

pertains to certain improvements in mechanism adapted to be applied to boats, vehicles, and the like, whereby they may be propelled with equal facility over the surface of land or water. The intervention of streams or lakes would in no way impede the progress of a traveler were his vehicle equipped with this device.

CONTRACTIBLE MOLD.—G. GEORGENSON and J. E. HENNEN, Fond du Lac, Wis. This flexible mold is for use in the construction of arches, culverts, sewers, or the like in which a temporary support is required for the cement, brick, or stone employed in the construction. In carrying out the invention what may be termed a "cylinder" is employed, the same being formed of sheet metal and provided interiorly with means for expanding and contracting it.

AIR-SHIP.—J. SHUKWECH, New York, N. Y. The ship has a main deck mounted on a supporting means for sustaining the weight of the ship when on the ground and maintaining it in an upright position when in flight. Wings are pivoted at each side of the ship, connected with suitable means for oscillating them, and propellers are journaled at each side of the bow of the ship and act to direct a current of air under each of the wings in driving the ship forward, which currents tend to force the wings upwardly.

LAWN-CLEANER.—C. H. MOSHER, Salisbury Mills, N. Y. The object of this invention is to produce a machine which is of simple construction and which can be readily moved across a lawn in the manner of a lawnmower, operating at the same time to pick up any articles which may pass under it and which may be operated by horse or motor power.

FABRIC-TESTER.—R. C. HARRIS, Roselle, N. J. The invention relates to improvements in devices particularly designed for testing the strength of paper, the object being to provide an instrument of this character that will be of comparatively small and compact form, so that it may be carried in a person's pocket and operated by hand pressure.

Prime Movers and Their Accessories.

VALVE.—A. SIMPSON, New York, N. Y. In this instance the invention relates to valves such as used in pipe systems. The valve is intended to be used for water, steam, gas or other fluids. The object is to produce a valve of simple construction which will be well adapted to maintain heavy pressures and which will reduce tendency to leakage.

AUTOMATIC STEAM-TRAP.—W. AUSTIN, Scranton, Pa. The aim of this inventor is to produce a device which may constitute an accessory for a steam pipe system, and which will operate to collect the water of condensation, and expel the same automatically and periodically without allowing any escape of steam.

Railways and Their Accessories.

CAR-WHEEL.—R. P. WILLIAMS, Santa Barbara, Cal. The invention consists of a cast metal wheel having the flange thereof so formed that in case it becomes broken the broken part will not become dissevered but will present a ragged edge extending outward at an angle to the normal plane of the wheel, whereby an air valve of the brake system may be operated. The valve is so constructed that should the car wheel become broken the brakes will operate to immediately stop the train.

AIR-BRAKE ATTACHMENT.—R. P. WILLIAMS, Santa Barbara, Cal. This invention relates to improvements in air brakes for railway cars, and more particularly to means for automatically operating the brake in case that the truck of any one of the cars becomes derailed. The object is to provide means whereby any variation in the plane of the car track in respect to the car body will automatically open a valve of the air brake system and cause the instant application of the air brakes throughout the train.

RAILWAY-SWITCH MECHANISM.—O. A. KUG, Cincinnati, Ohio. In this patent the invention has reference to improvements in railway switch mechanism, the object being the provision of a simple means whereby an open switch may be automatically closed by an approaching train in either direction, thus preventing possible accident.

RAILWAY-TIE AND RAIL-FASTENING.—A. NEWELL, Guadalupe, Mexico. The improvements are in ties for railways and rail fastenings, and the object of the inventor is to provide a metal tie that will be comparatively light, yet strong and serviceable, and further to provide a fastener that may be readily adjusted to the rail and normally hold the same from any lateral movement with relation to the tie.

STANDARD FOR LOGGING-CARS.—C. H. ALLEN, Aycock, Fla. The design in this case is to provide a standard which is to be arranged on the ends of the transverse bolsters of the car to prevent the logs from rolling off when in transit, but which is capable of adjustment to permit the easy loading or unloading of the log.

BLOCK-SIGNAL SYSTEM.—J. VAN ZANDWEGHE and L. VIBERTI, Rosario De Sante Fco, Argentina. In this patent the invention refers to block signal systems, the more particular objects being to provide efficient means for

stopping trains automatically when they approach each other within certain limits, and also for stopping them if desired when they approach a station.

Pertaining to Recreation.

GAME APPARATUS.—L. J. CASTONGUAY, Thompsonville, Conn. The object in view is to provide in this invention a game apparatus, more especially designed for playing parlor base ball, and arranged to require considerable skill on the part of the players to successfully play the game, and to afford amusement for the players as well as the onlookers.

Pertaining to Vehicles.

WHEEL-HUB.—F. F. UNCRICH, Gallion, Ohio. In the present patent the invention has reference to an improvement in wheel hubs, and it has for its object the provision of a metallic shell and the means for securing the shell in a fixed position upon the hub in a most efficient manner.

VEHICLE RUNNING-GEAR.—P. RICHARDSON, Kennebago Lake, Maine. Withstanding the shock of very rough roads and avoiding its transmission to the occupants, in this case, is accomplished by providing for the yielding in all directions of an upper frame on which the body of the vehicle is mounted, as by a system of springs comprising upright springs for yieldingly maintaining the weight of the body and the occupants and diagonally-extending longitudinal and transverse springs for admitting of a yielding end and side movement of the body, respectively.

TRACTION-ENGINE STEERING-GEAR.—R. RICHARDSON, Yates Center, Kan. The gear is designed particularly for use in connection with traction engines, but applicable in other ways. It may be applied to automobiles and all motor vehicles with equal ease, the shaft being either the crankshaft of the engine or some continuously rotating shaft driven from the engine.

DUST COLLECTOR FOR WHEELED VEHICLES.—J. M. WEAVER, New Oxford, Pa. The invention relates particularly to improvements in attachments for automobiles or similar vehicles for receiving dust rising from the vehicle wheels and discharging the same in a wet or condensed condition, thus obviating the annoyance from the spread of dust incident to such vehicles as ordinarily equipped.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.



HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication. References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn. Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same. Special Written Information on matters of personal rather than general interest cannot be expected without remuneration. Scientific American Supplements referred to may be had at the office. Price 10 cents each. Books referred to promptly supplied on receipt of price. Minerals sent for examination should be distinctly marked or labeled.

(10521) O. J. S. says: 1. Which telephone lines do you consider to give the best service in rural districts—ground or metallic? Can you advise me a good book on practical ground line telephony? A. A metallic circuit is best for all telephone lines, but the cost is so much greater that the grounded circuit is usually employed upon rural circuits. Long-distance lines are always metallic. The best book upon the telephone is Miller's "American Telephone Practice," which we send for \$4. 2. How do you find the distance between the earth and the sun? Give me a simple formula for calculating that distance. A. It is a long story to tell how the distance of the sun from the earth is found. Consult any college astronomy in the University library. The distance is computed from the parallax of the sun. 3. If the radius of a certain pulley is 4 inches and of another is 12 inches, and the distance between their centers is 6 feet, how would you calculate the length of a belt running around these two pulleys? A. The length of the belt you desire will be given with sufficient exactness by adding to 12 feet one-half the circumference of each of the pulleys. 4. Where, for good ventilation, should a ventilator be situated—near the top or the bottom of a wall? Is it better to have two ventilators one in one corner and another diagonally across? A. There are all sorts of opinions upon the location of ventilators. The usual practice is to place them both at the top and bottom of the room, so that either register may be opened. We do not think one ventilator in one corner and another in a diagonally opposite

corner should be preferred. 5. How do you find the horse-power of a common steam engine? A. To find horse-power of a steam engine, multiply the mean effective pressure in pounds per square inch by the length of stroke in feet and by the area of the piston in square inches, and by the number of single strokes per minute. If the piston passes through one end of the cylinder head, subtract one-half of the area of the piston rod from the area of the piston; but if it goes through both ends of the cylinder head, subtract the whole area of the rod from the area of the piston. Divide the product of these numbers by 33,000.

(10522) E. B. S. says: To render theaters safe from fire, a policeman should be on the stage near the curtain, having in his hands or close by one hose containing water under pressure and another hose with carbonic acid gas under pressure. Either one can be instantly used if necessary. A scientific book says one quart of water resolved into its elements gives 1,200 quarts of hydrogen and 600 quarts of oxygen. Is it correct? If not, how much gas will result of each kind? A. With reference to the suggestion you make that a policeman should be in a theater to guard against fire, we would say that in all New York theaters firemen are on duty all the time when an audience is in the building, ready to turn on the water and use the appliances for extinguishing a fire. A fireproof curtain would be dropped in an instant, and a rope cut, which would open large scuttles above the stage, so that any smoke upon the stage would be drawn up as by a chimney into the open air, and no fire or smoke would or could be drawn out into the house where the audience is seated. The statement is correct that two quarts of water contain 1,200 quarts of hydrogen and 600 quarts of oxygen, when the barometer is at 30 inches and the thermometer is at the freezing point, or 32 deg. Fahr. Unless the pressure and temperature are stated, any statement of quantity of the gases is meaningless.

(10523) L. A. C. asks: Why does not a submarine boat sink all the way to the bottom of the ocean? I understand the method used in plunging submarines is to admit water into tanks, so as to give the boat more weight, weight enough to cause the boat to sink only 50 or 60 feet. It sinks at the surface. Why does it not sink to the bottom? Would a hollow steel ball weighing 65 pounds and having a displacement of one cubic foot (when under a pressure of 4,600 pounds per square inch) sink to the bottom of the ocean, where a cubic foot of water weighs 65.56 pounds (27.366 feet below surface)? I should say that such a ball would sink to a depth of approximately 10,300 feet and there remain suspended. Am I right or wrong? What is the principle involved in the toy known to schoolboys as "the devil in the bottle"? This toy is a bottle filled with water, in which is contained a small hollow image, which image can be made to sink or float in the water, or even to remain suspended half way between the surface of the liquid and the bottom, by manipulating a diaphragm closing over the neck of the bottle. A recent controversy leads me to these questions. A. The submarine and the "devil in a bottle" are instances of the application of Archimedes's principle. The little imp in the bottle is known in science by the name "Cartesian diver." Archimedes stated the principle that a body immersed in a liquid loses as much weight as the weight of the liquid it displaces. If the liquid displaced weighs less than the body, the body sinks; if it weighs more than the body, the body rises and floats partly out of the liquid; if it weighs the same as the body, the body neither sinks nor rises, but remains just where the weight of the displaced liquid is exactly equal to the weight of the body. The Cartesian diver has a little opening into the lower part of its body. When pressure is put upon the air in the top of the bottle, that pressure is transmitted through the water in the bottle to the air in the imp, and compresses the air so that water flows into the imp and makes it heavier. It then sinks. By relaxing the pressure, the imp may be stopped at some point and kept there. If the pressure is however maintained as at first, the imp sinks to the bottom without stopping, since the water has the same density in all parts of the bottle. The submarine is intended to act upon exactly the same principle in the same manner. They usually do so, but once in a while one continues to the bottom, with disastrous results to all on board. The steel ball, which you suppose, would do exactly the same as you state, if it could retain its volume unchanged, and displace a cubic foot of water at a depth such that its weight were exactly the same as that cubic foot of water. But this is not possible. Under the pressure of the water as it sinks the steel will be compressed more than the water, as we showed, even if it were solid, and when it reached the theoretical depth its volume would be less than a cubic foot and it would sink still farther, and be compressed still more till it reached the bottom. There is no place such as you suppose. There is still another impossibility. A steel ball whose volume is one cubic foot and whose weight is 65 pounds must be made of steel plate about a third of an inch thick. This would be in worse shape than the proverbial "cocked hat" long before it reached a depth of 10,000 feet, by the pressure of the water.

NEW BOOKS, ETC.

THE STONE IMPLEMENTS OF SOUTH AFRICA. By J. P. JOHNSON. 258 illustrations. New York: Longmans, Green & Co. 8vo.; cloth. Price, \$2.50.

There is much work to be done in investigating the prehistoric races of South Africa, and in fixing them in their proper places as regards their advancement. Mr. Johnson has collected some interesting material, but it is to be hoped that he will find opportunity to investigate more thoroughly the ground that he has broken. However, his reasoning is quite in accordance with the facts, and places his finds beyond doubt in the periods to which they belong.

A POCKET-BOOK OF MECHANICAL ENGINEERING. Tables, Data, Formulas, Theory, and Examples for Engineers and Students. By Charles M. SAMES. Revised and enlarged. Published by the author at 542 Bramhall Avenue, Jersey City, N. J. 195 pages, 41 figures; flexible leather. Price, \$2.

The author has increased the scope of his first edition, adding much valuable matter, without adding materially to the bulk of the book. As a pocket reference book it cannot be too highly recommended. The field covered is extensive and closely covered, yet there are no unnecessary facts to hinder the practical worker.

THE COAST MANUAL OF LETTERING AND DESIGNS. Los Angeles, Cal.: The Coast Manual Publishing Company. Quarto; cloth; 106 pages. Price, \$5.

Now that advertising is accepted without hesitation as a vital part of commercial routine, a book of letterings and designs, selected especially for their value to the "display artist," will find the readiest appreciation. The handbook published by Fred Knopf and J. M. Mahaffey is full of successful combinations that will be found most serviceable in their promptings to the experienced designer as well as to the novice.

MODERN AMERICAN MACHINE TOOLS. By C. H. BENJAMIN. New York: E. P. Dutton & Co. 8vo.; cloth; 134 illustrations, 320 pages. Price, \$5.

The object of this treatise is to show to the buyer and user the prominent characteristics of modern machine tools as now manufactured in the United States, the various points in which they differ, and some recent data as to their capacity and performance.

To the buyer in Great Britain or on the Continent, this work should be a help, as it brings together in one volume facts from a variety of sources and furnishes information which might otherwise need to be sought at much expenditure of time and trouble.

While the present work is in no sense an advertising medium, it illustrates as large a variety of machines and of makes as the space allows, giving the reader as comprehensive a view as possible, and in all cases allowing an uninfluenced opinion to be formed.

ALTERNATING CURRENTS. A Text-Book for Students of Engineering. By C. G. LAMB. New York: Longmans, Green & Co. London: Edward Arnold. 8vo.; cloth; 325 pages, illustrated. Price, \$3.

Many treatises on this subject have been written, but Mr. Lamb's work fills the need for a text-book for beginners that without being too cumbersome covers the subject of alternating currents in all its aspects.

The treatment of the question is based largely on the use of vectors, supplemented by simple analytical methods when it is desired to obtain numerical results. The symbolic treatment does not appeal to students, and has for that reason not been used. Also no attempt has been made to distinguish in the formulæ whether absolute or practical units are employed, since the unwieldy results are perplexing to beginners.

SPACE AND GEOMETRY IN THE LIGHT OF PHYSIOLOGICAL, PSYCHOLOGICAL, AND PHYSICAL INQUIRY. By DR. ERNST MACH. From the German by Thomas J. McCormack. Chicago: The Open Court Publishing Co. London: Kegan Paul, Trench, Trübner & Co., Ltd. 12mo.; cloth; 148 pages. Price, \$1.

The three essays which form the present volume were written for the Monist some four years ago. Last year they were in great part incorporated in their original German in Prof. Mach's latest published work, "Erkenntnis und Irrthum; Skizzen zur Psychologie der Forschung." In them Prof. Mach discusses the questions of the nature, origin, and development of our concepts of space from the three points of view of the physiology and psychology of the senses, of history, and of physics, in all of which departments his profound researches have gained for him a most exalted position.

SMALL ELECTRICAL MEASURING INSTRUMENTS. How to Make and Use Them. By Percival Marshall. New York: Spon & Chamberlain. 12mo.; paper covers, 90 pages, illustrated. Price, 25 cents.

A clearly-written and freely-illustrated handbook for the experimenter and investigator. By its use many instruments of equal efficiency to those sold by the regular makers can be made at very low cost.

MODERN PLUMBING ILLUSTRATED. By R. M. Starbuck. Fully illustrated by fifty full-page plates made expressly by the author of this work. New York: Munn & Co. One large 8vo. volume; cloth; pp. 392. Price, \$4.

The purpose of this work is to demonstrate in the most practical manner the best modern practice in plumbing and water supply. There is an abundance of useful information in reference to the kinds of plumbing materials and fixtures and the installation of these for the modern cottage, or the more pretentious house, apartment house, hotel and office building. The purpose of this work is to demonstrate by liberal scale drawings, which cover almost every imaginable condition likely to come before the plumber, architect, and sanitary engineer. The book will be found valuable to the plumber in his actual work, giving special details as to size and weight of pipes required under different conditions. To the architect it will be found suggestive and will aid in preparing plans and directing and superintending work; to the owner in aiding him to secure the best and simplest systems for his building; to the plumber inspector the many practical features it presents will remind him of the methods to be pursued to secure safe and healthful sanitary conditions, and to the plumbers, practical methods of executing the work. The book presents, in a word, the latest and best modern practice, and should be in the hands of every architect, sanitary engineer and plumber who wishes to keep himself up to date in this important feature of construction.

A TEXT-BOOK OF SANITARY AND APPLIED CHEMISTRY, OR THE CHEMISTRY OF WATER, AIR, AND FOOD. By E. H. S. Bailey. New York: The Macmillan Company. 12mo.; cloth; 345 pages. Price, \$1.40.

Although some knowledge of chemistry is necessary for a thorough assimilation of the present work from the theoretical standpoint, the layman will find it unusually instructive. Chapter I. treats of the "Atmosphere," its composition and the impurities affecting it. Chapter II. deals with "Fuels," and Chapter III. deals with "Heating and Ventilation." Chapter V. on "Water," and Chapter VI. on "Purification of Water Supplies" are highly important. The rest of the book is devoted to foods, etc. As a whole, the work is concise, well written, and not too technical to be of universal value.

GLUE HANDLING. Part I. Twelve Chapters of General Information. By Friman Kahrs. East Haddam, Conn. Price, \$1.

A handbook of value to all glue users, being the result of the author's observations during his eighteen years of experience as a glue expert. It is too bad, however, that such an excellent work should have its attractiveness, if not its usefulness, lessened by the introduction into the text of matter of a purely advertising nature.

SOME CITIES AND SAN FRANCISCO AND RESURGAM. By Hubert Howe Bancroft. New York: The Bancroft Company.

An interesting comparison of San Francisco and the late disaster with other cities and the calamities that have befallen them. Every line is full of the local pride and confidence that go so far to make up the body of American patriotism.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued

for the Week Ending April 30, 1907.

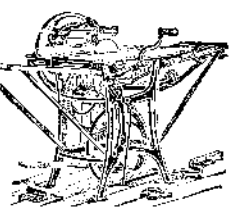
AND EACH BEARING THAT DATE

(See note at end of list about copies of these patents.)

Acid cooling and generating chamber, I. P. Libbe	852,390
Advertising device, H. F. Eckersberg	852,170
Aerial vessel, T. Orger	852,292
Aeroplane, navigable, E. F. Mickle	851,683
Agitator, J. W. Cowan	852,114
Agricultural implement, P. Petersen	851,959
Air brake apparatus, R. J. Wilson	852,007
Air brake system, D. M. Daley	852,108
Air brake system and engineer's valve, G. Macloskie	851,818
Air purifying apparatus, J. H. Kinealy	852,122
Air ship, J. C. Reckweg	852,239
Alarm mechanism, automatic, C. Breiland	851,915
Alloys, producing low-carbon ferro, E. F. Price	852,347
Amusement apparatus, N. G. Warth	852,149
Amusement device, W. T. Watson	852,248
Anchor, sea, F. Rouse	852,201
Animal trap, O. H. & F. H. Veekering	851,740
Animal tray, J. Wolf	852,009
Ankle supporter, R. F. Le Mat	851,950
Anti-skidding device, J. M. M. Blanchard	851,857
Apparel, C. R. De Bevoise	852,262
Automatic brake, J. J. Muller	851,766
Automatic switch, J. Hency	851,935
Automobile controlling means, H. Lempe	851,762
Axle stub, Detar & Schoenover	852,169
Bag holder, M. E. Eagleton	851,873
Baking pan, E. Morrow	851,826
Bale of fibrous materials, H. L. Duncan	852,015
Baling press, W. F. Truelsen	851,714
Baling press, L. E. Agnew	852,252
Banded stave pipe, J. S. F. Marks	852,336
Barrel trussing and hoop driving machine, J. B. Stanhope	852,040
Battery. See Dry battery.	
Bearing, centrifugal separator, C. H. Shaw	852,203
Bearings, ball holding ring for ball, S. Schneider	851,697
Bed, N. S. Stein	852,041

Wood-working Machinery

For ripping, cross-cutting, mitering, grooving, boring, scroll-sawing edge moulding, mortising, for working wood in any manner. Send for catalogue A. The Seneca Falls Mfg Co., 135 Water St., Seneca Falls, N. Y.



Engine and Foot Lathes

MACHINE SHOP OUTFITS, TOOLS AND SUPPLIES. BEST MATERIALS. BEST WORKMANSHIP. CATALOGUE FREE. SEBASTIAN LATHE CO., 120 Culvert St., Cincinnati, O.

FRICTION DISK DRILL

FOR LIGHT WORK. Has These Great Advantages: The speed can be instantly changed from 0 to 1600 without stopping or shifting belts. Power applied can be graduated to drive, with equal safety, the smallest or largest drills within its range—a wonderful economy in time and great saving in drill breakage. Send for Drill Catalogue.

W. F. & J. NO. BARNES CO., Establishes 1872. 1999 Ruby Street, Rockford, Ill.

ELECTRICAL APPARATUS REPRODUCED by Conventional Diagrams in Drawings.—Fifty diagrams showing the usual method of illustrating electrical apparatus in drawings. A labor saving paper. Contained in SUPPLEMENT 1106. Price 10 cents. For sale by Munn & Co. and all newsdealers.

Andrew Carnegie, Thomas A. Edison and many other successful men began their careers at Telegraph Operating. Why don't you learn? For \$1.75 we will send you a complete N. D. outfit with book of instructions, by express (not prepaid). Send for catalogue of electric apparatus, supplies and novelties.

J. H. BUNNELL & Co., Inc., 20 Park Place, New York



Asbestos and Magnesia Products

STEAM PIPE AND BOILER COVERINGS. ASBESTOS PACKING (For all purposes). ASBESTOS FIRE-RESISTING CEMENTS. ASBESTOS BUILDING MATERIALS.

"J-M" ASBESTOS ROOFING. ASBESTOS FABRICS. KEYSTONE HAIR INSULATOR. ELECTRICAL SUPPLIES.

H. W. JOHNS-MANVILLE CO.

New York, Milwaukee, Chicago, Boston, Philadelphia, St. Louis, Pittsburg, Cleveland, New Orleans, Kansas City, Minneapolis, San Francisco, Los Angeles, Seattle, London.

The Varnish that lasts longest

Made by Murphy Varnish Company.

DuBrie Marine Motors

4 REASONS why DuBrie motors are superior: operate at lower fuel cost, run easier, quieter and last longer than any other. (1) Compact design, form and shape of piston and rod and location of parts, producing perfect scavenging. (2) Perfect Porting System—direct intake and landing vertical, plunging pump, and we take water from top of cylinder where hottest. (3) Valves float on camshaft or positive, no pushers, etc. Other reasons, mentioning also value to you, in catalog, free on request.

DuBrie Motor Co., 421 Grand St., Detroit, Mich.

2 1/2 h.p. \$60
4 h.p. \$75
6 h.p. \$95

Prices for Complete Engine.

Wizard Repeating LIQUID PISTOL

Will stop the most vicious dog (or man) without permanent injury. Perfectly safe to carry without danger of leakage. Fires and recharges by pulling the trigger. Loads from any liquid. No cartridges required. Over 60 shots in one loading. All dealers, or by mail, 50c. Rubber-covered holster, 5c. extra.

Parker, Stearns & Co., 226 South St., Dept. G, New York

FUEL GAS

SEND FOR—FROM LAMP FOR—FREE CATALOG.

GANNERS, LAUNDRIES, SHOPS, LABORATORIES, ALL MANUFACTURING.

SPRINGFIELD FUEL GAS MACHINES.

GILBERT, BARKER MFG CO. 82-4th Av. N.Y. CITY

STEAM TURBINES.—THEIR CONSTRUCTION, Operation and Commercial Application. SCIENTIFIC AMERICAN SUPPLEMENTS 1306, 1307, 1308, 1422, 1400, 1447, 1370, 1372. The articles have all been prepared by experts in steam engineering. Price 10 cents each, by mail. Munn & Co., 361 Broadway, New York City, and all newsdealers.

Whipple The Motor-Cycle Man

(Pioneer Motor-Cyclist of Chicago)

Can and will save you money on new or second-hand motor-cycle. General agent and distributor seven leading makes—also **Ferro Motor Boat Engines**—with satisfied patrons the world over. If you have the "motor-cycle fever" let me prescribe for you.

WHIPPLE "The Motor-Cycle Man" 262 West Jackson Boulevard, CHICAGO

Make Your Own Fertilizer

at Small Cost with WILSON'S PHOSPHATE MILLS

From 1 to 40 H.P. Also Bone Cutters, hand and power for the poultrymen; grit and shell mills, farm feed mills, family grist mills, scrap cake mills. Send for our catalog.

Wilson Bros., Sole Mfrs., Easton, Pa.

Wooden Tanks

Any Size or Shape

Steel Towers

Any Height

The Baltimore Cooperage Co. MANUFACTURERS BALTIMORE CITY, MD. CATALOGUE GRATIS

The Major Reversible Marine Engine for 1907

1 1/2 H. P. \$33.15 (engine only)

New features, better engine, stronger, more horse power. MAJOR engine can be used for stationary work. We built and sold 5,000 engines last year. We are building 10,000 engines this year.

from 1-1/2 to 50 H. P. Write at once for catalogue and special inducement to one agent in each locality.

DETROIT GAS ENGINE AND MACHINERY CO. 58 E. Congress Street, Detroit, Mich.

WELL DRILLING Machines

Over 70 sizes and styles, for drilling either deep or shallow wells in any kind of soil or rock. Mounted on wheels or on hills. With engines or horse powers. Strong, simple and durable. Any mechanic can operate them easily. Send for catalog.

WILLIAMS BROS., Ithaca, N. Y.

Asbestos and Magnesia Products

STEAM PIPE AND BOILER COVERINGS. ASBESTOS PACKING (For all purposes). ASBESTOS FIRE-RESISTING CEMENTS. ASBESTOS BUILDING MATERIALS.

"J-M" ASBESTOS ROOFING. ASBESTOS FABRICS. KEYSTONE HAIR INSULATOR. ELECTRICAL SUPPLIES.

H. W. JOHNS-MANVILLE CO.

New York, Milwaukee, Chicago, Boston, Philadelphia, St. Louis, Pittsburg, Cleveland, New Orleans, Kansas City, Minneapolis, San Francisco, Los Angeles, Seattle, London.

DuBrie Marine Motors

4 REASONS why DuBrie motors are superior: operate at lower fuel cost, run easier, quieter and last longer than any other. (1) Compact design, form and shape of piston and rod and location of parts, producing perfect scavenging. (2) Perfect Porting System—direct intake and landing vertical, plunging pump, and we take water from top of cylinder where hottest. (3) Valves float on camshaft or positive, no pushers, etc. Other reasons, mentioning also value to you, in catalog, free on request.

DuBrie Motor Co., 421 Grand St., Detroit, Mich.

DuBrie Marine Motors

4 REASONS why DuBrie motors are superior: operate at lower fuel cost, run easier, quieter and last longer than any other. (1) Compact design, form and shape of piston and rod and location of parts, producing perfect scavenging. (2) Perfect Porting System—direct intake and landing vertical, plunging pump, and we take water from top of cylinder where hottest. (3) Valves float on camshaft or positive, no pushers, etc. Other reasons, mentioning also value to you, in catalog, free on request.

DuBrie Motor Co., 421 Grand St., Detroit, Mich.

WECKLER BOAT CO.

222-226 W. Irving Park Boulevard (and the River), CHICAGO

LET US ESTIMATE ON YOUR MOTOR BOAT OR LAUNCH

New Factory. Perfect Equipment. Testing Basin. River Connected. Expert Service. Competitive Prices. Write for Facts.

THE PETTYJOHN CO.

615 N. 6th Street, Terre Haute, Ind.

A MONEY MAKER

Hollow Concrete Building Blocks Best, Fastest, Simplest, Cheapest Machine. Fully guaranteed.

SPARK COILS

Their Construction Simply Explained

Scientific American Supplement 160 describes the making of a 1 1/4-inch spark coil and condenser.

Scientific American Supplement 1514 tells you how to make a coil for gas-engine ignition.

Scientific American Supplement 1522 explains fully the construction of a jump-spark coil and condenser for gas-engine ignition.

Scientific American Supplement 1124 describes the construction of a 6-inch spark coil.

Scientific American Supplement 1087 gives a full account of the making of an alternating current coil giving a 5-inch spark.

Scientific American Supplement 1527 describes a 4-inch spark coil and condenser.

Scientific American Supplement 1402 gives data for the construction of coils of a definite length of spark.

The above-mentioned set of seven papers will be supplied for 70 cents.

Any single copy will be mailed for 10 cts.

MUNN & COMPANY, Publishers 361 Broadway New York

Bed bottom, G. Bezanger	852,255
Bed, folding, J. M. Wilder	851,910
Bed, spring, W. F. Ade	851,911
Bedclothes fastener, A. M. Hoffman	852,180
Bedstead, folding, F. Wood	851,724
Beehive, C. P. Harmon	851,882
Beer coolers, locking device for, M. D. Sattler	852,140
Belt, abdominal, Knight & Davis	851,889
Belt cutter, R. T. More	852,340
Belt, life, A. & E. Gareis	851,740
Belt thrower and guide, J. L. Cutts	851,652
Binder, loose leaf, W. M. Rayner	851,693
Binder, loose leaf, J. Strang	852,084
Binder, loose leaf, P. Revere	852,130
Block signal system, automatic, Patenall & Dryden	851,692
Boat, G. A. Farini	852,380
Boats, device for locating and raising sunken, Slattery & Sambur	851,698
Bobbin clutching device for spindles, C. A. Hawes	851,884
Bobbin holder, C. Pope	851,774
Body holster, C. F. Hunteon	851,753
Boiler cleaner, steam, F. G. Rogers	851,694
Boiler water purifying device, steam, W. P. Weimann	852,005
Booster, A. Lipschütz	852,391
Bolt cutter, stay, E. T. Strong	852,302
Boot calk, C. Pfeiffer, reissue	12,644
Bottle holder, J. T. H. Paul	852,345
Bottle, non-refillable, M. P. Niendam	851,896
Bottle, non-refillable, G. V. Doherty	851,925
Bottle, non-refillable, A. B. Court	852,200
Bottle, non-refillable, H. O. McClurg	852,405
Bottle stopper, E. C. Leach	851,990
Bottle stopper, A. E. Reich	852,242
Bottle, syrup, W. R. Warner	852,360
Bottle washing machine, C. H. Loew	852,127
Bottles, capping, H. L. Follenwider, et al	852,323
Box ending machine, automatic, P. L. Smith	852,083
Bracket, J. Hilbert	852,179
Brake, W. H. Lewis	851,892
Brick kiln, E. Weiss	852,404
Broom, R. Rosenbaum	852,244
Broom machine, C. Clemens	851,916
Brush holder, R. E. Barker	851,793
Bucket scraper, orange peel, L. A. Desy	851,733
Bucket scraping attachment, J. T. Boyd	852,254
Bureau, P. Ramminger	852,132
Burglar alarm relay, D. D. Friedman	852,226
Burial case, J. F. Russell	852,000
Bushing, self-oiling, Perkins & Jenney	851,958
Button, hose supporter, E. Cleary	851,980
Cable chain connecting means, A. Frankenbeim	852,264
Cable clamp, A. H. Meech	851,822
Cake machine, G. S. Ward	852,208
Cane loader, J. B. Gaussiran	852,207
Car brake, automatic, C. Fero, Jr.	851,874
Car construction, W. G. Thummel	852,049
Car fender, J. P. Robn	851,900
Car signal, P. D. Malloy	852,200
Car stake, C. Carman	852,167
Car vestibule, J. Krebbel	851,945
Car wheel fender, J. F. Sargent, Jr.	851,945
Cars, pneumatic appliance for, G. H. Hollingsworth	852,117
Cars, steam-heating system for railway, E. E. Gold	852,019
Carburetor, A. Kunkel	851,759
Carding machine, M. A. Kehoe	852,330
Carpet beater, O. Halloran	852,195
Carpets and the like, apparatus for making, Clark & Peole	852,104
Carriers. See Target trap carrier.	
Carrier, L. M. Addington	851,698
Cash register attachment, P. L. Sheldon	852,352
Casket lowering device, A. W. Brown, et al	851,861
Cellulose, manufacture of artificial thread from solutions of, R. Linkmeyer	852,126
Cement kiln, T. M. Morgan	851,765
Center swiveling hook, G. F. Murray	852,285
Chart for garment patterns, W. P. Abnett	852,151
Check and like value or amount indicating document, form of, A. Collier	852,257
Check controlled apparatus, Beaumont & Garmon	851,641
Chimney flue protector, C. Leak	851,949
Chimney top, T. Kerchen	851,942
Chopper and cultivator, E. T. Odum	852,104
Chuck, tool, T. Dicks	852,320
Churn, R. Koch	852,067
Cigar cutter and pipe cleaner, combined, G. Nelson	851,769
Cigar machine, W. S. Luckett	851,681
Circuit connector, C. F. Patterson	852,395
Circuit protection, secondary, S. Ferguson	851,739
Circuits, means for nullifying inductive interference between parallel, E. Blakeney	851,856
Clamp, Hewlett & Van Brunt	851,661
Clamping device, E. Franke	851,765
Cleansing machine, W. H. Dunn	851,730
Closet bowl, W. H. Lloyd	851,959
Clutch, W. J. Hands	851,986
Clutch, A. Vivinus	852,045
Clutch for automobiles and other purposes, friction, M. F. McMahon	851,956
Clutch for countershafts, I. M. Foster	852,057
Clutch mechanism, T. L. Carbone	851,797
Coal piling apparatus, C. Piez	852,238
Cock box for water and gas pipes, street stop, Walcott & Fischer	852,359
Cock clamp, basin, T. L. Cecil	852,220
Cock lock, stop, C. H. Thompson	852,303
Coffee mill grinder, W. J. Bussinger	852,164
Cell, reactance, C. L. Fortescue	851,658
Coin collector circuit, J. G. Roberts	851,838
Coin mechanisms, fraud preventive device for, J. Fritzsche	852,111
Cold storage box, Emmerich & Heidland	852,225
Collar stuffing machine, horse, L. J. Powers	852,137
Columns, means of connecting channel irons in the construction of, G. Aus	851,973
Concrete arch, reinforced, H. M. Russell, Jr.	852,202
Concrete mixer, Muir & Herod	851,686
Control system, R. P. Jackson	851,664
Converter system, rotary, W. S. Rugg	851,695
Conveyer, E. H. Spear	851,701
Conveyer, L. C. Kyle	851,760
Conveyer system, J. H. Shay	852,204
Conveying apparatus, G. A. Amsen	851,790
Cooker for oil heating meal and the like, steam, A. W. French	852,058
Cooker, fruit, M. F. Holbrook	852,385
Cooler, H. T. Thomas	851,844
Corn cap, W. E. Klekke	852,023
Corn husker and fodder shredder, J. R. Hall	852,271
Corn husking machine, J. W. Paige	851,771
Corn protector, Hasselman & Smith	852,328
Corn shocking machine, D. W. Smith	851,699
Corset, abdominal, Downer & Hawes	851,926
Cotton and corn stalk cutter, G. R. Robin	852,349
Cranberry scoop or picker, G. W. Griswold	852,383
Crank shaft, J. Poebner	852,199
Crate, T. G. Wilson	852,366
Crib, collapsible, C. E. Raymond	852,296
Cross tie, metal, G. R. James	851,810
Cultivator, W. M. Asmore	851,727
Cultivator, cotton, R. H. Purnell	852,295
Cultivator replanting attachment, M. F. Hedges	851,750
Cultivator shovel or tooth, Burmeister & Boldt	852,316
Current interrupter, electrical, Lord & Erickson	852,186
Current machine on single phase circuit, alternating, R. D. Mershon	852,027
Current machinery, alternating, A. S. McAllister	851,828
Current, method of and apparatus for transforming single or polyphase into continuous, G. Faget	851,738
Current motor, J. Kirschweng	852,022
Curtain support, W. Luft	852,187
Cutting wire, W. R. Cunningham	852,107
Decorticating machine, C. N. Davis	852,377
Dental appliance, C. M. Dowell	851,735
Dental tool handle, J. Bede	851,659
Desk, W. Gaidman	851,959
Detinning process, van Kukulgen & Seward	851,946
Dial ornamenting machine, E. A. Marsh	852,189
Display rack, R. D. Harding	851,748
Display shelving, R. T. Joyce	852,229
Distillation, process of, J. N. Watt	851,718
Distilling coal, O. A. Goble	852,268
Ditching machine, W. Umstead	852,207
Door, C. A. Gloekler	851,879