Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

Notes & Queries

A. K. will find, on reference, that the perpetual motion absurdity in most of its forms is discussed in vols. 23 and 24.—R. J. will find formulæ for calculating the strength of boilers on pp. 116, 165, vol. 28.—F. W. can nickel plate iron castings by following the directions on p. 235, vol. 33. J. S. can clean marble by the method detailed on p. 330, vol. 32.—J. W. H., J. C. W., C. S., F. J. M., J. D., R. M., and others who ask us to recommend books on industrial and scientific subjects, should address the booksellers who advertise in our columns, all of whom are trustworthy firms, for catalogues.

(1) R. M. C. says: We have an engine 7¼ inches diameter by 20 inches stroke. The steam ports are 4 x ¾ inches, with a 1½ inch steam pipe. We use 60 lbs. steam boiler pressure, cut-off at ⅝ stroke, and run at 150 revolutions per minute, using ¾ to 1 cord hard wood per day. We have written to a firm in regard to a governor for the same, and have received a reply that the steam pipe should be not less than 2½ to 3 inches, as the steam now has to travel through 1½ inches pipe at the rate of 15,000 feet per minute, to keep up with the piston. Is this so? A. The steam pipe is too small if you wish to get full power out of the engine. Under the circumstances, it seems to be large enough, and you could probably carry a lower boiler pressure, and open the throttle a little more.

(2) C. C. E. asks: What time of the year is best for cutting oak timber for fence posts? A. There is some difference of opinion on the subject, but we think the weight of authority is in favor of cutting the timber in spring or autumn.

(3) C. L. M. asks: 1. What proportion has the focus of field lens of an Huyghenian negative eyepiece to the eyeglass, as used in compound microscopes? A. The field lens has about double the focal length of the eye lens, and their distance apart is one half the sum of their focal lengths. 2. What proportion has the aperture to the focus? A. The aperture of each is one half the focal length.

(4) W. O. asks: During the first quarter revolution of the driving wheel of a locomotive (the wheel pressing upon the rail), does the point in the circumference marking the exact top thereof move a greater distance forward than the exact bottom of the same? A. Yes.

(5) W. G. says: I have tried zinc in my boilers for preventing incrustation, and find it very good. I wind strips of copper around it. I put in a 3 feet by 10 feet boiler about 20 lbs. in 3 to 4 lbs. ingots. I put some on the bottom, and some on top of the flues, near the heads.

(6) M. B. M. asks: 1. How much water would Montgolfier's hydraulic ram discharge at the spindle valve in raising 100 gallons 25 feet above the supplying fountain? A. It would depend on the head and the efficiency of the ram. 2. Would it discharge any more at the spindle valve to raise the same amount 50 feet high? A. Yes, other things being equal.

(7) J. H. H. says: Our town is situated on a limestone rock bed, with a river running through it; and when the water runs over the dam, the windows and doors of the houses within a quarter of a mile of it shake. Is the shaking caused by the water falling on the same strata of rock that the foundations of the houses stand on, or by concussion of the air caused by waves, etc.? The fall of the water is about 12 feet. A. We incline to the first hypothesis.

(8) C. G. B. asks: How much water is evaporated from a pond of given area (say 100 by 300 yards) in the course of a year, and how much daily in warm weather? A. In general practice, the average evaporation per 24 hours is taken at $\frac{16}{100}$ of an inch in depth. This only gives an approximation for estimates. Of course, for any particular locality, it must be determined by experiment.

(9) H. F. S. asks: Would two half circles of round iron, 1 inch in diameter, placed in curved slots made to receive them, bear a sudden and great force, tending to separate two blocks connected by them, without straightening? A. Thus arranged, they would form a very strong connection.

(10) I. L. B. asks: 1. What effect is produced on the temperature of air by its being compressed? A. It is increased. 2. Is this effect intensified by the extent of compression? If so, what is the law? A. See p. 123, vol. 33. 3. How much can air be compressed? A. It is only limited by the strength and durability of the machinery. 4. What would be the effect of heating or cooling air, when compressed, after it is permitted to expand? A. Heating increases, and cooling decreases, the volume or the pressure. 5. Has any automatic device been contrived by which air can be compressed, so as to give it an expansive power of two or more atmospheres, and where can a description of such device be found? A. There are numerous machines of this kind. You can obtain descriptions from nearly any dealer in machinery.

(11) D. C. S. asks: 1. Is zinc paint as good as oil paint for the outside of a boat where it will come in contact with the water? A. Our experience, which is, however, quite limited, is rather against the use of zinc paint under such circumstances. 2. What is the best composition to use in cleaning the brasswork on a boat? A. Bath brick with oil answers very well. 3. What composition is the best to put on ironwork of a boat to give it a smooth black surface that will last? A. Black varnish made from petroleum is very good.

(12) H. M. W. says: 1. I am making a small engine, with a cylinder 1½ x 3 inches. What should be the size and weight of fly wheel? A. Make it 10 inches in diameter, to weigh 12 or 15 lbs. 2. I wish to make a horizontal boiler 14 inches in diameter and 2 feet long, with a flue 8 inches in diameter, using the flue for a fireplace. Would this leave sufficient water space? A. Yes. 3. Would cast iron heads do? A. We do not recommend their use.

(13) J. J. says: 1. You state that some kinds of cast iron become casehardened to a high degree by friction and wear. Is there any particular mixture of cast iron that will become thus casehardened? A. All cast iron casehardens by friction. The harder the metal is, the more it casehardens. 2. Is there any known method of casehardening either wrought iron or cast iron by the application of any substance while in motion? A. No.

(14) H. P. M. asks: I am making a pair of engines with live steam jackets on cylinders. Is there any better mode of effecting economy by preventing radiation? A. Steam jackets are advantageous in some cases, and in others it is doubtful whether their use is beneficial. Much depends upon the conditions under which the engine is operated, and more, probably, upon the design and management of the jacket.

(15) L. H. F. says: 1. We often see, in the morning and evening, when the sky is partly clear, streaks running to or from the sun. What causes them? A. They are caused by a portion of the sun's rays passing through openings in the clouds, while the adjacent portions are obstructed by the clouds. 2. Why does more snow fall after sunset than during the day? A. The heat of the sun retards its forming. 3. Some say that a noon mark for the summer season will not do for winter, that the sun is farther west. Is this true? A. There are but four times in a year in which the sun will be on the noon mark at noon. These are April 15, June 14, August 31, and December 24. The sun is either fast or slow the rest of the time. 4. What causes a circle around the sun? A. These are called parhelia, and are caused by the sun's light being refracted by moisture or frost in the higher portions of the atmosphere.

(16) H. J. W. asks: Is there any acid that will burn iron plating as deep as ⅛ an inch or more? A. You may try a hot mixture of muriatic and nitric acids with water. We do not, however, think that any method of this kind will prove very successful.

(17) J. H. H. asks: Does the virtue of gypsum for fertilizing land consist in the amount of sulphuric acid combined with the lime? If so, how can I determine the relative amount of acid in two different parcels? A. It is generally believed that the favorable action of gypsum upon vegetation is due to the absorbed ammonia which is yielded up. Putridity gives rise to the formation of carbonic acid, which combines with the lime of the gypsum, leaving carbonate of lime and sulphate of ammonia. This explanation of the efficacy of gypsum-dunging, as it is termed, is however insufficient. The investigations of Mayer have shown that in clayey soils the oxide of iron, etc., affords larger and better combinations with ammonia than gypsum. The quantity of gypsum used is about 5 cwts. to the acre, containing and realizing at the most $2\frac{7}{10}$ cwts. of carbonate of ammonia. Mayer's researches, however, show that in an acre of field land there are 272, and in chalky soil 158, cwts. of carbonate of ammonia contained. According to Liebig's late researches (1863) it appears that the gypsum gives up to the earth a portion of its lime in exchange for magnesia and potassa. But it must be borne in mind that pulverized gypsum, as well as unburnt gypsum, when brought into contact with a solution of potassa, sets into a difficultly soluble mass. We must, then, wait for an adequate theory until the several reactions have been more closely studied.

(18) C. R. C. says: I wish to convert waste silk into its raw state. How can it be done? Being twisted, it is almost useless. Is there any chemical process by which the twist may be disengaged and the substances converted into floss? A. We know of none.

(19) C. A. B. & B. ask: How can we make a waterproof glue, solid and tough at ordinary temperatures, but which can be softened by heat? A. Melt together in an iron pot equal parts of pitch and gutta percha; apply while hot.

How can we make artificial camphor, described by Dr. Ure? A. Transmit the dried hydrochloric acid gas into the artificially cooled essence of turpentine so long as it is absorbed. As soon as this absorption ceases, the compound must be submitted to the action of a freezing mixture of snow and salt, by which it is separated into two portions, one of which crystallizes while the other remains liquid even at 0° Fah. The production of the liquid compound is favored by elevation of temperature. If the temperature of the essence be raised to 212° Fah. during the absorption of the hydrochloric acid, the liquid compound only is formed. Both the solid and the liquid are found, on analysis, to possess the same composition. The solid body has been termed hydrochlorate of camphene or of dadyl. It crystallizes in white prisms, which have an aromatic smell and taste resembling those of ordinary camphor. It is insoluble in water; alcohol dissolves one third of its weight of it. This artificial camphor melts at 239° Fah., and boils at 329°, at the same time undergoing partial decomposition.

(20) H. L. asks: How can I make gasoline, for burning in a stove which I am constructing? A. Gasoline is obtained as a product of the distillation of petroleum. It is among the lightest oils that come over on the first application of heat, its volatility and inflammable nature rendering it a dangerous substance in inexperienced hands. It would be cheaper and safer for you to purchase one of the stoves in question, and with it explicit directions for its manipulation, rather than attempt the construction of one from any directions that we could give you. This answers several other correspondents.

(21) A. B. says: We are using inkstands made of zinc plate, but the ink will not keep in them, as the logwood falls to the bottom, and above is clear water. How can I remedy this? A. The common metals are not suitable for the construction of inkstands, no matter what variety of ink is employed. Glass vessels are the best and most economical.

(22) S. P. says: I desire to get a light (from an oil lamp or a coal gas flame) that has no chemical activity or actinism whatever. I understand that a yellow light has no such activity, and that photographers use a yellow light in their dark rooms without its exerting any apparent effect on the negative. How can I do this? A. The actinism of lamp or gas flame is almost imperceptible. Such light is of itself of a yellowish cast, and does not require the colored glass you mention.

(23) J. P. O. asks: What chemical will destroy tinfoil without soiling paper or eating it up? A. Try mercury.

(24) W. J. F. says: Please give me a formula for protoxide of iron. Can it be made by any other method than passing dry hydrogen over the red oxide? A. Yes. The monoxide is thrown down from its solution as a bulky, whitish hydrate, by the addition of a little solution of potassa; it soon becomes brown, however, if allowed to remain in contact with the air, by the absorption of oxygen.

(25) C. D. M. asks: Can dynamite be diluted to a degree that it will lessen its explosive properties, so that it can be experimented on by inexperienced persons without danger of serious results, and at the same time retain its characteristics so that its actions may be understood? A. Such experiments could not possibly be made free from danger. The dilution you suggest is not practicable.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

D. F. M.—It contains no silver.—J. C. H.—The inorganic constituents of the sample are alumina (considerable), potassa, soda, lime, and traces of iron and strontia. It would require a complete analysis to determine the organic constituents, which form a very considerable portion of the substance.—W. R. F.—No. 1 is gum of *artocarpus incisa*. We cannot say whether this contains any injurious matter or not; but many of the gums of the same species have acid and intensely poisonous properties. We cannot classify No. 2 without an analysis. Nos. 3 and 4 are Florida beans.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On a Telescopic Eye. By J. H. H.
On the American Flag. By C. E. N.
On a Boat Protector. By A. M. G.
On the Confederate Banner. By S. D.
On Canine Sagacity. By S. S. M.
On the Flow of Liquids. By C.
On the Erie Canal. By W. J. A.
On a Picno-Hydrometer. By H. W.
On the Wear of Railway Rails. By J. L.
On a Torpedo Experiment. By A. B. R.
On a Remarkable Egg. By J. McM.

Also inquiries and answers from the following:

B. B.—E. L. L.—A. M. S.—G. B. R.—P. B.—J. K.—T. B.—N. W.—J. W.—O. A.—T. R. V.—G. W. S.—C. S. C.—H. S. R.—D. S.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who makes air pumps? Where can steam engine indicators be bought? Whose is the best pressure gage? Who sells detonating railway signals? Who sells plate friction electrical machines?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

April 11, 1876,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specification and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired and remit to Munn & Co., 37 Park Row, New York city.

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