

testing pump and high pressure gage. In the union joint were placed two disks of hard rubber, each about 1/3 of an inch in thickness, and above the disks a lead ball, 1 inch in diameter, was placed.

The bullet passed through the 6 1/4 inches of pine planks, making a clean cut through the first planks and badly shattering and displacing the last plank of the target, then struck and splintered a beam under the roof and rebounded to the floor.

In conclusion we would remind our readers that the death of this prince of rogues does not imply that the type is extinct; and that "resonators," "vibrators," "etheric vapors," and others of that ilk, still walk the earth dressed in the ever-varying garb with which such human sharks as Keely are still seeking to catch the unwary.

Radium: A New Body, Strongly Radio-Active, Contained in Pitchblende.

BY M. P. CURIE, MME. P. CURIE, AND M. G. BEMONT.

Two of us have shown that, by purely chemical processes, a strongly radio-active substance can be extracted from pitchblende. This substance is near bismuth in its analytical properties.

Our subsequent researches are in accord with the results first obtained, but, concurrently with these, we have met with a second substance, strongly radio-active, and entirely differing from the first body in its chemical properties.

Polonium is precipitated from its solution by sulphureted hydrogen. Its salts are soluble in acids, and are precipitated by water; polonium is completely precipitated by ammonia.

It gives the barium spectrum easy to recognize. Nevertheless, we believe this substance, although in greater part consisting of barium, contains besides a new element which gives to it radio-activity, and which is close to barium in its chemical properties.

Here are the reasons which lead us to this opinion: 1. Barium and its compounds are not radio-active; also one of us has shown that radio-activity appears to be an atomic property, persisting through all the chemical and physical states of the substance.

2. The first substances we obtained had, in the state of hydrated chloride, an activity 60 times as great as that of metallic uranium (the radio-activity was measured by the amount of conductivity conferred on air in our apparatus).

3. M. Demarçay has been good enough to examine the spectrum of our substance. The results are given in a note following this. M. Demarçay has found in its spectrum a ray which does not appear to be due to any known element.

These different reasons lead us to believe that the new radio-active substance contains a new element, to which we propose to give the name of radium.

We have determined the atomic weight of our active barium by estimating the chlorine in the anhydrous chloride. We have found numbers differing very little from those obtained with inactive barium chloride; however, the numbers for the active barium are always a little higher, but the difference is of the order of magnitude of experimental errors.

Uranium, thorium, polonium, and radium, and their compounds, render air a conductor of electricity, and

act photographically on sensitive plates. From these points of view polonium and radium are considerably more active than uranium and thorium. On photographic plates we obtain good impressions with radium and polonium in half a minute.

The rays emitted by compounds of polonium and radium render barium platinocyanide fluorescent. Their action in this respect is analogous to that of the Roentgen rays, but is considerably more feeble.

We thus realize a source of light, very faint, it is true, but functioning without a source of energy. There is here a contradiction, at least apparent, to the principle of Carnot.

Uranium and thorium under the same circumstances give no light, their action probably being too feeble. —Comptes Rendus.

A Cable Steamer for the Philippines.

The War Department has authorized the Quartermaster's Department to secure at once an iron ship of from 1,000 to 1,200 tons burden to lay cables to connect the islands of the Philippines.

The Current Supplement.

The current SUPPLEMENT, No. 1204, is a very interesting number. It is begun by "The Beginnings of Plastic Art in Europe," in which some curious archaeological specimens are presented and a recent book is reviewed.

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RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

SUGAR-CANE WAGON.—MARK R. SPELMAN, New Orleans, La. This vehicle has fifth-wheels connecting the vehicle-body with the front and rear axles.

PLANTER.—CHIEVER C. and LEMUEL S. CAVES, Fremont, Iowa. This planter is especially adapted for planting potatoes, and is so constructed that the potatoes are introduced whole into the planter and automatically cut into proper pieces and planted.

Bicycle-Contrivances.

BICYCLE OR SIMILAR MACHINE.—JOHN A. KELLY, Brooklyn, New York city. The bicycle of this inventor is driven by hand-power and is so constructed that both hands can be used at the same moment for driving and steering.

BELL.—ORVEY PRICE, Forty Fort, Penn. The purpose of this invention is to provide a bicycle-bell which is arranged to permit a rider to throw the bell into gear with one of the bicycle-wheels in order to sound the gong.

CHAINLESS GEAR.—KARMELL BROOKS, New York city. The bicycle-gear of this inventor is essentially a roller level-gear, the novel features of the device residing in the peculiar construction of the shaft.

of the frame, and to relieve the rider of the jar experienced when riding over rough roads. A novel brake is provided, which is applied by back-pedaling.

Mechanical Devices.

ALARM CLOCK.—ARTHUR C. REICHEL, Union Hill, N. J. To provide an alarm clock with two bells, differing in sound or pitch, and arranged that both alarms may be so sounded by one spring that one bell will ring alone for a short time, and then the two will ring together for a short time, is the object of the invention.

EXCAVATOR.—WILLIAM S. RUSSELL, Toledo, Ohio. This invention seeks to equip an excavator with an efficient device for supporting the front end of the machine and for turning the whole main car and frame completely around in order that it may work in both directions.

DISH WASHING MACHINE.—ROBERT R. PARRY and EDWIN EVANS, Poultney, Vt. The machine has a reservoir and cover therefor. Two carriers are mounted to rotate in the reservoir and cover, and are adapted to be raised and supported above the water in the reservoir.

MERRY-GO-ROUND.—PETER J. SPRACKLEN, Kenton, Ohio. This invention provides a game-attachment for merry-go-rounds, which attachment is so constructed that a number of figures or articles may be brought, at the will of the riders, into the path of the striking section of

a wind-engine or other form of motor for the purpose of determining how many, if any, of the figures or articles can be dislodged by the action of the motor.

MACHINE FOR SHAPING PLASTIC MATERIAL.—GUSTAV STOFF, Berlin, Germany. The machine is designed automatically to roll, form, and cut round-shaped pieces from rods of plastic material, such as march-pane, chocolate, caramel, and clay.

Railway-Appliances.

CAR-BRAKE.—ERNEST B. and ADOLPH L. GESCHE, Bingham Lake, Minn. The brake provided by this invention is controlled mainly from the draw-heads of the car and is applied upon the inward movement of the draw-heads, the movement being caused by the stopping of the locomotive and the bumping together of the several cars of the train.

GRAIN-DOOR FOR CARS.—BENJAMIN W. DAVIS, Rock Springs, Wyo. Vertical guideways are arranged adjacent to the door-opening, which guideways are continued at their upper ends by a curved portion and a horizontal portion having a drop at its inner end.

METALLIC RAILWAY-TIE.—GEORGE A. and THOMAS F. PENROSE and WILLIAM R. WARE, Meredith, Ark. The purpose of this invention is the provision of a tie, designed to be held in place without the use of spikes, the adjacent ends being fastened together without the use of fish-plates.

Miscellaneous Inventions.

ELASTIC TREAD HORSESHOE.—ARTHUR W. CROZIER and GEORGE SMITH, New York city. The

horseshoe is fitted hot to the hoof, so that the rubber pads will form part of the shoe, the pads being removable and being provided with side calks. The pads lie snugly in panels made in the bottom face of the shoe between the heel and toe calks, and are held in position by nails driven through the shoe.

AUTOMATIC LOCK FOR DUMB-WAITERS.—GUSTAVE SEABERG, Brooklyn, New York city. This invention seeks to provide a hoisting and operating mechanism which will hold a waiter at any point, and which will operate as well with the waiter supported from one side of the pulley as from the other.

ACETYLENE GAS-APPARATUS.—EUGENE BOURNONVILLE, Jersey City, N. J. This apparatus comprises essentially a generating-chamber, a gasometer, and automatic means for controlling the generation of gas. The generating chamber has a tapering bottom to permit the ready withdrawal of the lime residue, and is provided with a carbide-receptacle, wheel-like in form, and divided into a number of radial, carbide-containing compartments.

FOLDING BED.—JACOB LEVY, Brooklyn, New York city. The purpose of this invention is to provide a cheap and strong crib which may be made of iron and which may be readily folded into a small space.

SPECTACLE ATTACHMENT FOR EYEGLASSES.—JOHN J. MUNDORFF, New York city. It sometimes happens that, in violently moving the body, eyeglasses fall off. For this reason an attachment has been devised which can be temporarily secured to the glasses and which converts them into a pair of spectacles.

having jaws attached to their ends adapted to embrace the edges of the lenses. The spring arms are bent to one side, in opposite directions, so as to throw the jaws normally out of line with each other, the object being to enable the jaws to be firmly clamped upon the lenses.

CANOPY FOR BOATS.—JOHN C. HARLOW, Janesville, Wis. This canopy is so constructed that it can be secured at any desired distance above the gunwales or lowered in order to protect the cockpit when the boat is not in use. The canopy is made so that a half-section at either side may be raised to enable a person to enter or leave the boat.

WIRE-NETTING FOR USE IN MANUFACTURING PAPER.—KARL KUFFERATH, Mariaweller, Germany. The rapid wearing away of the wire fabrics used in carrying the films of pulp has been a great disadvantage in paper-manufacture. It is the purpose of this invention to overcome the difficulty, by providing a fabric having warp and weft threads, the warp-threads of which fabric are passed, with respect to the top of the fabric, over one weft-thread and under two of the contiguous weft-threads.

BOX-FASTENER.—RUDOLPH C. KUHN, La Crosse, Wis. The fastener is adapted to be applied partially to the body of the box and partially to the cover. The parts of the fastener are so applied that the cover may be quickly placed in position and securely locked and unlocked. The cover has at one edge bracket-carrying projections upon its inner face, one member of each bracket being adapted for engagement with the under surface of a cover-projection. The other member of the bracket is provided with a spur adapted to enter the end of the projection. A lug extending from the end of the lower member of each bracket and beyond the upwardly extending member engages a staple on the cover when the latch of the cover is in its full locking position.

SHUTTLE GUARD FOR LOOMS.—MAJOR T. MELVIN, Fall River, Mass. To provide a shuttle-guard which shall prevent the shuttle from leaving the loom, should it fly out of the shed, is the object of the present invention. The guard comprises brackets having apertures, a rod secured at its ends by the brackets, and a connecting-piece for the brackets formed at its ends with reduced extensions passing through the apertures in the brackets.

ADJUSTABLE CHAIR.—DAN E. CARTER, Traverse City, Mich. By the combination of a stationary frame and an adjustable frame, this chair is adapted for use as a lawn-chair, a reclining-chair, an invalid's chair, a couch, or a stretcher. The back, seat, and direct support for the lower limbs of the person occupying the chair are made of canvas, which, by means of a roller, may be placed under any desired tension.

COMBINED CLOTHES RACK AND CLOSET.—EUGENE CHRISTEN, Decatur, Ind. The combined clothes rack and closet has its back fastened to a support and provided with hooks. A shelf is supported from the back. Segmental doors hinged to the ends of the back abut against each other at their free ends. The top of the doors and the shelf are connected with a flexible cover. A mantle made of two pieces of fabric is attached to the doors.

COMBINED CANE AND FOLDING-CHAIR.—NIELS CHRISTIANSON, Brooklyn, New York city. Two half-tubes curved at one end to form a cane-handle or crook and hinged together, serve as the casing of the cane and the back of the chair. A seat-bar curved to lie in the crook of each half-tube extends down to about the middle of the tubes, and is pivoted to swing outward, being held in this extended position by a post adapted to lie within the tubes.

Designs.

CIGAR-COUNTER UTENSIL.—WILLIAM E. PARSONS, Jr., New York city. This design provides a box of cigars supported by a standard, an alcohol lamp, before which are placed two cigar-lighters, and a cigar-cutter situated in front of the casings of the cigar-lighters.

GAME-BOARD.—SIMON M. LUTZ, Bedford, Pa. This game-board is an ordinary checker-board, having an additional row of squares running both vertically and horizontally at the center of the board. These additional rows are red in color and constitute a red cross. When upon the red cross, a player is upon neutral ground, as it were, and cannot be taken; he has, moreover, other privileges which may be decided upon before the game.

CLOCK-BACK.—NATHAN L. WHEDON, Everett, Wash. The leading features of the present design consist in an offset on the back and in star ornaments of the surface.

COVERED DISH.—ADOLPHE PAROUTAUD, New York city. The body of this dish has an upward swell, the upper portion of which is interrupted by embossed ornaments. Ribbon-like handles are provided for the body and the cover.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for 10 cents each. Please send the name of the patentee, title of the invention, and date of this paper.

NEW BOOKS, ETC.

MILITARY NOTES ON THE PHILIPPINES. War Department, Washington, D. C.: Adjutant-General's Office. November, 1898. Pp. 309. 8vo.

An excellent collection of notes compiled from the best data supplied by the military map of the island of Luzon, plans of the cities and charts of the bays, harbors, and Luzon.

BUSH FRUITS. By F. W. Card. New York: Macmillan Company. 1898. Pp. 533. 113 illustrations. 12mo. Price \$1.50.

This is the sixth volume of what is known as the "Rural Science Series," which is intended to include books which state the underlying principles of agriculture in plain yet scientific language. They are suitable for consultation alike for the amateur and professional

tiller of the soil, the scientist or the student. They are edited by L. H. Bailey, of Cornell University, N. Y., which is in itself sufficient guarantee of the excellence and accuracy of the volumes. The book before us is most valuable, and it is an extension of the thesis presented to Cornell for the degree of Master of Science and Agriculture. The author was a bush fruit grower before he was a university student. He is now Professor of Horticulture in the Rhode Island College of Agriculture and Mechanical Arts, so that in this instance an ideal combination of the practical man and the scientist is consummated.

BOILERS AND FURNACES. Considered in Their Relations to Steam Engineering. By William Barr. Philadelphia: J. B. Lippincott Company. 1899. Pp. 405, 468 illustrations. 8vo. Price \$3.

It is a pleasure to examine a technical book which is gotten up in such excellent form as the present work. The page is large, the type is clear, the illustrations lucid, the text and the tables are valuable. The author is already well known in steam engineering; so that he hardly needs the present book to assure the reader of his professional standing. No one is better qualified to treat of the subject. The book is of great value, and will be warmly welcomed by all who are interested in manufacturing or using boilers. It is a book we heartily recommend to the mechanical engineer.

COTTON. By C. P. Brooks. Lowell, Mass.: C. P. Brooks. 1898. Pp. 362. 8vo. Profusely illustrated. Price \$3.

The present volume deals with cotton—its use, varieties, fiber, structure, cultivation, and preparation for the market and as an article of commerce; also the manufacture of the cotton seed, and fertilizers, with a special reference to cotton growing, ginning, and oil pressing in the United States. The author was formerly the Director of the London Technical School and is a recognized expert on the textile industry, both in the United States and in England. Cotton is the greatest of all fiber products, and the present volume deals in a thoroughly scientific manner with the interesting problems which the growing, ginning, and shipping of cotton involve. The volume might readily have been made dull and uninteresting, as books on textiles are almost sure to be, but instead it is filled with interesting illustrations and is printed in clear type, admirably illustrated by high class engravings, although some of the engravings of the machines show their origin, the trade catalogue. The text is interesting even to the general reader, and we do not see how anyone who is interested in any way in the cotton industry can fail to own this really important volume.

PRISMATIC AND DIFFRACTION SPECTRA. Memoirs by Joseph von Fraunhofer. Translated and edited J. S. Ames. New York: Harper & Brothers. 1898. Pp. 68, plates. Price 60 cents.

Fraunhofer in 1814 worked independently of Wollaston, and discovered the lines in the solar spectrum which now bear his name. The paper of Fraunhofer in which he describes the results of his experiments is printed in full in this volume. The great merit of Fraunhofer's work is the systematic, logical method by which he proceeds from investigation to investigation. All modern work in spectroscopy is based upon that of Fraunhofer, and a brief bibliography of the most important contributions is appended to this volume. We believe that this is the first volume of "Harper's Scientific Memoirs" we have reviewed. A number of volumes are in preparation which will deal with original memoirs by celebrated physicists.

THE FREE EXPANSION OF GASES. Memoirs by Gay-Lussac, Joule, and Joule and Thomson. Translated and edited by J. S. Ames. New York and London: Harper Brothers. 1898. Pp. 106. Price 75 cents.

The present volume is another one of "Harper's Scientific Memoirs," and the remarks made above upon the importance of series of this kind are borne out by the work before us. The papers are accompanied by biographical sketches of Gay-Lussac and Joule. They will prove of great interest to the physicist.

FOWLER'S MECHANICAL ENGINEERING POCKET BOOK FOR 1899. By William H. Fowler, A.M.I.C.E. Manchester, England: Scientific Publishing Company. 1898. Pp. 324. 18mo. Price 60 cents.

The author is the editor of The Mechanical Engineer, which, though started only a short time ago, has already shaken up the dry bones of English technical journalism. There was an ample field for this newspaper in England, and we feel sure there will be for this new pocket book, which is certainly published in a cheap and useful form. There must be some reason at the present time for the infliction of another pocket book, but the quality of the little volume before us is sufficient to demonstrate its right of existence. Though not as expensive as many of the English pocket books, it is doubtful if any of them will prove of more value to the mechanical engineer. It is a book which we heartily recommend.

SEWERAGE. THE DESIGNING, CONSTRUCTION AND MAINTENANCE OF THE SEWERAGE SYSTEM. By A. Prescott Folwell. New York: John Wiley & Sons. 1898. Pp. 381. 8vo. Price \$3.

For a number of years the author has been looking for the appearance of a work on sewerage which should embody the most recent data and ideas relating to the subject and treating of both the combined and supply systems in a comprehensive manner, recognizing the fact that such a work is needed by engineers and engineering schools. We have also looked for a work of this class, and it has not been forthcoming. In view of this fact, the author has undertaken the task of supplying the deficiency. While primarily intended for practicing engineers, the work has also been arranged with the idea that it may be useful as a text book. The book will interest many engineers who have desired a really modern book on sewerage.

Business and Personal.

The charge for insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue.

Marine Iron Works. Chicago. Catalogue free. "U. S." Metal Polish. Indianapolis. Samples free. Gasoline Brazing Forge, Turner Brass Works, Chicago. Yankee Notions. Waterbury Button Co., Waterbury, Ct. Handle & Spoke Mch. Ober Lathe Co., Chagrin Falls, O. For bridge erecting engines. J. S. Mundy, Newark, N. J. Astronomical Telescopes, Lohman Bros., Greenville, O. FERRACUTE Machine Co., Bridgeton, N. J. Full line of Presses, Dies and other Sheet Metal Machinery. Inventions developed and perfected. Designing and machine work. Garvin Machine Co., 141 Varick St., N. Y.

The celebrated "Hornsbly-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 138th Street, New York.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4. Munn & Co., publishers, 361 Broadway, N. Y.

For Sale or Royalty, United States Patent No. 617,649. Improved Ice Skate. See cut and description on page 52, this issue. C. F. Filor, care S. S. Moore, Trenton, N. J.

Roche's "New Standard" Electric Necktie Pin. Works like a charm. Midget Battery. The electric light is a beauty and a wonder. Sent postpaid for \$1.00. Agents wanted. Wm. Roche, 259 Greenwich St., New York.

Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway New York. Free on application.

Notes & Queries

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.

(7576) J. A. W. asks: 1. Which is the better way to make core of induction coil—of disks of soft iron and tissue paper like an armature core or to make it of small iron wire? A. The core of an induction coil is arranged so that it can be magnetized lengthwise as easily as possible. It is therefore made of wires extending through it lengthwise. These are shellacked to prevent magnetic continuity through the mass crosswise, so that each wire shall act alone. In the armature core of a dynamo the object is to have the magnetic flux crosswise. Hence, disks of sheet iron are used, and the flow of magnetism lengthwise is prevented by disks of paper. These arrangements cannot be interchanged. Both coil and dynamo would be ruined. 2. Is there any advantage in shellacked wire over bare wire? A. Yes; it insulates the wire. 3. Have you any back numbers with a good article on coil making? A. A good coil giving a 6-inch spark is described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 1124. A smaller coil is to be found in SUPPLEMENT, No. 160, price 10 cents each.

(7577) J. H. B. asks: 1. Can you tell me how to make a primary battery that will give eight volts and three amperes for lamp work, and that can be built and run at a reasonable price? A. Five cells of bichromate plunge battery will give you this current. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 792, for plans and description of this battery, price 10 cents. 2. Can you give me any information or reference where it can be found in regard to photographing an eclipse of the moon? A. Lunar photography is not different from any other astronomical photography. A good equatorially mounted telescope with clock work is required. Attach a camera in place of the eye piece and expose as for any other photograph. We fail to see what advantage there is in photographing the moon in eclipse, since there is less light then than at other times, and the moon has little light at best. Todd's "New Astronomy," price \$1.50, will give you simple instructions for celestial photography.

(7578) J. T. F. writes: Five dynamos, each of 20 lights, are run by five different engines. Can the current from these five machines all be turned into one line and run 100 lights? If so, supposing that one of the machines is weak or gets out of order and fails to generate a current, are there devices made that will cut it out of the circuit without injury to it or the others? A. The five dynamos supposed in your query may be connected in parallel to the line, and each will send its current of the same voltage into the line. Such an arrangement is not to be approved. There are numerous automatic cut-outs on the market for breaking circuit, should anything whatever happen to one of the machines.

(7579) F. A. B. asks: Would it not be just as well to use a solid iron hoop in place of the iron wire ring for the armature core of the motor and dynamo described on pages 497 to 508 of "Experimental Science"? A. A wrought iron ring may be used in place of the wire ring of simple electric motor as an armature core.

(7580) E. M. M. asks: How can I construct a resistance coil so as to reduce a current of 150

amperes to 8 or 9 amperes, so I can charge a storage battery by attaching to the incandescent line? Or give me some simple method of accomplishing this. A. If you wish a current of 9 amperes, divide the voltage of the current by 9. The quotient is the number of ohms of resistance required. You do not tell us the voltage, nor do you give the number of cells in the battery to be charged—both absolutely necessary to be known to solve your question. See answers to query 7232.

TO INVENTORS.

An experience of fifty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

JANUARY 17, 1899,

AND EACH BEARING THAT DATE.

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

Table listing inventions with patent numbers and names of inventors. Includes items like Alarm, Bag filler, Bicycle pump, and various mechanical devices.

(Continued on page 62.)