(7350) W. B. B. asks (1) how to make or where to get the bichromate cell spoken of in the article "How to Make a Medical Coil," by S R. Bottone, in SUPPLEMENT, No. 569. A. SCIENTIFIC AMERICAN SUPPLEMENT, No. 792, price 10 cents, describes with full detail and drawings the bichromate cell, so that any one can make it. 2. Would any good battery do? If so, what voltage will it require? A. Any good battery will do. The bichromate cell has 1 8 volts. 3. Would the Mesco dry battery do? A. You will require two Mesco or other dry or Leclanche cells to equal one bichromate cell. A dry battery will not work the coil as well as a gravity or bichromate battery will do it.

(7351) W. G. H. asks: 1. What is the best battery for running a miniature electric locomotive, for about an hour at a time? A. Use either a gravity or a bichromate cell. 2. For a 75 foot telephone line do I need a battery at both ends? If so, how shall I connect them to the line? A. If you have a permanent magnet telephone, you can use it without any battery. The carbon transmitter requires a cell for its primary coil at each end.

(7352) J. H. T. asks for information about reading telescopes such as are used with reflecting galvanometers, etc. I would like to know lens system and details of construction. A. A reading telescope is a small astronomical or inverting telescope. Many of them are ordinary spy glasses with the erecting lenses removed from the inner tube. Such a spy glass can be bought for a couple of dollars with an object glass about 1¼ or 1½ inches in diameter. Mount this on a convenient stand and attach the scale below the telescope. The figures on the scale must be reversed so as to be turned around and stand right after they are reflected by the mirror of the galvanometer. The object glass should be an achromatic lens of 8 inches to 9 inches focus and the eye piece a positive eye piece of about 2 inches focus. These require the tube to be 10 inches to 11 inches long when adjusted for focus.

(7353) E. G. asks what kind of an attachment to put on a common turning lathe for turning round balls. A. As you do not state the kind of balls—wood or metal—we give the process for turning wooden balls and billiard balls. First, turn by a template or gage or by caliper, as nearly spherical as possible. Then make a chuck of wood and fasten it to the mandrel in any way the most convenient. Turn out the chuck hollow so that the ball will enter nearly half a hemisphere. Chuck the ball at right angles to the position that it was first turned in. Turn off the outside or projecting part true by nearly obliterating the lines of the first turning, then rechuck and turn the otherhemisphere. If great nicety is required, as in billiard balls, you will have to continue the chucking in several other positions and turn very carefully with curved tools. A little chalk in the chuck will help the ball to stick. If you have difficulty in holding the ball in, you may put a small false center against the ball, made of iron, with a thin piece of leather waxed upon it to prevent scratching. If this is done nicely, you may do the work without chucking the ball so deep.

(7354) L. H. M. writes: 1. The safety valve of a boiler becomes coated with lime. The boiler never foams. How and by means of what force does it get there? A. Whenever the safety valve blows off, the water beneath is agitated and small particles are lifted and blown through the safety valve. A boiler always foams when it is making steam. The space just above the water line is filled with a water mist raised by the liberation of the steam below the surface, which, on passing the surface, breaks the water in a mist or small particles of water—this is called wet steam—which may be drawn from any boiler having too little steam room. 2. Stand on the opposite side of a darkened room from a lighted lamp. Take a glass mirror and look slantingly across it, so that you can see the several (7 or 8) images produced by multiple reflection. If the brightest image is at the top and the others grow dimmer as you descend, change the mirror end for end, so that you look across it in the opposite direction to which you did at first. The brightest of the several images is now at the bottom and the others get dimmer as you ascend. Will you please explain how changing the mirror inverts the order of the images? A. Some defect in the surface of the mirror produces the change described. A perfect mirror gives the same quality of image in any direction.

(7355) C. E. P. writes: 1. I have a small dynamo that I would like to know what the voltage would be speeded to 2000; dimensions as follows: Field magnet 17½ inches long, 3 inches wide, ½ inch thick, 70 turns of No. 16 wire to each layer, and there are 32 layers, making 2,240 turns in all. Drum armature. The armature is 4 inches in diameter, 3 inches long, eight sections, wound with No. 18 wire, two layers, making in all 400 turns. A. About 30 volts, if your field is cast. If wrought iron, it would be 40 volts. 2. Would this machine make a sufficient exciter for an alternator of the following dimensions for 55 or 110 volts? Ring for fields inside 16 inches in diameter, with 12 poles and about 4 inches wide, armature 10 inches in diameter. A. Yes. 3 What size wire for this machine to get 110 volts? A. Use No. 16 for field and No. 18 for armature.

(7356) C. A. B. asks for a description of a battery to light from one to five 16 candle power lamps. A. You cannot, except at very great cost, light 16 candle power lamps by a battery. In addition to the materials, it would require one man's labor to keep the battery in proper order. Only very small lamps. 1 to 5 c. p., are ever lighted by batteries, and these more for some especial use, such as lighting a microscopic object, than for either quantity of light or economy.

(7357) C. W. R. asks: 1. What is the difference between an induction coil and an intensity coil? A. We do not know just how the name "intensity coil" may have been used in the place where you saw it. It might be used for an induction coil in which the voltage is raised, as in the Ruhmkorff coil, in distinction from one in which the voltage is lowered and current increased as in an ordinary transformer. 2 How could I wind the dynamo described on page 494, "Experimental Science," for the highest possible voltage and how many volts and amperes would I get? Also, could I use the same for electroplating, introducing resistance enough? A. Wind it like the hand power dynamo, page 487, same volume, and you will have twelve volts and perhaps three amperes. You cannot then use it to advantage for plating; the current is very small. Still, if you put in resistance in the external circuit, it will plate slowly. 3. Would the above dynamo be more powerful if the armature was the same style as the one for the simple electric motor, and if so, what size wire would it be wound with? A. No. There is not room for such an armature between the poles. 4. What would be the voltage and amperage of the above dynamo if the field were excited with two Samson batteries? A. It would make little difference and there would be no use in exciting the fields by external current when the machine can excite its own fields. You can, however, do it if you wish. 5. What voltage and amperage are No. 2 Samson batteries? also of Mesco dry batteries when new? A. All forms of Leclanche cells have about 1½ volts. Their amperes depend on the resistance of the external circuit. On short circuit they might show six to ten amperes, but could not deliver so much beyond a few seconds. They would polarize immediately.

## NEW BOOKS, ETC.

FOURTH ANNUAL REPORT OF THE COMMISSIONER OF PUBLIC ROADS. For the Year ending October 31, 1897. Issued under the Authority of Henry I. Budd, Commissioner of Public Roads. Trenton, N. J. 1898.

This is an interesting pamphlet which shows the badness of some roads in the State and the improvements which have been effected in them. The State of New Jersey may well be proud of her splendid network of roads which renders driving and wheeling in many districts delightful. The pamphlet contains several studies on road building which ought to prove of value to all those who are interested in good roads.

A PRIMER OF PSYCHOLOGY. By Edward Broadford Titchener. New York: Macmillan Company. 1898. 12mo, pp. 314. Price $1.

In the last few years psychology has come prominently to the front as a study which should be taught in all high schools and colleges. The author outlines with as little of technical detail as is compatible with accuracy of statement the methods and results of modern psychology, and the reader is stimulated by means of questions and exercises upon the subject matter of the chapters to refer to more advanced treatises. The subject may be introduced either by way of a general account of scientific study or by the way of brain anatomy or brain physiology. The book seems to be admirably adapted for the purpose for which it is intended.

HAWAII'S STORY BY HAWAII'S QUEEN LILIUOKALANI. Illustrated. Boston: Lee & Shepard. 1898. Pp. viii, 409. Price $2.

The present work is an autobiography of Hawaii's late queen. It is particularly timely in view of the probable annexation of Hawaii to the United States. As might be supposed, Queen Liliuokalani, in detailing the events of her life, protests against the revolution which deprived her of her throne and answers the slurs of her adversaries. She throws a new light on the manners and customs of this strange people and the book offers interesting reading. The work is an important contribution to the history of the Hawaiian revolution and the causes which led to it, and the treaty of annexation now pending before the United States Senate, and ought to command considerable attention from the reading and thinking public. The book is handsomely made and is well illustrated by half-tone engravings.

THE ART OF GETTING RICH. By Henry Hardwicke. New York: The Useful Knowledge Publishing Company. Pp. 294. Price $1.50 cloth, 50 cents paper.

The present work tells how fortunes were made in the middle ages and how they are made to-day, as well as sundry hints of how to succeed in business. We are constrained to observe that we do not believe that fortunes can be made by the instructions which can be gotten from this or any other book, but a diligent study of it would tend to inculcate that thrift which has been the basis of nearly all of the large fortunes.

THE REPORT OF THE SUPERINTENDENT OF THE UNITED STATES COAST AND GEODETIC SURVEY. Showing the progress of work during the fiscal year ending with June, 1896. Washington: Government Printing Office. 1897. Pp. 772. Quarto, 19 maps.



# INDEX OF INVENTIONS

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### AND EACH BEARING THAT DATE.

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Pump, diaphragm, N. A. Wahtola ..... 598,830
Punches and dies, manufacture of, S. D. Hartog, Jr ..... 598,867
Purins, making, E. Fischer ..... 598,502
Puzzle, C. W. Carter ..... 598,855
Puzzle, E. T. Young ..... 598,889
Puzzle card and picture exhibiter, M. Rosenzweig ..... 598,537
Pyroxylin compound, R. C. Schupphaus ..... 598,648, 598,649
Rack. See Kettle rack.
Radiator, electric, J. F. McElroy ..... 598,639
Rail joint, bridge, O. T. Bedell ..... 598,844
Railway, electric, M. T. A. Kubierschky ..... 598,731
Railway gate, J. W. Parsons ..... 598,605
Railway switch, automatic, J. H. Garner ..... 598,626
Railway tie, combination, W. F. Bond ..... 598,764
Railway tie, metal, P. Bogler ..... 598,692
Rake, F. J. Aubeuf ..... 598,690
Rasp cutting machine, J. Turner ..... 598,585
Ratchet wrench, J. Gilbertson ..... 598,669
Receptacle for packing and forwarding provisions, R Amsnick ..... 598,757
Reciprocating engine, K. F. W. Henschel ..... 598,515
Refrigerating apparatus, H. Auman ..... 598,621
Refrigerating machine, M. Reid ..... 598,814
Register. See Cash register.
Regulator. See Feed water regulator.
Rheostats, electric heaters, etc., manufacturing, H. W. Leonard ..... 598,568
Ring. See Napkin ring.
Rotary engine, W. Aab ..... 598,619
Rotary engine, Locke & Anderson ..... 598,793
Rowlock, J. J. Connell ..... 598,595
Rubber treating, B G. Work ..... 598,550
Ruler, section, F. B. King ..... 598,875
Sandpapering machine, C. H. Driver ..... 598,671
Sash balance, H. A. Pischke ..... 598,574
Sash balance and fastener, Wallace & Hilton ..... 598,880
Sash fastener, B. F. Cornell ..... 598,696
Sash fastener, W. Zaehringer ..... 598,756
Sash lock and lifter, P. Marshall ..... 598,797
Sash, window, A. Ruman ..... 598,644
Saw, scroll, A. Jones ..... 598,729
Seaweed, treating, A. Krefting ..... 598,790
Seat. See Vehicle seat.
Seat, Cadman & Malley ..... 598,557
Separator. See Steam separator.
Sharpening machine, knife, Nielsen & Thomsen ..... 598,806
Shelf support, J. H. Ostertag ..... 598,742
Ship fog dispelling apparatus, H. N. H. Lugrin ..... 598,636
Shovel and sifter, L. D. McElroy ..... 598,739
Skirts, etc., device for suspending or holding, B. M. Peach ..... 598,573
Smelting furnace, J. Kennedy ..... 598,709
Soda fountain cooler, H. J. Allen ..... 598,551
Soldering machine, can, E. P. Holden ..... 598,565