the soldering tips cheaply replaced. The core for the coil is so constructed that acid from the sealing tip cannot reach it to scale off the metal and short-circuit the wire wound adjacent to the core. A mica insulation is furnished between the layers of the coil.

WATER COOLER OR HEATER .-- J. H. ROSE, Shreveport, La. The inventor claims in this device an improvement in apparatus for cooling and heating water and the like, and the invention relates particularly to coolers and heaters in which the heating or cooling medium is placed within an air-tight can and the can immersed in the liquid to be heated or cooled.

SHUTTER-WORKER .- J. H. Rose, Shreveport, La. Mr. Rose in this case makes an improvement in that class of shutter-workers which are adapted to be operated from the inside of a building. The apparatus is very easily operated for opening or closing the shutter and it consists of few parts, which are not liable to get out of order. It may be easily applied to window-frames and shutters by boring through the window-sill and then applying the several parts.

PACKING-BOX .- J. H. ROSE, Shreveport, La. The purpose of this invention is to complete an improvement in the covers and coverfastenings of packing or shipping boxes. The covers are preferably constructed of sheet metal for the sake of economy in manufacture and of space in the box and also reduction of weight, and the invention relates in particu-lar to the construction of the cover proper, whereby the fastening is formed.

BOTTLE CLOSURE .-- C. W. SCOTT and H. HUGHES, Saratoga, Wyo., and C. E. SHIPLEY, Denver, Col. The closure consists of a plug having an interior chamber with outlet at the bottom. A ball-valve operates in the chamber and normally closes this outlet; but when the bottle is tipped the valve opens, permitting the contents of the bottle to flow into the chamber, whence they pass out of the bottle through a discharge passage in the plug.

SUSPENDERS .-- M. GLUCKAUF, New York, N. Y. In these shoulder straps the web is in one piece. A specially constructed back-piece holds the web so that a strap will be in position over each shoulder. When the strap or web passes over the plate the suspenders will be flat and comfortable. Means are provided which serve the dual purpose of a buckle for the web when used as a belt, and for connecting the front suspender-ends with the webs. These means are concealed in the button loops through which the ends pass and have play. The suspenders may be readily converted into a belt.

SILK-HOLDER.-S. V. LUALLEN, Alva, Oklahoma Ter. The purpose in the present improvement is to provide means especially adapted to be attached to tooth-brushes and by which silk or the like may be held taut, so as to be useful in cleaning the teeth. The inven-tion comprises means for carrying the silk in or on the handle of the brush or other supporting part and a bow for holding a part of the cord extended in position to be used.

SHADE-HOLDER.-C. J. KUSCHE, Oshkosh, Wis. Comprised in this invention is a certain specially-formed gripper for engaging a lamp. The gripper carries an adjustable arm, which in turn supports a frame or holder for the shade. This shade may consist of a cardboard or material of any degree of opacity. It may be either plain or ornamented, and owing to the construction provided, the shade may be made to occupy exactly the position desired. PERPETUAL CALENDAR.-W. M. FINCH, Willow, Cal. By a novel construction and com-

bination of parts, Mr. W. M. Finch is to provide a simple formation of a perpetual calendar which can be easily read and operated and which can be adapted to a pen holder, a pencil, or other cylindrical support or which can be used flat, as desired.

CANVAS-STRETCHER.--W. J. DORGAN. Chicago, Ill. The object in view in this invention is to provide a canvas-stretcher perfectly true, not liable to get out of shape, requiring no truing up before or after mounting the canvas thereon, and maintaining the canvas after the painting is finished, in the proper shape, thus requiring no remounting previous to se curing the painting and its stretcher in a suit able frame.

Business and Personal Wants.

READ THIS COLUMN CAREFULLY,-You will find inquiries for certain classes of articles numbered in consecutive order. If you manu-facture these goods write us at once and we will send you the name and address of the party desir-ing the information. In every case it is neces-sary to give the number of the inquiry. MUNN & CO.

Marine Iron Works. Chicago. Catalogue free. Inquiry No. 4084.-For dealers in gun metal.

AUTOS .- Duryea Power Co., Reading, Pa.

Inquiry No. 4085.—For makers of nose and mouth protectors to keep out dust.

For mining engines. J. S. Mundy, Newark, N. J. Inquiry No. 4086.-For a reversible marine clutch for explosive engines.

Morgan Emery wheels. Box 517, Stroudsburg, Pa.

Jaquiry No. 4087.-For makers of steam turbines of 11 to 20 or 30 h. p. "L. S." Metal Polish. Indianapolis. Samples free.

Inquiry No. 4088.-For makers of metal grille for fly screens.

Coin-operated machines. Willard, 284 Clarkson St., Breeklyn

Inquiry No. 4089.-For makers of kilns for burn-ing lime from limestone.

Blowers and exhausters. Exeter Machine Works, Exeter, N. H.

Inquiry No. 4090 -For makers of traction en-Handle & Spoke Mchy. Ober Mfg. Co., 10 Bell St.,

Chagrin Falls, O.

Inquiry No. 4091.-For manufacturers of ma-chines for making paper tubes. Mechanics' Tools and materials. Net price catalogue.

Gee. S. Comstock, Mechanicsburg, Pa. Inquiry No. 4092 .- For blue prints of one horse power stationary engines.

Sawmill machinery and outfits manufactured by the

Lane Mfg. Co., Box 18, Montpelier, Vt. Inquiry No. 4093.-For a large gasoline stove for heating a one horse power boiler.

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

Inquiry No. 4094.-For makers of collapsible metal tubes for holding polish, etc.

Gear Cutting of every description accurately done. The Garvin Machine Co., 149 Varick.cor. Spring Sts., N.Y. Inquiry No. 4095.-For a rotary fan run by clock ork.

PATENT FOR SALE .- The smoothest cork extractor ever invented. No screw. R. M. Prather, Clarendon, Tex.

Inquiry No. 4096.-For parties engaged in diffi-cult chilled casting work.

American Institute of Inventors Co., Inc'd., Buffalo, N. Y., U. S. A. Patents sold, placed on royalty and companies formed.

Inquiry No. 4097.-For makers of machinery for making potate starch. WANTED AT ONCE .- Circulars and pamphlets of gold

mining and retining machinery. 1. H. Dalez, 33 Pleas-ant Street, Dorchester, Mass.

Inquiry No. 4098.-For makers of self-cleaning curry combs.

Manufacturers of patent articles, dies, stamping tools, light machinery. Quadrig: Manufacturing Com-pany, 18 South Canal Street, Chicago.

Inquiry No. 4099.—For advertising noveltie suitable to advertise medicines. 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. 4100.-For makers of gas flxtures, chandelier hangings, etc. The largest manufacturer in the world of merry-go

rounds, sheeting galleries and hand ergans. For prices and terms write to C. W. Parker, Abilene, Kan. Inquiry No. 4101.-For machinery for cutting

Experienced mechanical draughtsman wanted. Permanent employment assured to rapid and accurate

draughtsman. Mili Work. Box 773, New York. Inquiry No. 4102.-For makers of table tennis supplies, such as balls, rackets, etc.

The celebrated "Hernsby-Akreyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 138th Street, New York. Inquiry No. 4103.-For dealers in glassware to make a special bottle.

The best book for electricians and beginners in elec. tricity is "Experimental Science," by Gee. M. Hepkins. By mail, \$5. Munn & Co., publishers, 361 Breadway, N.Y. Inquiry No. 4104.-For a machine for ripping stitches in seams and hems of bags.

Contract manufacturers of hardware specialties, machinery stampings, dies. tools, etc. Excellent marketing connections. Edmonds-Metzel Mfg. Co., 778-784

W. Lake Street, Chicage. Inquiry No. 4105.-For full information of motor cars, wagons and busses, as to size, capacity, weight, power, speed, cost, etc.



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 letter or in this department, each must take his turn.

Buyers wishing to purchase any article not adver-tised 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.

(8964) F. R. asks: I have a small battery motor which runs perfectly on one or a number of dry cells, or a sulphuric acid battery, and I put four gravity cells on, so it would be on closed circuit, and it would not move it. What is the trouble? A. We do not know why your motor would not run with four gravity cells when one dry cell will run it. The fault would naturally be sought in the gravity battery. 2. Can you give me a formula for making a good battery that would drive this motor for three or four hours or on closed cir-cuit, other than bluestone? A. For a good battery to drive a motor see SUPPLEMENT, No. 792, in which plans and drawings are given for such a battery. 3. How long will a Mesco dry battery last closed? A. A dry cell does not last long on closed circuit.

(8965) H. P. D. asks: Could you, or any of your readers, please explain the following results, obtained with an electric light generally the case, the following is certain and with a broken filament, and an induction coil giving one-fourth-inch sparks? When the current was too weak to produce any light in the globe, the approach of a strong horseshoe magnet caused a light in the tube, varying in intensity with the position and strength of the magnetic field. When only one terminal was connected to the coil, a faint light was produced. On touching the globe with my hand, the light greatly increased, and the place touched was surrounded by a bright spot, a dark band, and then a brighter band. A slight spark could be obtained from my finger to the glass if the other hand touched the other terminal of the coil. A. The experiments you describe are due to the fact that an electric light bulb is a vacuum tube, either a Geissler or a Crookes tube, according to the perfectness of the exhaustion. When brought into the field of a electro-magnetic coil, the tube fills with light, as you have observed. All lamps will not act in this manner. In the early days of the use of X-rays, some lamps were found which could be used for taking photographs by X-rays. These had a very high vacuum.

(8966) W. D. A. says: Can you give me any information concerning a water telescope? A. A water telescope consists of a tube of wood or of metal, closed at one end water-tight by a plate of glass. Plate or good window glass will answer the purpose. This is placed in the water, open end down, and by looking through the glass top of the box, one can see very distinctly to quite a depth; hence the name, water telescope. The apparent opacity of water is largely due to the ripples upon its surface, which break up the waves of light and prevent their accurate transmission from below. The surface of the water within the box is smooth and the glass top is through the box to the eye undisturbed. Such a box to be held over the side of a boat may be three or four feet long and six inches square in section, so that both eyes can look into it at once with ease.

rails of the double track. This effect is greatest by Presidents of the United States. Valentine's glass? It is admitted that the heat from the at very high speed, and at 50 to 60 degrees Manuals of the early 40's. Correspondence solicited. sun does pass through glass, but "A" contends sun does pass through glass, but "A" contends to nothing at the equator. This is caused by that the rays of heat from an oil lamp or an the differential velocity of the earth's surface, open wood fire will not pass through glass. If which a train meets and which bears the track sun heat only passes through glass, why? against the wheels on the west side when rundo not wish to know if glass conducts or radining south; on the contrary, when running ates heat, but whether glass is transparent to north, the train is running toward a decreasing artificial heat, and in what degree. A. Heat velocity of the earth's surface, and is borne lays of all wave lengths may pass through against the east rail. glass, but not equally. The longer wave lengths (8971) C. M. E. asks: 1. How can are cut off by glass much more than are the shorter wave lengths. Heat from any luminous I make a good, strong baking powder that will source passes easily through glass. The contennot cake in tins? A. For baking powder, mix tion of "A" that heat from an oil lamp can-80 parts dry bicarbonate of soda and 180 parts of cream of tartar. To the mixture add about not pass through glass is not well taken. He cannot say that he never felt heat which had 20 per cent to 25 per cent of starch : the object of the starch is solely to prevent caking and deterioration. 2. What is the formula for a passed through a lamp chimney, or that a thermometer would not rise if held near the glass chimney of an oil lamp. A window pane in strong liquid bluing? A. For liquid bluing: the same way cannot cut off all the heat of a a. Dissolve indigo sulphate in cold water and wood fire. filter. b. Dissolve Prussian blue by digesting F. I. G. writes further: Your kind favor with one-eighth its weight of oxalic acid in of the 13th is at hand and the answer is as I water solution. c. Dissolve 1½ parts of indige supposed. "A," however, is not satisfied. He carmine in 15 parts of water; add ¾ part gum says the heat from a lamp chimney is radiated. arabic.

May 2, 1903.

He also states that you do not dare publish the

answer and query in the Scientific American. Your friend "A" is certainly very poorly in formed upon the literature of this subject, if he supposes that our answer to your inquiry so differed from the text books and commonly received opinion of scientific men that we dared not print it in our columns. A very small portion of the hundreds of letters received and answered each week can be printed. The SCIENTIFIC AMERICAN would be filled with letters, should all be inserted. Only those are published which seem to have general interest. However, for the satisfaction of "A" we publish both inquiries. He will find in Ganot's Physics, 15th edition, price \$5, page 425, the power of heat to pass through bodies "differs greatly with the radiation from different sources. Rock salt is here stated to transmit all kinds of heat with equal facility, and is the only substance which does so. Fluor spar transmits 78 per cent of the rays from a lamp, but only 33 of those from a blackened surface at the boiling point of water. A piece of plate glass one-tenth of an inch thick, and perfectly transparent to light, is opaque to all radiation from boiling water, transmits only 6 per cent of the heat of copper at 850 deg. Fahr. and 39 per cent of that from an oil lamp without a chimney." These results were attained by Melloni, who died in 1854. They have never been disproved nor doubted by scientific men. With higher degrees of temperature than can be given by a lamp, Tyndall carried the subject much farther. These researches may be found in his book "Heat as a Mode of Motion," price \$2.50. The general subject is "diathermancy." We have many times lighted a match by heat rays which had passed through several lenses of the stereopticon and through iodine dissolved in carbon bisulphide, none of which were made hot by the heat rays. They were brought to a focus by the lenses and the heat without light was able to set the match on fire. This beautiful experiment we owe to Prof. Tyndall. It is not true that these heat rays were absorbed by the lenses and radiated on their farther side.

(8968) E. G. A. gives the following recipe for removing indelible ink stains: If the base of the ink is nitrate of silver, which is easy. Paint the ink stains with tincture of iodine, and after a minute or two wash out the stain, iodine and all, with stronger ammonia or a strong solution of hyposulphite of soda. The iodine simply creates iodide of silver, which is easily soluble in either of the above solutions. It works especially well in nitrate of silver stains upon the flesh.

(8969) H. D. H. writes: 1. Please inform me how to make a liquid glue suitable for mountaing photographs which have . a "glace" finish. The directions say : "Brush the backs with a very thin solution of pure white glue." I would like to know how to prepare such a solution that would remain liquid. A The mountants for photographs which do not affect the gloss of the front are usually made of gelatine or of white glue. They do not remain fluid, but are placed in a dish of warm water and melted before The warm glue is applied rapidly use. with a brush, and the print must be in its place before the glue sets. 2. Is Sirius, the great dog star, variable? I notice this winter it does not appear nearly so large and bright as it did last year. A. Sirius is not a variable star in the sense that one can with the eye tell that it is dimmer this year than it was last. It has a dark companion. The system revolves once in 52 years. This companion was first seen by the late Alvan Clark, Jr., since which time it has not been classed as a dark star, though it gives less than one ten-thousandth as much light as is given by Sirius.

(8970) E. A. W. asks: Is there any extra wear on either rail of a double track, if the trains run respectively due north and south? If so, on which rail? Should trains travel north or south on a single track, would there smooth; for both reasons the light comes up be more wear on one rail than on the other, and why? A. On a railroad track laid due north and south, the car wheels bear against the east rail when running north and against the west rail when running south on a single-track railway. On a double-track road ring the painting and its stretcher in a suit-ble frame. BOTTLE.—H. DE ROCCO, Buenos Aires, Merican Illustrated Magazines, Early Patents signed other than those from the sun pass through the wheel thrust is constantly on the outer (8967) F. I. G. says: Do heat rays

Argentina. In this construction of a bottle certain novel valve devices render refilling impracticable after the orginal contents have been extracted. A sectional plug is employed in which a tortuous passage is formed, this passage constituting the outlet for the liquid. In such passage are placed valves which open outward, so that the liquid may be withdrawn, but which will seat to prevent any introduction. This plug is held in place by a cap fastened by cement in the extreme mouth of the bottle.

SCENIC APPARATUS .- F. W. THOMPSON, New York, N. Y. In this invention the underlying aim is to provide a device comprising a rocking platform having wings to represent an aerial ship, in connection with scenic effects so arranged as to give passengers the illusion of gradually ascending and descending through the air.

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.

Address C. A. M., Box 775, New York

Inquiry No. 4106.-For makers of benzine

NOTICE TO TUNNEL CONTRACTORS. Seated proposals marked " Bid for Tail Race Tunnel will be received by the undersigned until noon, May 11, 1903, for the construction of a tail race tunnel for the Teronte and Niagara Power Co., of Toronto, Ontario, Plans and specifications for this work are on file, and can be seen after March 30, 1903, at the company's offices at Home Life Building, 'Foronto, Ontario, and Niagara Falls, Ontarie, er effice ef F. S. Pearson, No. 29 Breadway, New York, Room 220. The right is reserved to reject any or all proposals. Frederic Nicholls, President and General Manager, Home Life Building, Terente. Ontarie.

Inquiry No. 4107.—For a bicycle, getting pe from a dynamo driven by the sprocket wheel.

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

Inquiry No. 4108 .- For makers of collulaid Inquiry No. 4109.-For manufacturers of tents. Inquiry No. 4110.- For dealers in compressed aper buckets, pails, also of compressed paper in sbeets.

(8972) C. S. asks: 1. Which is the most desirable current for any electro-magnet ELECTRICAL PROBLEMS. By William L -one of great intensity, with less quantity, or one the reverse? A. The current through an electro-magnet should not be strong enough to heat the wire more than 40 deg. above the air, and is usually less than this. If the current is small the number of turns must be large in order to obtain the magnetic flux necessary to saturate the iron. If no other consideration existed, it would be better to have a large number of am- engineering practice, with very brief treatment peres rather than a high voltage. 2. Is the of the methods of solution. The contents comamperage of a dynamo measured by dividing prise: Twelve sets of problems and calculaits voltage by its internal resistance alone, or | tions on combinations of electro-motive forces is there an external resistance included? I refer to the current a dynamo is said to generate, | ing; distribution and fall of potential in rail as in the case of one for sale, when no exter-nal resistance is mentioned. A. A dynamo capacity of condensers, thermo-electricity, elecmachine will give its largest current when the external and internal resistances are equal. teries, generators, motors, etc.; four sets of This is not desirable except for uses in which problems on combinations of alternating electhe heat produced is desirable. The dynamo tro-motive forces and currents and the impedis calculated for a definite voltage or for a acce of circuits with constant and with vary constant current as the case may be. Incan-ing values of resistance, inductance, capacity, descent lamps in multiple call for a constant and frequency; five sets of problems on calvoltage, arc lamps in series call for a constant | culating and making winding tables and draw current. The output of a dynamo is better ex- ings for direct and alternating current arma pressed in watts than in amperes, at a certain tures, armature reactions, field windings, etc. speed or turns per minute. 3. Is there more problems on winding and operation of trans resistance between two separated electrodes in formers, rotary converters, and induction moa vacuum than in dry air, being the same dis- tors; and on testing of dynamos and transmistance apart in both cases. A. There is an sion of power. Answers are given to all prob-enormous resistance between two points in a lems, many in the form of curves showing the vacuum. A tube can be exhausted so completely that current cannot pass between points a small fraction of an inch apart.

(8973) W. A. S., Jr., asks: Can gas (natural or illuminating) be ignited without a spark? A. A red heat will ignite any of the Α hydrocarbon gases, when mixed with the proper proportion of air to make them explosive. Α spark is not necessary. The hot tube of gas and gasoline engines shows this principle.

(8974) J. L. P. asks: Can you inform me as to whether a bipolar dynamo having its yoke, cores and poles connected by common steel rod running through center will work all right, or should be of iron? A. Steel bolts may be used to fasten the yokes, cores, and pole pieces of a dynamo together. So, too, steel may be used for all these parts of a dynamo. But brass must be used as a bridge across from the positive to the negative poles piece, if there is need of anything to prevent the vibration of the pole pieces.

(8975) J. H. B. asks: 1. Does a given amount of gas give off, in combustion, the sume amount of heat, whether said gas be burnt as an illuminating flame in an ordinary gas jet, as a blue flame, in a Bunsen burner, or for heating purposes, in a stove furnished with ashestos lining. A. The complete combustion of a given quantity of coal gas produces the same man or the woman who claims to have a natu number of heat units without reference to the raily good eye for color. Much attention is manner in which it is burned; but if burned with a luminous flame, as in an ordinary burner, the composition is not complete. The Bunsen fiame or blast lamp gives the most complete comlustion, the most concentrated flame, and hence placed. One of the greatest difficulties in ar the highest temperature. The hottest part of a ranging a color design is in determining the Bunsen flame is 3.137 deg. F. The hottest blast furnace gives 3.272 deg. F. A white gas fiame may be between 2,300 degs, and 2,700 degs, F. 2. If so, what is the advantage of the last two methods for heating? A. An aspestos lining or fire brick acts as a non-conductor to retain understood and made use of in actual practice. the heat within the firebox and prevent to $an^{+} \ln$ illustrating the text the author has seen In this way more heat remains to be applied to the articles to be heated.

(8976) H. L. T. says: I have at my disposal one pound of No. 36 double silk-covered wire. With this I wish to construct a jumpspark coil for my motor bicycle. Will you inform me what amount of wire and what size should be used for the primary coil, how thick the core should be, and what the dimensions of the coil should be, whether short and thick or long and narrow? Also whether the vibrator can be omitted or not? A. For a primary two layers upon the core. The core should be 8 inches long and 1 inch thick. The condenser requires 100 sheets of tinfoil 5 x 7 inches. A

NEW BOOKS, ETC.

Hooper, Professor of Electrical Engineering, Tufts College, Boston, Mass. and Roy T. Wells, Senior Fellow in Physics, Clark University, Worcester, Mass. Boston: Ginn & Co. 1902. 8vo. Pp. 170. Price \$1.35.

The work contains a set of problems typical of those met with in electrical laboratory and and resistances in series and multiple group tro-chemistry; output and efficiency of bateffect of varying the various constants involved, such as temperature, frequency, capacity, resistance, and inductance. The text contains about forty explanatory diagrams.

COURSE IN BOTANY AND PHARMACOG NOSY. By Henry Kraemer, Ph. B. Ph.D. Philadelphia and New York: G. E. Stechert. 1902. 8vo. Pp. 384. Price \$3.50.

This book was written to meet the individual needs of the author in his work as a teacher. but can also be employed in connection with a laboratory course. Part I. contains a very full account of plant morphology and is divided into chapters on the cell, vegetative, and reproductive parts of the plant. Part II, discusses pharmacognosy and is divided into two chapters, the one on crude vegetable drugs, and the other on powdered vegetable drugs Part III, treats of reagents; and Part IV, commises the illustrations and index.

COLOR PROBLEMS. A Practical Manual or PROBLEMS. A Flattice. By for the Lay Student of Color. By Vanderboel, New Emily Noyes Vanderpoel, New York, London, and Bombay: Longmans, Green & Co. 1902. 8vo. Pp. xv, 135; 117 colored plates. Price \$5

A great deal will be found in these pages that will be of practical service even to the given to contrast of modified and subdued colors, such colors as would be required constantly in decorative designs covering large spaces, against which more positive colors would be qualities and quantities of color. Very few works give the useful hints on this subject con tained in this book. Under the heading "Historic Color" are some very interesting origi nal diagrams presented in a way easily to be reproduced, have been incorporated.

A TREATISE ON ROADS AND PAVEMENTS. By Ira Osborn Baker, C.E. New York: John Wiley & Sons. London: Chapman & Hall, 1.td. 1903. 8vo. Pp. viii, 655; 171 figures, 68 tables. Price \$5.

The object of this book is to give a discussion from the point of view of an engineer of the principles involved in the construction of country roads and of city pavements. Consid erable space has been given to economics and winding for your coil use No. 16 wire and wind location of country roads and to the construction and maintenance of earth roads, since such roads constitute more than ninety-five per cent of the mileage of the public highways and vibrator will not be required if the circuit is are greatly in need of careful consideration. broken by the motor in its revolution. A valu-able article on the winding of colls may be found in our Suppression No. 1402, mine the reducted as a contribution to the principles of road making and to the impression and math found in our SUPPLEMENT, No. 1402, price 10 road making and to the improvement and mainof the book, considering roads having perma nently hard surfaces, is based chiefly upon American practice. The work is presented in a form for convenient practical use. Numerous cross references are given by section number and whenever a table or figure is mentioned, the citation is accompanied by the number o the page on which it may be found. PRECIOUS STONES. A Book of Reference for Jewelers. By W. R. Cattelle. Philadelphia and London: J. B. Lip-pincott Company. 1903. Svo. Pp. 224. Price \$5. This is by far the handsomest technical book which has come to us for a long time. Beauti fully bound and beautifully printed, it contrasts strongly with the general run of technical books. The information which it contains is worthy of its handsome dress. The aim has been to avoid unnecessary detail and to present facts One who uses a lantern in all sorts of halls useful to a dealer in precious stones. Espe cial attention has been given to stones unfaself to the hall and produce his pictures of miliar to many jewelers, and for which there is a growing demand in this country.



INDEX OF INVENTIONS For which Letters Patent of the United States were Issued for the Week Ending April 21, 1903, AND EACH BEARING THAT DATE. [See note at end of list about copies of these patents.] Abrading material, J. M. Nash . 725.761 726,056 726,591725,835

Abrading material, J. M. Nash Addig matchine, S. Hartman, Adjustable gage, W. G. Templeton, Advertising device, C. F. Fehtermach, Advertising matter, conversance for display-ing, R. H. Neff Air conduit coupling, Stein & Mandel, Air, cooling, drying, and parifying, W. L. Moere Air or gas compressors, unloading device for, W. S. Fairburst Air sign, T. Michelsen Alumins, obtaining, C. A. Durennas, Andmal trap, F. M. Wakker Andmal trap, J. Campbell, Sc. Atomizer, M. Goldman Automatic potential regulator, A. A. Tr-rill Automabile engine, four starter mechanism 726,092726,004726.181 726, 220725, 981725,683726,121726,140726,964Antinal trap, J. Camphell, Sr.
Atomizer, M. Goldman
Automatic potential regulator, A. A. Tirrill
Awi, J. P. Brady
Axie, tobular vehicle, C. S. Smith
Bag, S. Nee Caddy bag.
Bag Eolder, C. Kenney
Bailing press, J. T. Renes
Bailing press, J. T. Renes
Baindage, E. L. Ewing
Bandage, C. A. Hewing
Bandage, etc., Lo shib, means for securing,
W. A. Keen
Basha, etc., to shib, means for securing,
W. A. Keen
Basha, etc., to shib, means for securing,
W. A. Keen
Basha, etc., to shib, means for securing,
W. A. Keen
Bed brace, C. A. Howse
Bed brace, C. A. Howse
Bed shit, V. T. Grabs
Bed shit, V. T. Grabs
Bedrastener, J. C. Miller
Bedrastener, J. C. Miller</l 726,234 725,955 726,135 725,787 726,209 725,721725,810725,872 725,958 725,688725,726725,858726,079726,079725.763725,821726,046726,113726, 108725,840725,982725,686726,042725,691 726,924726,224726,171726,093726,769726,085726,227 725,839725,698

(8977) S. R. asks how to make a stereopticon lantern large enough to throw an image about 20 x 15 inches, using regular slides. A. The ordinary condenser for a stereopticon is made with two plano-convex lenses placed with their convex surfaces nearly in contact. The combination should have a focal length of about 9 inches. It is not desirable to use lenses smaller than 4 inches in diameter, since the clear opening will then be smaller than a slide. For a projecting lens a Darlot quarter-plate lens of about 9 inches focus is commonly used. The size of the picture upon the screen is determined by the distance of the screen from the lantern. If the hall is long and the lantern must stand far back, it is desirable to have a projecting lens of 12-inch focus. If the lantern must stand near the a lens of 6-inch focus should be had. should have a set of lenses, so as to adapt himabout the same size in all places.



	Cattle mark, R. Schumann	726,104
	Cement for uniting wood, J. H. J. Bartels.	725,816
	Cement kiln, W. W. Maclay	725,975
5	Centrifugal machine driving mechanism,	
۶ '	H. Feldmeler	725,832
1	Centuifugal separator, C. J. Pihl	725,868
۱.	Thinney protector, W. I. F. Harden	726,160
	Chuck, lathe, C. G. Hichardson	725.774
	Clutch scrull Putter & Johnston	726,099
1	Cigarette, oval, G. P. Butler Cithern, C. T. Menze Coth unrolling machine, J. E. Whulle	725.671
	C (there $C = T$ Motors	726.084
	Coth uncolling machine I E Whulle	725.907
	Clothes line prop. Barbour & Meredith	725,917
	Thatch mechanism, friction, P. H. Mack	725,735
		725,756
	Clutch trip, W. A. Murphy	725,893
	Cock, blowon, G. H. Fruman	
	Cuck, shiely gas, G. E. Bao	725,600
	Coin counting machine, C. W. Johnson Coke, manufacturing, J. F. Wilcox Coke oven construction, E. A. Moore	726,067
	toke, manufacturing, J. F. WLCOX	725,904
	Coke oven construction, E. A. Moore	725,750
	Cuke oven dour, E. A. Moure	725,745
	Coke oven door frame, water cooled. E. A.	
	Moore	725,747
	Coke oven door, water couled, E. A. Moore	725,746
	Coke oven foundation or substructure, E.	
	A. Moore	725,748
	Coke ovens, means for protecting, E. A.	
	Moore	725,749
	Combustion of fuel, R. Thomson	726.115
	Composite post, A. B. Probasco	725,770
	Compound engine, E. M. Corvell	725,935
	Condenser, surface, W. Hayner	725,841
	Conduit outlet box, interior, W. F. Bassert	725,684
	Controller, J. B. Linn	725,730
	Conveyer, J. B. Pitchford	726.098
		,

(Continued on page 344.)