RECENTLY PATENTED INVENTIONS.

Engineering.

REVERSING GEAR AND GOVERNOR.—Thomas T. Waggoner, St. Louis, Mo. This is a combination mechanism for conveniently reversing the engine by an ordinary reversing lever, maintaining also an automatic and sensible governor to control the speed of the engine. The invention consists principally of a pivoted eccentric carried around on its pivot by the driving shaft of the engine, the eccentric being connected by the usual strap and rod with the engine valve, and being controlled in its swinging motion from weighted levers pivoted on supports attached to the driving shaft.

PUMP.—Artimus W. Shidler and William P. Hendrickson, Farmington, New Mexico. According to this invention a pulley is journaled in a hanger suspended in the top of a well, above which is arranged a tilting lever carrying a cable extending around the pulley, the cable also carrying a sucker rod provided with the usual pump piston. The improvement is particularly adapted for use in deep wells, and is readily applied to a driven well, obviating the use of heavy pump rods and much other mechanism necessary in pumps of the usual construction.

HYDRAULIC RAM.—Charles B. Jones and John S. Wetmore, Roanoke, Va. The construction of this ram is such that the path of the water entering the induction side and emerging from the check valve in the air chamber is in a straight line, thus conserving the power of the descending column and increasing the efficiency of the ram. The base has a direct passage from the induction pipe to the check valve, and is furnished with a valve chamber having a cap with a spherically concave valve seat to which is fitted a valve, there being adjustable guides for the valve stem, and, in combination with the induction passage, an air tube for maintaining a supply of air in the air chamber.

Electrical.

SUPPLY SYSTEM FOR ELECTRIC RAILWAYS.—Zebulon Foster, Chicago, Ill. According to this invention the conductor is made up of aligned, insulated sections, arranged alongside of a continuous or main line conductor, and the several sections are successively brought into electrical connection with the main hue as the trolley passes over them. The line wire has a series of branches whose free ends are inclosed in an air-tight casing, and independent conductor sections are arranged opposite the terminals of the branches, springs holding the sections and branches normally separated, and their engagement being effected by the trolley mechanism.

SPEED INDICATOR AND ALARM.—George A. Thompson and John F. Schmadeke, Brooklyn, N. Y. This is a device especially adapted for use on electric cars, to close an electric circuit when the speed reaches a certain point, when a bell is rung or a lamp lighted, to indicate that the speed of the car should be lessened. A contact rod is held in an insulating block at a distance which may be regulated from a sliding rod, the latter being moved toward or from the contact rod according to the swinging of arms on the ball governor principle from a shaft connected with the car axle. The device may be adjusted so the circuit will be closed at any desired speed.

Railway Appliances.

SLEEPING AND PARLOR CAR.—Linford F. Ruth, Connellsville, Pa. Among the leading features of this car is a system of pneumatic cushions connected to the compressed air pipes, to be inflated by opening valves, or collapsed and compactly stored, the mattress also being similarly inflated and collapsed, according to the period of use as a parlor or sleeping car. It is also designed by this improvement to lessen the expense of this class of rolling stock, reducing its weight and increasing its range of usefulness, while promoting cleanliness. The top-heaviness of the ordinary drawing room car is also overcome by doing away with the heavy upper bunks and seat frames.

LOCOMOTIVE DRIVE WHEEL BRAKES.—Walter O. Pelham, Taylor, Texas. This is a device for releasing the brakes of the drive wheels when the engine is reversed and the air brakes applied, to prevent the drive wheels from being locked and sliding on the track rails. The invention consists of an auxiliary piston connected with the triple valve piston and controlled by back pressure in the steam chest, the release being governed by pressure in the oil pipe, and this pressure being air when the engines are reversed and steam when there is back pressure in the cylinders and steam chests.

RAILWAY SWITCH AND CAR REPLACING MECHANISM.—Albert S. Debose, Cuero, Texas. Combined with the main rails and detachable switch or replacing members having pivot lugs and undercut recesses at their front end are guide blocks adapted for detachable connection with the rails, their rear ends tapering with the upper face of the rails, and their front ends having sockets and recessed portions to receive the lug ends of switch or replacing members. The several parts are detachably connected and can be readily assembled and fitted in position without the use of spikes or bolts for use either as a switch mechanism or as a car replacing means.

TRACK JACK.—Joseph McMurrin, Shoshone, Idaho. This jack comprises a supporting frame in which is arranged a vertical screw carrying a lifting sleeve, a swinging lever being mounted above the screw and operatively connected with it. There is a ratchet on the gear shaft connected with the screw, and by engaging one pawl with the ratchet and working the lever up and down the screw is turned in one direction, while with another pawl in engagement with the ratchet the screw is reversed. It is a strong and easily operated jack by which a rail may be quickly and easily arranged.

Mechanical.

NUT LOCK.—George E. Smouse, Everett, Pa. According to this improvement a key and ratchet are employed to adjustably hold the nut from unscrewing, the bolt being grooved in its thread and the nut having locking projections on top, while a spring pawl is employed having an integral depending key, a key flange being formed at right angles on the key along one edge. The improvement renders the application of the nut to the threaded bolt very easy, and a reliable locking of the nut is effected.

WRENCH.—William C. Lawrence, Casselton, North Dakota. This tool is especially adapted for use as a pipe wrench, having superior clutch or holding power, and being rapidly and easily adjustable. It will clutch any article placed between its jaws, from the smallest rod to its full capacity, never slipping when it once has a bite on the article. In its manipulation, the pivoted upper jaw permits the wrench to be readily carried backward for a new grip. It obtains an eccentric grip upon the pipe, and may be operated with one hand.

SOLE CHANNELING AND ROUNDING OUT MACHINE.—George F. Fischer, Rochester, N. Y. This machine automatically rounds out sole after sole from a pile of leather blanks, channeling and grooving the soles and discharging them completed, then cuts off the power until the machine is again charged. It also rounds or cuts out insoles. The stock for insoles and outsoles is placed on separate tables, and a carriage moving backward and forward simultaneously drops different sets of adjustable knives to do the work, the insoles being left clamped between the pattern and the table. Trip arms and trip fingers connected with the carriages and supports automatically shift the bars of each carriage to throw them into rack engagement with the main driven shaft. The mechanism is very simple, all parts being constructed to operate in unison.

GLAZIER'S TOOL.—George A. Rogers, Allegheny, Pa. This is an adjustable glass breaker attached to any part of the glazier's diamond glass cutter, whereby the glass may be more accurately and securely broken along the line of cut, regardless of varying thickness in the sheet of glass. The device is to take the place of the comb or notched or slotted glass breaker heretofore used, and may be made always to fit the glass closely.

Miscellaneous.

MUSIC LEAF TURNER.—James Flemming, Buffalo, N. Y. This is a simple device to be attached to a piano or other musical instrument, and provided with a series of arms which may be conveniently arranged behind the music leaf to be turned. On the striking of certain keys or fingers mechanism is released which actuates the arms and swings them around to turn the leaves. There is a key for each rod, and the keys project forward far enough to enable them to be easily struck by the finger.

TREBLE BRIDGE FOR PIANOS.—Christian L. O. Altenburg, New York City. This is a bridge supported at one end in such manner that the treble strings pass over its free, vibrating end, the bridge being fastened at one end on the string frame and its free end extending into a recess of the frame. It is designed that, with this arrangement, the short treble strings when struck by the hammer will give a full and sweet sound.

BICYCLE LAMP.—David Jackson and John Osterloh, New York City (No. 9 East 12th Street). This invention provides a lamp of simple and durable construction, to insure proper combustion and a steady, good light that is not liable to jar nor blow out. The lamp is adapted for burning either ordinary kerosene oil or the more expensive illuminants without changing the burner or wick; by the peculiar arrangement for the introduction of air and feeding it through an air chamber below the burner. The lamp is small, light in weight, of the shape most generally used, and inexpensive to manufacture.

VEHICLE RUNNER ATTACHMENT.—Walter J. Le Barron, Barre, Vt. This is a readily operated device, applicable to any kind of wheeled vehicle, to enable the latter to be mounted on runners, or the runners may be readily moved out of the way for the vehicle to run on wheels. With this attachment a baby carriage may be conveniently supported for use as a cradle. The invention comprises reach rods detachably secured to the axles, and carrying hangers to which the runners are pivotally connected, a locking slide bar connected to the hangers having a handle portion movable on a guide.

ROAD SCRAPER.—John D. Libey, Lima, Ind. According to this invention the scraper is pivotally connected with a wheel-supported frame, a double windlass made in two parts for joint or separate action raising the front or rear of the scraper, while there is also a scraper-supporting frame below the axles. This scraper will take up, carry and deposit earth, being operated easily by one man, and may be used wherever earth is to be leveled or removed.

WAGON DUMPING DEVICE.—Thomas Wright, Jersey City, N. J. This is a simple device for attachment to the body and running gear of a freight wagon, for conveniently tilting the body rearwardly to discharge its load. Parallel frame bars are bent downwardly near their rear ends, and two dumping bars are pivoted near one end on each of the frame bars. A body supporting device is slidable on the dumping bars, and elliptical springs are loosely connected at their ends to the frame bars, being intermediately fixed upon the rear axle of the wagon.

HORSESHOE.—James Maslen, 247 West 125th Street, New York City. This shoe has a detachable sole, removable calks, and fastening screws extending through the bed plate and sole and into the calks. It affords protection to the hoof, and is cheap and durable, as the bed plate will last for years, while the soles can be changed to suit the going. The leather and rubber sole prevent jar to the hoof and give a firm foothold, and the sharpened steel sole gives a firm foothold on ice or packed snow. No nails are used to split the hoof.

BRAKE FOR INK ROLLERS.—Emil Meier, New York City. This is an inexpensive spring brake attachment more particularly designed for application to the ordinary angle or distributing rollers of printing presses. It is adjustable to fit rollers arranged at different distances apart, clasping the shafts in such a manner as to permit the usual endwise and necessary rotary movements, but preventing the rollers from rotating excepting when in actual contact with the ink table.

PERPETUAL CALENDAR.—Charles E. Vawter, Crozet, Va. This calendar has a numbered and lettered face, and numbered and lettered movable piece, there being holes in the face of the calendar and a colored clip arranged behind the holes, while the perforated and marked lower end of the movable piece is arranged to swing between the colored clip and the perforations in the face of the calendar. It may be readily adjusted for any year, being then good for the whole year, and is adjusted as easily for one date as another.

PAVING BLOCK.—Irvin G. Poston, Veedersburg, Ind. This block has in each of its opposite vertical faces two horizontal grooves intersected by transverse grooves that run out to the upper and lower edges of the block, allowing a filling of melted pitch to be poured between the blocks when laid in the pavement, forming a locking key partly embedded in the groove of one block and partly in the coinciding groove of the next block.

SUPPORTING CARPET ROLLS.—Charles L. Taylor, Louisville, Ky. This invention provides a novel device for the support and rerolling or unrolling of carpets of good quality, lightening the labor of handling a large roll, quickening the operation, and avoiding injury to the edges of the carpet. The invention comprises a central disk-like hub with central socket in its underside to receive a pivot stud, and a series of radial bars projecting from the hub, there being a binding band on the outer edges of the bars.

MATTRESS FILLING MACHINE.—Elijah T. Gaskill, New Berne, N. C. This invention comprises a table frame with tick-holding devices, a filler-holding carriage or box reciprocating on the table, with filler compressing devices and means for reciprocating the carriage into and out of the ticking. The construction is simple and the machine is easily operated.

STEP LADDERS.—Sydney E. Allen, Winston, N. C. A combined brace, clamp, step fastening and support are included in this improvement, which comprises a sheet metal body of right-angular shape, having on its side edges teeth at an angle to the adjacent flat surfaces, and with two sets of flexible claws or toothed arms which project from the ends of the flat portions of the body. The steps are thereby readily and firmly connected with the legs of the ladder, dispensing with mortise and tenon, the steps being also readily detached.

NECKTIE FASTENER.—William C. McDougall, Cheboygan, Mich. This fastener consists of a slotted shield, to which is pivoted a hook to hook on a stud or button on the neck band, a metal guard being bent over the edges of the slot and secured by clips, and a latch plate pivoted to both shield and guard, while a U-shaped spring attached to the guard and latch plate lies flat on the latter.

GARMENT FASTENER.—Archibald Picken, Roanoke, Va. This is a device in the nature of a hook and eye, which, when brought together, will be fastened at the exact point where left, without carrying the hook a distance beyond the catch, to come forward again after being caught. The hook has a flat body portion, with one or more rearwardly inclined prongs, and the catch has two parallel bowed portions held together by spring tension.

BACK BRACE.—Jose Gallegos, Ocos, Guatemala. This is a support comprising a spine bar and adjustably connected side bars united at their lower ends by a waist bar, all loosely connected with one another, while elastic portions connected with the bars may be adjustably and detachably fastened to each other. The brace facilitates the exertion of various muscular efforts, and also enables one to carry greater loads than would be possible without its help.

SCISSORS HOLDER AND POINT GUARD.—William Chandler, North Bend, Canada. This is a skeleton elongated frame bent from a single piece of wire, a ring being formed at the top, from which bent limbs project between the bows of the scissors when they come together, while the lower end of one wire is bent to form a coniform cup to receive the point. A spring keeper clip secures the scissors in the holder.

BOTTLE STOPPER.—Cevedra B. Sheldon, Brooklyn, N. Y. A stopper which will prevent the refilling of a bottle after it has been emptied of its original contents has been designed by this inventor. The neck of the bottle is provided with a valve guard having a circuitous passage to prevent the introduction of a tool, there being on the inner side of the guard a valve and valve-actuating spring which are protected against acids. The stopper is inserted with the valve and cemented, and the guard applied, after the bottle has been filled.

FUNNEL.—Charles W. Beall, Saratoga, Wyoming. This funnel is particularly adapted for filling lamps with opaque sides, and similar uses, closing automatically when the receptacle is almost full, to prevent running over. A float-carrying lever is connected by a rod to a valve controlling the funnel outlet. When the funnel and float are raised from the vessel the float drops, so that the remaining liquid in the funnel flows into the receptacle, the funnel and float having been correspondingly gauged.

ECRASEUR.—Michael McNalley, St. Louis, Mo. This invention relates to a gelding device involving ligatures attached to an adjustable holder, the ligature holder and operating devices being so constructed that it may be conveniently and effectively manipulated.

DRENCHING BOTTLE.—John T. Turner, Jamestown, North Dakota. This bottle has a large bottom and contracted outlet, a protecting covering closely fitting and inclosing the bottle, while a funnel is adapted to enter the smaller end of the bottle when its cap is removed. It is designed for conveniently dosing an animal without spilling the medicine.

INSECTICIDE.—Ludwig and Ernest Brumleu, Cuero, Texas. This is a poison to be used instead of Paris green or London purple, and it may also be easily converted into a beautiful green powder for advantageous use as a pigment. It is made of ferric oxide, arsenious acid and sulphate of lime, combined in a novel way.

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.

PRACTICAL LESSONS IN FRACTIONS BY THE INDUCTIVE METHOD, ACCOMPANIED BY FRACTION CARDS. By Florence N. Sloane. Boston, U. S. A.: D. C. Heath & Co. 1894. Pp. xxvi, 92. Price 40 cents.

One of the saddest lessons that the teacher has to learn is that most progress is made by keeping along with the average intellect of the pupil by going very slowly, by teaching little and teaching that little thoroughly. It is only such intellects as that of Sir Isaac Newton that can afford to treat geometry as something too elementary to be worthy of study. This work is by a lady teaching in the Edward Everett School, in Boston, who teaches fractions by the use of diagrams, models and interesting problems, and we believe that it will be found an exceedingly valuable text book in schools where thorough work in arithmetic is an object.

TECHNICAL DRAWING SERIES. ELEMENTS OF MECHANICAL DRAWING. Use of Instruments, Geometrical Problems and Projection. By Gardner C. Anthony. Boston, U. S. A.: D. C. Heath & Co. 1894. Pp. 98. Price $1.50.

What we have said of the preceding work applies to this one, which treats this subject from the lowest level of simplicity and develops its subject to a reasonably advanced standpoint from the simplest elements. The plates are so arranged that when they are open and the book closed all of the plate is visible. This is the more necessary as the binding of the book is of that unfortunate description which precludes the possibility of keeping it open without some special effort.

THE ANIMAL AS A MACHINE AND A PRIME MOTOR, AND THE LAWS OF ENERGETICS. By R. H. Thurston. New York: John Wiley & Sons. 1894. Pp. 97. Price $1. No index.

The treatment of the animal from the standpoint of thermodynamics has long been a favorite idea with writers on these subjects. We believe that Professor Thurston's work will be found very, interesting, and his data in regard to work done and food consumed while doing it are very interesting, as derived from all sources. Haulage of vehicles is excellently treated from the standpoint of the parallelogram of forces. We regret the want of an index.

ANIMALS' RIGHTS CONSIDERED IN RELATION TO SOCIAL PROGRESS. With a bibliographical appendix. By Henry S. Salt. Also an essay on vivisection in America. By Albert Leffingwell. New York and London: Macmillan & Co. 1894. Pp. x, 176. Price 75 cents.

This is a very curious book; it treats of the subject of animals' rights in relation to vivisection and kindred topics, giving animals a standing in the world of ethics comparable to that enjoyed by man. While the tendency of the book is, of course, toward the best possible results in the abolition of cruelty, the treatment of it is a little one-sided. Its distinctive point is that it treats the subject of humanity to the lower creatures largely on the basis that there is no such difference between the rights of man and the rights of animals as is usually assumed to exist. In a letter given in a foot note on page 131 the case seems to be put in a nutshell. Vivisection in American institutes of learning receives considerable attention, and in the concluding sentence of the work numerous letters from college presidents are given, to show how extensively vivisection is practiced in the colleges of this country.

THE GOSPEL OF BUDDHA ACCORDING TO OLD RECORDS. Told by Paul Carus. Chicago: The Open Court Publishing Company. 1894. Pp. xiv, 275. Price $1.50.

Buddhism seems to be very fashionable just now. In his preface the author states that the bulk of the contents of the book is derived from the old Buddhist canon, and that besides the three introductory and the three concluding chapters, there are only a few purely original additions. While we cannot pretend to be especially familiar with Buddhism, it does seem as if in a book of this sort it would, perhaps, be well to draw more exact distinction between the original and the added matter. The fact that in reading one may be reading original or merely translated matter without knowing which, to our mind, detracts from the value and interest of the book.

THE RISE AND DEVELOPMENT OF ORGANIC CHEMISTRY. By Carl Schorlemmer. Revised edition. Edited by Arthur Smithells. London and New York: Macmillan & Co. 1894. Pp. xxiv, 280. Price $1.60.

The barren statement of facts in organic chemistry is usually pretty dry and makes very unattractive reading. This work, which is in some sense a posthumous one, and has had a careful revision by Professor Smithells, really makes most interesting reading. The subject of organic chemistry is given in form, with dates of discovery, notes of discoverers, and of their work, so as to make a consecutive treatment of the subject. As an example of the careful editing, we will particularly remark on the fullness of two indexes, one an index of authors' names, the other the index of subjects; authors, of course, is to be interpreted as authors of various discov-

cries, not merely of books. A beautiful photogravure of Professor Schorlemmer is used as frontispiece. While chemistry is, in many ways, a disappointment, the present work will be found a most valuable contribution to chemistry from an almost new aspect.

THE TELEPHONE HANDBOOK. By Herbert Laws Webb. Chicago, Ill.: Electrician Publishing Company. 1894. Pp. 146. Price $1.

This little book is quite clearly described by its title. It is compactly printed, adequately illustrated and contains an index. The subject is not very deeply gone into, and we believe its descriptions of telephone practice, with the accompanying diagrams, will be of interest and value to many.

MANUAL OF PHYSICO CHEMICAL MEASUREMENTS. By Wilhelm Ostwald. Translated by James Walker. London and New York: Macmillan & Co. 1894. Pp. xii, 255. Price $2.25.

This admirable work on measurements derives interest from being, in a great measure, a description of experiments. It is an excellent illustration of what we are growing to recognize as German thoroughness, all the minor points of the work being as closely considered as the other portions. It differs from recent works on the same subject that we have had to review in precisely this thoroughness and in the utilization of the best methods rather than the simplest methods, the latter attaining, to our minds, often an almost vicious importance in the American treatment of inductive work in science. In this work the author designs to tell how work can be well done, not merely how the mere forms of work can gone through most readily.

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Theoretical and Practical Ammonia Refrigeration. J. J. Redwood. Illustrated, tables. Cloth (in the press), $1. Spon & Chamberlain, 12 Cortlandt St., New York.

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

Woven wire brushes.—The Belknap Motor Co., of Portland, Me. are the patentees and manufacturers of the best woven wire commutator brush on the market.

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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.
Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.
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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.

(6317) W. S. asks: 1. What is the horse power of a cylinder of steel 3 inches long, 3½ inches wide, revolving at the speed of 15,000 revolutions a minute on a ⅜ inch shaft? What must the speed of the cylinder be to generate 1 horse power? Is it true that the higher the speed, the less power you get? If it is true, how is it that the De Laval steam turbine generates 20 horse power at 30,000 revolutions a minute? A. The solid cylinder while revolving at the high velocity stated would have 2¼ horse power by its momentum alone, which would diminish to 0 in a few moments by the giving out of its unsustained power. A little less than one-half the speed will be equal to one horse power under the same conditions. The power derived from momentum of a mass or weighty body increases with velocity, and when the velocity is sustained by a power, as in an electric motor, [steam turbine, or impact water wheel, the power is also sustained in terms of the factors of momentum and velocity.

(6318) M. H. J. writes: Will you please inform me what will be the effect of loose steam turned in one of the patent drying kilns in case of a fire? I refer to drying kilns such as are built by the Sturtevant Dry Kiln Company, the Reliance Patent Dry Kiln Company, and the Standard Dry Kiln Company. A. Steam is an extinguisher of flame, and if turned into a drying kiln on fire, will extinguish the flame, and finally extinguish the ignited wood, if kept on long enough, and the kiln thoroughly saturated with wet steam. The only difficulty that might arise will be in turning off steam before the ignited wood is cooled, when the admission of air may again start the flame.

(6319) E. R. asks: Why is it that brick chimneys always lean toward the north after they have been several years built? Also, how to find the length of the outside line of a segment of a circle when the length of the chord and rise of arc are known. A. Mortar in walls and chimneys is subject to change of constituents by the presence of moisture and carbonic acid gas in the atmosphere. The mortar, which at first is a hydrate of lime and sand, gradually changes to a carbonate in its lime element; thereby increasing its bulk to a small extent. On the storm-wet sides of chimneys subject to repeated changes of temperature by sunshine, the process of the elemental change probably goes on somewhat faster than on the shady side; which, with the additional change due to a slight disintegration of the mortar by the continual change of temperature on the sunny side, gradually lifts one side faster than the other, producing the observed cant in chimneys and columns. The internal heat of a chimney cannot be assigned as a cause of unequal expansion of the sides, because it is of equal effect on all sides. For length of arc, multiply square root of sum of square of chord and four times square of versed sine by ten times square of versed sine; divide this product by sum of fifteen times square of chord and thirty-three times square of versed sine; then add this quotient to twice chord of half arc, and sum will give length of arc very nearly. This rule is worked out with an example in Haswell's "Engineer's Pocket Book," chapter on mensuration, $4 by mail.

(6320) G. W. asks: How long would a tank containing ten cubic feet of compressed air, at a pressure of two hundred pounds, run a one-half horse power motor? What would be the most suitable motor to use in this connection? What power would a twelve foot windmill develop at 50 revolutions per minute? A. At 200 lb. pressure the cylinder will contain 14⅓ volumes or 143 cubic feet of free air. It requires 12 to 14 cubic feet of free air per horse power in small engines, so that the time could not exceed a 10 minute run, unless the air can be heated before entering the engine to about 300° Fah., when the time could be extended to 15 minutes. The most economical form of steam engine is the best air motor. A well designed windmill of the size and at the speed named should develop ¼ horse power.

(6321) G. W. P. writes: My line wire terminates at each end in a tensional diaphragm of raw hide for signaling purposes, the wire being suspended from loops of hemp cord, instead of using the usual insulators, the insulation being secured by the perfect dryness of everything in this climate for most of the year. 1. Would such an arrangement hinder the working of the telephone over the same wire? A. Your line will answer, we think, for electric telephoning. 2. Does an iron pump stock furnish an efficient grounding medium, the supply pipe of course ending in water? A. Yes.

(6322) F. C. W. asks: How can I change the shape of a piece of aluminum? Can it be melted and cast in moulds the same as lead, or will it have to be worked the same as wrought iron? A. Aluminum can be hammered, rolled, and drawn the same as brass, only requiring more frequent annealing, which should be at low temperatures, 400° Fah. makes it soft enough for ordinary working. It can be easily cast in iron moulds for ingots, and in sand moulds with patterns; an ordinary plumbago crucible is used; flux is not needed, but common salt only is used when scrap metal is to be melted.

(6323) I. S. asks: I have four storage cells, each having 72 square inches positive plate. What is the best kind of battery, and how many would it take to charge them? I have used gravity battery and found it very unsatisfactory. A. You will require a current of 3 amperes to charge your battery. You may use a bichromate battery for the purpose. It is better to use a mechanically generated current for economical reasons. The gravity battery is cheaper than the bichromate, but is much slower.

(6324) G. A. W. F. asks: How many and what gases enter into the composition of air? Is there any truth in the alleged discovery of a third gas as a component part of air, in addition to those now recognized, viz., oxygen and nitrogen? A. We refer you to our SUPPLEMENT, No. 977, "Chemistry at the British Association," for some notes on the new gas, one of the most interesting discoveries of the year.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

December 4, 1894,

AND EACH BEARING THAT DATE.

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

Advertising or other sign, R. Henderson 530,226
Aerial navigation, apparatus for, N. H. Borgfeldt 530,219
Air, apparatus for generating compressed, E. C. Nichols 530,118
Air compressing device, Griffiths & Niedermayer, 530,335, 530,336
Alarm. See Bilge water alarm. Burglar alarm.
Ale or beer condenser and cooler, J. T. Jones 530,309
Animal releasing device, H. Larsen 530,487
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Banjo bridge, A. D. Grover 530,483
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Battery connection, W. S. Doe 530,401
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