of fine copper wire may be wound around the board on each side



Tip-Up in Place

of the hole to give added strength. Both ends of the board should be notched deeply.

A long gash is cut in the ice and then a round hole is made with a chisel, as this will cut under the water without splashing. The chipped ice can be removed with a pail. A rod or round stick of wood is passed through the hole in the tip-up and placed across the round hole, as shown in the illustration.

The fishhook is baited in the usual way and hung on a line from the short end of the tip-up. When a fish is hooked, the other end will tip up and signal the fisherman. Any number of holes can be cut in the ice and a tip-up used in each, thus enabling one person to take care of as many lines.

Home-Made Candle Holder

The candlestick or holder shown in the illustration is made of an ordinary tin can, such as is used for canning salmon or potted ham. Three triangular cuts are made in the cover or bottom of the can and the points turned up about the candle. The can may be bronzed, silvered, enameled or otherwise decorated, thus making it ornamental as well as useful.—Contributed by Mrs. A. M. Bryan, Corsicana, Texas.



Repairing a Worn Knife Blade

When the blade of a favorite pocket knife, after constant use, becomes like A, Fig. 1, it is more dangerous than



FIG. 1

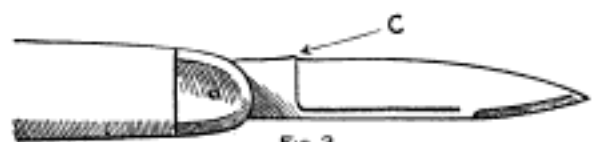


FIG. 2

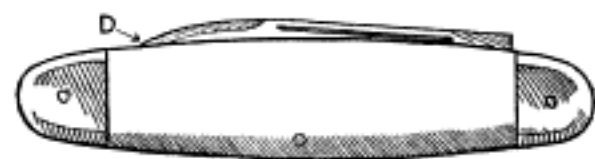


FIG. 3

The Blade Is Cut Down

useful. To cut down the already worn blade would leave only a stump, but if the blade is fastened in a vise and the point B filed off until it is like C, Fig. 2, the projecting point A, Fig. 1, will sink into the handle as shown at D, Fig. 3, and the knife will be given a new lease of usefulness.—Contributed by James M. Kane, Doylestown, Pa.

How to Make a Leather Spectacle Case

The spectacle case shown in the accompanying illustration may be made of either calf or cow skin. The calf skin, being softer, will be easier to work, but will not make as rigid a case as the cow skin. If calf skin is to be used, secure a piece of modeling calf. The extreme width of the case is $2\frac{3}{8}$ in. and the length $6\frac{5}{8}$ in. Two pieces will be required of this size. Put on the design before the two parts are sewed together. First draw the design on paper, then prepare the leather. Place the leather on a small non-absorbent surface, such as copper or

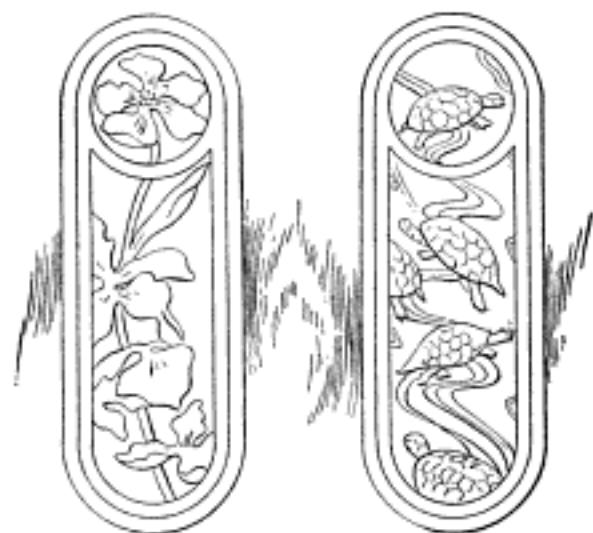
brass, and moisten the back side with as much water as it will take and still not show on the face side. Turn the leather, lay the design on the face, and hold it in place while both the outline and decoration are traced on the surface with a pencil or some tool that will make a sharp line without tearing the paper.

After the outlines are traced, go over the indentations a second time so as to make them sharp and distinct. There are special modeling tools that can be purchased for this purpose, but a V-shaped nut pick, if smoothed with emery paper so that it will not cut the leather, will do just as well.

Take a stippling tool—if no such tool is at hand, a cup-pointed nail set will do—and stamp the background. It is intended that the full design shall be placed on the back and the same design placed on the front as far as the material will allow. Be careful in stamping not to pound so hard as to cut the leather. A little rubbing on the point with emery will take off the sharpness always found on a new tool.

Having prepared the two sides, they may be placed together and sewed around the edges.

If cow hide is preferred, the same



Two Designs of Cases

method of treatment is used, but a form will need to be made and placed inside the case while the leather is drying to give it the right shape. The form can be made of a stick of wood.

How to Make a Wireless Telegraph Set—Part VI

By ARTHUR MOORE

Construction of a Coherer and a Detector

Either the coherer or a detector may be used in the receiving circuit. When it is desired to receive with audible signals, the coherer is used in combination with a relay and battery, as shown in Fig. 2. The relay R controls a local circuit consisting of a second battery, B_2 , and a vibrating bell, B. The use of the detector in connection with a telephone receiver, as used in receiving, will be taken up later.

One of the easiest coherers to make and one that will give excellent results when used with a sensitive relay is one of the ordinary metal filings kind. The following coherer has been found to give excellent results, if properly constructed. A wooden base for the instrument should first be made from some $\frac{3}{4}$ -in. hard wood, about $3\frac{1}{2}$ in. wide and 6 in. long. Round off the upper corners and edges of this piece and give it two or three coats of good shellac. Obtain two good size binding-posts as shown in Fig. 1. These binding-posts should have holes in them that will allow a $\frac{3}{16}$ -in. brass rod to pass through. Mount the binding-posts on the wooden base as shown in Fig. 1. Two other binding-posts, B_3 and B_4 , should be mounted on the ends of the base and back-connected to the first two.

These two binding-posts are to serve as terminals for the coherer. Procure two pieces of $\frac{3}{16}$ -in. brass rod, 2 in. long, and amalgamate one end of each of them by first dipping the end in acid and then in mercury. These rods can now be mounted as shown. A glass tube, whose inside diameter corresponds to the outside diameter of the rods, should be cut to such a length that it will slip over the rods and be almost in contact with the two binding-posts B_1 and B_2 .

The ends of the brass rods inside of the glass tube should be separated $\frac{1}{16}$ to $\frac{3}{32}$ in., providing a small chamber, C, in which the filings are to be placed.

These filings can be made from a piece of nickel, by sawing it with a medium-toothed hacksaw. They should then be sifted through a thin cheesecloth or a very fine sieve to separate the coarser filings from the fine dust which is not desired. A small trace of silver filings added to the nickel filings will increase the sensitiveness of the coherer.

Assuming you have constructed the aerial at the receiving end and have made the proper ground connection, you can put your set in operation. You will of course need a 300-ohm relay, R, Fig. 2. This relay will cost about \$7, if purchased ready made, but a description of how to build one will be given in one of the following chapters and its cost will be considerably less. The completed connections at the receiving end are shown in Fig. 2. The switch S is the same kind of a switch as you installed at the transmitting station. The brass rods of the coherer should be pushed in against the mass of iron filings until the armature of the relay R is drawn up and the bell B starts to ring. Withdraw the brass rods until the bell barely stops ringing.

The distance between the armature of the relay and the contact should not be much more than the thickness of a piece of good quality wrapping paper. The adjustment of the spring controlling the armature of the relay will be found to be rather tedious.

It no doubt would be best to place the receiving and sending equipment only 10 or 15 ft. apart at first, using short pieces of wire hung to the ceiling for aeriels, and the adjustments can be more easily made than when they are quite a distance apart. The distance can then be increased and the adjustment continued.

The vibrating bell must be mounted so that the hammer strikes the coherer a light tap when it is vibrating. You could, if desired, make the base of the coherer large enough so that the bell

could be mounted on it permanently. A rubber band can be wrapped around the hammer on the bell so the striking will not break the glass rod. The operation of this coherer has been previously described, but it might be well to give it again. The wave motion sent out from the aerial at the sending station goes in all directions and a part of it is caught by the aerial at the receiving station and passes through the coherer to the ground. The passage of this current through the filings in the coherer causes them to cohere, this lowers the resistance of the relay circuit and allows sufficient current to flow from the battery to actuate the relay and close the bell circuit.

The filings are decohered of course when the hammer of the bell strikes the glass rod, and the bell will cease to operate, unless there is still current through the coherer which causes the filings to immediately re-cohere. Hence, the bell will only stop ringing when the current ceases to flow through the coherer. This current will flow so long as the key in the primary winding of the spark coil at the sending station is closed, and in this way the dots and dashes of the code are sent.

Two types of detectors will be described—the "crystal" and "electrolytic." It has been found that certain metallic oxides and sulphides possess the remarkable property of conducting current a great deal better in one direction than in the other, when two dissimilar crystals are in contact. This condition is utilized in the construction of the so-called "crystal detector." These detectors, when connected in the aerial circuit, will transform the electrical oscillations into a pulsating current which is unidirectional and a sound will be produced in a high resistance telephone receiver connected in parallel with the detector, without the use of a local battery.

The "pericon" detector is no doubt one of the most important crystal detectors made, and its construction will be given here. You should purchase a small quantity of chalcopyrites $\text{Cu}_2\text{SFe}_2\text{S}_8$ and zincite ZnO from a

dealer in wireless telegraph supplies. Break up the largest pieces into small fragments and test them out by placing a piece of each kind of material in a crystal detector as shown in Fig. 3. The best combination you can obtain is selected and they can be mounted in a better form of detector as shown in Fig. 5. The first detector consists of nothing more than two spring clips fastened to a small block of wood and connected as shown in Fig. 4. The most sensitive pair can be determined by listening in the telephone receivers T to the signals.

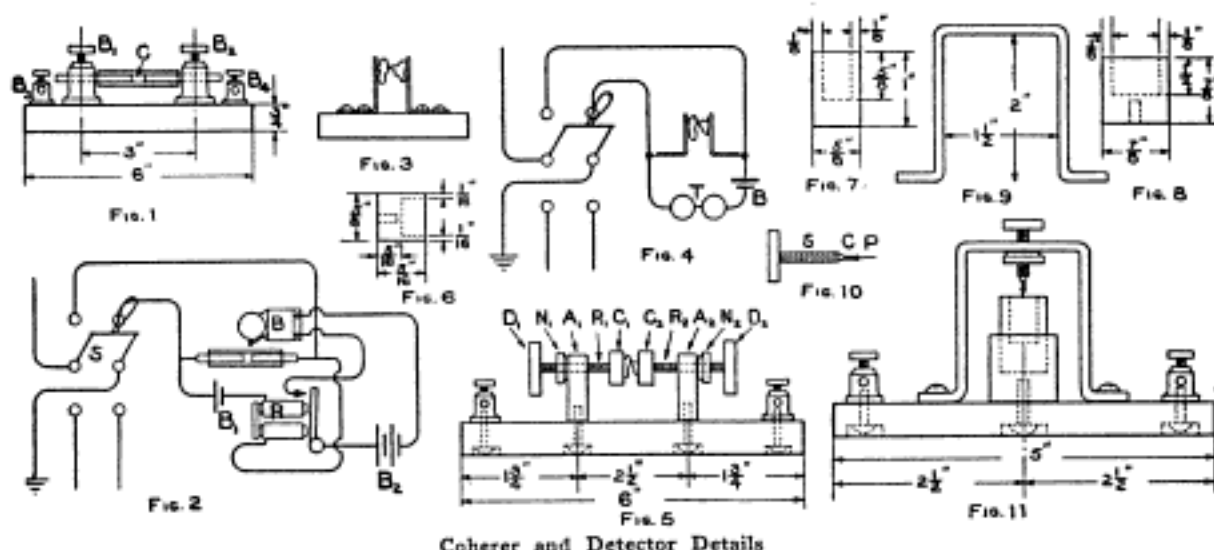
Cut from some $\frac{5}{16}$ -in. round brass, two pieces $1\frac{1}{2}$ in. long, A_1 and A_2 , Fig. 5. Drill a small hole in one end of each of these pieces and tap them to take a $\frac{1}{8}$ -in. screw. Drill two other holes through the pieces, $\frac{3}{8}$ in. from the opposite end, and thread them to take $\frac{1}{8}$ -in. screws. Mount these pieces on a wooden base, $2\frac{1}{2}$ in. wide and 6 in. long, cut from some $\frac{5}{8}$ -in. hard wood, with small brass screws passed through the base from the under side. These screws should be countersunk and the brass pieces should be about $2\frac{1}{2}$ in. apart. The holes in the upper ends of these pieces should be on a line with each other.

Make two rods, R_1 and R_2 , $2\frac{1}{2}$ in. long and threaded their entire length, to fit the holes in the pieces A_1 and A_2 . Two disks, D_1 and D_2 , $1\frac{1}{4}$ in. in diameter, should be cut from some $\frac{1}{4}$ -in. hard wood and fastened on the ends of the rods R_1 and R_2 to serve as handles in adjusting the detector. Make from some $\frac{5}{8}$ -in. brass rod two cups, C_1 and C_2 . The dimensions are given in Fig. 6. Drill a small hole in the bottom of these cups and thread them to fit on the ends of the rods R_1 and R_2 . These holes should not be drilled all the way through the bottom of the cups.

The two crystals you selected can now be mounted in these cups by means of a composition known as Wood's metal. This metal can be purchased at a supply store or it can be made by melting together four parts of bismuth, two parts of lead, one part of tin and one part of cadmium. This

composition melts at a very low temperature, something like 140 deg. F. The cups should be thoroughly cleaned and then nearly filled with this metal, and the crystals held in place until the metal cools and hardens. Two lock nuts, N_1 and N_2 , should be placed on the rods, R_1 and R_2 , as shown in Fig.

can be made as follows: The cup that is to hold the electrolyte should be made from a piece of carbon rod, and its dimensions should correspond to those given in Fig. 7. Cut from a rod of brass a piece whose dimensions correspond to those given in Fig. 8. Drill a small hole in the bottom of this piece



Coherer and Detector Details

5, to hold the cups in place after they have been once adjusted. Two binding-posts should be mounted on the base and connected to the screws on the under side of the base.

This detector can now be connected in circuit, as shown in Fig. 4, and the final adjustment made, which will remain for a long period, unless it be roughly handled or burned out by being placed near a strong transmitter without proper protection. A battery, B, should be connected in series with the telephone receiver to give the best results.

It might improve the sensitiveness of the detector to construct it so that the crystals are held in contact by means of a small spring. To do this, do not thread the hole in one of the supports, but drill it out so that the rod will move freely through it. A small spring can be slipped over the rod between the cup and the support and the lock nut used in adjusting the tension in the spring, it being placed on the rod between the end of the spring and the cup.

An inexpensive electrolytic detector

and thread it to take a $\frac{1}{8}$ -in. screw. Now cut from some $\frac{1}{2}$ -in. hard wood a piece 5 in. long and 2 in. wide. Drill the holes indicated in Fig. 11 and countersink them on the under side. The upper edges of the piece can be nicely rounded off, and it should then be given three or four coats of shellac. Cut from some $\frac{1}{8}$ -in. brass a piece $6\frac{1}{2}$ in. long and $\frac{1}{2}$ in. wide. Drill a hole in the center of this piece and thread it to take a $\frac{1}{8}$ -in. screw. Drill two other $\frac{1}{8}$ -in. holes, $\frac{1}{4}$ in. from the ends.

Now bend the piece into the form shown in Fig. 9 and mount it on the base so that the hole in its center is directly over the center of the carbon cup. Mount two back-connected binding-posts with screws through holes in the ends of the base. Connect one of these to the U-shaped piece of brass and the other one to the screw that holds the piece of brass, supporting the carbon cup, in place.

Obtain a low voltage lamp that has been burnt out and remove the pieces of platinum wire in the base of the lamp. Be careful not to break the platinum wires loose from the copper lead-

in wires. Mount one of these pieces in the end of a screw, S, Fig. 10, by soldering the copper wire C in a small hole drilled in the end of the screw. This screw should now be placed in the threaded hole in the U-shaped piece and provided with a lock nut. The piece of platinum wire can be raised and lowered with respect to the carbon cup. The detector should be connected in circuit, as shown in Fig. 4, with a

battery in series with the telephone receiver. Connect the positive pole of the battery to the binding-post corresponding to the platinum-pointed screw. Fill the carbon cup with a solution, made by adding one part nitric acid to four parts water (always add the acid to the water), to within $\frac{1}{8}$ in. of the top. The platinum point should just barely touch the electrolyte. Figure 11 shows the completed detector.

(To be continued.)

Wood-Working for Beginners

By IRA S. GRIFFITH

CHAPTER IX

Whetting Plane Irons and Chisels

Plane irons and chisels are sharpened in precisely the same manner, so that a description of sharpening only one—the plane iron—will be given.

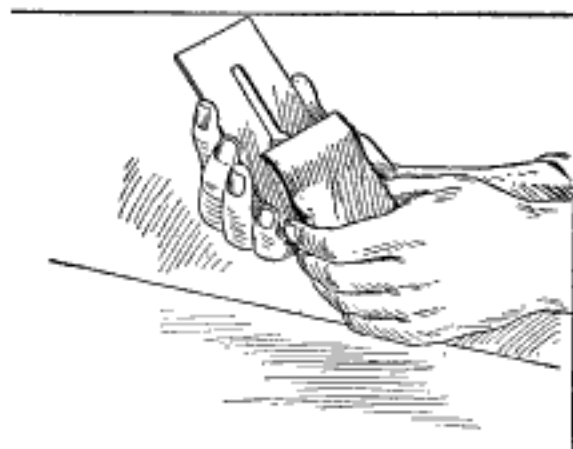


Fig. 48—Taking the Irons Apart

Release the plane iron and cap from the throat of the plane by lifting the cam on the cap. Separate the plane iron and cap iron—do not remove the cap screw, but slide the irons lengthwise until the screw head will pass through the opening made for it, as shown in Fig. 48. Place a little oil on the stone and, holding the plane iron as shown in Fig. 49, proceed to whet the cutting edge. The iron must be held neither too high nor too low. If held too high, the edge will be blunted

and ruined, and a new edge must be ground on the grindstone. If held too low, the whetting takes place on the heel of the bevel and does no good, since it does not allow the stone to touch the edge of the iron. To tell when the tool is at the correct angle, draw the oil to one spot in the center of the stone. Place the iron with the bevel in the oil and the rear end down so the iron is flat, or nearly so, on the stone (Fig. 50). Gradually raise the rear of the iron until the oil can be seen to spurt from under the cutting edge. The iron is then in position. Now move the iron either back and forth the full length of the stone or give it a circular motion, in either case striving not to change the angle at which it is held.

After the whetting has been con-

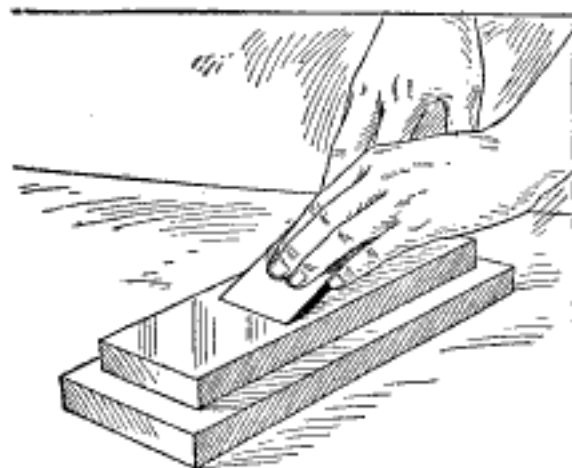


Fig. 49—Proper Pitch of Iron

tinued for some time, considerable pressure having been applied, and the test for position having been frequently made, a rubbing of the fingers down over the face side and out over the cutting edge will reveal a "wire edge." This must be removed before the iron is used again. To do this, hold the plane iron, face down, so that it touches the stone along its whole length, and give it a forward and downward movement on to the stone (Fig. 51). This generally bends the wire edge under and cuts it off. Some-

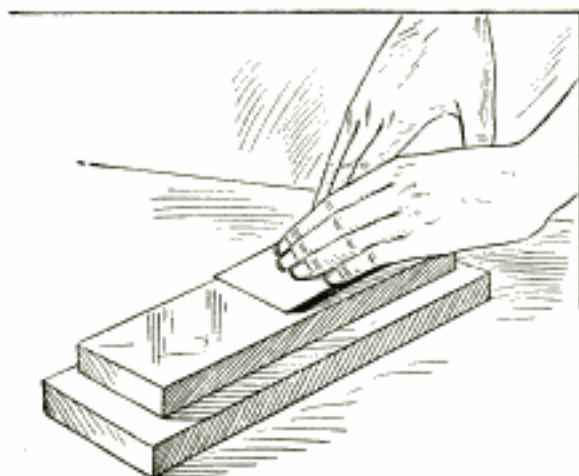


Fig. 50—First Position in Testing Angle

times, however, it simply bends it back on the bevel. In this case the bevel must be whetted again slightly to bend the wire edge back on the face, when the above operation may be repeated. Sometimes it takes several turnings to remove the wire edge.

After the wire edge has been removed, the iron must be tested for sharpness. There are several ways of doing this. One way is to hold the iron up to the light; if a white line appears, the edge is blunt and should be whetted more.

Another way is to draw the edge of the iron along the thumbnail, feeling for friction. If the iron is sharp, it will cut the nail slightly and the resulting friction will be perceived by the worker. If the iron is dull, there will be no cutting and therefore no friction, in which case more whetting will be necessary.

A mechanic generally uses the second method, but instead of the

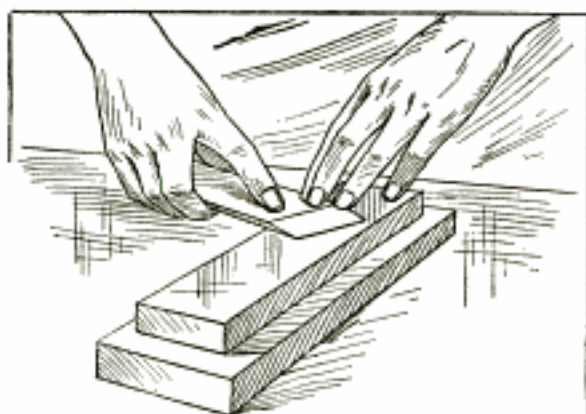


Fig. 51—Removing Wire Edge

thumbnail he uses the ball of the thumb (Fig. 52). This is a more sensitive test and therefore more satisfactory. The ball of the thumb is calloused and if slight pressure is applied as the edge is drawn along the thumb, no harm need be done. When the edge is found satisfactory, put the plane



Fig. 52—Testing for Wire Edge

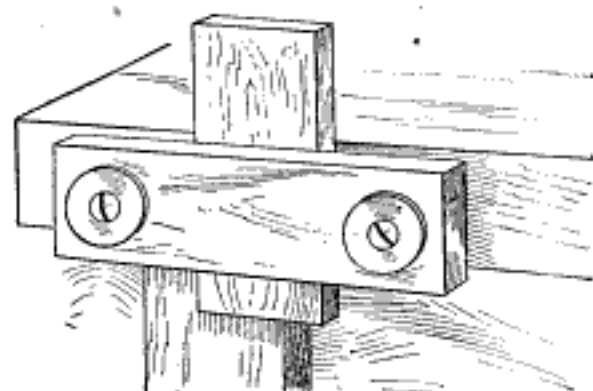
iron and the cap iron together and place them in the throat of the plane.

(To be Continued)

ⒸAutomobile wheels, that are out of true and in unequal planes, cause unnecessary wear on the tires.

A Home-Made Vice

While making a box I had some dovetailing to do, and as there was no



Vise on Bench

vice on the bench I rigged up a substitute. I secured a board $\frac{3}{4}$ in. thick, 3 in. wide and 20 in. long and bored a $\frac{1}{2}$ -in. hole through it, 1 in. from each end. The board was then attached to the bench with two screws passing through washers and the two holes in the board into the bench top. The screws should be of a length suitable to take in the piece to be worked.—Contributed by A. M. Rice, Syracuse, New York.

Cardboard Spiral Turned by Heat

A novel attraction for a window display can be made from a piece of stiff cardboard cut in a spiral as shown in Fig. 1. The cardboard should be about 7 or 8 in. in diameter. Tie a piece of string to the center point of the spiral

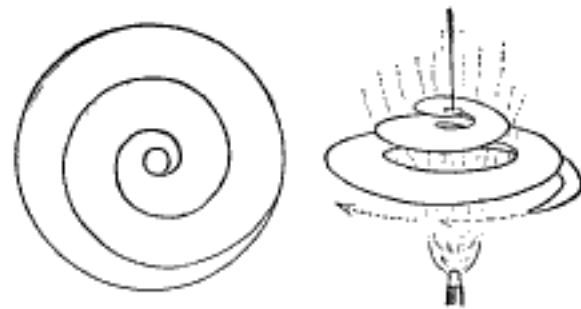


Fig. 1

Fig. 2

Spiral Cut from Cardboard

and fasten it so as to hang over a gas jet, Fig. 2. A small swivel must be put in the string at the top or near the cardboard, if it is desired to have the

spiral run for any length of time. The cardboard will spin around rapidly and present quite an attraction.—Contributed by Harry Szerlip, Brooklyn, N. Y.

A Workbench for the Amateur

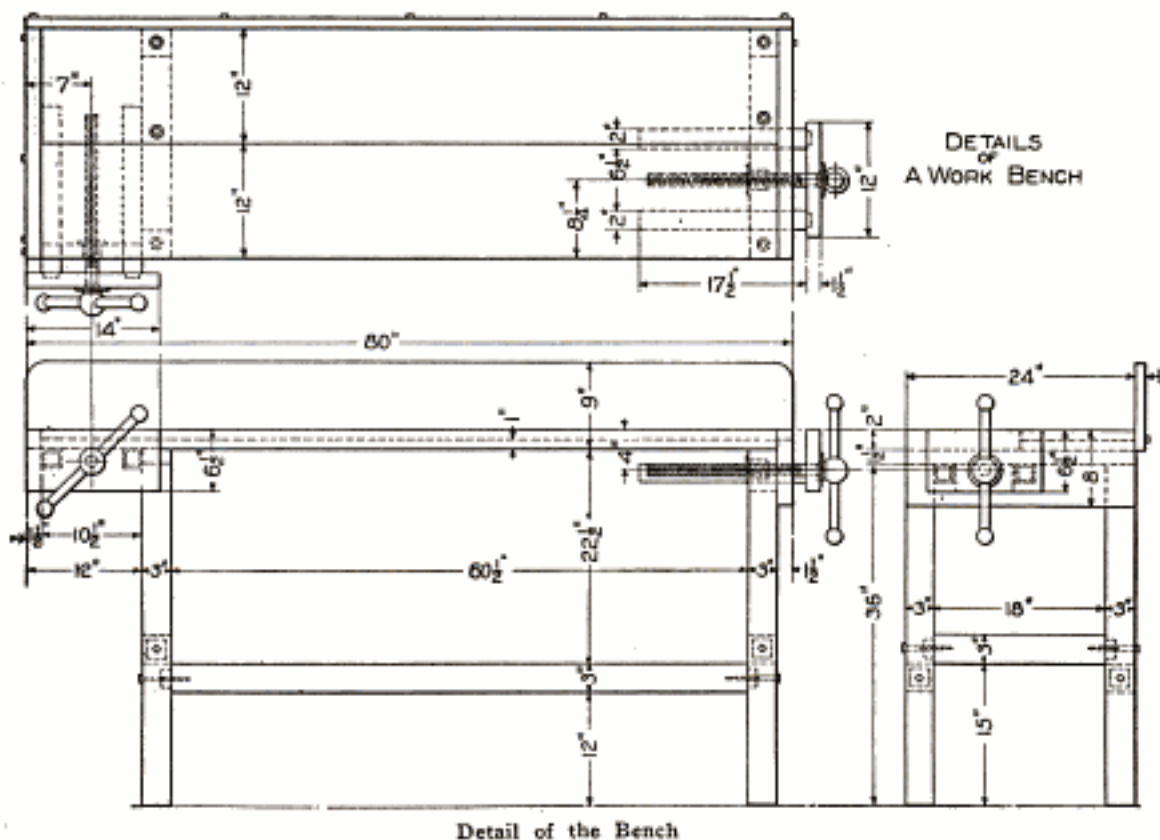
The accompanying detail drawing shows a design of a portable workbench suitable for the amateur woodworker. This bench can be made easily by anyone who has a few sharp tools and a little spare time. If the stock is purchased from the mill ready planed and cut to length, much of the hard labor will be saved. Birch or maple wood makes a very good bench, and the following pieces should be ordered:

- 4 legs, 3 by 3 by 36.
- 2 side rails, 3 by 3 by 62½ in.
- 2 end rails, 3 by 3 by 20 in.
- 1 back board, 1 by 9 by 80 in.
- 1 top board, 2 by 12 by 77 in.
- 1 top board, 1 by 12 by 77 in.
- 2 crosspieces, 1½ by 3 by 24 in.
- 1 piece for clamp, 1½ by 6½ by 12 in.
- 1 piece for clamp, 1½ by 6½ by 14 in.
- 4 guides, 2 by 2 by 18 in.
- 1 screw block, 3 by 3 by 6 in.
- 1 piece, 1½ by 4½ by 10½ in.

Make the lower frame first. Cut tenons on the rails and mortise the posts, then fasten them securely together with $\frac{3}{8}$ by 5-in. lag screws as shown. Also fasten the 1½ by 3 by 24-in. pieces to the tops of the posts with screws. The heads should be countersunk or else holes bored in the top boards to fit over them. Fasten the front top board to the crosspieces by lag screws through from the under side. The screws can be put in from the top for the 1-in. thick top board.

Fasten the end pieces on with screws, countersinking the heads of the vise end. Cut the 2-in. square holes in the 1½ by 4½ by 10-in. pieces for the vise slides, and fit it in place for the side vise. Also cut square holes in the one end piece for the end vise slides as shown. Now fit up the two clamps. Fasten the slides to the front pieces with screws. Countersink the heads of the screws so they will not be in the way of the hands when the vise is used. The two clamp screws should be about 1½ in. in diameter. They can be purchased at a hardware store. A block

should be fitted under the crosspiece to hold the nut for the end vise. After the better grade of tools should be purchased as they are the cheapest in



Detail of the Bench

you have the slides fitted, put them in place and bore the holes for the clamp screws.

The back board can now be fastened to the back with screws as shown in the top view. The bench is now complete, except for a couple of coats of oil which should be applied to give it a finish and preserve the wood. The amateur workman, as well as the patternmaker, will find this a very handy and serviceable bench for his workshop.

As the amateur workman does not always know just what tools he will need, a list is given which will answer for a general class of work. This list can be added to as the workman becomes more proficient in his line and has need for other tools. Only

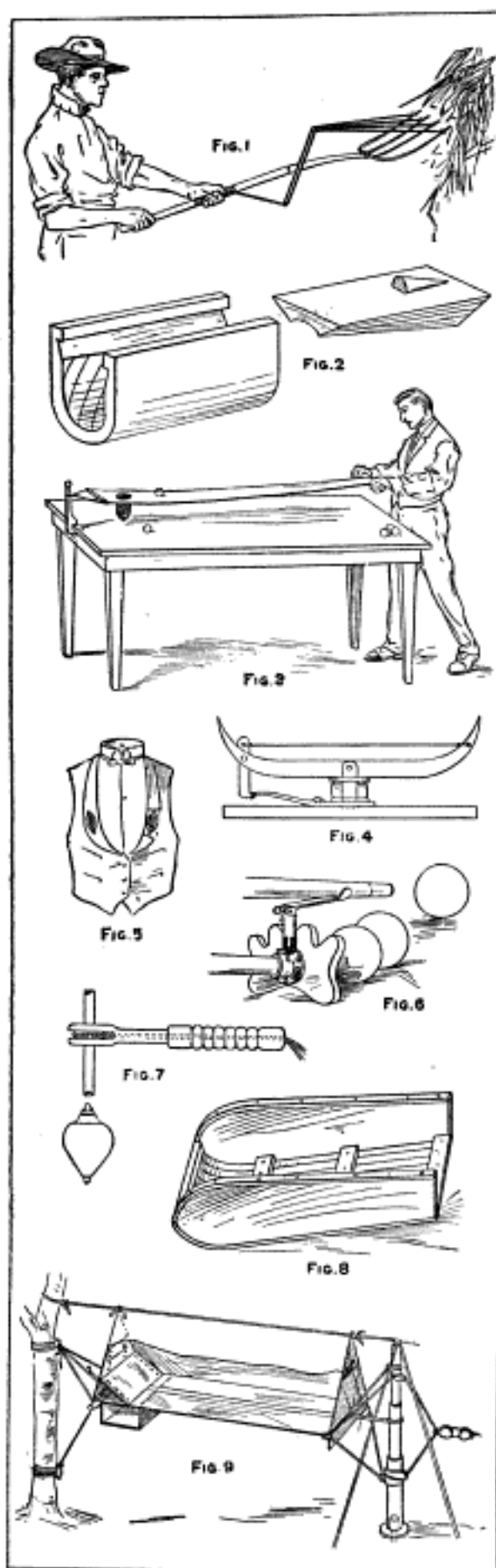
the long run. If each tool is kept in a certain place, it can be easily found when wanted.

1 bench plane or jointer; 1 jack plane or smoother; 1 cross cut saw, 24 in.; 1 rip saw, 24 in.; 1 claw hammer; 1 set gimlets; 1 brace and set of bits; 2 screwdrivers, 3 and 6 in.; 1 countersink; 1 compass saw; 1 set chisels; 1 wood scraper; 1 monkey wrench; 1 2-ft. rule; 1 marking gauge; 1 pair pliers; 1 nail set; 1 pair dividers; 1 pocket level; 1 6-in. try square; 1 oilstone; No. 1, 2 and 00 sandpaper.



Workbench Complete

INTERESTING PATENTS,



LOAD DISCHARGER FOR HAY-FORKS—This looped-rod attachment for fork tines (Fig. 1) is designed as a load discharger, and separates the fork from its load without the pitch and jerk required with the ordinary fork. The rods loop over the points of the tines and are carried back to a rocker bar operated by a steel sleeve that slides on the handle. The apparatus is especially useful in the handling of corn stalks.

NEW TYPE OF CABLE CLAMP—A cable clamp with the gripping portions so constructed that increased strain upon the cables, tending to pull the latter apart, will compel the gripping parts to more tightly grip the cables, is illustrated in Fig. 2. The body portion of the clamp is provided with oppositely disposed wedge-shaped grooves adapted to receive and retain a correspondingly shaped wedge in positive engaging position. The interior surface of the body is also provided with serrations or notches, which, in engagement with corresponding notches on the wedge, provide against any tendency of the clamp to lose efficiency when the cable is slackened.

GAME APPARATUS—Figure 3 illustrates a parlor game, the requirements of which are a set of balls, a flexible band provided with a pocket near the lower end, and a clamp standard. The standard is clamped to one end of the table, and the band is attached to it and extended over the table surface to the other end, where it is held by the player. The game consists of rolling the balls down the band into the pocket. Considerable skill of manipulation is required to keep the balls from running off the band.

ANIMAL JAW-TRAP—A U-shaped leaf spring trap is shown in Fig. 4. It is sunk in the ground across an animal trail or in front of bait, with only the points of the jaws and the trip-cord protruding. The animal strikes the cord and springs the trap.

ARRANGEMENT FOR DRESS SHIRT AND WAISTCOAT—A means of providing a close union between dress shirt and waistcoat is illustrated in Fig. 5. The shirt is provided with buttonholes so located as to register with buttonholes in the waistcoat under each lapel. Small metal frames are provided with tongues, which enter the buttonholes of the shirt and waistcoat from below, and bend downward and outward for the purpose of securing the two firmly together.

IMPROVED BILLIARD BRIDGE—The ordinary bridge arrangement used for making difficult shots in pool or billiards is like the bridge shown in Fig. 6, minus the special raised rest. For ordinary shots the low bridge-block suffices, but when the shot is over a nest of balls, or even two balls close together, the auxiliary high rest becomes a requirement. When not in use, the auxiliary rest is pushed back against the handle.

TOP-SPINNING HANDLE—A handle and spindle arrangement for spinning tops is illustrated by Fig. 7. A cord passes around the grooved pulley and through the hollow handle. The pulling of the cord whirls the spindle, which engages with the crown of the top.

COMBINATION TOBOGGAN AND COASTER—A sledge that may be used as either a toboggan or a coaster is shown in Fig. 8. Side pieces attached to the toboggan serve as runners when the sledge is used as a coaster, and as side guards when used as a toboggan. In like manner, the part which forms the running surface as a toboggan becomes a carrying top when the sledge is used as a coaster.

BED-TENT—Figure 9 illustrates a bed-tent for use on sleeping porches, in yards, or when on camping expeditions. In camp, one end of the supporting

PRACTICAL OR UNIQUE

tackle is made fast to a tree trunk, and at the other end to a supporting pole, which, in turn, is held upright by pulley blocks and tackle engaging with a second tree trunk.

COMBINED PEN AND SEAL—A fountain pen with a seal in its handle is shown in Fig. 10. In the handle is a fixed jaw carrying one portion of the die, with a movable jaw attached to it and carrying the remaining portion of the die. A cap screws over the seal portion and gives the whole the appearance of the ordinary fountain pen.

FINGER SUPPORT FOR MANICURISTS—The necessity of manicurists using one hand to support the finger being manicured is obviated by the finger support illustrated in Fig. 11. It is of a height that will allow the wrist to rest on the table.

TELESCOPIC FLAGSTAFF—Figure 12 illustrates a telescopic flagstaff composed of two or more sections, provided with expansive means for fractionally holding the inner section within the outer at any length of extension desired. The supporting base is so arranged that the pole may be set at any angle.

A STOOL FOR THE BARBER—The barber stool shown in Fig. 13 is presumably the invention, or at least the idea, of a barber desirous of additional comfort while serving a customer. It consists of a bicycle saddle, mounted on a tubing standard, provided with rollers, and designed to swing around the chair at the proper distance.

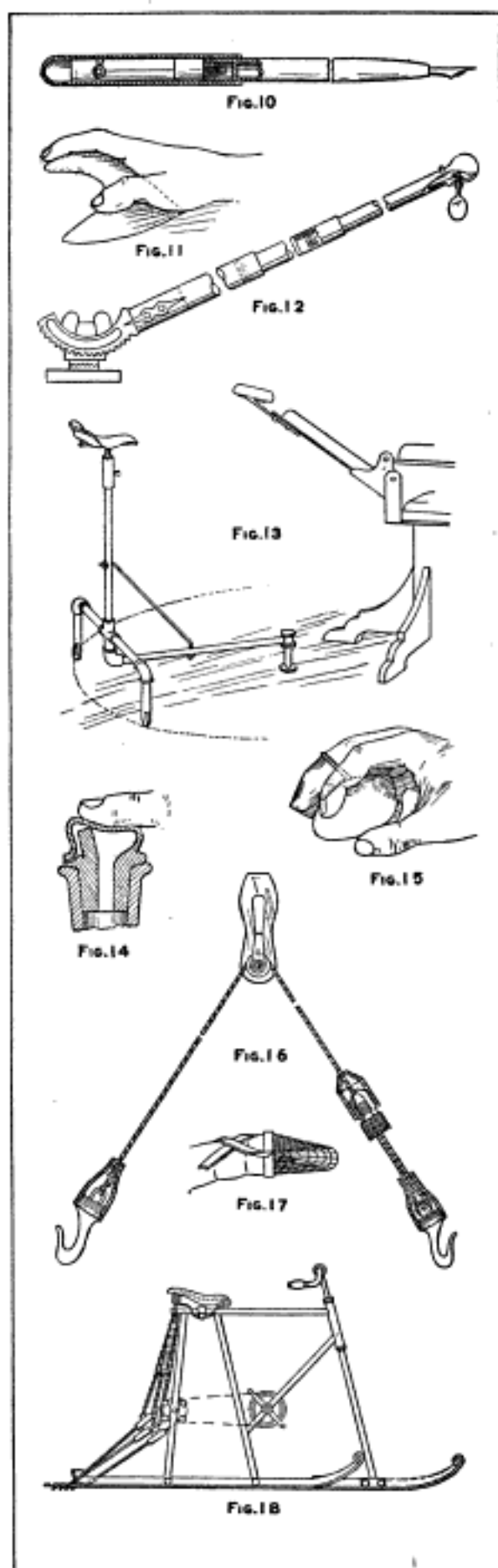
COMBINED BOTTLE STOPPER AND DROPPER—A bottle stopper provided with means by which the contents of the bottle may be discharged in drops is here shown (Fig. 14). Pressure exerted on the top-piece of the stopper opens a passage through which the contents of the bottle may exude in drop form. When the finger pressure is removed the passage closes.

EGG STAMP—Figure 15 illustrates a finger arrangement by means of which eggs may be rapidly stamped. It is worn like a thimble, the under surface being provided with the characters to be imprinted. In picking up an egg in the ordinary way the stamping finger comes in contact with the shell and the imprint is made.

DEVICE FOR HANGING PICTURES—In Fig. 16 is shown a device for hanging heavy pictures and other like objects. The suspension rope or cable engages with a roller at the lower end of the supporting hook. A means is provided for changing the length of the cable.

THUMB-SUCKING PREVENTOR—A shield designed to prevent an infant sucking its thumbs is illustrated by Fig. 17. The thumb cap is formed of metallic netting of small mesh, and around the cap at its open end is a band of absorbent material, the ends of which cross each other as shown in the drawing, and provide the means for tying the device to the hand.

SLEDGE DRIVEN LIKE BICYCLE—A sledge, the motive force of which is the same as that of a bicycle, and which with a motorcycle engine added, would become a motorcycle-like driven sledge, is shown in Fig. 18. Several levers are pivotally fastened to the cranks, and to these levers are fastened sliding pieces provided with shoe-like projections bearing detachable teeth which engage with the running surface. Telescopically mounted tubes connect the sliding pieces with the upper part of the frame just below the back part of the saddle, and the spiral springs surrounding these tubes continually press the above mentioned levers against the running surface.



MR. LUSHINGTON was meeting with heavy weather on his way homeward at 2 A. M. His course was decidedly zig-zaggy and he listed to port. Finally he ran foul of a policeman.

"I guess you need an escort, old man," said the cop, good-naturedly.
"Looksh that way," muttered Mr. Lushington. "I'd be alrigh' (hic) though, if I wuz only equipped with a gyroscope!"

A young lady entered a dentist's office, sat down in the chair of torture without a tremor and uncomplainingly allowed the dentist to examine her teeth. When he had poked and probed and punched and prodded to his evident satisfaction he said:

"Why, my dear young lady, every filling in your mouth is loose and two of your teeth are about to fall out."

"I know," the young lady murmured.

"May I ask what is the cause of it. I see no signs of violence or concussion."

"Well, you see," the young lady explained. "I'm a telephone operator and I have been trying to follow instructions and say three so it will not sound like any other sound on the face of the earth. We are supposed to say it this way, Thr-r-r-r-ee. Do you see?"

"I can't truthfully say that I do," replied the dentist, extracting a gold filling from his eye.
—Telephony.

Muddlum — Wonder what makes the telegraph lines hum?

De Broke—I've wired dad for dough, and I guess he's talking back.
—Chicago Journal.

The guests at a summer hotel in northern New Jersey are laughing over the following: The proprietor of this hostelry put up a bungalow in its neighborhood last winter. Near the hotel the Morris and Essex canal winds its way through the woods, and on its banks in that vicinity is a "general store" kept by a native who is quite a character in his way. Showing him the new dwelling after its com-

pletion, the hotel proprietor pointed out with pride the modern bathroom with which it is equipped. "Why did you put in a bath?" said the storekeeper. "Why," said the hotel keeper, "it adds so much to comfort." "Well," said the S. K., "the canal is good enough for me." "That may do in the summer, but what do you do when it gets cold?" "Why," said the S. K., "you don't suppose I'm such a — fool as to take a bath in the winter time, do you?"

The real estate firm of Solomon & O'Sullivan had lots for sale in a newly planned suburban district. O'Sullivan—young, enthusiastic and Irish—was

writing the advertisement, the national eloquence flowing from his pen. He urged impending purchasers to seize the passing moments.

"Napoleon," he wrote, "not only met opportunity; he created it!"

Mr. Solomon read this line in the advertisement slowly and carefully.

"This fellow Napoleon," he said—"what's the use of advertising him with our money?"

Bacon—I see a patent has been granted for an attachment to rocking chairs to operate a fan to cool the occupant.

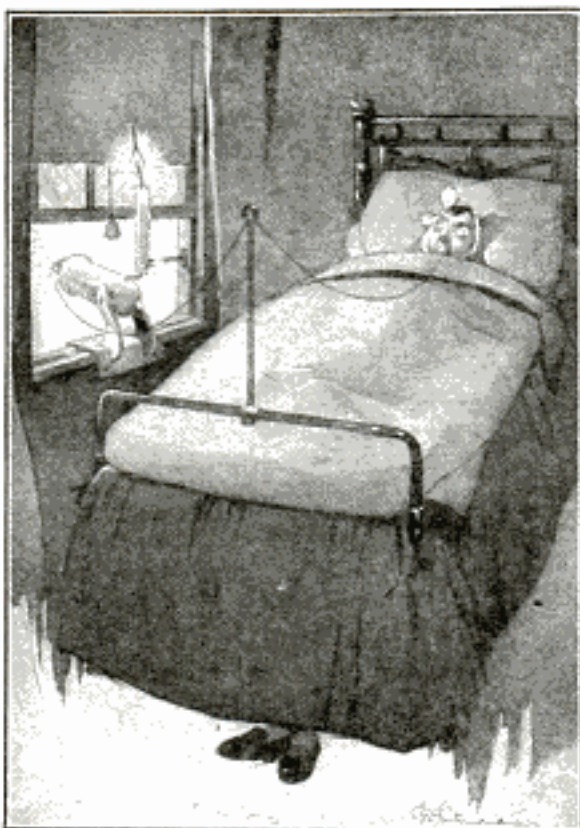
Egbert—And when a man goes into the dark room and stubs his toe against that rocker, we do not think the new attachment will cool him off any.—Yonkers Statesman.

After he had waited outside for ten long minutes, the door was opened on the chain and a woman's face appeared at the aperture. "Good morning, madam," began the street hawker in his suavest tones. "I have here a little article

of universal utility. It is called the Marvelous Mice Exterminator, and the price—"

"No use," interrupted the woman grimly. "We have no marvelous mice in this house—only the ordinary kind."

Then the door was shut and the hawker was once more alone.—Tit-Bits.



Black and White, London

PAINLESS EXTRACTION Why Spend Money on Dentists?

of universal utility. It is called the Marvelous Mice Exterminator, and the price—"

"No use," interrupted the woman grimly. "We have no marvelous mice in this house—only the ordinary kind."

Then the door was shut and the hawker was once more alone.—Tit-Bits.

NEW BOOKS

WIRELESS TELEPHONES AND HOW THEY WORK—By James Erskine-Murray. Cloth; illus.; 68 pp. Price, \$1.00. Gives a clear survey of the way in which wireless telephones work, including a discussion of the methods and instruments used. The Norman W. Henley Pub. Co., New York.

PRACTICAL HANDBOOK FOR MILL-WRIGHTS—By Calvin F. Swingle. Cloth; illus.; 411 pp. Price, \$2.00. Describes practical planning and arrangement of mill buildings; strength of materials; modulus of elasticity; moment of inertia; shafting; journal bearings; couplings; horsepower to be transmitted by shafting; alignment and leveling of shafting; pulley location; key fitting; belts and belting, etc. F. J. Drake & Co., Chicago.

HANDWORK IN WOOD—By William Noyes. Cloth; illus.; 232 pp. Price, \$2.00. Intended primarily for teachers of woodwork. Discusses logging, sawmilling, seasoning and measuring of wood, wood hand tools, wood fastenings, equipment and care of the shop, the common joints, types of wooden structures, principles of joinery, wood finishing. The Manual Arts Press, Peoria, Ill.

MODEL BALLOONS AND FLYING MACHINES—By J. H. Alexander. Cloth; illus.; 127 pp. Price, \$1.50. This book will be of assistance to those who desire to construct a model airship or flying machine. It contains five folding plates of working drawings, each sheet containing a different sized machine. Much instruction and amusement can be obtained from the making and flying of these models. The Norman W. Henley Pub. Co., New York.

He Saved \$800⁰⁰ On This Bungalow!

Dr. Whitehurst, of Texas, Tells of Big Saving in Building Cost by Use of Gordon-Van Tine Millwork and Lumber

Here's His Letter

Peniel, Texas, May 7, 1910.

Gordon-Van Tine Co., Davenport, Iowa.

Gents: Enclosed are photos of our new house, in which we used your millwork, including White Pine Siding, Maple Flooring and Bishopric Mastic Wall Board. It is almost a Gordon-Van Tine house.

I have the swellest bungalow I think I ever saw now and saved about \$800.00 in the building of it.

I received your check for \$25.70 some time back, covering an overcharge in freight.

Please accept my thanks for your honest treatment.

These hardwood veneered doors, thick maple floors and Queen Anne windows are the talk of the town.

Respectfully,

D. Whitehurst M.D.



Front View of Dr. Whitehurst's Bungalow

Isn't This Good Evidence of Dr. Whitehurst's Satisfaction?



Interior View of Dining Room

We Protect Our Customers' Interests in Every Possible Way



Side View of Bungalow

Further Evidence of Intense Satisfaction

Over Half a Million Customers and Every One SATISFIED!

Over half a million home builders are buying their materials at bargain prices, direct from our great Millwork and Lumber Plant.

We carry a tremendous stock of building material—everything needed to build complete and beautiful homes of the most modern types, even to mantels and hardware. We guarantee quick shipment, no matter how large the order.

Quality, safe delivery and satisfaction guaranteed or money refunded.

Have You Written for Our Latest HOME-BUILDERS' CATALOG?

Solely through this wonderful Catalog of 5,000 Bargains in highest grade Millwork and Lumber we have built up a patronage extending from ocean to ocean. Everything offered at dealers' prices. Every item we sell is guaranteed up to the official grades of the Sash & Door Manufacturers' Associations.



At Last—A Plan Book That Keeps Cost Within Estimates!

The Gordon-Van Tine Plan Book shows over 50 designs of Houses, Cottages, Bungalows, etc., costing from \$600 to \$6,000, that have actually been built at the exact cost specified.

Doubtless you have sent for many of the Plan Books advertised for sale. Have you ever tried to put up a house at the prices stated in these books? The Gordon-Van Tine Plan Book wins out because it safeguards the builder! For a limited time we will send this splendid volume free on receipt of 10c to cover handling and postage.

Get Our FREE BOOKS and Save Big Money!

Our Grand Free Millwork and Lumber Catalogs will save an average of 50% on material, and our Plan Book will enable you to build with the positive assurance that the cost will not exceed the original estimate.

We offer to the Home-Builder a service that no other concern in America can duplicate. In justice to yourself, investigate the big advantages which we place at your disposal.

ESTIMATES FREE! Send on your list of materials. We will be glad to furnish complete estimates. You incur no obligation by availing yourself of this service.

All correspondence receives prompt, courteous and careful attention. Write us. (79)
GORDON-VAN TINE CO., 2146 Federal Street, DAVENPORT, IOWA

Please Mention Popular Mechanics

A BOY'S RISE TO THE TOP

BEING A STORY FROM REAL LIFE, WHICH PROVES
"BOOST, AND THE WORLD BOOSTS WITH YOU."

TO strike a rich "pay streak" in the form of a big job with a fat pay envelope attached to it, helped by an extensive college education, in these days of intense competition is quite an achievement—but to do it through one's power of "I will" alone, just as Tom Jewell did it, proves beyond any question of doubt that true success rests with the individual rather than with outside conditions.

This is the story—one that holds a deep lesson for every man and boy anxious to make his mark.

Tom Jewell left school at the marble-playing age, to work with the North Chicago Rolling Mill people at 87½ cents a day. Shortly after, he was transferred to the South Chicago branch of the same Company. A few years there, and he started to learn the machinist's trade. Five years of this, and he changed to the roll-turning trade, going to Bridgeport, where he worked until a strike closed the plant. Then to East Chicago, and from there to Birmingham, Alabama, where he worked four years.

All this time Tom was working by "rule-of-thumb," that is, he was learning his trade and doing his work in exactly the same way as thousands of other chaps—a method that was and still is quite usual, but which Tom knew would never carry him beyond the "just-so-much-a-week-and-no-more" limit. He saw that the men in charge used their brains as well as their hands—that they brought technical knowledge into their work as well as manual labor—and so decided to get in line with them for promotion and the bulky pay envelope.

So, while in Alabama, he took the complete Mechanical Course of the International Correspondence Schools, knowing that the training would benefit him greatly in his work. By this time he was earning \$3.50 a day. But he *knew* there would be more money for him once he got the right training. There was. He applied for a position with the Republic

Iron and Steel Company at Sharon, to take charge as roll designer. He got it—and the \$1,800 a year that went with it.

The unexpected closing down of the plant which happened later made no difference to Tom, for his I. C. S. training stood him in good stead. Position after position was offered him—among them the position as Superintendent of one of the mills of the Deering Harvester Company, which he took at a good salary.

Then came a still better offer from the International Harvester Company, which Tom accepted, and which led to even better positions with that company.

Finally came the big opportunity—the big job—as shown by the position now held by Mr. Thomas Jewell, Superintendent of the Wisconsin Steel Company, at a salary that makes his former figure of \$1,800 a year seem about as small in comparison as his first day's pay of 87½ cents.

Mr. Jewell gives full credit for his success to his power of "I will" and the help of the International Correspondence Schools. He says that any other ambitious chap can do just as well as he through the same help. In fact, Mr. Jewell's experience is but one of thousands of instances of similar good fortune won through the help of the International Correspondence Schools, which were established for the sole purpose of helping poorly-paid but ambitious men.

The coupon on the opposite page will bring complete information and the I. C. S. "1001 Stories of Success." Marking and mailing the coupon to learn how the I. C. S. can make you an expert in your chosen line of work, without requiring you to leave home, or give up your present position, costs you nothing, and puts you under no obligation.

If you can read and write, and are really ambitious to succeed in life, mark the coupon, and have the I. C. S. explain to you exactly how you can be helped.



How Will YOU "Size Up"

When you come in contact with the man whose "Yes" or "No" means success or failure for you?

At such a time your future will hang in the balance. You will be scrutinized, weighed, tried. Have you the training to decide the test in your favor—a training to fit you for a position of responsibility? If not, you can get it.

A. S. Elliott, Bandon, Ore., says: "My Course in Electrical Engineering has enabled me to fill responsible positions with several large milling companies in British Columbia, in Oregon, and with the United States Reclamation Service. Now I am in charge of the business of the Bandon Light and Power Co. Without the training given me by the I. C. S. I would not have been able to hold successfully any of these positions. The Course has been worth to me approximately \$3,000 in increased earnings within the last 5 years."

With such a training you will be equipped to stand the test—to "size up" well. If you can read and write and have a little spare time each day, the I. C. S. will train you in your own home—no matter where you live.

Regardless of how old you are, what you work at, how little spare time you have, or how little you earn—there is an I. C. S. way specially adapted to your requirements.

Mark and mail the coupon. Learn how you can be helped to a better position and an increased salary. Sending the coupon places you under no obligation.

Send the coupon NOW.

International Correspondence Schools

Box 872-B, Scranton, Pa.

Please explain, without further obligation on my part, how I can qualify for a larger salary and advancement to the position, trade, or profession before which I have marked X.

Electrical Engineering
Electric Lighting
Electric Railways
Electrician
Electric Car Running
Dynamo Foreman
Dynamo Tender
Wireman
Mining Engineer
Telephone Expert
Civil Engineer
Automobile Running

Mechanical Engineer
Mechanical Draftsman
R. R. Constructing
Concrete Construction
Architect
Contracting & Building
Architectural Draftsman
Plumbing & Heating
Chemist
Bookkeeper
Advertising Man
Civil Service Exams

Name _____

St. & No. _____

City _____

State _____

Please Mention Popular Mechanics

6 Months Free SPECIAL OUTFIT

ON SHOP ASSORTMENT LUTHER DIAMOND TOOL GRINDER

A Luther diamond tool grinder will help any shop or factory to earn more money. This is exactly what we want you to prove by six months' free use of this genuine Carborundum grinder shop and factory outfit. We want every shop and factory, every contractor, carpenter, mechanic, and tool-users generally to try out this outfit on **any and all work**—to sharpen every kind, and as many tools as possible for six months, and then if you are not fully satisfied that this outfit is a **big money maker for you—send it back. The six months' use will not cost you a single cent.** Whether you keep it or send it back, you are sure to be "ahead"—and you **can't** be anything out. Send back the coupon on the next page for this 6 Months' Free Trial Offer on this special offer on this Special Shop and Factory Outfit.

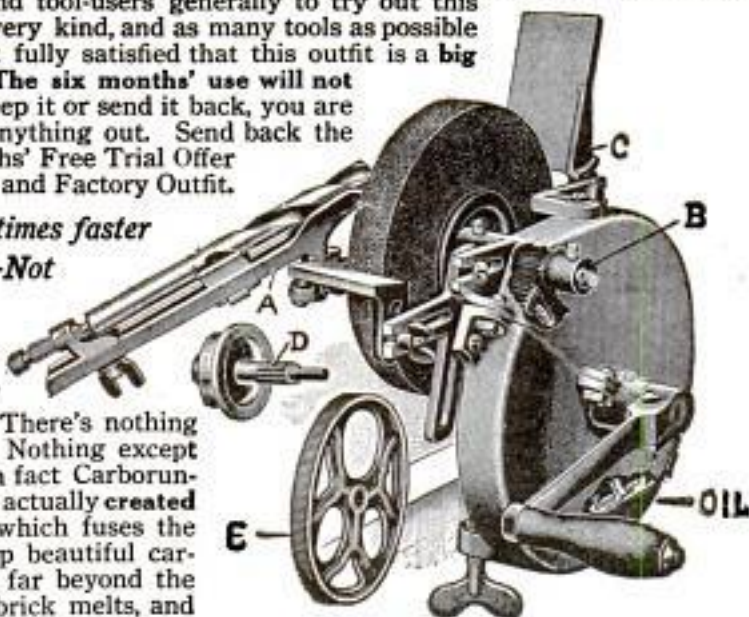
25 times faster than grindstones—8 times faster than emery—will not draw temper—Not emery called by a fancy name, but

GENUINE Carborundum

Carborundum is a wonderful abrasive. There's nothing else like it, or near like it in the world. Nothing except the genuine diamond itself is so hard. In fact Carborundum is made of artificial diamond crystals, actually **created** in the terrific heat of electric furnaces which fuses the elements of real diamonds into hard sharp beautiful carborundum crystals. In this **utmost** heat far beyond the measurements of science, in which fire brick melts, and runs like butter, Carborundum crystals get a temper and sharpness that cuts hardest steel as emery does copper. Wheels actually made of genuine South African diamonds would sharpen tools no quicker. And all this speed and ease of tool sharpening is done **without danger of drawing temper from tools**, and with **no need of cooling with water.** Grindstones and emery wear steel away; frictional heat caused by the necessary heavy contact draws the temper. But Carborundum **cuts** steel away without frictional heat **peeling** off tiny shavings of hardest steel at highest touch.

No need of heavy pressure, no water cooling needed, no danger of drawing temper if it is a **genuine** Carborundum wheel. We guarantee wheels on Luther Diamond Tool Grinders to be genuine Carborundum. And you can be highly suspicious of anything described as we have described Carborundum, but called by any name other than **Carborundum**, no matter how fancy the name. **There is only one Carborundum, there is nothing else like it.**

For Detail of Special Offer Outfit on Six Months' Free Trial—See Next Page



Built Like a High Grade Lathe

The Luther Mechanics' Special, forming the basis of this special shop and factory outfit special offer is built substantially for a lifetime of service. The genuine Carborundum wheel will not get lopsided. The mechanics' special is built with steel and malleable construction—dust-proof, bronze bearings—machine parts run in bath of oil—machine cut spur gears—speed 2,500 revolutions per minute. It will stand the severest, hardest service, out-wear and give better service than any number of emery wheels, grindstones, or anything else.

- A. Twist drill attachment to give twist drills proper angle and clearance.
- B. Bronze Bearing.
- C. Chisel Sharpening Attachment
- D. Spur gear cut from solid steel.
- E. Large spur gear machine-cut, oil bath.

LUTHER GRINDER MFG. CO., 59 MADISON STREET MILWAUKEE, WIS.

Please Mention Popular Mechanics

Trial OFFER 10 TOOLS IN ONE



**Mechanics'
Special Foot
Power With
Twist Drill
Attachment**

This genuine Carborundum Luther Diamond Tool Grinder Shop and Factory Outfit is a remarkable value—the greatest reasonably priced Grinder offer ever made. The outfit consists of one Mechanics' Special as described on previous page with the following accessories:

- | | | |
|---|--------------------------------|--|
| 1. One rough genuine Carborundum wheel. | 4. One twist drill attachment. | 8. One Carborundum Hone in leather case. |
| 2. One fine genuine Carborundum wheel. | 5. One Buffer. | 9. One Carborundum Sickle Stone. |
| 3. One chisel grinding attachment. | 6. One Polisher. | 10. One Foot-power attachment. |
| | 7. One Oil Stone. | |

This outfit is a complete equipment for any possible grinding work, and our special offer on this assortment is the biggest value ever offered. The chisel and twist drill attachment make it easy for even inexperienced persons to sharpen chisels and twist drills correctly.

Send Coupon Today for 6 Months' Free Trial Offer on Outfit Offer

Often you work with dull tools because it's not easy to sharpen them. This outfit makes any sharpening the work of only a few minutes. Keen, bright tools mean faster work every moment of the day, and that means **more money made**, to say nothing about the time saved in sharpening, and the money saved because there is no danger of drawing temper, and all your tools will last longer. The Carborundum wheels will outlast any number of emery wheels or any other abrasive, and this means **still more money saved**. But don't take our word; let the Outfit itself prove all this in your own shop, on your own tools. We don't say 10 days' Free Trial. We say **Six Months' Free Trial—A whole half year** to decide if you want to buy the outfit or not and that's a Free Trial that is really worth while. Then if you don't want the outfit after six months' free test—if you don't believe it saves and earns money, send it back, you won't be out a cent. The six month's use will cost nothing.

Let us tell you all about this Mechanics' Special Shop and Factory Outfit and send you an interesting booklet about Carborundum and our Liberal Six Months' Free Trial Offer. Send back the coupon at the bottom of this page today. Doing so will not obligate you in any way whatever.

**RETURN
THIS
COUPON**

TODAY



**Six Months' FREE
Trial Offer on Luther
Diamond Tool Grinder Shop
and Factory Outfit Special Offer.**

Luther Grinder Mfg. Co., 59 Madison St., Milwaukee:

Gentlemen:—At no obligation, please send Six Months' Free Trial Offer on Shop and Factory Outfit Special Offer. Also interesting booklet about Carborundum. This coupon does not mean that I will buy; it simply means I want full details, and does not obligate me in any way.

NAME.....

ADDRESS.....

After using your Mechanics' Special Grinder for seven months, would say that it is perfectly satisfactory, and I could not be without it for double the amount.

Respectfully,

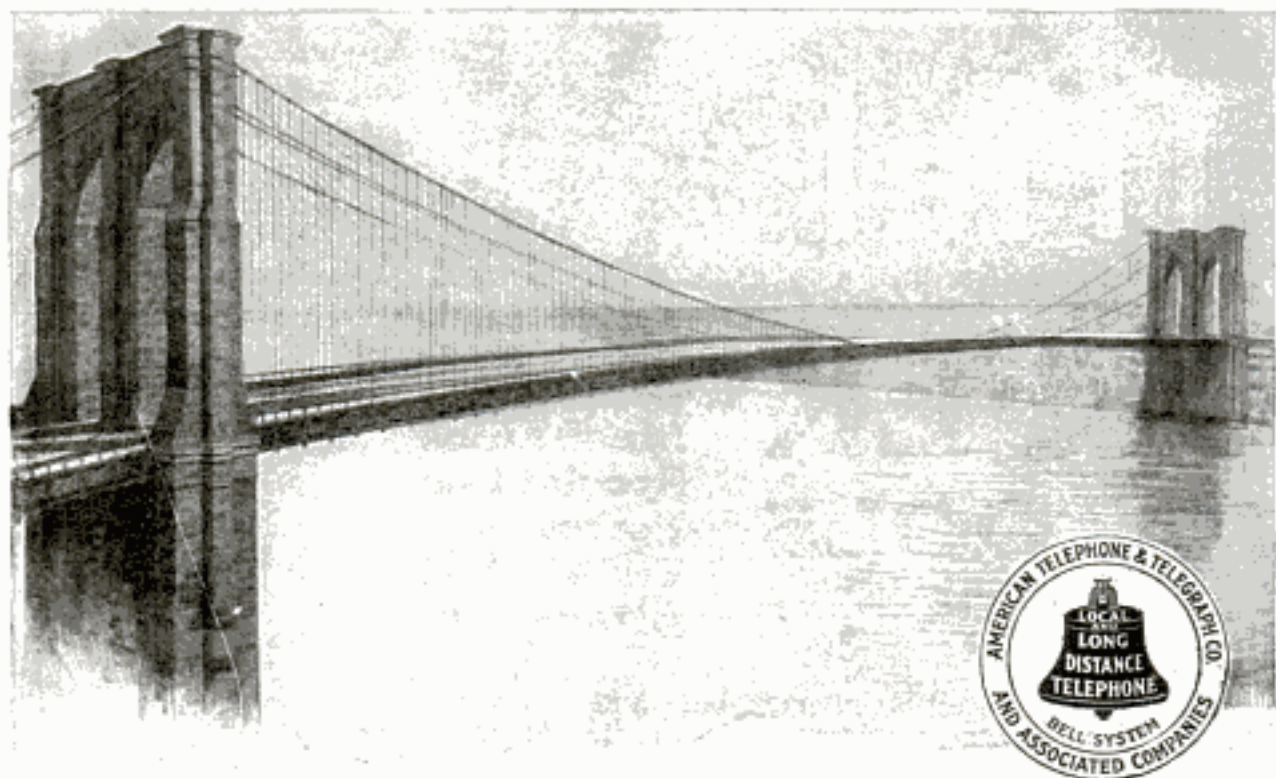
Geo. T. Taylor,
732 No. 17th St., Philadelphia.

I am in receipt of the "Mechanics' Special Grinder." I have tried the machine and have found it a most excellent device. Yours very truly,
The Haynes Automobile Co.
Elwood Haynes, Pres.

*Don't Delay.
Send Back the
Coupon Today.*



Please Mention Popular Mechanics



The Neighbor-Maker

SAVAGES built rude bridges so that they might communicate with their neighbors. These have been replaced by triumphs of modern engineering.

Primitive methods of transmitting speech have been succeeded by Bell telephone service, which enables twenty-five million people to bridge the distances that separate them, and speak to each

other as readily as if they stood face to face.

Such a service, efficiently meeting the demands of a busy nation, is only possible with expert operation, proper maintenance of equipment, and centralized management.

The Bell System provides constantly, day and night, millions of bridges to carry the communications of this country.

**AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES**

One Policy

One System

Universal Service

Please Mention Popular Mechanics

The Edison!

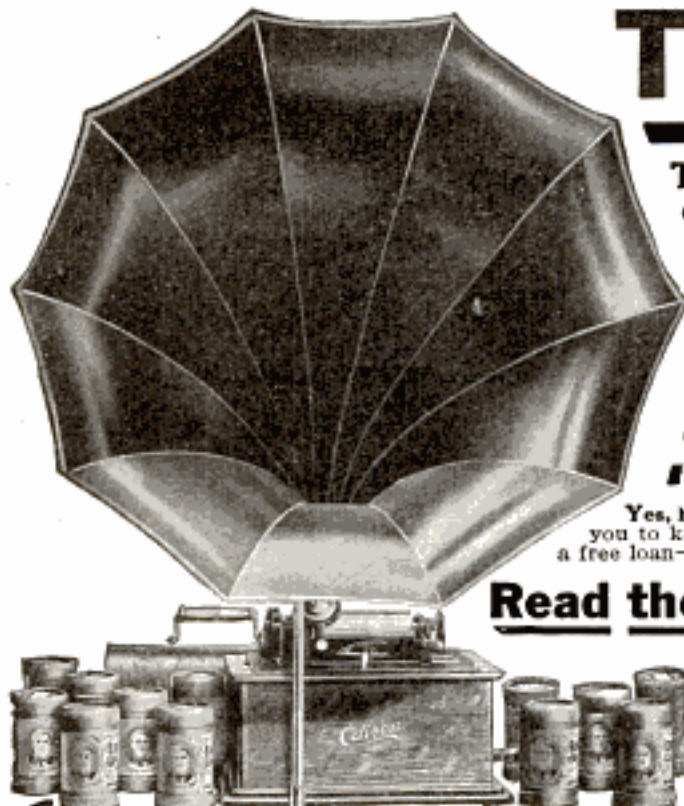
The latest style Edison Phonograph in our new outfit No. 9 — this superb entertainer, Mr. Edison's latest, final improvement of phonograph, shipped

FREE!

Yes, FREE! I don't ask a cent of your money—I don't want you to keep the phonograph—I just want to give it to you on a free loan—then you may return it at my own expense.

Read the Offer: I will ship you free this grand No. 9 outfit, Fireside Model, with one dozen Gold Molded and Amberol records.

You do not have to pay me a cent C. O. D. or sign any leases or mortgages. I want you to get this free outfit—the masterpiece of Mr. Edison's skill—in your home. I want you to see and hear Mr. Edison's final and greatest improvement in phonographs. I want to convince you of its wonderful superiority. Give a free concert; give a free minstrel show, music, dances, the old-fashioned hymns, grand opera, comic opera—all this I want you to hear free of charge—all in your own home—on this free loan offer.



My Reason for this free loan offer, this extra liberal offer on the finest talking machine ever made—see below.

Mr. Edison Says: "I Want to See a Phonograph in Every American Home."

The phonograph is the result of years of experiment; it is Mr. Edison's pet and hobby. He realizes fully its value as an entertainer and educator, for the phonograph brings the pleasure of the city right to the village and the farm home. Now, the new Fireside Edison Phonograph of our outfit No. 9, 1911 Model, is the latest and greatest improved talking machine made by this great inventor. If you have only heard other talking machines before, you cannot imagine what beautiful music you can get from the outfit No. 9. We want to convince you; we want to prove to you that this outfit is far, far superior to anything ever heard before. Don't miss this wonderfully liberal offer.

My Reason I don't want you to buy it—I don't ask you to buy anything. But I do feel that if I can send you this great phonograph and convince you of its merits, of its absolute superiority, you will be glad to invite your neighbors and friends to your house to let them hear the free concert. Then, perhaps, one or more of your friends will be glad to buy one of these great outfits No. 9. You can tell your friends that they can get an Edison Phonograph outfit complete with records for only \$2.00 a month—\$2.00 a month—the easiest possible payment and, at the same time, a rock-bottom price. Perhaps you, yourself would want a phonograph, and if you ever intend to get a phonograph now is the chance to get the brand-new and most wonderful phonograph ever made, and on a most wonderfully liberal offer. But if neither you nor your friends want the machine, that is O. K. I simply want you to have it on a free loan, and perhaps somebody who heard the machine will buy one later. I am glad to send it on the free loan offer anyway. I will take it as a favor if you will send me your name and address so I can send you the catalog. Then you can decide whether you want the free loan. There are no strings on this offer, absolutely none. It is a free loan, that is all. I ask not for one cent of your money. I only say if any of your people want to buy a phonograph, they may get one for \$2.00 a month if they want it.

Now, remember, nobody asks for a cent of your money I want every responsible household in the country, every man who wants to see his home cheerful and his family entertained, every good father, every good husband, to write and get these free concerts for his home. Remember, the loan is absolutely free from us, and we do not even charge you anything C. O. D.

Write Today for this interesting catalog FREE

Just sign and mail the coupon at the right and get this FREE catalog. Write today

Write for FREE Edison Catalog

In this catalog you will find a complete list of music and vaudeville entertainments. Get this catalog at once, then you can decide whether or not you want a free loan and when you want it. You can also decide just the music you want. Remember, I will appreciate it as a favor if you will give me the opportunity of sending you this latest style machine—the climax of Mr. Edison's skill—on this free loan offer.

Sign the coupon today. Do it right now.

F. K. BABSON Edison Phonograph Distributors
Dept. 1199, Edison Bldg., Chicago

Canadian Office:
315 Portage Avenue, Winnipeg, Canada

Without any obligations on me, please send me your Great Edison Catalog, and also full explanation of your Free Loan Offer on the Edison Phonograph.

FREDERICK BABSON, Edison Phonograph Distributors, 1199 Edison Bldg., CHICAGO, ILL.

Name _____ Address _____

No letter necessary! Just sign and mail this free coupon right now—today.



The MARK of the MAKER is the Mark of Excellence

IT makes you sure of getting GOOD TOOLS because it *makes us responsible* for the quality.

Any item in our four large lines of Guaranteed Hand Tools has to be up to the standard of over 90 years of supremacy in tool-making before we are willing to stamp that mark on it with a steel die.

That means the greatest care in selection of materials, the most skillful workmanship and the most rigid testing. We couldn't afford to risk our reputation by the slightest defect.

Look for The MARK of the MAKER on P. S. & W. Guaranteed Hand Tools for Carpenters, Machinists, Electricians, Tinsmiths, etc.

The Peck, Stow & Wilcox Co.

MANUFR'S of the Largest Line of Mechanics' Hand-tools Offered by Any Maker

Established
1839

Address correspondence to 29 Murray St.
NEW YORK CITY

Five Large
Factories



You Need This Book

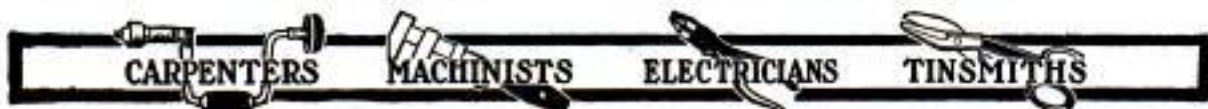
It's just the right size to slip into your pocket or to keep in your kit or tool-chest.

It contains a handy reference catalog of over 200 of the best hand-tools made, with full descriptions, prices, etc.

Besides that, it has 35 pages of valuable shop-information—statistics, reference tables, etc.

We've had such a demand for it that the second edition is nearly exhausted.

Write today and we'll send you a copy free.



Waterman's Ideal Fountain Pen



Sterling Silver
Filigree
No. 412. \$5.00
Larger Sizes:
No. 414. \$7.00
No. 415. 8.50
No. 416. 9.50
Silver Clip-on-Cap
adds 50c
to above costs



Always Acceptable

WATERMAN'S IDEAL is one of the very few gifts which the receiver can put right in his pocket for constant use. If everyone had the selecting of his own Christmas presents this is the kind that would be purchased. As a gift to *anyone*, or for yourself, there is not another article that shows better purchasing discretion than Waterman's Ideal Fountain Pen—it is a compliment to your taste.

This pen is made in a very wide range of sizes and styles in order that the pen technique of every writer may be individually suited. Your selection may be exchanged until satisfactory. Whether you buy a plain Waterman's Ideal or one studded with diamonds, the quality is of that same successful standard which the careful workmanship and Waterman patents have brought to continued perfection. This is the gift for people who are hard to suit.

Avoid Substitutes

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From the Best Dealers

Made in Regular, Safety and Self-Filling Types



Plain Style
No. 12... \$2.50
Larger Sizes:
No. 14... \$4.00
No. 15... 5.00
No. 16... 6.00
Clip-on-Cap
adds 25c
to above costs

L. E. Waterman Co., 173 Broadway, N.Y.

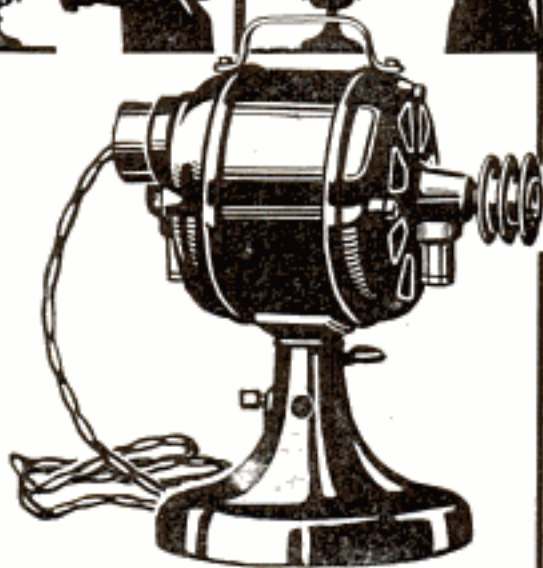
8 SCHOOL ST., BOSTON. 189 CLARK ST., CHICAGO. 734 MARKET ST., SAN FRANCISCO.
L. E. WATERMAN COMPANY, LIMITED, MONTREAL.
KINGSWAY, LONDON. 6 RUE de HANOVRE, PARIS.

Please Mention Popular Mechanics



*New This Christmas.
A Splendid Gift for
Man, Woman or Boy*

EVERY woman who keeps house will have a dozen uses for this perfect little electric motor. Every man who has a garage or workshop will want one; so will everybody who is mechanically inclined. It runs the sewing machine. (This is worth its price.) It polishes silver—grinds knives and tools—cleans faucets and automobile trimmings—blows away cooking odors—ventilates—forces heat out of the register or radiator—runs a boy's lathe or any small machine.



Simple attachments change it from one kind of motor to another—costs less than one cent an hour to operate.

The Westinghouse General Utility Motor

is a real motor, not a toy. Built as strongly for its work as the sturdy Westinghouse motor that runs the electric trolley car, and by the same organization known everywhere for the correct design and honest construction of electrical apparatus for all purposes. This motor will last for years and needs no attention beyond an occasional oiling. Price of motor \$18.25. Attachments are inexpensive and may be added to the outfit as desired.

Your Lighting Company or dealer will show you the motor and its different applications. Send us your name on a postcard, and we will mail you booklet telling what it does. Send for folders describing many other electrical devices suitable for Christmas presents. Address Westinghouse Department of Publicity, Pittsburg, Pa.

Westinghouse Electric & Mfg. Co.
Pittsburg, Pa.

Sales Offices in Forty American Cities.

Representatives all over the world.

The \$100 Typewriter for 17 Cents a Day!

Please read the headline over again. Then its tremendous significance will dawn upon you. The Oliver Typewriter—the standard visible writer—the \$100 machine—the most highly perfected typewriter on the market—*yours for 17 cents a day!*



The typewriter whose conquest of the commercial world is a matter of business history—*yours for 17 cents a day!*

The typewriter that is equipped with scores of such conveniences as "The Balance Shift"—"The Back Spacer"—"The Ruling Device"—"The Double Release"—"The Locomotive Base"—"The Automatic Spacer"—"The Automatic Tabulator"—"The Disappearing Indicator"—"The Adjustable Paper Fingers"—"The Scientific Condensed Keyboard"—all *yours for 17 cents a day!*

Our Record Year

About one year ago we gave to the public the famous *17-Cents-a-Day Plan* of purchasing Oliver Typewriters.

The announcement that the Oliver Typewriter—the latest model, with all its perfected conveniences—could be had on such tempting terms created a furore of buying.

We find at the close of this record-breaking year that the plan has appealed to *all classes*.

Business and professional people, salaried workers—men and women of every station in life have bought Oliver Typewriters on this simple, convenient plan.

A Quarter of a Million People are Making Money With

The **OLIVER**
Typewriter

The Standard Visible Writer

The Oliver Typewriter is a money-maker, *right from the word "go!"* So easy to run that the beginners soon get in the "expert" class. *Earn* as you *learn*. Let the machine pay the *17 cents a day*—and all *above* that is *yours*.

Wherever you are, there's work to be done and money to be made by using the Oliver. The business world is calling for Oliver operators. There are not enough to supply the demand. Their salaries are considerably *above* those of many classes of workers. Hundreds are in business for themselves as public stenographers in hotels and exclusive clubs. They receive as much as 25 cents for a dictated letter and 5 cents for a carbon copy.

Pretty good pay for a few minutes' work!

The average price for copying form letters is 10 cents each—and 5 cents for each carbon copy.

This serves to show the money-making possibilities as an Oliver operator.

"An Oliver Typewriter in Every Home!"

That is our battle cry today. We have made the Oliver *supreme in usefulness* and absolutely *indispensable in business*. Now comes the conquest of the home.

The simplicity and strength of the Oliver fit it for family use. It is becoming an important factor in the home training of young people. An *educator* as well as *money maker*.

Our selling plan puts the Oliver on the threshold of every home, every office, in America. Will you close the door on this remarkable Oliver opportunity?

Write for further details of our easy offer and a free copy of the new Oliver catalog. Address

THE OLIVER TYPEWRITER CO., 107 Oliver Building, CHICAGO

Please Mention Popular Mechanics



Breakfast in a Warm Room

In very cold weather many dining-rooms would be "like ice-boxes" at breakfast time, before the house fires have started up, if it were not for the

PERFECTION SMOKELESS OIL HEATER

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Lighted in a moment, and quickly giving a glowing heat, the Perfection Oil Heater has enabled many a man to go to business in a cheerful, confident spirit who otherwise might have felt and shown all day the effects of a cold, cheerless breakfast-room.

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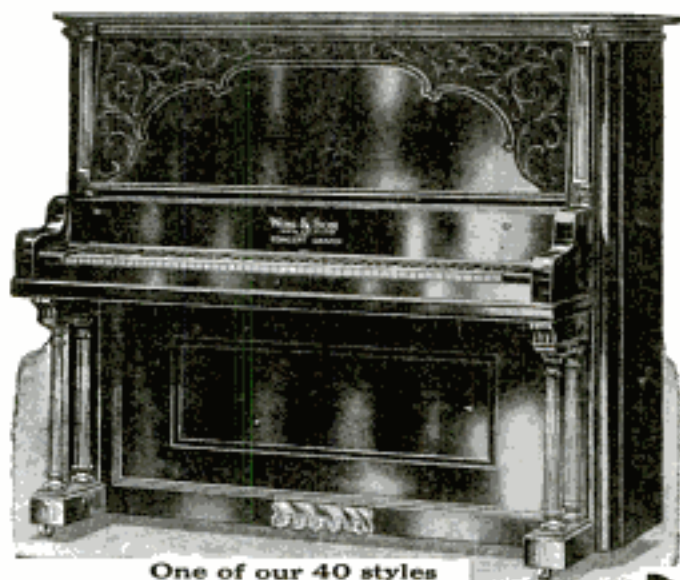
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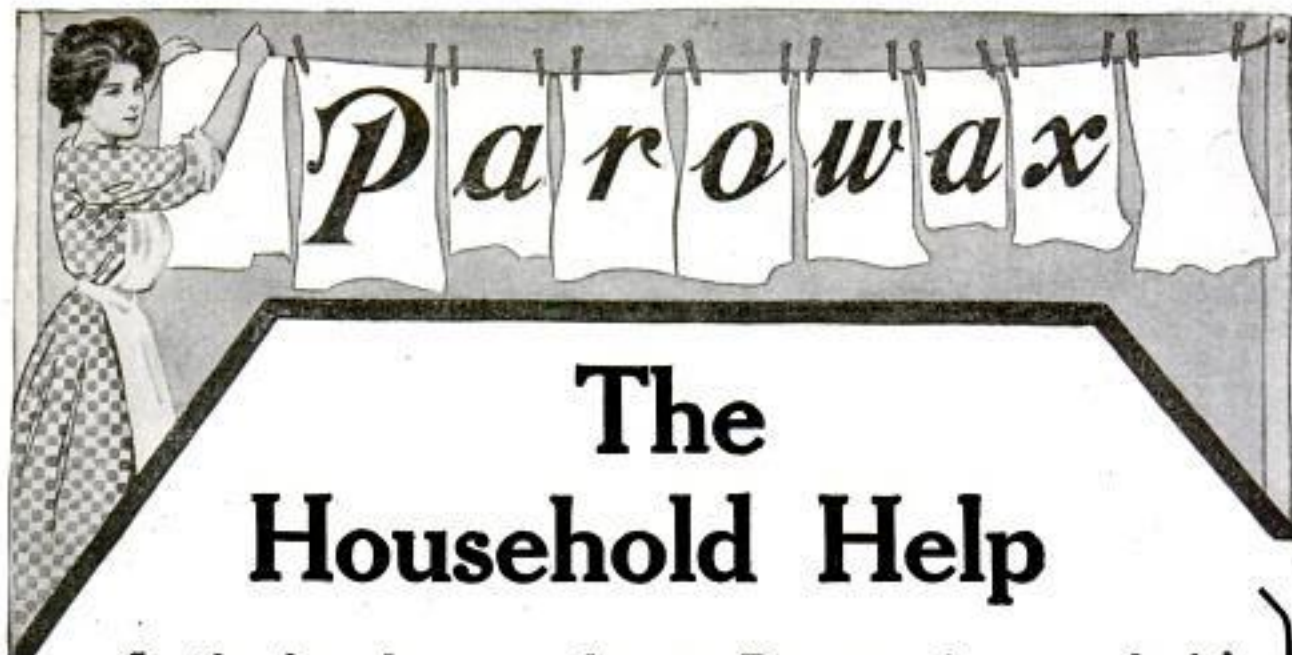
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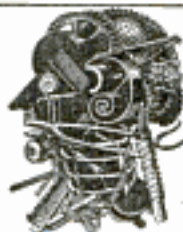
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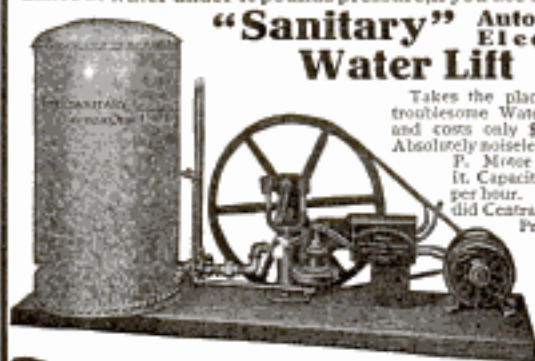
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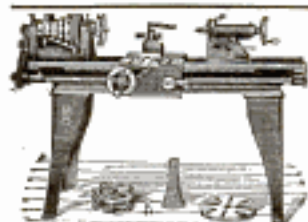


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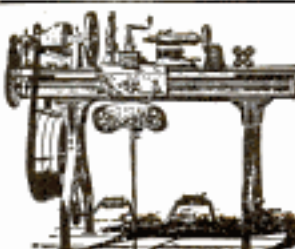


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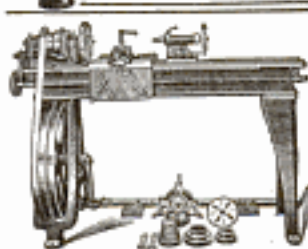
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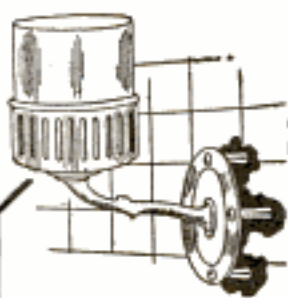
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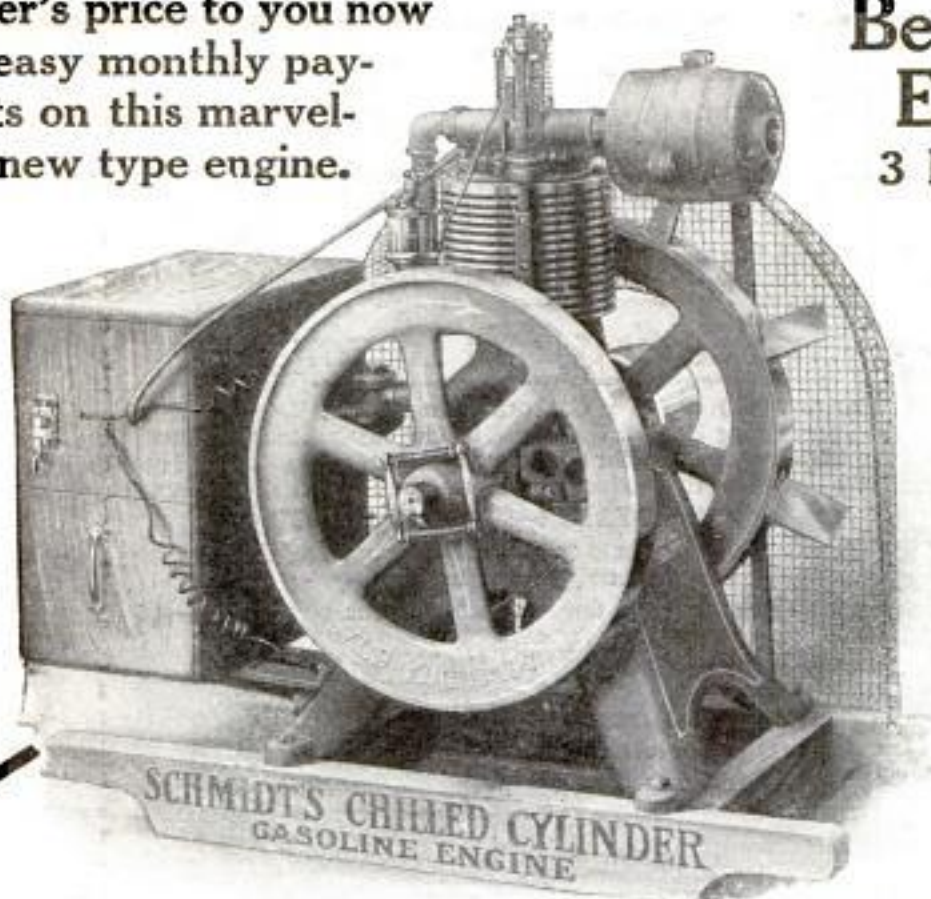
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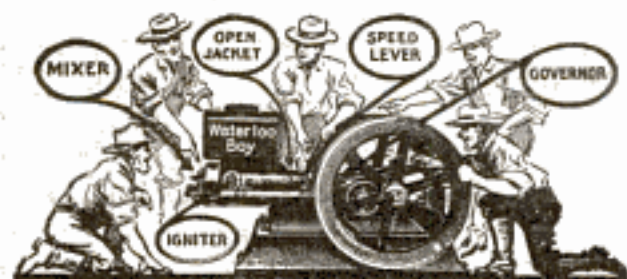
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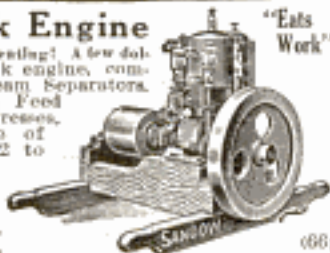
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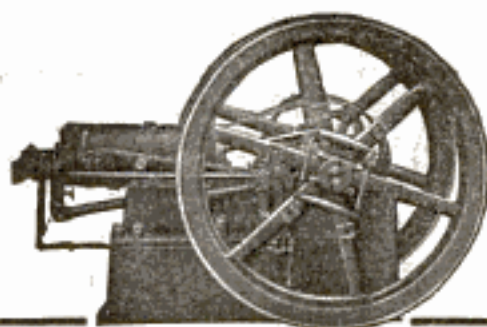
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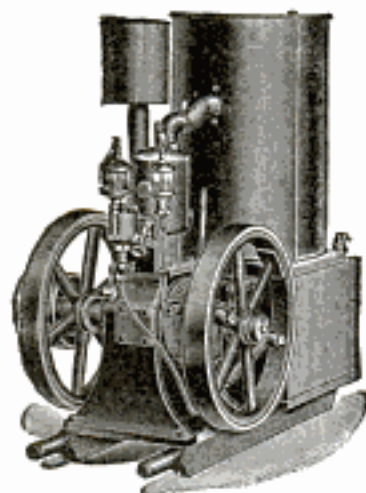
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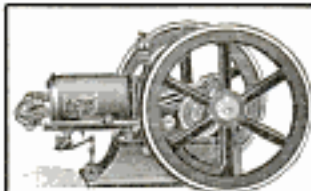
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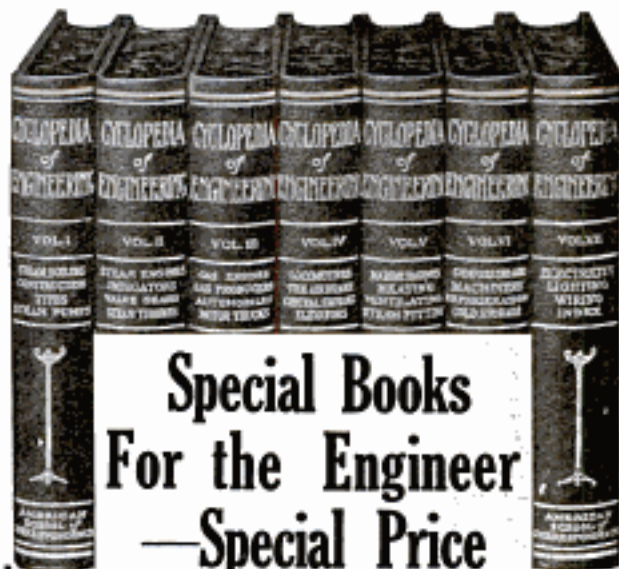


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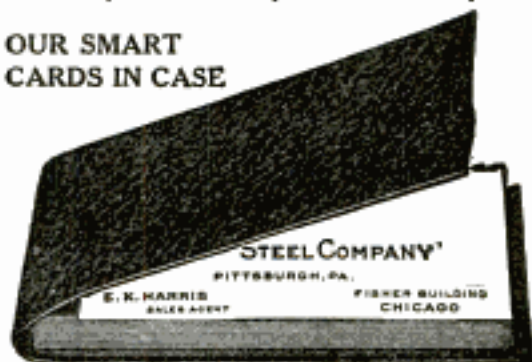
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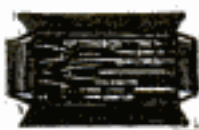
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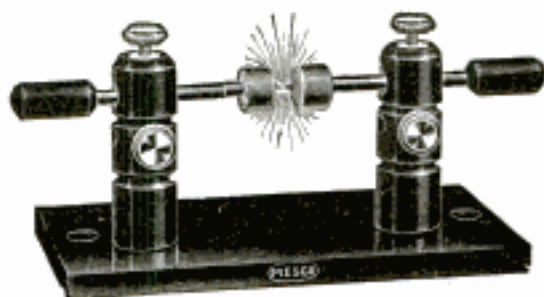
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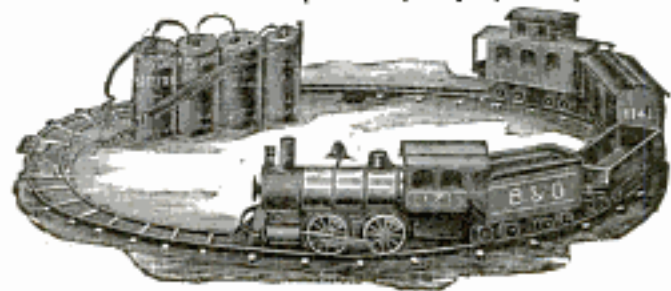
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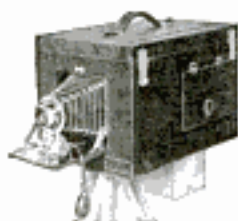
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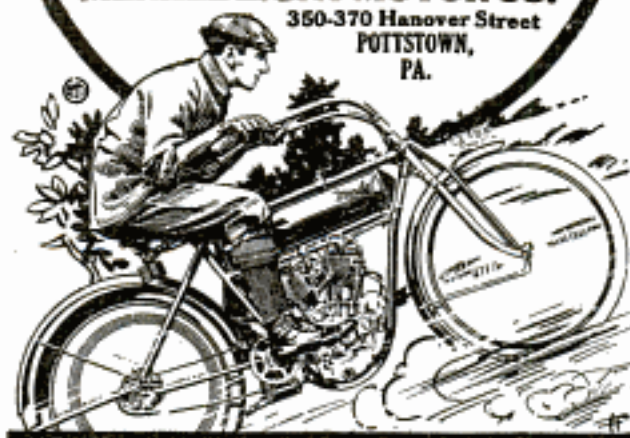
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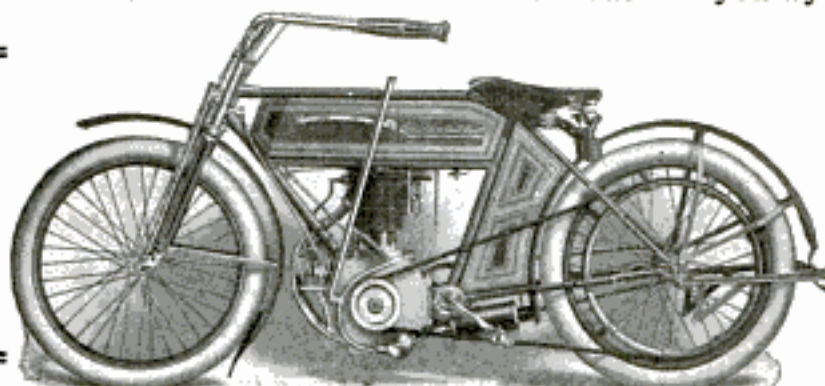
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even when motoring, and rarely take enough interest in the sport to raise a languid head from the lap of an owner, while a terrier will sit erect, fairly sniffing the air and revelling in the speed. An aristocratic bulldog, whose mistress lives on West End avenue, knows the notes of her motor horn, and at the first "toot" dashes madly to the window, raises a shade with his broad nose and barks with delight at the prospect of a ride.—Cleveland Plain Dealer.

For some time to come, however, the popular way of crossing the Alps will be by means of the tunnel under them.—Chicago News.

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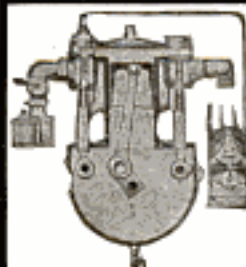
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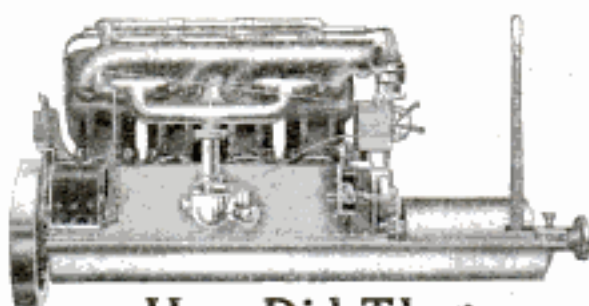
R. O. Cowan, N. Y., placed 18 in 6 hours—(profit \$39.00). Mrs. J. Brown sold 10 in 3 days—(profit \$30.00). K. J. Blevins, O., writes: "Made 7 calls, sold 5 one day"—(profit \$15.00). R. H. Lattimore, Pa., writes: "Sold 4 this morning. Never yet turned down." A. G. Witt, Pa.: "Received Easy Way yesterday; sold 4 today—not out for orders." Mrs. Gerrish, Mont., ordered sample, then 1 dozen, then 100—(profit over \$300.00). Just made one shipment 1,000 Easy Ways to Russian agent. N. Boucher, Mass., orders 75 more, says: "Everybody wants one, best business I ever had." A. S. Verritt, La., sold 8 in one day—(profit \$24.00). So it goes. A Money Landslide.

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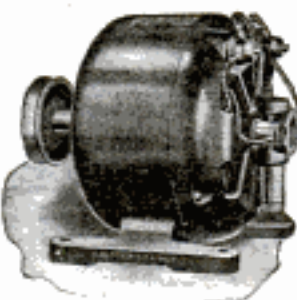
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(38)

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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, 1910

First Prize—HARRY F. LOWE, Washington, D. C. \$10
"Sawing Tubes at an Angle"
Second Prize—R. H. LUFKIN, Dorchester, Mass. \$5
"A Paper Drinking Cup"

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:

F. W. GRANGER, Waterbury, Conn. \$5
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W. H. BOOKER, Belfast, Me. \$5
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HELGE R. CRAFTON, Chicago. \$5
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A. E. JOHNSON, Frankfort, Ind. \$5
"Trimming the Edges of Wall Paper"

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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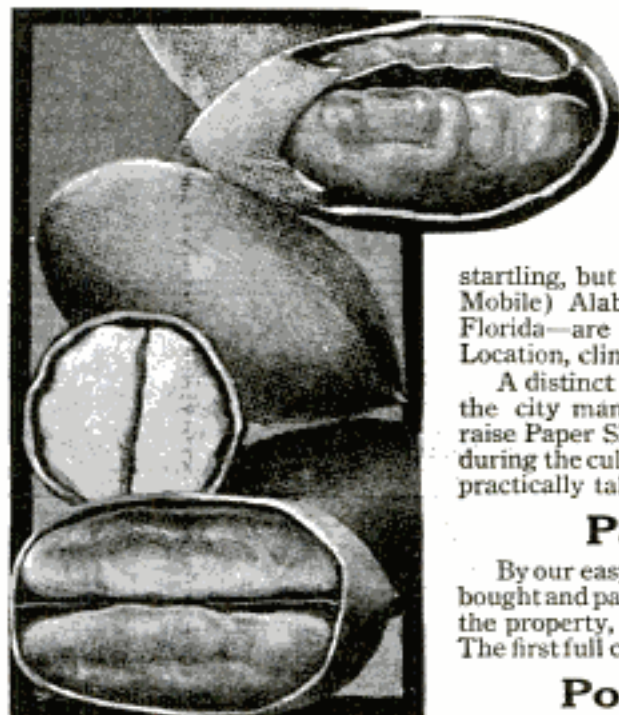
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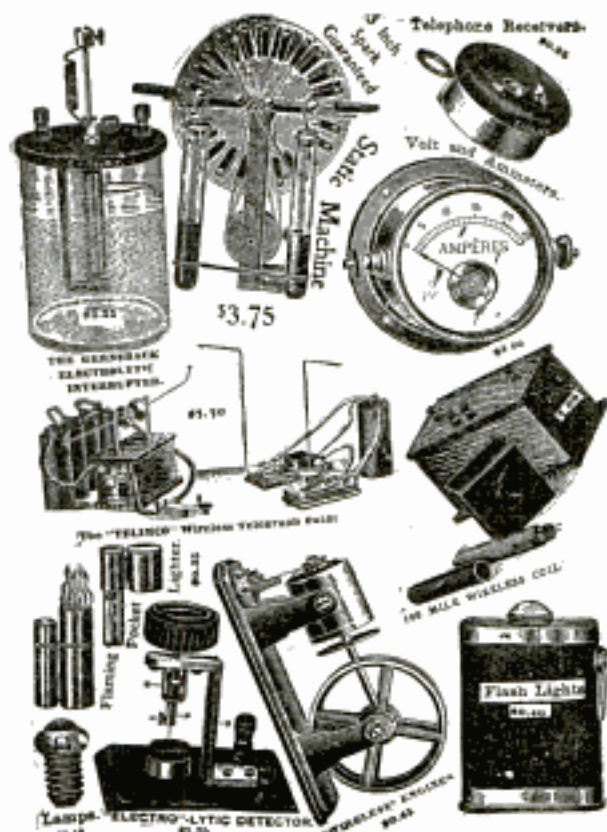
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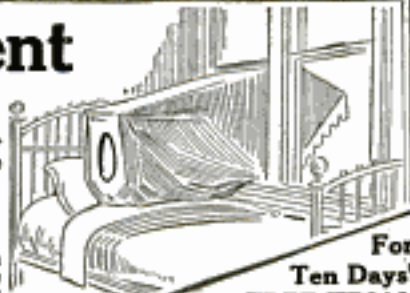
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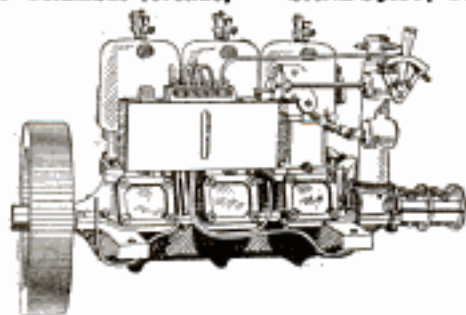
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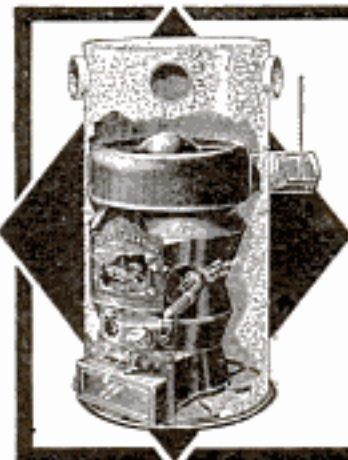
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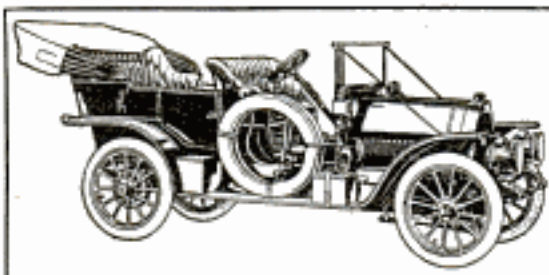
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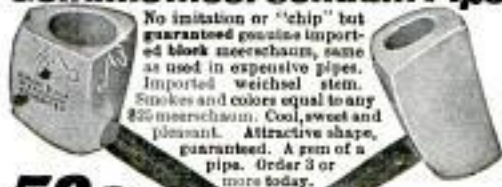
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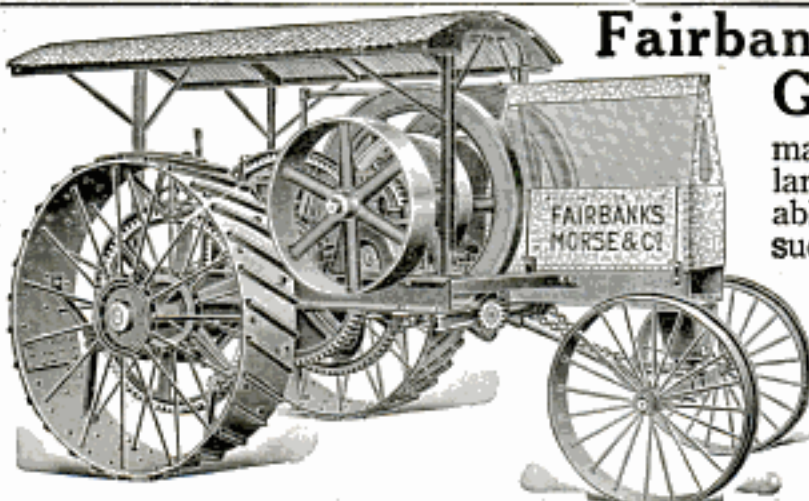
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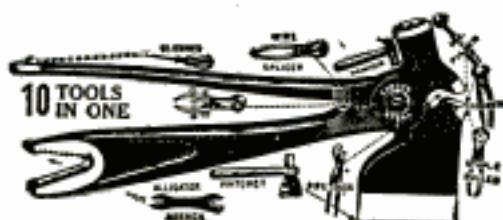
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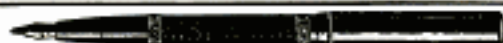
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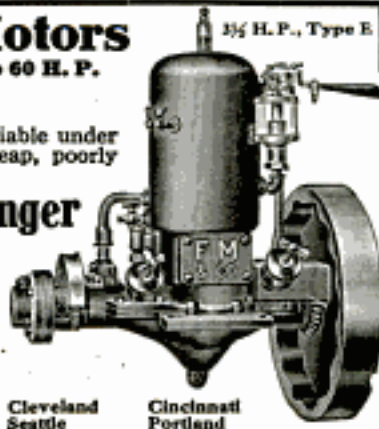
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