RECENTLY PATENTED INVENTIONS.

Pertaining to Apparel.

COMBINED BUTTON AND PIN FASTENER.—R. ELLIS, Niagara Falls, N. Y. The object had in view in this case is to provide an attachable button which shall be specially adapted for use as a skirt-supporter and fastening means for the skirt-placket, the device to be equally adapted for affording ready replacement of a detached suspender-button and for other obvious uses.

BELT.—J. ASKEW, West Point, Miss. The invention has reference to wearing-apparel, and its object is to provide a new and improved belt arranged to properly support the trousers or other garments without exerting undue pressure on the stomach of the wearer. The ends are connected in a manner to maintain the usual appearance of an ordinary belt and to serve as ornaments.

Of Interest to Farmers.

COMBINED HARROW AND CULTIVATOR. M. TRUE, Watervalley, Miss. This improvement comprises the combination, with two like triangular frames provided with teeth and spaced apart and flexibly connected and provided with pendent bars, of wheels having axles provided with sockets adapted to receive and slide upon the bars, and clamp-screws applied for securing the sockets in any required adjustment, the wheels being arranged parallel in the inner sides of the frames.

MACHINE FOR LOADING SHOCKS.—W. O. CRAWFORD, Beaver Creek, Minn. A purpose of this invention is to provide a portable and readily-operated machine for loading shocks of corn or cornfodder onto wagons or for stacking the shocks or for moving them from the stack to the wagon, which machine may be used with equally good results for loading and stacking manure, hay, straw, and all kinds of fodder.

Of General Interest.

EMBROIDERY-SILK HOLDER.—J. J. LAWLER, Winsted, Conn. In this case the object is to provide a new and improved embroidery-silk holder arranged to securely hold a skein of embroidery-silk and to allow convenient removal of a single thread from the skein without danger of tangling the threads forming the skein.

HOLDER.—J. P. MERLINE, Oconto, Wis. This holder is particularly adapted for the support of paper bags. The objects of the inventor are to provide a simple and convenient device. In use the bags are drawn from the bar and when all have been used the device may be conveniently removed by means of its center loop projection and another supply placed upon it.

SURGICAL APPLIANCE.—W. L. WOODRUFF, Troy, Arizona Ter. The purpose of the improvement is the provision of a hood or cover for the part, especially designed to be used as an aid in the cure of venereal diseases, and to so construct the device that it can be readily applied and removed and worn with comparatively little discomfort.

UNDERTAKER'S MITTEN.—F. J. PIKIEL, JR., Appleton City, and J. N. UTTERSON, Montrose, Mo. The invention is a mitten for use to facilitate the dressing of corpses. In drawing a coat on a corpse the cuffs and shirt-sleeves slip back on the arms and are hence not in proper position when the operation is completed. By the aid of the mitten this result is avoided and the operation of dressing is more quickly performed.

KILN.—A. P. BROOMELL, York, Pa. The arrangement of the furnaces with respect to the stack provides for the efficient utilization of all the heat and for application thereof evenly througbout the extent of the interior of the stack, thus securing a uniform burning of the rock and consequently superior quality in the product. Means are provided to permit application of heat to the rock near the outer part thereof, and to avoid overburning of the central portion of the rock. At the same time, however, enough heat is directed upon the center to prevent formation of an unburned core.

Hardware.

COMBINED RATCHET WRENCH AND DRILL.—J. R. NEILSON, Union City, Tenn. The principal object in this case is to provide a device which affords a very positive grip upon the tool or other member gripped thereby, and which is provided with a reversible ratchet operating mechanism by means of which the wrench and drill may be positively rotated in either direction about its axis of rotation.

HOOK-LOCK.—F. LILIGER, St. Joseph, Mo. The invention relates to a device intended for locking or closing hooks, so that an article engaged therewith cannot be accidentally disengaged. The invention is particularly intended for use in connection with tackle-hooks, although it may be employed for other purposes.

CALIPERS AND DIVIDERS.—G. C. SMITH, St. Kilda, near Melbourne, Victoria, Australia. Mr. Smith has devised this invention in order to provide simple and inexpensive means for locking calipers and dividers in position and incidentally for enabling calipers to be used to measure accurately in positions from whence it is not possible to remove them in order to transfer the measurement without slacking them back.

Household Utilities.

SHADE AND CURTAIN BRACKET.—W. J. CONNELL and L. C. LOWE, Huntington, W. Va. The invention pertains to improvements in shade and curtain brackets, and has for its object to produce a simple, cheap, and efficient bracket that can be readily and quickly applied to and removed from a window-casing and one from which a short ventilating-shade in addition to a lace curtain and window-shade may be suspended.

BED-RAIL JOINT.—J. MURPHY, Kenosha, Wis. In this instance the invention refers to improvements in corner joints or fastenings for the rails of metal beds, the object being the provision of a joint that will be comparatively cheap to manufacture because of the small amount of metal required for the desired strength. The rails readily engage without employing screws or bolts, forging, bending the rail, or without a casting on the rail.

Machines and Mechanical Devices.

WASHING-MACHINE. — G. H. WISNER, Pioneer, Mont. In this patent the invention relates to improvements in washing-machines, the inventor's object being to provide a machine by means of which garments may be rapidly and thoroughly cleansed. In operation the water is kept in practically constant agitation. Means are provided to relieve the turn-table from undue shock when it is moved by means of the springs.

CLUTCH AND TRANSMISSION-GEAR.—J. W. WALTERS, New York, N. Y. One object in view of Mr. Walters is to combine in one structure a two-speed or differential transmission-gear and a clutch device adapted to control the starting and stopping of the machine to which the new device is applied. A further object is to compactly arrange the several parts to make them take up a very small amount of space on a motor-vehicle or any other form of machine or apparatus.

FIBER-CLEANING MACHINE. — A. G. PONS, Mexico, Mexico. In this patent the purpose of the invention is to construct a machine for decorticating plants, especially sisal hemp, and to provide a machine which will expeditiously remove the pulp from the fiber in a thorough and cleanly manner and without detriment to the fiber. After material is fed thereto the machine is practically automatic in its action.

MEASURING-MACHINE. — S. O. MYERS, Mount Vernon, N. Y. The invention of Mr. Myers has reference to measuring-machines, and his more particular object is the provision of a coin-controlled machine for measuring the heights and for indicating the normal weights of persons. Repeated use upon payment of a single coin by a number of persons successively stepping upon the platform without allowing the movable parts to resume normal position, is prevented.

BALL-BEARING.—R. CONRAD, 248 Kurfurstondamm, Berlin, Germany. Provision is made in this invention for a ball-bearing having concentric-grooved rings, the sides of the grooves being uninterrupted throughout their circumference and the parts being so proportioned and designed that the balls may be admitted to grooved space by displacing the rings relatively to each other. The term ball-bearing is to be understood as including various other known equivalent devices rolling between the rings.

Prime Movers and Their Accessories.

CARBURETER FOR GASOLENE-ENGINES. R. A. MIDDLETON, Rexburg, Idaho. The essential object of the improvement is to provide devices for furnishing an auxiliary air-supply, so that when the engine runs at excessive speeds an increased quantity of air will be permitted to pass through the carbureter, thus maintaining the correct proportions of air and fuel. It is designed for use especially in connection with internal-combustion engines, but may be used for other purposes.

Railways and Their Accessories.

AIR-BRAKE SYSTEM.—A. I. PERRY, New York, N. Y. More particularly the invention relates to those systems in which the braking action is to be effective throughout a train consisting of a plurality of cars. Its principal objects are to provide means for simultaneously applying the brakes with a definite and controllable pressure and for securing an automatic application if the train parts.

METALLIC TRUCK FOR RAILROAD-CARS.—F. GERHARDT, Alliance, Ohio. In this patent the object of the invention is to provide a new and improved metallic truck for railroad-cars formed of comparatively few parts, readily assembled, and arranged to insure an easy riding of the car-body of an exceedingly strong and durable truck.

FOLDING AND EXTENSION CAR-STEP.—J. S. COXEY, Aberdeen, Wash. One purpose of the invention is to provide a simple and readily-applied means whereby to simultaneously operate a folding extension car-step from the platform of a car and raise and lower the temporary platform which normally covers the steps and open or close the gate at the platform when a gate is employed.

Pertaining to Recreation.

MERRY SKATING-RINK. — H. LOISELEUR, New York, N. Y. This invention has reference to amusement devices such as used at pleasure resorts; and the object of the inventor is to produce an amusement device of simple construction which will have the general characteristics of a merry-go-round or carousel, but which will be used by persons upon skates.

PARLOR GAME. — J. A. S. CHEVOLLEAU, Kingston, Jamaica, West Indies. In this instance the invention pertains to parlor games and resembles the games of billiards and pool. The intention of Mr. Chevolleau is to produce a table upon which an amusing and interesting game may be played, the rules of the game being designed to put a premium upon accuracy and judgment.

Pertaining to Vehicles.

MEANS FOR UNITING A PAIR OF BICYCLES TO FORM A QUADRICYCLE.—C. H. NICHOLAS, 34 Stroud Green road, Finsbury Park, London, England. The object here is to provide means for connecting together a pair of bicycles (of any usual construction and motor or pedal or otherwise driven) side by side in such manner that the combination may constitute a single vehicle capable of carrying more than two persons, the device so provided being designed to enable the cycles to be quickly and easily united to form a quadricycle and to be as readily detached from one another, so as to permit of the ordinary use of either machine alone when desired.

COUPLING.—G. LLOYD, Gananoque, Leeds, Ontario, Canada. In the present patent the invention has reference to a coupling useful in various connections, particularly as a means for joining the parts of vehicle-springs and for connecting the thills of a vehicle to the axle-clips. With this coupling the thills are free to swing vertically; but the parts are prevented from side play, and wear may be taken up quickly by tightening a bolt.

Designs.

DESIGN FOR A BADGE.—F. BUSSE, New York, N. Y. This ornamental design for a badge shows an outspread "base ball fan," with the ball in the center of the fan, the whole mounted on a stick-pin.

DESIGN FOR EIDER-DOWN CLOTH.—C. H. FRENCH, Canton, Mass. This ornamental design for eider-down cloth consists of rows of squares of confused texture against a plain field of cloth. These blocks are separated one from another at regular distances of half the width of each.

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.

Notes and 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.

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(10016) O. M. S. asks: 1. How may opaque objects be seen under the microscope? A. By the use of the bull's-eye condenser. A lens which will focus the light of a lamp upon the upper surface of the object. One of these usually accompanies a microscope. 2. How can the glimmering of artificial light be overcome? A. If the light is too strong, turn the reflecting mirror till the field is illuminated to suit your eye. Shaded glasses can be had from dealers in microscopes which cut down and also color the light agreeably. These may be blue or gray. They are also made so that they are deeper in color in one portion than in another, and a nicer adjustment may be made of the illumination. 3. Will the best window or plate glass do for glass slips to use with a microscope of sixty-five diameters? If not, why? A. Any sort of glass will answer if it is smooth. It is better to buy the regular slips. These are 3 × 1 inch and are polished on the edges. They present a much better appearance than pieces of glass cut and left rough. 4. What proportion should the liquid, zinc and carbon be for a bichromate cell? A. A good bichromate mixture is composed of water 100 parts, potassium bichromate 17 parts, and sulphuric acid 10 parts, all by weight. The zinc and the carbon may be of any size which the battery jar will hold. It is better to have a carbon on each side of the zinc, two carbons to each zinc. This gives a larger current and utilizes the action on both sides of the zinc. 5. How to make an induction coil which will not induce a current strong enough to kill a person. A. A good induction coil is described in SUPPLEMENT, No. 160, price 10 cents. It is not necessary to injure one's self with a large coil. A simple rule for safety is to put the left hand in your pocket or behind your back when doing anything to the coil with the right hand, if the coil is running. 6. What are the preserving fluids used in the museums and laboratories? A. Alcohol is the fluid ordinarily used in museums for preserving specimens in jars and bottles.

(10017) L. F. S. writes to us as follows: I wish to know what horse power would be developed by a stream of water, which, if dammed would give a head of 130 feet or more. The amount of water flowing over a 4-foot weir is 8 inches, weir being rectangular 4 feet equals breadth, 8 inches equals depth. What size steel pipe or iron pipe would this water fill if it were to be carried to a turbine at distance of 1,200 feet? What is the cost of such pipe a running foot? Also, what would be the cost of a dynamo to utilize power thus developed by turbine? Suppose it were necessary to transmit power to a manufacturing plant at a distance of 4½ miles from power house. What would be loss of power in transmitting and what approximate cost of motor and wiring for such a plant? Kindly tell me where price list of motors and dynamos may be obtained. A. The capacity of your weir is 432 cubic feet of water per minute. This with 130 feet fall will give a theoretical power of nearly 3½ million foot-pounds or 112 horse-power. From this must be deducted the loss by friction and the water wheel which, if of the Pelton type, should net you 80 horse-power. The size of steel pipe for conveying this amount of water 1,200 feet with a loss of less than 2 feet head will be 24 inches in diameter and will cost about $1 per foot. A Pelton wheel and connections will cost about $400. The dynamo will cost about $2,400. A motor on a 4½-mile line will cost about $2,000, and should net 60 horse-power at 4½ miles distance. We refer you to the water wheel companies for estimates of a complete power plant.

(10018) Y. N. W. writes: As it is your aim to disseminate useful information we make the following statement which will interest all photographers: We recently purchased one of the new aluminium trays and lately undertook to intensify a negative in it, using a three-solution intensifier: Bromide of potassium, bichloride of mercury, and sulphite of soda, in the order named. Upon applying the mercury solution the chemical growth (which we had forgotten all about) of which a detailed description was given in the SCIEN-

TIFIC AMERICAN of March 10, 1900, immediately began, and we were unable to check it until to-day, when we happened to think of using muriatic acid. We immediately applied a dilute solution of the acid to the tray, using a cloth to take off the black coating. After rinsing we applied a solution of soda and other tests without any action of the mercury. We would, therefore, advise our brother photographers to never use an aluminium tray for intensification, but if they have already spoiled a tray by it to try the acid, which we think would prove effective in every instance. A. We suppose it is not possible that every one who has to do with chemicals should first study their chemical actions sufficiently to avoid the mistake of our correspondent of putting a chemical into his tray which would dissolve it. He knows the fact regarding aluminium now and is not likely to repeat the experiment. Experience is a good schoolmaster, though her instruction comes high, it has been said.

(10019) F. L. asks: 1. What causes the humming in electric street railway motors? They are noiseless when new, but after about six months or a year, they begin to hum. A. If this statement is true, we are not able to give a reason for it. There is no electrical cause which after this or any other period will develop a humming noise, nor any mechanical cause for such a universal effect. We suggest a broader investigation to see if all motors hum at the end of six months. 2. In cast-welding rail joints do they allow for any expansion or contraction? If so, how? A. No. If the joint is made stronger than the force of contraction, the rail will not break. If the rail is held down more rigidly than the force of expansion, it cannot break away from its fastenings. Hence, it will stay in its place both in winter and in summer. This is the theory. 3. Is there any direct incorporation of the metal in the rail and in the cast? I have heard some claim there is not, while others claim that the rail is fused at one or two points, generally about the size of a half dollar, where there is a direct union of the two metals. A. There is firm adhesion. We do not know whether there is incorporation or not of the two metals. 4. We have made a box-kite, with 2 cells, 16 inches long, and 15 inches square, with about 10 inches clear between them. When we try to set it up it will dive down, after going up about 25 or 30 feet, sometimes hitting the ground and breaking some of the sticks. A. We advise you to apply to the Weather Bureau at Washington, D. C., for the plans and construction of a box-kite.

(10020) J. B. P. asks: 1. Will you please advise me of some compound, or chemical, that will clean scales from a boiler, while boiler is in use, without any risk of burning the boiler, by water foaming? A. For keeping a boiler clear of incrustation there is nothing so easily managed as caustic soda or potash lye. Dissolve about a quarter pound of the soda or lye for each horse-power of the boiler in a barrel or tub of water and connect it with the suction of the feed water pump. Use the boiler for a day with the soda in. Then blow out from the boiler after the fires are drawn or banked or when the engine stops, to the level of the lower gage cock or bottom of water gage and pump up with fresh water to high water mark. Use the boiler next day as usual and at night after fires are drawn and walls cooled below the temperature of injury to the boiler, blow out all the water and clean out the boiler. This may be repeated according to the condition of the boiler, once or twice a month. See Davis' book on "Boiler Incrustation," $1.50 by mail. 2. Can I charge a set of storage cells by connecting them in series, in main circuit, batteries having the same capacity, in amperes and voltage, as the circuit, and will the batteries cause the lamps to burn dim? Would an ammeter connected in the circuit answer to tell when the batteries were charged? A. Connect the cells in series and to the line through the ammeter and a rheostat by which the amount of current can be adjusted. A good charging rate is 2½ amperes per square foot of positive plates, reckoning both surfaces. The final voltage should be 2½ volts per cell. This you must determine by a voltmeter in shunt with the cells. Stop the charging when this is reached. As you must put the cells in shunt with the lamps on the circuit, the charging of the cells cannot affect the light if the dynamo has capacity enough to charge the cells and light the lamps at the same time. A good book for one having charge of a storage battery is Treadwell's, price $1.75 by mail.

(10021) E. L. C. writes: Kindly inform me how to copper-plate—a good heavy plate. I wish to plate some steel and iron wire, 2 feet long and about 12 gage. I would also like to plate some wood a good heavy copper plate. I have tried a receipt from some book, but with little or no success, as the plate will not stay on the iron or steel when I rub or try to polish it, and some will not take at all. A. Your trouble probably is not due to the defects of the description in the book which you have followed, but to your own inexperience. The only way to become an electroplater is to learn the trade from some one who understands it practically. No description can prevent you from making mistakes, or tell you how to recognize the proper working of the process and the proper condition of the bath and the article to be plated. Had yours been all right, the coating would have formed properly and adhered. Such points must be learned by actual experience in actual work. We are not electroplaters and cannot teach electroplating. We recommend Watt's book, price $1.

(10022) G. A. H. asks: Can you give a description of a sketching camera that reflects direct from the photograph and not from a transparency or negative, and how to arrange the reflectors and lens in a lantern to do the same? A. We think you will find what you want in a "sketching camera" in Hopkins' "Experimental Science," price $5.00, by mail. He there describes a camera for projecting opaque objects, so as to project them upon a screen, as slides are projected by an ordinary lantern. If you place the screen where you wish the picture to fall as you sketch it, you will have a sketching camera for the direct use of a photograph, or any opaque object.

(10023) W. S. D. writes: I wish to make a storage battery large enough to light two 16-C. P. incandescent lights for a few months, several hours a day. I would kindly ask you to please give me your opinion as to which book to get for the construction of such a battery, and if you could give me some information, I would be very thankful to you. A. We can supply you with the following books on the storage battery: Salomon's "Accumulators," price $1.50; Treadwell's "Storage Battery," price $1.75. Prices are by mail. We do not, however, advise amateurs to attempt the construction of a storage battery for real work. It is well enough to make a few cells for experimental purposes. Amateurs cannot expect to make cells which will have much endurance or efficiency, as compared with the cells made in a properly equipped factory, and by experienced workmen. In your case you wish to light 16-candle-power lamps. These are rarely made for less than 50 volts. You will then need twenty-five cells with five or seven plates each. The cost will be very much greater than for the same amount of light obtained in some other way. The labor of making so large a number of cells is a great deal. You need as many cells as if you had a greater number of lamps. If you really must have electric lights from a storage battery, we would say buy the battery.

(10024) L. H. R. asks: 1. Does a static electric machine depend for its volume of electricity on the superficial size of plate or velocity, and will a sufficient series of plates at a greater speed give off very much electricity at a high speed on one large disk, at 200 or 300 revolutions? Please answer an old reader in query column next issue, to satisfy a difference of opinion. A. The discharge of a static machine depends upon several conditions, size of plate, swiftness of rotation, dryness of plates, absence of dust, etc. The spark cannot much exceed the radius of the plates in length, since it will find the distance less between the combs if the balls are separated more than half the diameter of the plates, and will pass between the combs, taking the axle of the machine on its way across. This is the reason for using as large plates as convenient. Glass is the best substance for the plates. Since there is a limit to the safe speed for glass, hard rubber is now used a great deal. This can be run at any speed desired, and a very strong spark can be produced. It is better to use several smaller plates than one large one, because of compactness and neatness of appearance. A well-made machine with two 18-inch plates of hard rubber, driven by a quarter horse-power motor, gives a steady stream of sparks at 1,800 revolutions per minute. It may also be driven by hand, though no one can maintain that speed very long. 2. Are mica plates superior to glass? A. Mica differs very little from glass in its inductive capacity, and would serve equally well for the plates of a static machine, if pieces of sufficient size could be had at a moderate cost.

(10025) F. A. V. asks: Please inform me how a small dry battery for a pocket search-light may be recharged from a 110-volt direct-current circuit. The batteries become exhausted very quickly, and it is rather expensive to be continually buying new ones, while I have the 110-volt circuit to draw from, where the minimum amount of current charged for is not being consumed. A. A small pocket dry battery is not worth recharging. They are thrown away when exhausted. To reduce a 110-volt current to 4 or 5 volts for this purpose would be very wasteful. A pocket search-light is a luxury which those who carry must be willing to pay for. The battery is never durable, and soon gives out whether used or not. It is usually overrated. 2. What resistance in the way of 16-candle-power lamps should be used in a 110-volt direct-current circuit to enable it to be used for electro-plating? What should the voltage and amperage be? A. The voltage for electroplating varies with the metal to be deposited. It is from 0.5 volt to 7 volts. The amperes depend upon the area of surface to be plated. The data are to be found in such books as Langbein's, which we send for $4, and Watt's, which we send for $4.50. 3. I have an ammeter whose limit is 20 amperes. How many lamps in series or parallel should be connected in the 110-volt circuit to obtain a reading on the ammeter? What is the resistance of a 16-candle-power lamp? A. If your ammeter does not register till 20 amperes are flowing, you will require forty lamps to make it indicate any current. The resistance of an incandescent lamp when hot is about 220 ohms.

(10026) G. W. asks: 1. What length of spark must my induction coil produce to make an X-ray apparatus for examining objects such as a leg or arm? A. A coil giving an 8-inch spark will answer for the thinner parts of the body, but for every kind of service one giving a 14-inch spark should be had. 2. What kind of tube would be the most suited for this work? A. There are many makers of tubes, whose advertisements are frequently to be found in our columns. A higher vacuum is required for use with a coil than for use with a static machine. All good tubes are now made with adjustable vacuum. 3. Can you give me directions for making a fluoroscope? A. You had better buy your fluoroscope.

(10027) J. E. P. asks: 1. How to remove the elements from a Hercules battery cell after the salts have crystallized, forming a solid mass of zinc, carbon, and jar. I have about a dozen cells in this condition, and it is impossible to get the elements out of the jars. A. We would suggest that you soak your cells in water, thus dissolving the crystals which have formed. This will be a slow operation. It will hasten matters to dig out all the crystals which can be got at with any sharp-pointed tool. Sulphuric acid will dissolve the substance more rapidly, but it will also consume the zinc, which you are probaby desirous of saving. In this case prevention is better than cure. 2. Can satisfactory results be got from compressed air in an ordinary steam cylinder, and how high a pressure is necessary per rated horse-power of engine to get best results? The best steam engine is also the best for compressed air. Only a very little higher pressure or longer cut-off is needed to give the same results for air as with steam for power.

(10028) J. L. C. asks: 1. Can you give details of construction of an acetylene search light that will project a narrow beam of light? A. An acetylene search light presents no peculiar conditions. Place the light in the focus of the reflector. Have the reflector adjustable so that it can be brought nearer or slid farther from the burner. You can adjust for best projection of the beam as may be required. 2. How would be the best way to reinforce the above light to increase the size of the burner, or to add individual burners? A. You cannot obtain all sizes of burner for acetylene. To increase the illumination you must add to the number of burners. They are usually placed tandem, and not abreast, when used for projection.

(10029) C. H. H. asks: 1. What kind of flux would you use for soldering platinum to copper, or a cement such as is used in incandescent lamps? A. Copper and platinum may be soldered together by the use of any ordinary flux and soldering tool. In making incandescent lamps, they are melted together by a blowpipe; that is, welded together. Carbons are attached to the platinum wires in a lamp by means of a cement whose composition we do not know. 2. What is the white powder used inside of cartridge fuses, and where can same be purchased? A. Any inert powder, not combustible, can be used in inclosed fuses. We have not anlayzed this powder in any fuse, and cannot tell what is used. 3. How would you calculate the amount of resistance to use on arc lamps for theatrical lighting purposes? A. Dimmers for theaters are probably designed by trial and experience. Make a variable resistance and cut in enough to reduce the lights to the lowest point desired, unless you would prefer to purchase a dimmer from the companies who already have the data for them in their posession. We should do this if we needed a dimmer. 4. Can an ordinary force pump be used for compressing air up to say 40 pounds per square inch? A. A force pump can compress air till the pressure equals the power of the pump to hold it, and then the pump will leak or burst. If the pump is strong enough, it will hold 40 pounds.

(10030) C. B. H. asks: Is it possible for the human eye to possess any of the features of a camera? I have noticed peculiarities about my own eyes being able to see objects a second time, after looking away from the object looked at, especially if in the shadow. The force of this lasts several seconds, being of greater strength with certain colors, etc. Will you have the kindness to answer this query, without reciting it in the columns of your paper? A. It is not a peculiar experience that you can still see an object before the eye after you have gazed intently at it for a brief time. Everybody can do the same. If you look at a colored object, say a bright blue, the object seen afterward will be a yellow. We call these objects seen after the object has disappeared, after-images, and the color presented by one of these is the complementary of the color presented by the object itself. Such an after-image will drift before the eye in a very curious fashion along a dimly-lighted wall, larger than the object if the wall be farther away from the eye than the object was, and smaller if the wall be nearer. This proves that the image is in the eye and is simply projected against the wall in the line of sight. You will find these matters discussed in books of physics under the name Accidental or After-Images. As you send no post-office address, but only your name, we can only reach you by publication of the information in our columns. We think too that the matter is of general interest, so as to justify its publication. Quacks often prey upon the fears of the nervous by means of these after-images.

(10031) C. L. K. asks: Will you please advise me through your query column how to get the various broken parts of the mercury column in a thermometer together after they have been separated in shipping? A. To reunite the parts of a broken mercury column in a thermometer, first try jarring it by taking it in the hand and striking the arm suddenly downward as if to give a blow with a hammer, being careful that there is nothing in the way of the arm which the thermometer can hit. If this does not accomplish the object, tie a sufficiently strong cord to the thermometer, and whirl it rapidly around the head. In this way centrifugal force and momentum may bring the mercury together. As a last resort cool the bulb in a freezing mixture, and contract the mercury till it is all in the bulb at the bottom of the tube. When the instrument warms again, the thread of mercury will be continuous. The break in the column of mercury is caused by minute air bubbles in the mercury and on the glass. These are pushed down by the mercury as it contracts into the bulb, and so the column becomes continuous when the mercury expands from the bulb again. If there is a small cistern at the top of the tube, the mercury can be heated till the broken portions are driven up into this cistern, thus accomplishing the same object as if the bulb is cooled.

NEW BOOKS, ETC.

FINANCIAL RED BOOK OF AMERICA. 1905 Edition. New York: Orlando C. Lewis & Co., 1905. 4to.; pp. 496. Price, $10.

This work is a list of the wealthy people of the United States, containing about 18,000 names of individuals and estates of wealth, giving office and residence addresses, business connections, and other details arranged alphabetically by States, subdivided by cities and towns. Those who wish to reach by correspondence or otherwise a wealthy class of people will do well to purchase a copy of this book. We have recently used this work successfully, and the percentage of unclaimed letters was so small that its accuracy seems assured. The book is edited by Charles D. Burbank.

THE PRINCIPLES AND PRACTICE OF IRON AND STEEL MANUFACTURE. By Walter Macfarlane, F.I.C. New York: Longmans, Green & Co., 1906. 12mo.; pp. 266. Price, $1.20.

The author treats his subject on original lines; for instance, the usual sequence is reversed, and the finished products are discussed first, while the treatment of the iron ore is developed toward the end of the book. The work is illustrated both by engravings and diagrams, and many of the twenty-three brief chapters will be found of value, including those on "Iron and Steel Castings," "Malleable Castings," and the "Testing of Materials." Valuable hints for the manufacturer are given in the appendix, such as the Analyses of Finishing Materials and Softeners, Typical Analysis of Pig Iron, etc.

THE APPLICATION OF GRAPHIC AND OTHER METHODS TO THE DESIGN OF STRUCTURES. By William W. F. Pullen. Manchester: The Technical Publishing Company, Ltd., 1905. 12mo.; pp. 341. Price, $2.

This book has been used by many engineers since the appearance of the first edition, and it has been found useful in many cases where the graphical methods are the only instruments needed by which particular numerical results are easily obtained. In the second edition the author has rewritten the chapter on "Struts," and has dealt with the question at greater length than in the earlier book. An appendix contains useful notes for the further elucidation of points in the original text.

GARBAGE CREMATORIES IN AMERICA. By William Mayo Venable, M.S. New York: John Wiley & Sons, 1906. 8vo.; pp. 200; 45 figures. Price, $2.

The municipal authorities of the United States are beginning to realize, though unfortunately at a late date, that the disposal of garbage and other municipal wastes is a question of the utmost importance, and, if properly executed, the handling of the wastes may be turned to pecuniary account for the benefit of the city. Mr. Venable's book is a review of the work that has already been done in the field of crematory construction, and it is based upon the actual inspection and the investigation of installations already in operation, and the analyses of the features of design, as set forth in patented inventions. The text includes many fully-illustrated examples of crematories in use throughout the country.

THE MORTON MEMORIAL VOLUME. A History of the Stevens Institute of Technology. With Biographies of the Trustees, Faculty, and Alumni and a Record of the Stevens Family of Engineers. Edited by Prof. F. De R. Furman. Hoboken: Stevens Institute of Technology. Half morocco; quarto, 663 pages, illustrated. Price, $10.

This book was originally planned as a souvenir of the twenty-fifth anniversary of the Stevens Institute of Technology. The late President Henry Morton of the Institute de-