

Means are provided for cutting roots and the sod at the sides of the ditch, and provision is made for the elevation and discharge of the soil at the sides of the ditch and to open the way for the penetration of the share at the bottom of the ditch.

**Medical Devices.**

**APPLICATOR.**—W. C. HOLT, Oakley, Kan. This applicator is adapted for the application of medicaments to the vagina, cervix, and other uterine organs, the rectum, and also to other internal parts of the human body. The invention provides a device which can be readily cleaned and by means of which a tampon may be quickly and neatly applied by the person receiving treatment. The device also serves to render positive the application of medicines without loss before a full entrance has been effected.

**Railway Improvements.**

**CAR-TRUCK.**—R. E. POWERS, Johnstown, Pa. Mr. Powers' invention is an improvement in truck frames for railroad cars. The side frames for the trucks are cut from an I-beam and reinforced by binder strips of angle metal. The frame can thus be strongly and at the same time very cheaply made.

**Vehicles and Their Accessories.**

**SPEED-VEHICLE.**—F. S. STODDARD and F. E. WHITNEY, Syracuse, N. Y. The present invention relates to a vehicle of the type suitable for driving at high speeds. The shafts are fastened to a point lower than the bottom of the vehicle and yet higher than the spindles of the front axles, this point having been found to be most advantageous. If the draw-irons be placed at a point higher than this, the animal will, to some extent, be pulling the vehicle toward the earth, and if placed lower than this, he will be lifting the vehicle somewhat. The fifth wheel is practically as wide as the vehicle body in this construction, thus greatly strengthening the vehicle and at the same time preventing undue rocking movement or an excess of lost motion when the vehicle is strained into different positions.

**DRIVING MECHANISM FOR VEHICLES.**—L. G. NILSON, New York, N. Y. It is a common practice to place the driving gearing for electric automobiles, such as chains or spur gears, directly on the spokes or very close to the drive wheels. The disadvantage of this is that such gearings catch considerable sand or grit which may fall from the wheels, causing the gearing to wear out quickly, and it is practically impossible to encase the gearing. The present invention overcomes the above-mentioned difficulties by so arranging the parts that the driving mechanism is placed between the body-supporting springs and remote from the wheels, where it can be completely encased.

**Miscellaneous Inventions.**

**FOOT-SHIELD.**—W. E. BOSWORTH, Frankfort, Ky. When pulling on a shoe the under part of the stocking engages the insole of the shoe and produces a pulling effect on the ends of the toes which tends to draw and turn under the toes into a cramped and unnatural position. This causes much discomfort and results in the probable formation of corns. To obviate such cramping, Mr. Bosworth has invented an attachment which may be placed over the end of the foot to prevent all such frictional contact.

**DIE FOR COVERING TUBES.**—P. H. FRIEL, Kenosha, Wis. The present invention is an improvement upon a former invention patented by Mr. Friel. It consists of a die of such construction as forms the double lock-joint with flush parallel edges, which makes a stronger and more nearly invisible joint than the single lock-joint heretofore used on the die as already patented.

**SAD-IRON HOLDER.**—K. BARNICKOL, Rome, N. Y. The object of this invention is to provide a holder for heated sad irons which is connectable with an ordinary ironing board, and when in place is adapted to receive a hot sad iron and hold it reliably against lateral displacement.

**FASTENER FOR GARMENTS, ETC.**—J. L. DINKELSPIEL, New York, N. Y. This invention relates to a device for fastening together the parts of a garment or other structure of cloth, leather or other material. The present invention provides certain improvements in the construction forming the subject-matter of patent previously granted to Carrie P. Parker.

**CISTERN-FILTER.**—J. W. CRAINE, Winfield, Kans. Mr. Crane's invention relates to a cistern filter which will purify water as rapidly as the same is removed from the cistern. Provision is made for removing undue pressure from the water upon the interior of the filter and also for permitting the ready entrance and egress of air to and from the filter.

**HOSE-COUPLING.**—H. T. CRONK, New York, N. Y. Mr. Cronk provides in the present invention an improved hose coupling which relates to a previous invention patented by Mr. Cronk. The ends of the hose are turned back forming a flange, and coupling sections engage these flanges and are held together by clamping nuts.

**GARMENT-RACK.**—C. DOUBLAT, New York, N. Y. This garment rack is especially adapted for use in hotels and other places where a

number of garments are to be taken care of. The construction of the rack is such that the wraps and umbrellas and canes of the various guests can be quickly and accurately arranged, classified and returned in good condition to their owners without the liability of mistakes.

**COOLING APPARATUS.**—J. E. HAARMANN, Omaha, Neb. An apparatus for cooling fluids particularly liquid or semi-liquid substances is provided in this invention. It is especially adapted for use in distilleries, starch and sugar factories, breweries, glucose works, and other manufactories where material is cooked or boiled.

**FOLDING CHAIR.**—S. R. ROGERS, Mount Airy, Ga. This invention relates to improvements in folding chairs, the object being to provide a chair that may be readily adjusted to any desired position, or folded in compact form so that it may be easily carried or transported from place to place.

**BROILER.**—R. P. SMITH, New York, N. Y. This improved broiler is especially intended for buffet and other use where the space is limited. Such, for instance, as in the buffet kitchens of parlor cars, apartment houses, or private residences, yachts and the like.

**CONVERTIBLE ARTICLE OF FURNITURE.**—W. M. BOAZMAN, Greenville, S. C. This improved article of convertible furniture may serve as a stationary bed or lounge, also as a rocking lounge, cradle, or chair, a rolling chair, or reclining chair. The changes or adjustment of parts required to adapt it for any one of these articles is effected by a very simple manipulation.

**FOLDING LADDER.**—H. LABRANCHE and F. THIROT, 114 Avenue de Suffren, Paris, France. The present invention relates to an improved folding ladder of the kind which comprises rigid sides connected together by means of steps, the ends of which are pivoted or jointed to these sides, so that the latter can be brought together, the one against the other, when the ladder is not in use.

**FASTENER FOR SHOW-CASES.**—P. S. SCOTT, Brooklyn, N. Y. The fastener is more particularly intended for use on show-cases on the outside of stores, where they are exposed to the weather and to the view of the passing public. In show-cases of this class it is desirable to provide a lock-hasp which cannot be pried or broken open by thieves, and which at the same time is capable of preventing rain or dust from entering the crevice at the point of application of the hasp. Such a device is provided in the present invention.

**TILING FOR FLOORS, WALLS, CEILINGS, FIREPLACES, ETC.**—F. ALCAN, New York. The object of the invention is to provide an improved tiling arranged to permit of setting the tile blocks in such a manner as to form color patterns, greatly resembling those of oriental rugs, and hence greatly enhancing the artistic merit of the structure on which the improvement is used.

**CIGAR HOLDER AND ASH RECEIVER.**—J. C. D. ROSS, Chicago, Ill. Mr. Ross's invention relates to improvements in combined cigar holders and ash receivers. It provides a simple and cheap article adapted to hold a cigar in position for the ashes to drop into a receiver, thus preventing the ashes from dropping on and soiling the clothing of the smoker. The holder may be adjusted as the cigar burns away to bring the receiver into proper position for catching the ashes.

**BOX-COVER SUPPORT.**—S. B. EVANS, Enid, Okla. Ty. A device for holding the cover or lid of cigar boxes in open position to display the contents of the box to purchasers is provided by Mr. Evans' invention. The device may be cheaply manufactured and easily applied to securely hold the box cover in the desired rearwardly inclined open position. It may also be readily removed from an empty box and reused on a new one.

**HEAD-GATE.**—H. W. ELDER, Dawkins, Colo. This improved head-gate is adapted for use in irrigating ditches and the like, and is arranged to form a portable dam in the ditch to control the water flowing through the ditch upon the land to be irrigated without danger of the water leaking past the gate at the sides. The arrangement also is such as to prevent the bottom of the ditch from unduly washing out at the downstream side of the gate.

**PHOTOGRAPHIC CAMERA.**—W. F. FOLMER, New York, N. Y. The invention relates particularly to reflex cameras, and it provides for automatically setting the shutter while depressing the mirror and making the exposure automatically when the mirror is released. Means are provided for automatically opening the diaphragm to a full aperture when setting the mirror and permitting the operator to diaphragm the lens to whatever stop may be desirable.

**Designs.**

**POKER-CHIP.**—S. A. COHEN, New York, N. Y. The design consists of a representation of a shield bearing on its face the representation of a raging lion in horizontal position and surmounted by a crown having a cross and flanked, on both sides by leafy branches, the whole being surrounded by a circle.

**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.

**Business and Personal Wants.**

**READ THIS COLUMN CAREFULLY.**—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. **In every case it is necessary to give the number of the inquiry.** MUNN & CO.

Marine Iron Works, Chicago. Catalogue free.

**Inquiry No. 3659.**—For a machine for cutting light leather into narrow strips about 1/4 inch wide.

"U. S." Metal Polish, Indianapolis. Samples free.

**Inquiry No. 3660.**—For makers of tool steel balls. Coin-operated machines. Willard, 284 Canal St., Brooklyn.

**Inquiry No. 3661.**—For 1892, 1893, 1894 or 1895 make of drop frame ladies' bicycles, weight 35 or 40 pounds.

Dies, stampings, specialties. L. B. Baker Mfg. Co., Racine, Wis.

**Inquiry No. 3662.**—For machinery for making starch from rice.

Handle & Spoke Mch. Ober Mfg. Co., 10 Bell St., Chagrin Falls, O.

**Inquiry No. 3663.**—For manufacturers of mop-wringers.

Sawmill machinery and outfits manufactured by the Lane Mfg. Co., Box 13, Montpelier, Vt.

**Inquiry No. 3664.**—For makers of model castings for steam and electrical machinery.

Want metal novelties of any kind, any quantity? Write Metal Stamping Co., Niagara Falls, N. Y.

**Inquiry No. 3665.**—For dealers in advertising novelties.

Patented articles, principally of cast iron, made and introduced. Atlantic Foundry, Phillipsburg, N. J.

**Inquiry No. 3666.**—For makers of ice and creamery plants.

Let me sell your patent. I have buyers waiting. Charles A. Scott, Granite Building, Rochester, N. Y.

**Inquiry No. 3667.**—For manufacturers of fringing machinery.

Special and Automatic Machines built to drawings on contract. The Garvin Machine Co., 149 Varick, cor. Spring Streets, N. Y.

**Inquiry No. 3668.**—For manufacturers of caps.

Manufacturers of patent articles, dies, stamping tools, light machinery. Quadriga Manufacturing Company, 18 South Canal Street, Chicago.

**Inquiry No. 3669.**—For firms who install factories for the production of artificial manures from bodies of dead animals.

Crude oil burners for heating and cooking. Simple, efficient and cheap. Fully guaranteed. C. F. Jenkins Co., 1103 Harvard Street, Washington, D. C.

**Inquiry No. 3670.**—For makers of electric clock alarm bells for colleges and schools.

The largest manufacturer in the world of merry-go-rounds, shooting galleries and band organs. For prices and terms write to C. W. Parker, Abilene, Kan.

**Inquiry No. 3671.**—For dealers in small novelties.

We manufacture anything in metal. Patented articles, metal stamping, dies, screw mach. work, etc. Metal Novelty Works, 43 Canal Street, Chicago.

Patent No. 694,279, horse ties, for sale outright or on royalty. J. T. Horris, 299 Lexington Ave., New York.

**Inquiry No. 3672.**—For parties to make small, magnetic electrodes.

The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 188th Street, New York.

**Inquiry No. 3673.**—For the address of parties who make cardboard 3-16 inch thick and one side faced.

Africa advertiser open to represent any business or will purchase for cash notions or novelties. Catalogues, prices and samples to Mr. A. Nickson, 8 Airth's Buildings, Smith Street, Durban, Natal, South Africa.

**Inquiry No. 3674.**—For makers of toy printing presses, also stencil manufacturing sewing machine companies.

Gasoline Automobile Batteries. William Roche's "Autogas" used properly will carry vehicle twice as far as any other battery of same weight. William Roche, inventor and manufacturer, 42 Vesey Street, New York, N. Y., U. S. A.

**Inquiry No. 3675.**—For parties to make telephone brackets to order.

A public exhibition of American and foreign inventions will be held for two weeks in February at Buffalo. Object, practically presenting them to manufacturers and capitalists. Modern Invention Exhibit Company, 124 Erie Co. Bk., Buffalo, N. Y.

**Inquiry No. 3676.**—For machinery for making cigar boxes.

FOR SALE.—Patent No. 717,281 "Novelty" new article of manufacture, "Cigar Holder and Ash Receiver." This will surely supply a long-felt want for smokers, especially at officers, clubs, homes, etc. Julius C. D. Ross, 685 Burlington Street, Chicago, Ill.

**Inquiry No. 3677.**—For an electric motor from 6 to 8 h. p. of the alternating type.

Inventors wishing to sell their patents or to have them manufactured on royalty will find it to their interest to correspond with me.

J. C. Christen, Main and Dock Sts., St. Louis, Mo.

**Inquiry No. 3678.**—For machinery for extracting the fiber from Lechuzilla, Maguay or Heniquen.

Inventors and parties desiring to have patented articles manufactured please take notice:—An old established New England concern, with large experience in manufacturing and marketing specialties of different kinds, desires to obtain control of patented inventions of merit, and would either purchase same outright or manufacture on royalty. All communications will be considered strictly confidential, and we reserve the right to reject any or all inventions submitted.

Address P. O. Box No. 316, Bridgeport, Conn.

**Inquiry No. 3679.**—For makers of steam turbine wheels.

**Inquiry No. 3680.**—For makers of small turbine water wheels.

**Inquiry No. 3681.**—For parties to make a small steam engine to order.

**Inquiry No. 3682.**—For a motor for running a sewing machine.

**Inquiry No. 3683.**—For makers of gasoline engines.

**Inquiry No. 3684.**—For the makers of the Bunsen burners for gas mantle lamps.

**Inquiry No. 3685.**—For makers of the dry gold washer for placer mines.

**Inquiry No. 3686.**—For a trolley box or device for delivering mail from rural routes to houses on the routes.

**Inquiry No. 3687.**—For a 10 h. p. gasoline engine to operate a 150 light dynamo for electric light work; one in which the regulation is as good as a steam engine.

**Inquiry No. 3688.**—For makers of running gear, wheels, axles, tires, motor, etc., for automobiles.

**Inquiry No. 3689.**—For new or second-hand brick-making machinery.

**Inquiry No. 3690.**—For dealers in strip tool or spring steel of special sizes.

**Inquiry No. 3691.**—For manufacturers of gas mantels.

**Inquiry No. 3692.**—For makers of ornamental faucets for fancy coffeepots, etc.

**Inquiry No. 3693.**—For dealers in electro-plating supplies.

**Inquiry No. 3694.**—For makers of corn broom machines.

**Inquiry No. 3695.**—For makers of electric launches.

**Inquiry No. 3696.**—For makers of strong, durable gasoline automobiles for rough country roads.

**Inquiry No. 3697.**—For makers of machinery for making common pins, hat pins, etc.

**Inquiry No. 3698.**—For makers of glass jars and labels.

**Inquiry No. 3699.**—For makers of whitening.

**Inquiry No. 3700.**—For makers of concrete mixers.



**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.

(8786) F. B. asks: How many pounds pressure would I get on a 12-inch pipe, running to a turbine, with a tank of water holding one and one-half million gallons of water, with a ten-foot fall? How many horse power would it give me? How many horse power would I gain with every ten-foot fall through the same pipe? How many horse power will it require to lift a six-inch stream of water 100 feet with the best pump, and will it take twice as much power to lift a 12-inch stream the same height? A. You would have 4 1-3 pounds per square inch pressure at the turbine. It is possible to obtain 5 horse power from the 12-inch pipe, and the same for each additional 10-foot fall. It will require about 12 horse power to fill your 6-inch pipe at full flow, and four times as much power for a 12-inch stream with four times as much water.

(8787) T. O. C. states: I have made an electro-magnet as follows: The cores are 1 1-16 inches in diameter, 3 1/4 inches long, wound with No. 22 magnet wire (double cotton-covered) 12 turns on each spool, the spools three inches clear in length; there is nearly 1 pound of wire on each spool. I want to use it on 110-volt current, but if the current is on for a few seconds, the wire on spools gets pretty warm. Can I avoid the heating by changing the dimensions? I would rather do that than put a lamp in the circuit, if it is possible. I want the magnet to overcome 8 or 10 pounds spring pressure. A. The difficulty with your magnet is excessive current. Two pounds of No. 22 wire will not have more than 16.6 ohms resistance. This at 110 volts will allow about 6 amperes to flow, and the wire cannot carry that current. You must either wind on much more wire, probably three times as much, or use some external resistance, the simplest form of which is a bank of lamps, so arranged as to allow the proper amount of current to flow.

(8788) A. W. F. writes: Is not your advice to C. R., Query No. 8725, a little dangerous in spite of your caution? For instance, if a quantity of gun cotton less than a bursting charge were exploded in a strong tube, would not the initial pressure of the liberated gases remain constant until the gases were allowed to escape, less the reduction of pressure caused by cooling to normal temperature? Therefore, would not the danger be great to suddenly liberate this great pressure by unscrewing the confining plug, as per C. R.'s question No. 2? A. Your suggestion is very proper in regard to suddenly liberating the high-pressure gases of combustion of gun cotton. In unscrewing a plug that would be used in such an experiment, the high pressure would be wasted by leakage over the thread before the plug could be unscrewed.

(8789) R. J. asks: Can you kindly advise us as to the best means of oxidizing yellow and red brass (in castings or in rolled sheets) copper and bronze? We have several showcases, the metal trimmings of which are backed with wood, rendering it impossible to heat same sufficient to oxidize in the usual manner. A. If the blackening effect is the one desired (and this is what is known as "oxidizing" in the trade) it can be obtained by using a very dilute solution of potassium sulphide, to which sometimes a little ammo-

nium sulphate is added. As the article itself cannot be heated, it will be well to heat the solution of potassium sulphide.

(8790) H. J. K. says: I desire to deposit nickel directly on a wax mold, and to do this it is of course necessary to first make the wax mold conductive. The molds are blacklead first. What I would like to know is, what kind of a conductive coating is best to apply. Some use a solution of nitrate of silver and phosphorus. Can you tell me how to proceed with this? It is for use in making nickel-faced electrolytes. A. The blacklead (graphite) is applied to act as the conducting surface upon which the metal is deposited. You are evidently misinformed as to the nitrate of silver and phosphorus; these are not used. A good account, with formulae, for the process of blackleading and nickel plating, will be found in the "SCIENTIFIC AMERICAN Cyclopaedia" articles, "Electrotyping" and "Electro-metallurgy."

(8791) E. O. H. asks: Will you kindly inform me what composition pulp or fiber water pails, tubs and trays are made of? Also kindly explain how they are formed or pressed. A. Old paper stock is boiled to a pulp with water. It is then pressed to remove the excess of water and mixed with glue, gum, dextrine, starch paste or rosin size and pressed into oiled molds under heavy pressure. Dry. Then soak with linseed oil and dry with heat. It is usual to add some mineral weighting material to the pulp, such as clay, chalk, barytes, etc.

(8792) F. R. J. asks: How should paper be treated (manila or wood pulp or straw paper) to prevent mold when placed on damp or moist surface? A. Any antiseptic chemical can be used; as these are all poisonous, paper so treated must not come in contact with edibles. Bichloride of mercury, sodium fluoride, carbolic acid, salicylic acid, or benzoic acid are a few of such chemicals. The essential oils are also very good, and would not be poisonous to any extent; dissolve in alcohol and flow it over the paper to be treated. Oil of sassafras is one of the cheapest that can be so used. Oiling or paraffining the paper will also serve.

(8793) P. M. C. says: We desire some cheap adhesive substance that can be used in manufacture of briquettes to contain charcoal and sawdust. A. Coal tar and molasses are the substances used for briquetting, and are both quite cheap.

(8794) H. B. says: In looking over the SCIENTIFIC AMERICAN of October 25, 1902, I notice reference made to the water pail forge. In your reply to 8722, K. T., will you kindly let me know the construction and use of the water pail forge, as we desire to use in shop if it is practicable. A. The "water pail forge" may be easily constructed by placing a sheet of lead in the bottom of a common water pail. It would better be large enough to cover the bottom and have a strip up one side of the pail to the top, to which the positive wire is attached. Fill the pail about half full of a liquid composed of washing soda 10 parts, borax 1 part, and water to a specific gravity of 1.15. Make a couple of notches in the edge of the pail and lay an iron bar across the top of the pail to which the negative wire is attached. Take the article to be heated in a pair of tongs, place the tongs against the iron rod and thrust the article to the desired depth in the water. A pressure of 220 volts is necessary for rapid heating. A rod of iron one quarter inch through will be red hot in a second or two. A large soldering iron is hot in a few seconds. It works too fiercely to be easily controlled, and for this reason it has not come into use in shops. The metal is soon melted and falls in drops.

(8795) E. E. S. desires a method of identifying the element rhodium, also its chemical reactions, which would enable one to test ores for the presence of the above-named substance. A. The separation and detection of rhodium is difficult and requires expert chemical work; it would be impossible to give any simple method of detection, as it is always associated with other metals of the platinum group. There is no book published devoted to the analysis and separation of the rare earths. The information must be obtained by consulting the various standard works on chemical analysis and by looking through the journal literature. Fresenius' "Qualitative Analysis" gives considerable information as to rhodium, as well as on the other rare metals.

(8796) J. W. W. wishes to know what is best for a mold to burn a substance at a red heat that will not crack or give? Have tried wrought iron. Cast sometimes gives or bends. How would fire clay or the same composition as Berlin crucible do? (Can you give me a formula for it?) A. Fire clay, mixed with some molder's sand, or kaolin, can be used for making such molds. If mixed with stale beer or ale, it gives a firmer mold than if mixed with water. Phosphate of lime, also mixed with stale beer, gives a very clean, white mold, but is not strong. Thoroughly dry and bake before using.

(8797) B. D. wishes a receipt for a glue which will satisfactorily glue celluloid to wood, such as is used in making draughtsman's tie squares of celluloid and wood. A. A very simple formula recommended for this purpose is to heat glue to boiling, and stir in gradually wood ashes until the consistency is similar to a thick varnish. Use hot.

NEW BOOKS, ETC.

ANNALS OF THE ASTRONOMICAL OBSERVATORY OF HARVARD COLLEGE. Vol. XLIV. Part II. Reduction of Observations made with the Meridian Photometer During the Years 1892-98. By Edward C. Pickering, Director of the Observatory. Cambridge: Published by the Observatory. 1902. Pp. 115-216.

How to ATTRACT THE BIRDS. And Other Talks About Bird Neighbors. By Neltje Blanchan. New York: Doubleday, Page & Co. 1902. 8vo. Pp. 224. Price \$1.35.

The author has presented us with a book which tells much of birds that is probably not contained in any of the animal books now so widely read. The title of the work is somewhat misleading, for a goodly portion of the volume is devoted to a popular exposition of the principles of ornithology. The manner in which this book is written is extremely personal. For that reason it is far more readable than a cold description of bird habits. The publishers have seen to it that the work appears in a handsome dress.

THE JOURNAL OF THE DEPARTMENT OF AGRICULTURE OF VICTORIA. April, May, June, July. Published for and on behalf of the Government by Direction of the Hon. John Morrissey, M. L. A. Edited by H. W. Potts, F. C. S., F. L. S. Melbourne. 1902. Pp. 457-535.

THE PAINTER'S LABORATORY GUIDE. A Handbook of Paints, Colors, and Varnishes for Students. By George H. Hurst, F. C. S. London: Charles Griffin & Co., Ltd. Philadelphia: J. B. Lippincott Company. 1902. 12mo. Pp. ix, 248.

In writing this laboratory manual, the requirements of students who can attend practical courses in the subject of painting at some technical school or college, as well as those students who, although unable to attend such courses, desire the benefits obtained from a course of experimental work, have been kept in view. In his sections on pigment making, the author enters into some description of the chemical principles on which the preparation of pigments is based, as well as of the chemical properties of pigments. Short notes on pigment manufacture on a large scale are likewise introduced. In the section on lakes special attention to the preparation of lakes and coal-tar dyes is given. Experiments are described which can be carried out by students whose time is limited.

A TEXTBOOK OF PHYSICS. By J. H. Poynting, Sc.D., F.R.S., and J. J. Thomson, M.A., F.R.S., Hon. Sc.D. Dublin. Properties of Matter. London: Charles Griffin & Co., Ltd. Philadelphia: J. B. Lippincott Company. 1902. 8vo. Pp. vi, 228.

With this volume on the Properties of Matter, Profs. Poynting and Thomson open a series comprising a textbook on Physics. The second volume, that on Sound, has already been issued, and the remaining volumes, dealing with Heat, Magnetism, Electricity and Light, will be published as soon as possible. Like its predecessor on Sound, the present volume is intended chiefly for the use of students who lay most stress on the study of the experimental part of physics, and who have not yet reached the stage at which the reading of advanced treatises on special subjects is desirable. To bring the subject within the compass thus described, an account is given only of phenomena which are of special importance, or which appear to throw light on other branches of physics. The mathematical methods adopted are very elementary. In the present volume the authors deal with weight, mass, gravitation, and those properties of matter which relate chiefly to change of form, such as elasticity, fluid viscosity, surface tension, diffusion and solution.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending

January 6, 1903,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Table listing inventions with names and dates. Includes: Account register and desk, Paul & Hankey 717,909; Acetylene burner, J. W. Bray 717,535; Air and gas mixer, C. A. Dally 718,049; Air heater and steam generator, T. S. C. Lowe 718,008; Alarm, See Burglar alarm; Alarm giving mechanism, E. H. Juhlin 717,867; Amusement apparatus, B. Beerwald 717,508; Anchor, S. T. Miller 717,590; Anvil shearing attachment, C. A. Christenson 717,658; Awl, sewing, I. D. Morgaridge 718,057; Axle skein, W. Lytle 717,879; Bag forming machine, L. F. Fales 717,828; Baling press, D. L. Nicholson 718,016; Ball and socket joint, J. S. Martin, Jr. 717,882; Bar-severing machine, H. C. McCool 717,706; Barrel, E. C. Phillips 718,020; Basin, adjustable wash, M. Brandt 717,533; Bath, tubs, stoves, etc., fastening device for, W. S. Johnson 717,803; Battery-diaphragm, Decker & Divine 717,549; Bearing, A. Ramsay 717,715; Bearing, ball, F. W. Gurney 717,987; Bearing, shaft, A. H. Reid 717,924; Bed chair, sick, D. M. Moore 717,804; Bed, invalid, B. R. Butler 717,809; Bell, alarm, J. C. Schlicher 717,626; Bending machine, angular, A. Finel 718,035; Beverages, production of fermented, M. Hahn 717,744

"Star" Foot and Power Screw Cutting Lathes. Antomatic Cross Feed. FOR FINE, ACCURATE WORK. SEND FOR CATALOGUE B. SENECA FALLS MFG. CO. 695 Water Street, Seneca Falls, N.Y., U.S.A.

ENGINE & FOOT LATHES. MACHINE SHOP OUTFITS. TOOLS & SUPPLIES. SEBASTIAN LATHE CO. CINCINNATI, O.

Foot and Power and Turret Lathes, Planers, Shapers, and Drill Presses. SHEPARD LATHING CO. 131 W. 2d St., Cincinnati, O.

HAVE THE LATEST IMPROVEMENTS. No machine shop can be thoroughly up-to-date unless it has the most modern perfected tools. For instance, the ASHLEY PATENT NIPPLE HOLDERS hold nipples for cutting either right or left hand threads. They hold the sleeve from turning and take the strain of both the sleeve and shank thread. Made of best quality cast steel, carefully fitted. Long or short nipples cut with equal facility. The Ashley Holders are of light weight and compact form. WALWORTH MANUFACTURING CO. 128 TO 136 FEDERAL ST., BOSTON, MASS.

Graphophone Users. Send your reproducer with \$1.50. We will adjust aluminum disc and French diaphragm glass. Increases volume, liquefies tone. Thousands in use. Money refunded if not satisfactory.

Hawthorne & Sheble Manufacturing Co. Oxford and Mascher Streets, Philadelphia, Pa.

THE EUREKA CLIP. The most useful article ever invented for the purpose. Indispensable to Lawyers, Editors, Students, Bankers, Insurance Companies and business men generally. 5000 marker and paper clip. Does not mutilate the paper. Can be used repeatedly. In boxes of 100 for 25c. To be had of all booksellers, stationers and notion dealers, or by mail on receipt of price. Sample card, by mail, free. Manufactured by Consolidated Safety Pin Co., Box 121, Bloomfield, N. J.

MAXIMUM POWER-MINIMUM COST. If you use a pump for beer, lard, acids, starch, petroleum, brewer's mash, tanner's liquor, cottonseed oil or fluids, hot or cold, thick or thin you want to get the TABER ROTARY PUMP which does the most work at the least expense. Simply constructed. Can be run at any desired speed. Perfectly durable. All parts are interchangeable. Needs no skilled workman. Directs standard Catalogue free. TABER PUMP CO., 32 Wells St., Buffalo, N.Y., U.S.A.

If You Want the Best Lathe and Drill CHUCKS. BUY WESTCOTT'S Strongest Grip, Greatest Capacity and Durability, Cheap and Accurate. Westcott Chuck Co., Oneida, N. Y., U.S.A. Ask for catalogue in English, French, Spanish or German. FIRST PRIZE AT COLUMBIAN EXPOSITION, 1893.

"WOLVERINE" Gas and Gasoline Engines. STATIONARY and MARINE. The "Wolverine" is the only reversible Marine Gas Engine on the market. It is the lightest engine for its power. Requires no licensed engineer. Absolutely safe. Mfd. by WOLVERINE MOTOR WORKS, 12 Huron Street, Grand Rapids, Mich.

Upright Drills. Complete line, ranging from our New Friction Disk Drill for light work to 42-inch Back Gear Self Feed Drill. Send for Catalogue and Prices. W. F. & JOHN BARNES CO. (Established 1872) 1999 Rubs St., Rockford, Ill.

Gas Engine IGNITER. Complete with spark coil, \$12.00. The Best Thing on the market. Latest and most improved model. Send for Circular. Carlisle & Finch Co., 233 E. Clifton Av., Cincinnati, O.

ALL WHO ARE INTERESTED IN THINGS ELECTRICAL can obtain our illustrated catalogue by sending 2-cent stamp for postage. LIBERTY ELECTRICAL SUPPLY CO., 136 Liberty St., New York

FREE Treatise on DISC GRINDERS. A machine tool not known or appreciated by the ordinary manufacturer. The booklet is not an advertisement of our particular machine, but is a clear statement of the varied uses to which machines of this class can be put and examples of the time consumed in producing various kinds of work. BAYLON MACHINE AND TOOL CO., 28 MORRIS ST., JERSEY CITY, N. J.

Our Pen Carbon Letter Book Copies Your Letters While you write. Use any pen and your own stationery. If your stationer does not keep it, write for free specimen of work. Beware of imitations. Address Dept. L. Pen-Carbon Manifold Co., 145-7-9 Centre St., New York.

Table listing various mechanical and electrical items with prices. Includes: Bicycle brake, F. P. McElfresh 717,900; Bicycle gearing, C. Holst 717,576; Billiard or pool table cushion, D. W. Delaney 717,737; Binders, loose leaf for temporary, G. W. Weaver 717,957; Blower, steam, E. Gibson 717,536; Boiler furnace, steam, E. Gibson 717,567; Boilers, glass tube water gage for steam, W. Bright 718,046; Book, coupon, E. V. Sanderson 717,939; Book, rose leaf, H. C. Miller 717,697; Bottle, F. M. Norris 718,017; Bottle filler, A. Schneider 717,627; Bottle filling machine, E. H. Schofield 717,720; Bottle holder or support, W. T. Holton 717,995; Bottle, non-refillable, A. G. Stevens 718,031; Bottle washing machine, B. Gallagher 717,671; Bottles or similar articles, machine for washing, B. Gallagher 717,671; Brake shoe, D. & H. Rawstron 717,624; Brick kiln, C. B. Platt 718,052; Brick machine, H. McIntosh 717,767; Briquet making machine, E. B. A. Zwayer 718,043; Broom rack, A. B. Lehman 718,095; Brush, combination floor, carpet, and wall, F. H. Loveless 717,878; Brush holder, W. W. Beeler 717,656; Brush machine, Harlow & Lindgren 717,988; Brush, metal finishing, H. H. Hirsch 717,861; Bucket and stand, paste, F. H. & W. C. Warren 717,643; Buckle, J. F. Atwood 717,524; Buckle, E. W. Hadley 717,743; Buckle, cotton tie, P. L. Howlett 717,856; Building blocks, metallic matrix for, W. C. Lyon 718,009; Buglar alarm, E. Puscherus 717,921; Burner, See Acetylene burner; Burnishing machine, W. J. & J. R. Mitchell 718,013; Button, collar, H. G. Quilty 717,714; Cable or wire, shield for suspended cable track roads, H. M. Harding 717,570; Cake or doughnut cutter, C. H. Brown 717,537; Calculating machine, electrically operated, F. C. Rinsche 717,762; Candy machine, Morrison & Wharton 717,756; Car construction, metallic, H. C. Buhoup 717,540; Car coupling, A. L. Sherwood 717,633; Car coupling, Fabian & Wildmark 717,663; Car coupling, E. H. Janney 717,686; Car coupling, C. S. Earlight 717,740; Car coupling, automatic, G. A. Hermanson 717,746; Car coupling, safety, S. D. Barnett 717,525; Car draw bar spring, railway, J. F. O'Connor 717,602; Car draw gear and luffing apparatus, railway, Felt & Kimbark 717,667; Car, dumping, Wolf & Willoughby 717,788; Car fender, J. B. Robison 718,025; Car frame, F. A. Babel 717,668; Car friction draft rigging, railway, J. J. Hennessy 717,677; Car grate operating apparatus, B. Rivkin 717,928; Car replacer, O. W. Johnson 717,862; Car seat mechanism, H. Tosseyman 717,723; Car wheels, manufacturing, Buboup & Ritter 717,538; Carpet fastener, W. J. Doan 717,554; Carpet stretcher, H. C. Fehrmann 717,820; Carriage and hearse, combined, C. Anderson 717,652; Carriage, baby, C. F. Thayer 717,945; Carriage brake, baby, W. H. Ramscar 717,922; Carriage, folding baby, J. Mehlferber 718,056; Centrifugal machine, J. J. Berrigan 717,802; Centrifugal separator, E. Bardolle 717,963; Chain link, J. M. Dodge 717,975; Chamber utensil and attachment thereof, P. L. Bando 717,972; Chapter pointer, J. A. Poole 718,023; Chart, transportation, L. O. Woods 718,065; Chimney, B. H. Miller 717,696; Chisel, carpenter's, W. S. Ward 718,040; Chocolate coating machine, G. Carlson 717,969; Churn, G. G. Beynon 717,531; Cigar shield, pocket, H. F. Drake 717,556; Clay block grooving or scoring apparatus, I. L. Conkling 717,546; Clay block trimming apparatus, I. L. Conkling 717,544; Clover buncher, C. C. Behm 717,529; Clutch, friction, C. R. Gabriel 717,836; Coach platform gear, J. Knapp 717,690; Coat and hat rack, coin operated, E. G. Lindheimer 717,874; Coating with tin, etc., machinery for plating plates for, J. E. Lewis 717,585; Cork, four-way, F. McDonald 717,899; Collar lowering device, C. W. Wellman 717,727; Coin controlled apparatus fraud preventive for, H. S. Mills 717,801; Coin package, C. S. Baddorf 717,964; Coke oven, M. E. Rothberg 718,027; Colter scraper attachment, plow, R. E. Miller 717,698; Comb, J. E. Head 718,054; Combination lock, J. B. Miller 717,889; Concentrator, J. S. Brownell 717,580; Concrete mixer, rotary, F. W. Judd 717,599; Condenser, steam, C. F. Nicholas 717,509; Confectionery coating machine, G. Carlson 717,970; Cooking utensil, R. T. Astle 717,655; Copper from its ores, extracting, A. von Gernet 717,565; Cork sorting machine, G. H. Vineke 717,726; Corner brace, J. P. Johnson 717,687; Coupling, See Car coupling; Cow tall holder, W. Noxon 717,712; Crane, electric, J. H. Holland 717,904; Crate, bottle, P. C. Linker 717,586; Cream separator, L. E. Siebenhaar 717,936; Cuff holder, H. S. Pond 717,919; Cultivator, J. S. Howell 717,578; Cultivator attachment, J. M. Brewer 717,733; Cultivator replanting attachment, J. & T. M. Hendrickson 717,573; Curtain pole or rod, E. C. Phillips 718,021; Curtains, adjustable support for roller, Lightner & Holleran 717,693; Cut off, automatic, B. F. J. Miller 718,012; Cutter and tool grinder, W. Osterlein 717,605; Cycles for use as a hand rest or parcel carrier, attachment for, T. R. Ellison 717,662; Damper regulator, A. Carmichael 717,810; Deey duck, F. H. Yorke 717,790; Dental broach, W. J. Miles, Jr. 717,594; Diffusion process, C. Steffen 718,039; Display cabinet, W. E. Howry 717,937; Display counter, L. N. Landauer 717,870; Ditching and ridging machine, L. H. Hahn 717,846; Door check, G. E. Colman 717,813; Doors, device for opening laterally moving, T. W. Heermans 717,745; Dough mixer, R. Robinson 717,929; Draft apparatus, M. Weiss 717,786; Draft rigging, W. M. Piper 717,615; Draft rigging, combined friction and direct acting, J. J. Hennessy 717,678; Drafting instrument, combination, J. Leitschuh 717,871; Dress shield, L. M. Ferguson 717,830; Drill, Hays & Douglas 717,992; Dust pan, G. G. Tichonor 717,639; Dye and making same, azo, W. Voigtlaender-Tetzner 718,032; Dye and making same, mixed diazo, Schraube & Voigtlaender-Tetzner 718,028; Dye, making black polyazo, J. Dieichen 717,550; Dyeing, O. Jueck 717,749; Electric conducting cable, R. Spanling 717,778; Electro energy to translating devices, controlling the supply of, H. W. Leonard 717,584; Electric switch, W. R. Thompson 717,724; Electric regulator, C. P. Philbrick 717,918; Electrode, storage battery, L. Paget 717,607; Electrodes, preparing storage battery, L. Paget 717,608; Embroidering machine, J. A. Groobli 717,843; Engines, electric igniting device for internal combustion, F. R. McMullin 717,902; Envelon, M. L. Hinchman 717,993; Excavating machine, E. A. Mathers 717,589; Excavator, W. H. Fulcher 717,835; Eyeglass nose guard, H. Borsch, reissue 12,070; Feed and pressure roll, sectional, C. J. L. Meyer 717,593; Feed mechanism, S. Upton 717,952

(Continued on page 49)