RECENTLY PATENTED INVENTIONS.

Engineering.

ROTARY ENGINE.—Alexis F. Gillet, Kearney, Neb. This engine is preferably constructed with two steam chambers, with pistons arranged to operate alternately, and the abutment or slide valve is formed with two apertures, and operated for variable movements by the piston, the valve alternately connecting the main chamber with the steam inlet to drive the piston and the valve pocket to cushion the valve. It has a solid base portion and channel way connected therewith, providing for a sufficient steam abutment to hold the valve against the piston. The engine is constructed of few parts, and the piston travel and abutment movement are regular, the usual jarring and thumping being avoided.

ROAD WAGON.—Clarence Gillett, Gloversville, N. Y. This invention relates to traction engines propelled by steam, compressed air, electricity, etc., providing a simple and durable road wagon, adapted to carry passengers or freight, and to be propelled at a high rate of speed and easily steered asdesired. The boiler is preferably of the Shipman style, to utilize oil as a fuel for generating steam, and the wheels are so mounted that they will readily pass over any obstructions in the road.

FURNACE TO TREAT ORES.—Charles J. Fauvel, London, England. This is a furnace for the treatment of refractory ores containing precious and other metals, and is one in which the oxidizing of the impurities is effected by a current of hot air entirely out of contact with the furnace gases, so that the ore will be delivered in what is known as a "sweet" condition. The furnace is so constructed that the oxidizing current is separately heated, and the passages are so arranged that neither the ore nor the oxidizing current can at any time come in contact with the products of combustion of the fuel, while the flues for the latter are designed to secure its utilization to the utmost extent. The furnace is also applicable for utilizing the silver in the ore by adding the chlorinating medium.

Railway Appliances.

CAR COUPLING.—George W. Mahan, Cold Spring Harbor, N. Y. This is an automatic coupler of strong, simple, and durable construction, which embodies the principle of the old-fashioned link and pin coupling, and is so constructed that the pin by its weight will hold the link in position to enter an opposing coupling. The device may be operated to uncouple from either the top or the sides of the car, so that the brakeman need not go between the cars to uncouple them.

RAILWAY BLOCK SIGNAL.—Frank B. Burt, New York City. This invention provides a simple mechanism for the expeditious and positive operation of a block signal system, in which the signal will remain set in the block while the train is in the block, but when the train leaves the block, in setting the signal of the block it enters, the signal of the block it leaves is taken down or concealed. The mechanism of the system is brought into action by a trip mechanism carried by a car or by the engine, and at each block it is connected with the signal of that block and the signal of the block in advance.

CLAMP.—Walter Hewitt Robinson, St. Paul, Minn. This is an improvement on a formerly patented invention of the same inventor, for a clamp which can be readily applied and manipulated for conveniently removing or replacing the cap and spring in air-brake cylinders. The construction of the clamp is strong and simple.

RAILROAD CONSTRUCTION.—Eliphalet L. Arnold, Georgetown, Texas. This invention provides for building an all-metallic railroad, to be strong, not very expensive, and which can be rapidly laid. The cross ties are essentially triangular in cross section, are hollow, to be filled with ballasting material, and each has a horizontal cross brace near the top serving as a support for rail-supporting chairs. The tie has a dovetailed recess to receive the rail-supporting chairs or wedges, by which the track rails are held firmly on both sides throughout their entire length, so that if a rail should break at any point it would still be held in place, and there is no chance for the rail joints to settle. Thus a perfectly smooth road may be made.

Mechanical.

LOOM LET-OFF MECHANISM.—Jeremiah C. Bill, Willimantic, Conn. This is a very sensitive and automatic mechanism, whereby, as soon as the slightest pull is exerted upon the warp, friction disks are so moved that the warp beam is turned a sufficient distance to let off the warp required by the working of the loom. An arm mounted to swing, and controlled from the warp beam, is connected with a friction disk adapted to engage a second friction disk geared with the warp beam and driven from the operating mechanism of the loom.

QUILL WINDER.—Corry Jones, Long Island City, N. Y. This winder has a frame to be secured to the loom or other machine, and on the frame is journaled a hollow slotted spindle provided with a disk and a fast and loose pulley, a traveler actuated from the spindle having a slot and a thread guide, while a vertically movable rod actuated by the rise of the quill has an arm on its lower end in the upward path of which is a pivoted brake arm, a belt shifter being loosely engaged by the brake arm. The device is very effective and positive in operation, and not liable to get out of order.

WRENCH.—Walfrid A. Aberg, New Westminster, Canada. This is a strong and simple wrench arranged to permit of moving the jaws into any desired angle relative to the handle, so as to turn nuts in close quarters. It has a swinging head having a polygonal head at its axis, an outwardly swinging locking arm being pivoted to the handle at right angles to the axis of the wrench head, and having a polygonal opening at one end to receive the polygonal head and lock it, there being also means for locking the swinging arm in place.

TILE MACHINE AND CUTTER.—John Fernald, Wellington, Ill. This is a simple and strongly constructed machine for quickly and accurately producing pipes or tiles of different sizes, from clay or composition of like consistency. The larger pipes or tiles may be delivered vertically, while the smaller ones leave the mill in a horizontal position, the pipe or tile being automatically cut off in required lengths from a continuous bar or cylinder coming out from the formers.

CONCENTRATOR.—Joseph A. Coombes, London, England. An improved hand power device, for conveniently and thoroughly separating gold from gravel and alluvial beds, is afforded by this invention, it being also designed to save precious metals from pulverized quartz and tailings without the aid of water, quicksilver, or chemicals. The gravel or other material to be treated is placed in a hopper, from which it is passed over a series of sieves, and thence into a hopper where it is subjected to a draught caused by an exhaust fan, the arrangement being such that the currents of air are broken up and eddies are produced to facilitate the collecting of fine float gold.

CAM FOR STAMP MILLS.—George A. Thompson, Tombstone, Arizona Ter. This is a cam for lifting the stamps, and is made in sections for conveniently fastening it on the shaft or removing it without disturbing the other cams or parts on the shaft. The cam comprises two interlocking toothed sections, each provided with a hub portion, a sectional band engaging the hub portions being provided with lugs for the reception of bolts.

TIMBER MORTISING MACHINE.—Charles P. Turner, Johnstown, Pa. This machine is especially designed for producing mortises in large timbers or in heavy beams, and its construction is such that vertical or horizontally placed augers or boring tools may be brought into action as may be desired, the cutters being also capable of removing material between the adjacent bores or apertures made in the timber or beam. The entire machine is portable, and may be placed upon beams or upon a table.

LATHE CENTER.—William C. Roe, Honolulu, Hawaii. An outer center engaging the work to be turned is mounted to turn on an inner fixed or dead center, the latter having the usual shank adapted to engage the tail stock or the main head stock spindle in case the device is used as a live center. The device may be quickly applied and arranged to be conveniently adjusted to bring irregular work into a true position for turning it correctly.

WEIGHT MOTOR.—John G. Ball, Chesterville, Ohio. This motor is more especially designed for actuating pumps, operating for a certain predetermined time and then stopping automatically. It consists of a lever connected at one end with the machinery to be driven and at its other end pivoted to a pitman connected with a crank arm attached to a shaft belonging to a train of gear wheels connected with a drum on which winds a rope carrying a weight.

Agricultural.

PLOW.—Charles H. Gerrard, Xenia, Ill. The beam, the shank, and the handles of this plow are so constructed that shares of different kinds, adapted to be used upon soils of a wide variety of character, may be quickly and conveniently attached to the beam and shank. The plow is very simple, strong, and inexpensive, and its colter may be easily removed, or it can without trouble be carried upward out of the way. The invention comprises various novel features of construction and combination of parts.

CULTIVATOR.—Bluford T. Scott, Milford, Ill. This invention provides in one implement a combination of gopher blades and shovels, to first stir the ground with the shovels and then level it by means of the gopher blades. The shovels are kept away from the plants, but the blades run closer, so as not to endanger the roots, and from the manner of connecting the braces or adjusting bars of the blades, the outer end of the blade is always the lowest, so that it can run close to young plants without injury. The blades are reversible, and may be adjusted to allow the operator to throw the soil to or from the plants as he may desire.

PLANTER AND CULTIVATOR.—John B. Burke and John F. Badger, Quitman, Ga. This invention relates to grain-sowing cultivators, and provides a machine that is easy to adjust and operate, not costly to build, and designed to be very durable. The plow may be of the ordinary construction, with a clevis in front to be connected with the draught chain or doubletree, but the plow can readily be held at any desired height, or drawn up out of engagement with the ground during the travel of the machine from one part of the field to the other. In a hopper-shaped seed box secured to the beam of the main frame is journaled a stirrer wheel, but the stirrer is removed and a dropping disk inserted for planting corn, an opening plow being then placed in advance of the seed dropper and a coverer plow at its rear.

Miscellaneous.

BREECH-LOADING SHOT GUN.—Charles F. Hacker, Parsons, Kansas. This improvement is designed to afford greater simplicity, strength, and durability in the construction of locks, ejectors, and fore ends, together with a more perfect balance of the gun itself, and with greater safety in a hammerless gun. Combined with an annular hammer is a stationary hub or cylinder arranged within the hammer, and a coil spring arranged within the cylinder, while the gun barrels have independent ejectors, and a separate spring mechanism for throwing out the ejectors, push pins being connected with the spring mechanism and operated upon by the hammers to put the springs under tension to independently throw out the shells.

AXLE LUBRICATOR.—John W. Schoaf, McKeesport, Pa. The wheel hub has, according to this invention, an oil chamber surrounding its central tubular portion, the oil inlet being at one end of the hub and its outlet at the other end, which moves next to the contact surface. This outlet is closed by a spring-pressed ball valve, adapted to turn or roll as it abuts against the contact surface, and when not so engaged being held closed by the spring. The invention is likewise applicable to pulleys and analogous devices.

SASH FASTENER.—Robert D. Murphy, Baltimore, Md. This is an improved article of manufacture in which the fastener and lock consists of a disk with roughened exterior and eccentrically pivoted, oppositely projecting twin hooks having a shank pivoted to the disk. The device is very simple, and may be applied either to the sash or to the casing, holding the sash in any position in which it may be placed or locking it closed.

DOOR CHECK.—James S. Patten, Baltimore, Md. This is an inexpensive door check and stop, with a securing plate attached to the door in the ordinary manner, from which projects an arm on which is eccentrically pivoted an elastic disk. A flattened contact portion extends to each side of the axis of the disk, whereby stop faces at opposite sides of the pivot are provided when the contact portion is turned to engage the floor.

VEGETABLE CUTTER.—James S. Patten, Baltimore, Md. This device has a main supporting frame with a holder for receiving the vegetables, a reciprocating slicer knife, movable in the bottom of the holder, and a presser or follower which serves to press the vegetable against a reciprocating cutter platen or frame. The machine is simple and cheap in its construction, easily manipulated, and very effective for the uses designed.

AWNING.—Rodolph D. Thornton, Brooklyn, N. Y. The construction of this awning is such that the lower portion, which is usually open, may be closed by a screen, thus admitting of the window being kept open without the possibility of flies entering the room. The screen is so made and attached that it may be elevated with the awning, or be brought up close to the sash when occasion may demand. When the awning has a hood, the lower portion of the hood may also be closed with a screen held in fixed position.

DISPLAY STAND.—William E. Stow, Newborn, Ga. This invention provides a special construction and arrangement of parts of a revolving stand for exhibiting goods in connection with a canopy of netting, which may be raised above or lowered around the goods for their protection. Display wheels, on which may be placed sectional shelves, are loosely held upon a central standard, supported upon a suitable base, which is either portable, with casters or rollers, or may be a stationary fixture.

PIANO STOOL.—Charles O. Parsons, Milwaukee, Wis. This is an inexpensive stool, which is vertically adjustable, but which does away with the ordinary screw, and has a revoluble seat, which may be fastened at any desired height, so as not to be accidentally changed. In the central bore of the usual pillar is a sleeve, in one side of which is a vertical row of holes, either one of which may be engaged by the lower end of a spring-pressed latch pivoted in a hollow shaft extending vertically through the sleeve, the upper end of the latch being connected with a horizontal push rod terminating in a push button in the edge of the seat. The button is to be pushed in when the seat is to be raised or lowered, the latch entering the nearest hole when pressure on the button is released.

RAZOR.—Carl R. Evertz, Brooklyn, N. Y. This invention provides a razor stock with a detachable blade, and means for making a quick and secure connection of the blade with the stock or back piece, and to permit the blade to be removed readily and safely for interchange with similar blades. It is designed to furnish a set of blades with a single stock and handle, so that a dull blade may be removed and replaced by a sharp one.

SPOOL THREAD CABINET.—James W. Hayden, Lewisport, Ky. This cabinet has a closing lid or cover, and may be of any size or shape, and within it are cells, preferably arranged in transverse rows or clusters, in which the spools are arranged in single columns, to be delivered therefrom by pulling a knob, which in turn operates a releasing device. The invention covers various novel details of construction and combinations of parts.

WAGON BOX STRAP.—Godfrey W. Bauder, Sheldon, Iowa. This invention relates to that variety of straps used to connect the floor and side pieces of wagon boxes at the corners, and which are also adapted to secure the end boards or gates in place. Its body portion has parallel ribs forming a groove in which the end gate may be held, while a flange overlaps the end of the side of the wagon body, and another flange rests on its top at the corner, the two flanges serving as braces.

LIFTING DEVICE.—Willis L. Brown, Lake Geneva, Wis. This device comprises a light frame, preferably made of gas pipe, to a cross piece at the upper end of which is pivoted a lever, the device being readily set up and adjusted, and arranged for conveniently lifting and supporting stoves, safes, and other heavy objects, for setting or removing them. It may be readily folded up in small space when not in use.

SHELLS FOR PLATED WARE, ETC.—William McAusland, Taunton, Mass. Oval and oblong shells for hollow plated ware are, according to this improvement, produced of ductile or plastic material by first making a round, seamless shell, and then expanding it to an oval or oblong by introducing successively sectional former blocks of different size and shape, to be expanded progressively by a tapering plug forced centrally through. By this method not only metal shells may be shaped, but also those of pasteboard, wood fiber, rubber, and other materials.

GRAIN SCOURER.—Archibald P. Campbell, Portage la Prairie, Canada. This scourer comprises a revoluble perforated cylinder, the perforations adapted to receive the grain and means for delivering grain into the cylinder and removing it therefrom, while revoluble brushes are held to impinge on opposite sides of the cylinder shell. The perforations are slightly larger on the inner side of the cylinder than on the outside, and the kernels of the grain catch in the perforations and are brushed, being thence dropped into a discharge spout.

MUSICAL INSTRUMENT ATTACHMENT.—William Leiner, Milwaukee, Wis. This is a simple device for attachment to harps, zithers, etc., a sliding and yieldingly supported bar above the strings of the instrument carrying dampers adapted to contact with strings, and mechanism for shifting the relative positions of the dampers. It may be conveniently operated to change the key, and is arranged to damp all the strings except those in actual use, thus facilitating easy and nice playing.

RUB FLUTE.—Balilla Carpigiani, Philadelphia, Pa. In a suitable base is held a row of rods of different heights, preferably of wood, each rod terminating in a socket, the sockets being connected together by a silken cord or other brace. Each socket has a removable top section, by changing which the tones of the instrument are changed. The instrument is played with gloved hands, the gloves being resined and drawn longitudinally along the rods, the long rods emitting relatively deep tones and the short rods sharper tones.

MUSIC BOARD.—Harry S. Sharpe, Seattle, Washington. A series of connected bars is provided with notation lines, and between the adjacent bars music characters are adapted to be inserted, each having a rearwardly extending lug to hold the character in proper position relative to the notation lines. The improvement is designed to facilitate the teaching of music, permitting of readily inserting or removing the music characters as desired.

PENHOLDER DESIGN.—Dent L. Lydick, Quaker City, Ohio. This is a combined penholder and paper cutter, whose lower stem portion is a tube, while the upper portion represents a feather, having one straight marginal edge.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS.

THEORY OF STRUCTURES AND STRENGTH OF MATERIALS. By Henry T. Bovey. New York: John Wiley & Sons. 1893. Pp. xv, 817. Price $7.50.

The preface states that this work deals with that portion of applied mechanics which has to do with the design of structures. It therefore will be found to develop into a very full and exhaustive treatise on the strength of material, truss and girder calculations, and all those matters which are now acquiring such importance in the architectural and engineering worlds, where the use of iron and steel of known constants enables exact mathematical calculations to be applied to the practical dimensions of the sizes of the members of bridges and buildings of all kinds.

MANUEL THEORIQUE, INSTRUMENTAL ET PRATIQUE D'ELECTROLOGIE MEDICALE. Par G. Trouve. Paris: Octave Doin, editeur. 1893. Pp. xxii, 788. Price 8 francs.

Gastou Trouve is well known as a constructor of a wide range of electrical apparatus. A great deal of his material was invented for use in a medical application of electricity. The present work is largely devoted to his own different apparatus, but notwithstanding that, his researches and work have been so complete that it will be found a very good treatise on the titular subject. A bibliography is given, and numerous illustrations and tables of data give value to the work.

ENGINE ROOM CHAT. By Robert Grimshaw, M.E. New York: Practical Publishing Company. 1893. Pp. 144. Price $1.

A very graphic presentment of the engineer's difficulties and the advices often given in a humorous or sarcastic vein make this little work excellent reading. The author is known as a very spirited writer, and in this book he has made full draft upon his humorous powers. The advice he gives is excellent, and it really seems as if the presentment of his advices in this humorous form would make it a more suitable dose than when given in more serious shape.

PHOTO-ENGRAVING. A practical treatise on the production of printing blocks by modern photographic methods. By Carl Schraubstadter, Jr. 8vo. Pp. 132, 60 engravings, cloth. Published by the author at St. Louis. Price $3.

This book will fill a want long felt for a treatise which will enable an amateur or professional photographer to make good printing blocks. Zinc etching is by no means an easy process to work, and really requires practical instruction from a man in the business if the highest class of work is to be attempted. With a book like Mr. Schraubstadter's it is possible to make excellent engravings after a few weeks' practice. The process of making wet plate negatives is well described, and full details of the preparation of the zinc, the etching and finishing are given. Half tone work comes in for a share of attention, though the subject is not as fully treated as it might be. The simple and double washout processes, as well as the swelled gelatine process, are also described. Altogether the work is a very satisfactory addition to the literature of the subject, which is by no means meager. It is a book which will be well received by amateurs.

COPY FOR PHOTO-ENGRAVING. By Carl Schraubstadter, Jr. St. Louis, Mo. 24mo. Pp. 25, paper. Price 25c.

A valuable little work giving full information in regard to the paper, pens, and ink which will obtain the best results in the hands of the photo-engraver.

CATALOGUE OF AMERICAN LOCALITIES OF MINERALS. By Edward Salisbury Dana. New York: John Wiley & Sons. 1893. Pp. 51. Price $1.

This reprint of a very practical portion of Dana's Mineralogy will doubtless be acceptable to many collectors, enabling them to get the list of localities at a nominal price.

WATERDALE RESEARCHES; OR, FRESH LIGHT ON THE DYNAMIC ACTION AND PONDEROSITY OF MATTER. By "Waterdale." London: Chapman & Hall, Ltd. 1892. Pp. xvi, 293.

The author has addressed a special preface to his American readers. The aim of the author, it seems, is

the discovery of some result other than the hypothesis of attraction to account for the gravitation of one body toward another. This will indicate at once that the book is of the inconoclastic type, and shows that the author may be expected, in it, to remorselessly attack modern scientific conceptions. He seems to have covered the ground at great length and after the conclusion of his treatise favors us with about 100 pages of appendix.

DOMESTIC SCIENCE. A book for use in schools and for general reading. (Second and revised edition.) By James W. Talmage. Published by George Q. Cannon & Sons Co. 1892. Pp. 389.

We have gone through this little work emanating from far-off Salt Lake City, and have been most pleasantly impressed by the selection of topics and the judicious way in which they are arranged and treated by the author. He seems to have the talent of making a readable and consecutive work from materials which normally are considered of a somewhat disconnected nature. From what we have seen of it we feel strongly inclined to recommend it to the general reader.

THE COAL TAR COLORS. With especial reference to their injurious qualities and the restriction of their use: a sanitary and medico-legal investigation. By Theodore Weyl. Philadelphia: P. Blakiston, Son & Co. 1892. Pp. xii, 154. Price $1.50.

This interesting work touches upon a subject of growing importance. The toxicology of the coal tar colors has hitherto been rather neglected. The use of such colors not only in textile fabrics, but in food and elsewhere, makes it of unusual importance to understand what their effects upon the human system are. This work is done for us in Dr. Lethman's translation of Weyl's excellent treatise.

ELECTRICAL EXPERIMENTS. A manual of instructive amusement. By G. E. Bonney. London: Whittaker & Co., Paternoster Square, E. C. Pp. xvi, 252. Price 75 cents.

Much that is old, but for that reason none the less interesting, appears in this book. The usual topics of magnetism, induction coil experiments, static electricity and electrolysis are given, and the work will doubtless be of considerable interest to amateurs. Many of the cuts will be recognized as old friends, yet they are all pertinent to the subject.

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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.
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.

(4757) **N. N. writes: I have an artesian** well 612 feet deep, 5 inches diameter, and flows 190 gallons of water a minute. How much power can I get from it, and in what way can I test the pressure of it with a steam gauge? A. We should know the height that the flow of water can be utilized for power, as well as the quantity. You can reduce the area with a 2 or 3 inch hole in a pipe cap and find the height of the jet. You may also tap the side of the pipe for a gauge and close the top for the total pressure. Can you give the vertical height of the stream from the open pipe? With the water that is flowing, if you can get 20 feet fall, you can realize ¾ of a horse power.

(4758) **R. V. De B. writes: It is proposed** to feed a reservoir from a lake situated on a higher level. The lay of the land is such that a canal with a slight but continuous fall could be constructed from the lake to the reservoir, the water in the canal running at the rate of say one foot per second. Would there be any objection to the construction of an open canal, 3 feet deep, on account of the formation of ice in winter or from other causes? A. The question of climate should decide the matter of an open water ditch. In your climate slow-running water is liable to freeze from 2 to 3 feet thick during the coldest winters. If the reservoir is small, so that there is necessity for constant flow through the ditch, it will be at considerable risk to depend upon its supply during prolonged cold weather. If the cost is not a bar, we recommend cast iron pipe, or if within the range of size, glazed tile pipe is cheap and serviceable where there is no pressure.

(4759) **E. R. F. asks: If the air contained** in a cylinder 8 inches long and 1½ in diameter is compressed into ⅛ of that space, with the pressure of how many atmospheres would it rest on a square inch of surface? If the same quantity of compressed air should suddenly be released and escape from the cylinder through a tube ¼ of an inch in diameter, and in its passage through the tube encounter a bullet weighing ½ ounce, what force in pounds would it exert on the bullet, and how far and with what force or penetrating power would such a force drive it (the bullet)? A. The pressure as stated will be about 150 pounds per square inch, depending upon absorption of the heat of compression and leakage. The isothermal pressure = 103 pounds = 7 atmospheres. The adiabatic pressure = 235 pounds = 16 atmospheres. If the air were let into the air gun at the instant of compression, the pressure upon the bullet would be about 200 pounds per square inch and would eject the bullet with a velocity of about 500 feet per second, having a range of from 100 to 200 yards, according to smoothness and length of barrel and facility for giving free vent of the compressed air to the barrel. The force of impact would be that due to about 15 foot pounds.

(4760) **W. K. M. asks: Has the process** of tempering aluminum been discovered yet, and is it possible to use it in the open air without fear of its tarnishing? Also please state the comparative weight and tensile strength of steel, copper, and aluminum. A. The process of tempering aluminum has not been discovered, except by alloying with other metals. It does not readily tarnish in the open air. Aluminum, 26,000 pounds per square inch tensile strength, weight 168 pounds per cubic foot; copper, 30,000 to 33,000 pounds per square inch tensile strength, weight 552 pounds per cubic foot; steel, 70,000 to 90,000 pounds per square inch tensile strength, weight 490 pounds per cubic foot. See a valuable treatise on "Aluminum: its Manufacture, Properties, Alloys, and Working," by J. W. Richards, $5 mailed.

(4761) **F. W. W. says: I have a few** hives of bees which I keep for pleasure. Ever since I first had them, my extracted or strained honey has sugared or crystallized. This takes away its fine flavor, as some of the sugar will not melt on being heated to the boiling point of water. I have kept this honey in a warm room, and have also tried a cold one without attaining the desired result. The honey is extracted by removing the caps of the cells and whirling the combs in a honey extractor. My neighbor, who also has a number of hives, is troubled in the same manner. The honey was extracted in July. Do you know of any way of preventing this crystallizing without detracting from the value of the honey? A. There is a possibility that your bees have been feeding on sugar, which makes crystalline honey. Otherwise the centrifugal extractor may carry too much air through it, evaporating part of the moisture. Try moistening the air of the extracting room with steam while the work is being done. A boiling pan of water may answer the purpose.

(4762) **C. G. C. asks: Will there be a** gain (if so, how much?) in mixing hot air (furnace gases) with steam in working an ejector (pump) to lift cold water on high lifts to prevent condensation of steam? What proportion of hot air would be most useful? A. Hot air mixed with steam in an ejector is of but little or no value, and without pressure decreases its working power, and in any quantity nearly destroys its lifting power. The power of an ejector to lift and force water is in the property of steam to condense and disappear as a vapor at the instant of imparting its velocity to the water. Air mixed with the steam retains its gaseous volume in the receiving nozzle of the ejector and occupies the space that would otherwise be occupied by the water jet. Air alone is of little value in a water ejector. Will soon publish something on ejectors.

(4763) **W. C. R. asks: How can I count** the flaps of a small bird's (sparrow) wings, and how may I compute the area of a bird's wing which is somewhat irregular in form? A. You can only approximate the wing vibrations of small birds by eye comparison with a wing fitted to a vibrating mechanism with a variable power and registering index. The area may be computed by sectional divisions of a drawing to be made exactly of the size and shape of the wing.

(4764) **Subscriber asks: Can wood car**bon be used instead of battery carbon in an arc light? A. Wood carbon was the material used in producing the electric arc by Sir Humphry Davy, but it is not as good as the manufactured carbon made from powdered coke. The old authorities used to recommend saturating it with mercury to improve its conductivity. 2. Is there any way of changing heat direct into electricity? A. The nearest approach to the direct conversion of heat into electricity is found in the thermo-electric battery.

(4765) **H. G. asks: What explosive pow**der when mixed with powdered magnesium will cause a powerful instantaneous flash, suitable for photographic purposes? A. Magnesium powder, 6 ounces; potassium chlorate, 12 ounces; antimony sulphide, 2 ounces; 75 to 150 grains of the powder should be used.

Magnesium	40 per cent.
Permanganate of potassium	40 "
Peroxide of barium	20 "

(4766) **A. D. M.—A good cement for cel**luloid is made from 1 part shellac dissolved in 1 part of spirits of camphor, and 3 to 4 parts of 90 per cent alcohol. The cement should be applied warm, and the broken parts securely held together until the solvent has entirely evaporated.

(4767) **G. M. R.--The designs for watch** works are made on an enlarged scale, generally ten times the size, which makes the actual dimension expressed with a decimal point one digit to the left. There is no haphazard work in watch making or in the machinery for producing the parts.

(4768) **E. R. S. asks: 1. What book is** there on friction, suitable for a young student, yet giving practical calculations, such, for instance, as finding the horse power required to keep an axle or shaft turning at a required speed (the dimensions of the shaft and its weight being known)? A. We recommend Thurston's work on "Friction and Lost Work in Machinery," $3, mailed. Also our SUPPLEMENT, Nos. 572 to 576, for an admirable series of articles on friction. 2. If the resistance of the air is not taken into account, does the speed with which an axle or shaft will revolve in its bearings vary as the horse power applied? A. Friction varies with the speed, and relatively decreases in proportion to the increase of work in revolving machinery. 3. What book is there, showing how to calculate an electric motor to produce a certain horse power? A. Dynamo calculations are given in Sloane's "Arithmetic of Electricity," $1 by mail. Multiply the desired horse power by 746, divide by the potential difference at your disposal. This gives you the amperage. Then calculate on the lines of a dynamo of similar factors.

(4769) **R.—No one has the right to make** a patented article for his own use without consent of the patentee.

(4770) **O. M. W. writes: I have built a** small electric machine, windings and pattern after the 8 light dynamo described in the SCIENTIFIC AMERICAN, except size; armature 3¼ inches long, 2 3-16 inches in diameter; magnet waists oval, 1×2 inches; 4 inches long, magnet coils 18 wire gauge; armature No. 20; 16 commutator bars; each armature coil six turns per layer, two layers deep. As a motor it seems to be a success, but as a dynamo a complete failure; can only get a current of seven-tenths ampere up to 1800 revolutions, above that speed less. What is the trouble? What sized wire and what manner of winding can I get the largest amperage as a dynamo, using very soft cast iron magnet or very soft forged iron magnets? Magnets and armature size as above. A. The iron used in a field magnet should always be as soft as possible. If the iron in your magnet is hard, it accounts for your failure. With No. 18 wire on the field magnet you should use your machine as a series wound machine. If you find the resistance is too great with the two arms of the magnet in series, you can put these in parallel. If you desire to use the machine as a shunt wound machine, the resistance of the field magnet is not great enough. Probably the winding of the field magnet for a shunt machine should be of No. 22, or possibly No. 24 wire.

(4771) **W. H. D. writes: I want to know** about the resistance necessary for a ⅛ horse power motor when running it with fan on a 500 volt T. H. street railway circuit, with amperage bearing as high as 240. You will do me a kind favor by letting me know through your valuable paper how many ohms resistance it will take. A. An electrical horse power is 746 watts. A watt is an ampere multiplied into a volt. The current in amperes equals the electromotive force divided by the resistance. You have an electromotive force of 500 volts; for ⅛ horse power you require 93 watts. You will therefore need about 5 amperes of current, and a consequence your machine will need to have a resistance of 100 ohms.

(4772) **W. A. S. writes: I have been try**ing to smelt tin cans, tin clippings, and all kinds of rough iron scrap, in a common straight cupola such as all foundries use, and have been unable to get any iron. There is a great quantity of slag, which is very thick and tough, and in a short time fills the tuyere holes and won't let any wind through. We have not used anything for flux. A. You cannot run down wrought iron scrap in a cupola. It should be piled in masses of 100 pounds or more, heated in a reverberatory furnace and welded with a power hammer. The tin scrap may be used in small quantities with cast iron in the cupola.

(4773) **C. E. B. asks how big a space he** needs for the gas in a gas engine with a cylinder 1½ inches in diameter and a stroke of 2½ inches, also how big space he requires for the compression of the air. A. A compression gas engine uses about 1 part of gas to 7 or 8 of air. We think you will find it extremely difficult to operate an engine of the size given. The space for the gas and air varies with the system upon which you propose to run a motor. If you are running it without washing out the cylinder with air before each explosion, you will need a space twice as large as that required for the combustible mixture. If, however, you wash the cylinder out, the space for gas and air need be only large enough to contain the combustible mixture when compressed.

(4774) **M. T. B.—Your proposed im**provement in telescopes would have no value, as the defects of each telescope and mirror would be multiplied; furthermore, each reflection and each refraction of the light absorbs an appreciable quantity, so that your telescope would lack in illumination as well as defining power.

(4775) **W. M. C.—(1) First select a clean** perfectly fitting cork for each bottle. Then melt your salve and pour it into the bottles from a vessel provided with a spout, taking care in doing so not to allow any of the grease to touch the inside surface of the neck. (2) There is nothing dangerous in the use of the inhalations recommended to you for the asthma. (3) You will find a valuable article on the "Etiology and Cure of Asthma" in SCIENTIFIC AMERICAN SUPPLEMENT, No. 589. Price 10 cents.

(4776) **E. F. S. writes: I was in a store** the other day, and saw a clerk take a cotton string about six or eight inches long (common wrapping twine) and stick it to a glass showcase on the inside with a piece of wet paper across the middle and let both ends hang down alike, but opposite each other, from the round side of the showcase. Then he rubbed the back of his hand on the outside of the glass, and the strings began to move backward and forward until the one nearest the hand hit the glass and stuck to it; the other end stood out the other way, and became rigid. Some said that it was electricity, and some magnetism. Please tell us what it was. A. The results which you describe are probably due to frictional electricity generated by rubbing the glass with the hand.

(4777) **A. A. asks what size wire to wind** the four cores of a small shunt wound dynamo, the cores of which are 4 inches by 2 inches by ⅜ inch. I wish to wind these with such wire as will, when wound to about 5-16 inch thick all over, permit about 1 ampere of current only to pass through the coils. The armature is 2 inches by 4 inches, wound with No. 20 wire, with which I expect to get 4 amperes and 50 volts. A. You will need about 1,000 feet of No. 27 wire for your field magnet.

(4778) **T. B. writes: I have a magnet** that I wish to wind to obtain best results. The size of the cores is 2 inches long and 5-16 inch in diameter. What size and quantity of wire shall I wind on bobbins? A. Wind each core of your magnet until the thickness of your wire equals the thickness of the core. If you intend to use the magnet for local work, No. 24 magnet wire would be the best size for the winding.

(4779) **G. A. G. asks: How far will the** electricity now in use on the electric street railways jump