Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue

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 This is for our information and not for publication.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.

(4274) C. M. P. asks: 1. In using iron rings in the construction of simple motor, 641, would you use the same size as in dynamo, 600? How many would you use? What would be the length of the wood core of armature? A. In the construction of the simple motor you should not depart from the instructions. If you desire to use iron rings in the armature, make them of a suitable width and diameter to form an armature of the size given. 2. Am winding cast iron field magnet with No. 20 single-covered wire, 40 convolutions to layer, 5 layers to coil. Now, how much wire by weight, and what number, must I use on armature? In other words, can I follow the instructions for dynamo 600, only using a less number of iron rings? A. If you intend to use your motor as a shunt machine, wind the armature with No. 18 as directed. It will probably require about half a pound. If you desire to make a drum armature, you can follow the instructions given in SUPPLEMENT, No. 600. 3. Would it be any advantage were I to shellac each layer of field magnet and armature as I wound them? Am I correct in my winding of field magnet as in question 2? A. It would be an advantage to shellac the layers as suggested, but a wrapping of thin paper would answer just as well, and you save the time required for drying.

(4275) W. B. writes: 1. I am making an armature for simple motor in "Experimental Science" and would like to know if an armature made of cast iron and annealed would prove satisfactory? A. Cast iron does not answer well for the core of an armature; better use sheet iron or iron wire. 2. How can I make say 5 gallons of oxygen and 5 gallons of hydrogen on a simple scale? A. You can make oxygen by heating chlorate of potash and black oxide of manganese in a retort, conveying the gas through a wash bottle to the gas bag. In making oxygen, to avoid explosion, you should take care to secure pure materials, and also to guard against the entrance of water from the wash bottle into the retort. You can make hydrogen by placing scraps of sheet zinc in dilute sulphuric acid—acid one part, water ten parts. You can convey the hydrogen from the generator to a bag or pneumatic trough. The hydrogen should be washed in the wash bottle as in the case of the oxygen.

(4276) J. H. R. says: A reservoir to contain thirty cubic feet of air is first filled at atmospheric pressure; could it be compressed to fifty pounds pressure with an ordinary hand force pump in a reasonable time? Also how long would said reservoir run a six horse power engine, the pressure kept uniform throughout? A. You can compress air into the reservoir by hand, but it will take a long time to put 50 pounds pressure upon it by hand. It will run a 6 horse power engine for a few minutes only. You will have to put 15 horse power of work into the compressed air in order to get 6 horse power of work ont of it through an engine.

(4277) W. J. B. says: A cannon is fired perpendicularly from a train moving 60 miles an hour. Where will the ball drop, or will it drop in the place the cannon was at the time of firing? A. The ball has the same forward motion that the cannon has at the instant of firing, and its line fire will travel forward the same as the gun, less the friction of the air, and will return near the gun. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 830, on this subject.

(4278) C. R. Co. asks: 1. I have a 0·75 kilo-watt dynamo of the Edison type which has an E. M.F. of 125 volts. Could storage battery described on the 418th page of "Experimental Science" be charged and then be made to light 40 volt lamps? A. Yes. 2. Would 22 cells of this battery be sufficient? A. Yes. 3. Would the full voltage of the dynamo be too great to charge? A. No. 4. Could you have a box partitioned into about five parts, with mortised joints to make tight, and then lined with asphalt, and use it instead of glass jars? A. Yes, or you can soak the wood in paraffin or beeswax.

(4279) Electric asks: 1. What are the relative advantages in using silk and cotton covered and single and double wound magnet wire? A. Silk is superior to cotton as an insulator. Single covered wire, either cotton or silk, is liable to become bare in spots and thus to become short-circuited or crossed. 2. What are the best kinds of oil for high insulation purposes? Please name some. A. Probably paraffine oil or heavy hydrocarbon oils are the best insulators. 3. What is the chemical composition of vaseline? A. Vaseline is a heavy hydrocarbon.

(4280) K. H. asks how much wire, and what size, is used on the primary and secondary coils of Blake transmitter induction coil? A. Use four layers of No. 24 wire for your primary coil, and 12 or 15 layers of No. 36 silk-covered wire for your secondary. Make the core of a bundle of soft iron wires 2½ inches long and ⅜ of an inch in diameter.

(4281) A. W. T. asks for an explanation of the principle of a simple lightning arrester for a telegraph line. A. A simple lightning arrester for telegraph lines consists of a pair of serrated plates, one being connected with the line, the other with the ground, the teeth of the plates being placed very near each other but not in contact.

(4282) Subscriber asks: 1 Please state what solution is put in cup of a Leclanche battery. A. A nearly saturated solution of sal ammoniac in water. 2. Will one large cell of said battery operate one bell? A. Yes.

(4283) H. W. P. asks: 1. What does phosphorus contain to make it visible in darkness? A. Slow combustion is the cause; the phosphorus combines with the oxygen of the air. 2. Can you give a menstruum that will corrode iron very fast? A. There is none better than acids, such as hydrochloric. 3. Would the solvent have any effect on rubber? If so, how to prevent it? A. None. 4. How long would it take to go through six inches of iron or steel? A. With constant renewal it would take many hours. 5. Place a dime on your tongue, and a piece of zinc between your lips and teeth, leave space between your teeth for the two to connect. What do you experience? A. The slight electric current may decompose the fluids of the saliva. Ordinarily it is attributed to the current, and this may have a part in it. The zinc is attacked, and may contribute to the taste.

(4284) A. S. T. asks (1) for dimensions for a spark coil used in electric gas lighting. A. Use a core consisting of a ¾ inch bundle of soft iron wires 18 inches long. Upon this wind 12 to 18 layers of No. 18 magnet wire. 2. Amount and size of wire for the electromagnets (about the usual size) for a bell to be rung over a line of 1,000 to 1,200 feet of galvanized iron wire by five cells of Leclanche battery. A. For a bell to be operated over the line described use about 300 feet No. 24 wire on the bell magnet.

(4285) G. W. W. writes: I want to make an illustration by having some perfectly clear liquid to begin with, then add something that will make it dark or muddy, then again add another liquid which will make it perfectly clear again in a few seconds. What chemicals and how much of each will be required? A. Use very dilute solution of copper sulphate or iron chloride. Add dilute solution of caustic soda. This gives a precipitate. Add hydrochloric acid, and the mixture clears.

(4286) E. C. S. asks (1) of what silicate of soda is composed and how it is made. A. Of silicic acid and sodium oxide. It is made by dissolving silica in caustic soda solution. 2. How long has it been in use? A. For many years. 3. What chemical will change its appearance without destroying its adhesive qualities? A. None, except as regards coloring it. Aniline dyes and cochineal will do this.

(4287) R. H. of Japan asks: 1. What would be the best means to prevent the steel rails used in the copper wire from corroding in the water saturated with the copper salts? A. You cannot prevent it, except by excluding the water. 2. To what distance will the voice tube be effective? A. About 500 feet. 3. Or what would be the cheap method of sending message to a distance within a mile? A. Bell or acoustic telephone.

(4288) E. W. asks: Have hydrogen, air, oxygen, etc., the same mechanical and expansive properties as steam, when compressed? A. The properties are the same, but differ in degree. Gases all vary more or less, especially when near their liquefying points.

(4289) C. H. S. asks: 1. Is the calcium light for magic lanterns, in which ether is used instead of hydrogen, a success? Is ether as good as coal gas? A. Ether answers very well for the purpose, but we think gasoline is preferable. Neither of them answers as well as coal gas. 2. Please describe how to make an ether saturator for this purpose. A. The gasoline or other fluid is placed in a double-necked bottle containing pieces of sponge or shreds of cloth, or any porous material that will absorb the liquid. The air to be charged is contained in a bag, which is weighted and connected with one of the necks of the double-necked bottle, the other neck being connected with the burner. An annular burner is preferable for this arrangement. 3. What kind of colors are used in coloring lantern slides, and how applied? I would be obliged for references to any books or articles in the volumes of the SCIENTIFIC AMERICAN on the principles and management of the magic lantern and the making and coloring of slides. A. Transparent oil colors, such as are used by artists, are commonly employed for painting lantern slides. Only transparent colors can be used for this purpose. They are mixed with varnish and applied quickly to the slide, so as to allow the colors to flow and become smooth. We recommend the following books on the lantern: Wright's "Projection," price $3; Howorth's "Book of the Lantern," price $2; and "Experimental Science," price $4.

(4290) H. W. writes: 1. I have an induction coil which gives ½ inch spark with 1 large cell, Grenet; how many cells will it take to make a spark ¼ and ½ inch, and will it charge a Leyden jar? A. If the capacity of your induction coil is a one-eighth inch spark, you cannot increase it much by the addition of more battery cells. The coil will charge a small Leyden jar. To do this, connect one terminal of the secondary wire with the inside coating of the jar and the other with the outside, placing the jar on an insulating support. 2. Will you give me a prescription of a paint to put inside of boxes and use them instead of battery jars? A. Saturate the boxes with paraffine to render them acid proof. 3. If I make a dynamo as large again as the original, using double the amount of the same size wire as is on the machine, will it have 8 times the capacity and light 8 times the number of lamps? A. You should increase the diameter of the wire in the same ratio in the rest of the machine. By so doing, the machine will have eight times the capacity. 4. Will you please tell me how to make a magneto, or is there a SUPPLEMENT in which one is described? A. You will find one form of magneto described in SUPPLEMENT, No. 162, under the head of telephone calls. 5. How can I tell platinum from silver, German silver, etc.? A. Test it with nitric acid or by heat; platinum is not affected by nitric acid. Silver and German silver will melt in an ordinary flame, while platinum will not. 6. How many amperes does a cell of Grenet give, the carbons (2) being 9 inches by 2 inches by ¼ inch, and 1 zinc, 2¼ inches by 4 inches by ⅜ inch? A. The E.M.F. of the battery is practically 2 volts per cell. By dividing this by the resistance of the battery and circuit you will have the current in amperes. For instance, if you have two cells connected in series you will have an E.M.F. of 4 volts. Now, if the resistance of your battery and circuit is 1 ohm, you will have 4 amperes of current; if it is 2 ohms, you will have 2 amperes; if it is 4 ohms, you will have 1 ampere, and so on.

(4291) H. L. M. asks: 1. What other acid, except sulphuric acid, could be used in constructing a voltaic cell? A. Nitric acid is used in the Grove cell, and chromic acid in the Bunsen cell. 2. What kind of battery should be used for a small electric bell? A. For an open circuit, the Leclanche battery in some of its modifications, or the Fuller battery. 3. What ought to be the price of a battery to be used for the same bell? A. The price of batteries for bells ranges from 75 cents upward. 4. Which is the most precious metal? A. It is difficult to say which is the most precious metal, owing to the variability of prices. Vanadium is $22 per gramme, lithium $15 per gramme, thorium $20 per gramme, rubidium $20 per gramme.

(4292) J. K. asks how lantern slides, which have the subject produced on them by means of photography, may be colored, and what are the best colors to be used? A. There are several different methods of coloring lantern slides. Probably the most satisfactory for the amateur is to use transparent oil colors for the broad surfaces, applying them to the glass side of the slide, afterward varnishing the slide to give the colors greater transparency. Another method is to use the liquid colors commonly employed in coloring photographs. These may be applied to the film side of the slide. Where very broad surfaces are to be covered with bright colors, colored lacquers applied to the glass side of the slide answer very well.

(4293) T. S. S. writes: I have about ¾ pound of No. 32 (B. & S.) cotton-covered copper wire which I would like to use in making an induction coil. I have also a Crowfoot gravity battery of 4 cells (line size 5 inches by 8 inches) which I wish to use for the primary current. To get the best results with the above, will you please let me know what size wire to use for the primary, how many layers to wind, how long and of what diameter the core should be? A. Make the core of your coil of a bundle of soft iron wires ⅝ of an inch in diameter and 6 inches long; insert this in a thin spool, and on the spool wind two layers of No. 18 wire for the primary, and on the primary place three or four layers of strong paper, which should be coated with shellac varnish. Upon the paper wind your No. 32 wire; there should be at least 10 or 12 layers of this wire. For particulars as to condensers and other accessories consult SUPPLEMENT, No. 160.

(4294) B. S. E. L. Co. writes: Please explain the three-wire system of incandescent lighting. A. In the three-wire system the two dynamos are connected in series and the neutral wire is attached to the connection between the dynamos. In the normal working of the apparatus the lamps are arranged practically in series of two, and the current, flowing from the positive of one dynamo to the negative of the other, passes through a number of these series arranged in parallel, so that while the voltage is double that of the two-wire system, each lamp has practically the same current as in the two-wire system. So long as the lamps on opposite sides of the neutral wire are in balance, the neutral wire conveys no current whatever, but when the balance is disturbed on either side of the neutral wire, it returns the surplus of current.

(4295) J. B. B. writes: Parker's philosophy, 1858, page 302, says magnetic and electric power is confined wholly to the surface of bodies, and is independent of its mass. If that is a fact, would not hollow wire be a better conductor for electricity, diameter being equal, than a solid wire, and a tube make a stronger magnet than a solid bar, on account of the greater surface? I never saw tubes recommended for those purposes. A. In the case of frictional electricity and high tension alternating currents, the outer surfaces of bodies seem to convey the greater portion of the current, but in all other cases it is found that the conductivity of a body is in proportion to its sectional area. Tubes have been used for conductors, but there is no particular advantage in their use.

(4296) L. E. J. asks: 1. If a wheel of a given diameter made of copper or any other metal capable of withstanding the strain be revolved at the highest possible speed, would a dry atmosphere surrounding such a wheel become heated or would the velocity of the wheel cause a cooling of the same? Is there any limit to the number of revolutions that can be produced in a solid wheel or shaft? A. Air by excessive friction as you describe is supposed to increase in temperature. We have no data at hand on this subject. The speed of revolving wheels is only limited by mechanical possibilities; 50,000 revolutions per minute has been claimed for small wheels; 20,000 revolutions is claimed for the driving wheel of the new momentum torpedo.

(4297) S. O. S. writes: I am making the simple motor described in "Experimental Science," and would like to know if the shaft can run on oiled wood, and can I make the armature ring out of iron? A. You can use wood for your journal boxes if you prefer to do so. Use the end of the grain for bearing purposes and have it thoroughly saturated with oil. The motor will operate with a ring of solid iron, but it will not be nearly as efficient as it would be if laminated or made of iron wire.

(4298) C. W. Y. asks how to connect the terminals of the winding on a three armed motor armature. A. You can connect each pair of adjacent terminals with a commutator bar, the commutator having three bars. Connected in this manner, the current will flow as in a Gramme ring, or you can connect one set of terminals together at one end of the armature and connect the other set with a commutator having three bars.

(4299) G. P. K. wants a toning solution and the amount necessary for 2½ by 4 prints (silver paper). A.

Water	3 oz.
Bicarbonate of soda	1 gr.
Common salt	2 "
Chloride of gold	1 "

(4300) W. P. D. writes: 1. I have an air pump, the receiver of which is stuck to the brass plate. When last used some four or five years ago, the edge of the glass was smeared with oil to insure contact. Do not know what kind of oil. Ether or benzine will not start it. How can I get it off? A. We think kerosene oil applied to a joint will soften the hard oil, if allowed to stand two or three days. If you do not succeed with the kerosene, you might try a solution of caustic potash or soda in water. If this fails, possibly you may be able to accomplish the desired result by heating the plate slowly and carefully until the oil is softened. 2. Repairing a battery in which the carbon plates are held in position by soldering to metal plates. How can I tin or plate with metal the carbons to hold the solder? A. You should paraffine the ends of the carbon plates to which you desire to apply the connections, by heating the ends and rubbing on paraffine, allowing it to soak in. Care should be taken to not allow the paraffine to extend to the part which is to be immersed in the battery solution. The paraffined ends you can electroplate with copper, and to the copper plate you can solder your connections, or if you desire a simpler method you can cast lead upon the paraffined ends. In this case care should be taken to pour the lead as cool as possible.

(4301) J. H. J. C. writes: How to ascertain if water that flows and stands in galvanized iron pipes contains a solution of zinc. A. Concentrate by evaporation, add a slight excess sodium hydrate, filter if necessary, and pass sulphureted hydrogen through it. A white precipitate indicates the presence of zinc.

(4302) N. L. asks: The way in which to put a canvas razor strop in the best condition? A. Oxide of tin or the putty powder of the shops mixed with sweet oil to a thick paste and spread thinly on the strop makes an excellent dressing.

(4303) C. C. L. says: Will you inform me through Notes and Queries as to what is the cause of the popping of corn? A. The popping of corn is supposed to be caused by the generation of steam from the water combined with the starch and gluten, which by its pressure ruptures the cells.

(4304) F. K. asks what arsenic is used for in the manufacture of wall paper? What grades of paper is it mostly used in? A. It is used in green and other colors; sometimes in those where it would be least suspected. It is also claimed that it finds its way in with the glue sizing, having been used as a preservative of hides and stock from which the glue was made. No grade of paper can be specified in which it is specially to be apprehended.

(4305) J. W. asks for a method of cleaning papered walls. A. If not very dirty, the paper of any room will be much improved by brushing it over in straight lines with a soft broom, covered with a clean, soft cloth; if, however, the paper be much soiled, very stale bread is the best thing to clean it with. Cut a very stale loaf into slices, and in the lightest manner wipe the paper with it in a downward direction. Clean about a yard at a time, all one way.

(4306) J. B. asks: 1. Can "carbon copies" from typewriter be fixed so as not to rub off? If so, how? A. Prepare water starch, in the manner of the laundress, of such a strength as to form a jelly when cold, and then apply with a broad camel hair brush, as in varnishing. The same may be done with thin cold isinglass water or size or rice water. In lieu of this treatment you may use the fixative commonly employed for fixing drawings. This is applied with a spray tube or automizer. 2. What is the difference in the winding of a direct current dynamo and an alternate current dynamo? A. In a direct current dynamo all of the coils are commonly wound in the same direction. If wound alternately in opposite directions, the current is made to pass in one direction, over the circuit by means of a commutator. In alternating current machines, the coils of the armature are wound alternately in opposite directions and the current is not corrected.

(4307) J. T. asks for the best and safest method to generate chlorine gas in small quantities. A. Simply expose bleaching powder to the air, and chlorine will be evolved. Addition of an acid, such as hydrochloric, will accelerate the operation. By acting on manganese binoxide with hydrochloric acid, especially if warmed, chlorine can be evolved in large quantities.

(4308) C. T. B. asks where "sodium ethylate" (mentioned in SCIENTIFIC AMERICAN, No. 24, December, 1889), for the removal of hairy moles, can be procured or how it can be made? A. Address a wholesale dealer in chemicals. It is made by dissolving metallic sodium in alcohol. The latter should be anhydrous or absolute.

(4309) J. W. T. asks: 1. How many cells of storage battery and approximate weight of same would be required to run one-half horse power motor for at least ten hours without recharging? A. It requires eight cells of storage battery for a horse power. For running your one-half horse power motor for ten hours you would require eight cells. 2. In an alternating current transformer, what would be the effect on the primary circuit of a short circuit in the secondary with no fuses in circuit? A. The primary and the secondary wires would both become hot.

(4310) E. S. A. asks: What size wire to use for connecting field magnet terminals with brushes and binding posts of the eight light dynamo, described in SUPPLEMENT, No. 600, also what size conductors to use in distributing lamps through a room? A. For connecting the field magnet terminals use No. 12 or No. 14 wire. For conductors for conveying away the current you can begin with No. 16, which you can use throughout unless you desire to reduce the size, in which case use No. 18 for the branch wires, and No. 20 for the conductors leading to the lamps.

(4311) W. B. R. says: I have two pounds No. 30 double cotton-wound copper magnet wire with which I wish to construct an induction coil. What number and how many layers of wire should I use for the primary? What size core of soft iron wires should I use? How long should the coil be? Could I run the above coil with a magneto-electric machine with alternating current, or would I get better results from the coil to use batteries and a circuit breaker? A. No. 30 wire is rather large for a small spark coil; however, you will be able to make a coil which will yield a heavy but short spark. You will find the instructions you require in SUPPLEMENT, No. 160. A magneto of suitable size, with a winding adapted to the primary coil, would be preferable to batteries.

(4312) F. P. writes: 1. I have made the small dynamo described in SUPPLEMENT, No. 161, as per instructions. I have tried to run a 12 candle power 20 volt Edison incandescent lamp, without any success. What is the trouble? Is it too low voltage of the machine? If so, can I increase it enough by magnetizing the fields with a battery, and how many cells would it take? A. The dynamo referred to has an E. M.F. of about 12 volts, which is obviously insufficient for running a 20 volt lamp. You can run two or three five or six candle power low voltage lamps with the machine, but you cannot increase the voltage to 20. 2. Which dynamo do you think would give the better results, in the way of running incandescent lamps—the one described in SUPPLEMENT, No. 600, or the one in No. 844? A. The Edison dynamo described in SUPPLEMENT, No. 844, is undoubtedly more efficient than the dynamo described in SUPPLEMENT, No. 600. 3. Have you any book that would be advisable to study in connection with making a dynamo, in order to learn the fundamental principles? A. "Experimental Science" will probably meet your wants. Price by mail $4.

(4313) C. W. N. says: If you will tell G. E. T. (No. 4223, issue April 16) to leave off or quit his coffee, there is no doubt but that he will have no nervous irritability to complain of. Many will exclaim nonsense to this advice, but it costs only a bit of self-restraint to try the remedy a couple of months, and that can do one no great amount of harm.

(4314) M. D. asks: 1. What is meant by shunt-wound dynamos and alternating current dynamos? A. A shunt-wound dynamo is one in which the current divides at the brushes, part of it going from one brush through the field magnet back to the other brush, the other part going from the same brush to the external circuit and back to the opposite brush. An alternating current dynamo is one which generates a current formed of equal and opposite pulsations. The alternations occur with very great frequency. 2. Can the motor described in SCIENTIFIC AMERICAN SUPPLEMENT No. 641 be used on an incandescent lamp circuit of about 110 volts? A. Its resistance is too low for use on a 110 volt circuit. 3. How many feet of Nos. 20, 30, and 36 copper wire is required for a resistance of 20 ohms? A. 1924·2 189·32 and 47 feet respectively. 4. What is the object in low-speed dynamos? A. They are designed to avoid belting by the connection of the armature directly with the engine shaft. 5. What is a rheostat, ammeter, and galvanometer? A. A rheostat is any variable resistance which may be thrown into a circuit. It generally consists of a series of coils of different resistances, with switches for throwing the coils in and out of the circuit. An ammeter is an instrument for measuring amperes. It is a form of galvanometer having a coil without appreciable resistance. A galvanometer is an instrument consisting of a magnetic needle suspended within or above a coil and designed for indicating the direction of the current, and for use in connection with a rheostat for measuring currents. 6. How is soldering fluid made? A. By dissolving zinc in muriatic acid until it will dissolve no more, then diluting the solution with an equal bulk of water. 7. Could I use No. 16 paraffined office wire to wind cast iron field magnets of motor 641? Or would it be best to remove first layer of insulation? A. The insulation of office wire is too thick for use on electro magnets. Better purchase magnet wire. 8. Will ten coils do for armature as well as twelve? If not, why? A. By multiplying the number of coils the tendency to sparking and burning out the armature is diminished. 9. What changes would be necessary to use this motor as a dynamo? A. Use a cast iron field magnet and wind the armature and magnet with No. 20 wire.

(4315) J. F. C. says: Within a space of four years two barns have been struck by lightning and burned on the same spot of earth—no rock, no gravel. Does this indicate iron or other metals? There are three stones in an ancient temple in Syria, or near foot of Mount Lebanon, 71 feet by 14 feet by 13 feet and one the same size on pillars at quarry one mile away. Could our engineers move this one to the temple. Could they handle the stone forming the overhead ceiling to room in the great pyramid or the largest stone in the old wall at Jerusalem? Has any analysis of Egyptian mummies determined whether anything more than common salt was used in mummifying process? If so, what? A. We can only add that it is an old saw that lightning never strikes twice in the same place, yet in this case it does not indicate mineral attraction. The great stones weigh about 1,000 tons. Captain Eads' ship railway was to carry several times this weight across the isthmus. The Great Eastern was the greatest block that modern engineers ever stumbled on, beside which the stone blocks are pygmies. There were probably other preservatives than salt used on the mummies. The dry air of Egypt was the principal preservative.

(4316) J. W. K. asks: I would like to know if a telegraph sounder can be so injured by long use of an excessive amount of battery as to afterward render it unfit for use with a normal amount of current, say from one cell gravity battery. I have one that has been in use for about a year with three cells gravity battery, and upon trying to use it with only one, it fails to work in a satisfactory manner. If it can be and is so injured can you suggest a remedy? A. The resistance of the winding of the sounder magnet may have been very slightly increased by the use of an excessive current, but we do not think it would be appreciable in the ordinary working of the instrument. If you examine the sounder and the connections of the wire carefully, you will probably find a poor electrical connection at some point, or possibly the trunnions of the sounder lever work with too great friction. If you have used a current which has burned out the insulation, of course the only remedy is rewinding the magnet.

(4317) J. S. S. asks: 1. What is the cause of the bursting of an emery wheel when running at a high speed? A. It is generally due to lack of cohesion among the particles of the wheel, the wheel having insufficient strength to withstand centrifugal force. The remedy is obviously stronger wheels or less speed. 2. What effect would the opening of a window have upon a vulcanizer, with the pressure above the limit of safety, the cool air blowing through the window on the vulcanizer? A. The tendency will be to cool the vulcanizer and reduce the liability to explosion. 3. How is the specific gravity of a body obtained? A. Specific gravity is obtained by weighing the body in air, then weighing in water and dividing the weight in air by the loss of weight in water.

(4318) C. B. asks how to purify rancid butter. A. This can be done by melting in twice its weight of boiling water and shaking well. Pour the melted butter into ice water, allow it to regain its consistence. Another plan is to beat up ¼ pound good fresh lime in a pail of water. Allow it to stand for an hour until the impurities have settled. Then pour off the clear portion, and wash the butter in that. Butter so treated is never as good as fresh butter.

(4319) W. J. N. asks: Is it correct to put a globe or any valve in a steam pipe with the pressure on top of disk? There is a gentleman who claims to be quite a mechanic, says the pressure should be at top of disk. I say it should be on the bottom of disk. A. You are right. All valves should shut against the source of steam supply. This enables the packing of the stuffing boxes with steam on the boiler.

(4320) L. W. A. asks why an injector works. The best informed machinists I have met cannot tell. Others say there is more pressure on top than on bottom of boiler. I thought I had discovered the reason why it works, but was told that the feed pipe is sometimes larger than steam pipe. At any rate, if you close one cock more than the other on a glass gauge you can fill it with water or, by reversing, blow it all out. A. The theory in regard to the mechanical action of the injector is based upon the transfer of the momentum of steam at a high velocity to the surrounding annulus of water at the point of contact and the instantaneous condensation of the steam into water. The water of condensation by its impact at the high velocity of the steam gives momentum to the surrounding water equal to overcoming nearly double the boiler pressure, or, in other words, it is the impact of the condensing steam at a high velocity that carries the feed-water through the nozzle with sufficient force to overcome the resistance from the boiler pressure.

(4321) E. D. W. says: A fence is to be built over a half circle hill. Another over a straight line being the exact diameter of the above half circle. The specification calls for posts placed 2 feet apart. Which job will require the greatest number of pickets? A. If the pickets are placed vertically, it will require the same number of pickets for both jobs. Not so with the rails, as is self-evident.

(4322) H. A. U. asks whether he is right in his belief that phrenological examinations, executed in the hands of a competent person, indicate true results or not, and whether phrenology is an established science or not. A. Phrenology is not considered an exact science, but there is enough in it to make it very useful as a system by which character and propensities can be known and recorded by persons proficient in the manipulation of the outward signs.

(4323) A. E. L. writes: I have two pieces of gas pipe, one telescoping the other. The large piece I wrap with a piece of flannel, the smaller one I heat over a lamp and insert in the larger one; the flannel then becomes moist. How can I heat the flannel without the presence of moisture? A. We suggest the use of an unglazed porcelain tube for the outer tube.

(4324) J. F. asks: 1. Will not a soft iron plate answer for an insulator of magnetism for a magnetic motor or a perpetual motion machine? A. A soft iron plate will cut off the magnetism, but it requires power to remove it from the magnetic field. 2. What size wire is used on the field magnet of the simple electric motor described in SUPPLEMENT, No. 641. A. No. 18.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

April 26, 1892.

AND EACH BEARING THAT DATE.

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

Acid, making naphthosultondisulphonic, H. Kuzel 473,467
Accountant, pocket cash, J. Davis 473,656
Agitator, R. Smith 473,530
Air brake, T. J. Hogan 473,839
Alarm. See Fire alarm.
Amalgamator, B. Tyson 473,533
Animal exterminator, G. Gillpatrick 473,872
Ant hill cutter, J. Tym 473,799
Armature for dynamo-electric machines or motors, C. G. Curtis 473,568
Atomizer, J. S. Klein 473,759
Automatic sprinkler, A. P. Howes 473,628
Axle box, car, H. B. Spencer 473,529
Axles, dust collar for vehicle, Cochran & Hardie 473,612
Bag. See Mail bag.
Bag, bale, and bundle tie, D. E. Ladd 473,822
Baling press power, P. C. Southwick 473,645
Band cutter and feeder, W. H. Ellinger 473,620
Banding machine, W. H. McDavitt 473,886
Bar fixtures, sectional interchangeable, J. Neumann 473,771
Barrel contractor, C. Little 473,764
Barrel roller, W. W. Loflingwell 473,690
Barrel, ventilated, R. J. Patterson 473,589
Barrels, etc., manufacture of metal, D. Caird 473,495
Battery. See Plunge battery. Secondary battery.
Bed, spring, H. L. Day 473,729
Bee smoker, T. F. Bingham 473,724
Beer drawing apparatus, P. F. Gaynor 473,737
Bell, E. D. Rockwell 473,854
Bell, call, A. Iske 473,880
Bell handle, door, A. Iske 473,879
Belt fastener, Bailey & Tilton 473,864
Belting, R. Cowen 473,896
Bicycle, J. Diamond 473,820
Bicycle ball bearing, W. H. Binns 473,816
Bicycle chain adjustment, W. H. Binns 473,817
Bicycle hub and shaft coupling, W. H. Binns 473,818
Bicycle saddle, W. Brampton 473,609
Bicycle saddle spring, H. Bergfels 473,493
Bicycle wheel lock, C. J. Brosnan 473,867
Bill and letter holder or file, T. E. Gould 473,835
Bin. See Flour bin.
Binder, harvest, A. G. Reaman 473,780
Blackboard rubber, D. R. Miller 473,558
Block. See Piano pin block.
Board. See Ironing board.
Boiler. See Water tube boiler.
Boiler scraper, T. J. Baker 473,809
Bolts, machine for cutting screw threads on, H. W. Pudan 473,640
Book cover, G. W. Holden 473,575
Book cover protectors, blank for, W. B. Harison 473,502
Book, file, and coupon system, combined order, J. W. Hill 473,875
Book or envelope for theaters or other places of amusement, Kheiralla & Haddad 473,703
Bootjack, Haight & Biffar 473,740
Bottler's apron, A. Fischer 473,698
Bottling liquids and sealing bottles, method of and means for, W. Painter 473,776
Box. See Axle box. Fare box. Folding box. Letter box. Loom shuttle box.
Box stapling machine, C. Beck 473,813
Bracket. See Gas and electric light bracket.
Braid, machine for softening cotton, J. H. Hecox 473,747
Brake. See Air brake. Car brake.
Brake mechanism, automatic, E. G. Shortt 473,789
Brake operating mechanism, G. Harrison 473,553
Brick and tile cutter, J. W. Boltz 473,446
Brick and tile cutter, W. Broughton 473,565
Bucket sinker, well, W. Howze 473,576
Buckle, J. Schaf 473,477
Buggy top attachment, J. King 473,758
Burner. See Lamp burner. Oil burner.
Butter packing machine, H. J. Brine 473,494
Button, F. E. Williams 473,861
Cabinet, R. D. Willson 473,541
Calculator, H. V. Dunn 473,833
Can. See Oil can.
Can cover and cooler, milk, N. H. Terens 473,481
Candlestick, S. Szigethy 473,797
Canning apparatus, corn, G. L. Merrell 473,885
Cap, D. Samuel 473,784
Car brake, H. P. Bassett 473,806
Car brake, J. A. Fisher 473,501
Car brake, automatic, W. B. Guernsey 473,457
Car brake mechanism, street, H. H. Kelley 473,510
Car coupling, R. L. & J. L. Bird 473,445
Car coupling, O. Hanson 473,742
Car coupling, O. C. Harris 473,574
Car coupling, E. H. B. Knowlton 473,761
Car coupling, N. J. Parish 473,588
Car heater, railway, W. C. Baker 473,721
Car heating apparatus with heating mediums, system of charging, J. F. McElroy 473,635
Car, logging, J. E. Henry 473,748
Car replacer, Morris & Harkness 473,587
Cars, side bearing for, Burling & Bird 473,610
Carbon blocks, manufacture of, L. Hulin 473,841
Carbons, securing, Sharpneck & Shedd 473,479
Carburetor, H. L. Cruttenden 473,498
Carding machine, G. Meyer 473,685
Carpet sweeper, J. P. Marsh 473,766
Carrier. See Package carrier. Parcel carrier. Trace carrier.
Cartridge shells, machine for loading, W. W. Babcock 473,440
Case. See Shipping case.
Cash indicator and register, H. Cook 473,694
Cash register, H. A. Bierley 473,723
Cash register, T. Rogers 473,887
Cash register, R. W. Whitney 473,719
Cash register and indicator, W. R. Johns 473,555
Catching tool, R. C. Groom 473,739
Cementing wells and cisterns, device for, W. H. H. Davis 473,828
Chair. See Folding chair.
Chimney top, M. M. Raymond 473,853
Chiseling, drilling, or prospecting machine, W. Gehring 473,549
Chopper. See Meat chopper.
Cigar and ash holder, Tibbits & Sadler 473,646
Circuit closer, C. H. Delano 473,499
Circuit controlling device, M. Thum 473,595
Clamp. See Hose clamp. Pulley clamp. Saw clamp.
Clasp. See Suspender clasp.
Clasp, E. K. Kelly 473,629
Cleaner. See Flue cleaner. Grain cleaner.
Cloth winding machine, J. J. Zahner-Mosli 473,602
Clothes drier, Reed & Buob 473,781
Clothes drier, J. B. Wolfe 473,601
Clover hullers, rake mechanism for, Kailor & Williams 473,701
Clutching mechanism, hydraulic, F. M. Barney 473,444
Coal drill, C. S. Sheppard 473,788
Cock, safety gas, J. Clark 473,611
Coloring and burnishing composition, J. F. Thompson 473,679
Commutator connection for electric motors or generators, C. G. Curtis 473,567
Compressing apparatus, L. A. Parisher 473,472
Concentrator, A. Schulenburg 473,644
Cooling apparatus, S. L. Smith 473,793
Corn thinner, J. L. Tandy 473,678
Coupling. See Car coupling. Electric wire coupling.
Crane, J. Vanes 473,682
Cultivator, H. D. Babcock 473,491
Cup. See Lubricator cup.
Curling iron, M. Campbell (r) 11,237
Cuspidor, H. B. Millard 473,634
Cut-off for watering troughs, C. F. Herman 473,749
Cutter. See Ant hill cutter. Band cutter. Brick and tile cutter. Straw cutter.
Cylinder casing, E. W. Mackenzie-Hughes 473,469
Die. See Leather cutting die.
Display rack, C. Puddifoot 473,709
Disintegrator and amalgamator, placer, G. L. Cudner 473,451
Distillation and apparatus used therefor, A. W. Ellis 473,659
Door, W. T. Gregg 473,625
Door check, L. Samuel 473,785
Door fastener, P. Farwell 473,548
Door fastener, S. N. Lawing 473,668
Door spring and check, combined, W. Gilfillan 473,456
Dredger, dipper, J. Van Patten 473,535
Drier. See Clothes drier.
Drill. See Coal drill.
Drills, sleeve for taper, C. T. Pratt 473,639
Drink mixer, R. D. Schroeder 473,643
Dust and ash receptacle, F. J. Steinwald 473,561
Dust collector and grain cleaner, P. Haeckler 473,662
Dye, red, M. Epting 473,453
Ear trumpet, W. G. A. Bonwill 473,608, 473,865
Electric circuit controlling device, M. Thum 473,594
Electric contact protector, R. Varley, Jr 473,717
Electric machine, dynamo, W. Decker 473,547
Electric machine, dynamo, R. Eickemeyer 473,618, 473,619
Electric switch, H. K. Hitchcock 473,504
Electric switchboard, J. B. Mayer 473,848
Electric wire coupling, J. F. McElroy 473,637
Electric wire, covered, H. A. Rueter 473,713
Elevator. See Hydraulic elevator. Truck elevator. Water elevator.
Engine. See Gas engine. Steam engine.
Engine, M. B. Dodge 473,657
Evaporator. See Hot air evaporator.
Exhibiting apparatus, C. S. Jenkins 473,508
Exhibition stand, knockdown, H. A. J. Rieckert 473,783
Explosives for aiding rainfall, automatic transporter and exploder for, L. L. Brown 473,820
Fabric. See Knit fabric. Knitted fabric.
Fare box, S. O. Tuerk 473,680
Faucet, J. Westervelt 473,600
Feed trough, E. B. French 473,735
Feed water, device for separating oil from, J. Reilly 473,591
Fence gate, wire, J. M. Sailer 473,855
Fence pickets, machine for wiring, L. H. Slagle 473,792
Fiber extracting machine, F. Darkin 473,826
File, letter, B. Brower 473,448
File, journal page, J. O'Rourke 473,775
File, newspaper, S. Ray 473,476
Filing physicians' prescriptions, W. R. Hall 473,552
Fire alarm, thermostatic, G. D. Mosher 473,669
Firearm, repeating, L. M. R. Daudeteau 473,827
Fire engines, feedwater heater, for, F. Smith 473,593
Fire escape, W. Gunnarson 473,572
Fire extinguisher, automatic, O. C. Barber 473,442
Fishing lines, swivel for, R. Herring, Jr 473,503
Fishing reel, A. B. Hendryx 473,685, 473,700
Floors and other surfaces, apparatus for the manufacture of coverings for, Oetzmann & Narracott 473,519
Flour bin and sieve, combined, A. Wolff 473,543
Flower pot, H. Goodacre 473,836
Flue cleaner, M. J. Carbis 473,821
Flushing device for urinals and closets, J. Shanks 473,715
Flushing tank, G. W. Keyser 473,882
Folding box or crate, E. Dredge 473,730
Folding chair, T. J. Le Count 473,704
Frame. See Plant frame. Umbrella or parasol frame.
Fruit pitting machine, T. Harding 473,838
Fuel press and cutter, G. Frank 473,834
Fumigator, H. F. Loepere 473,631
Gauge. See Leather gauge.
Gas and electric light bracket, combined, J. Fitzgerald 473,661
Gas engine, C. W. Weiss 473,685
Gas to burners, automatic governor for regulating the supply of, C. B. Bosworth 473,447
Gate. See Fence gate. Railway gate.
Gate, W. Huff 473,752
Gate, A. Ihlenfeldt 473,578
Gate, W. J. Pearce 473,777
Globe or shade holder, D. N. Gleason 473,550
Governor, cut-off, L. O. Harris 473,743
Governor, engine, M. Rothfuss 473,712
Grader and scalper, Desjardin & Stewart 473,500
Grain binder butt board, G. Schubert 473,559
Grain cleaner and scourer, G. A. Smith 473,794
Guard. See Razor guard.
Gun, magazine spring, O. H. Arno 473,808
Gun, spring air, W. F. Markham 473,633
Handle. See Bell handle.
Harrow, W. J. Hyde 473,754
Harrow, W. Strait 473,796
Harrow and roller, F. B. Harvey 473,746
Harvester, corn, W. C. Houser 473,840
Hat blocking and pressing machine, M. Quinn 473,641
Hay rake, horse, G. H. Carver 473,496
Hay rake, horse, W. Strait 473,795
Heat regulating apparatus, automatic, C. F. Goodhue 473,699
Heater. See Car heater. Hot water and hot air heater. Water heater.
Heel, G. W. F. Randolph 473,590
Hinge, Baker & Stump 473,688
Hoe for vineyards, sulky, J. A. Lamb 473,513
Hoisting machine, M. Curran, Jr 473,655
Holdback, O. C. Davis 473,569
Holder. See Bill and letter holder. Cigar and ash holder. Globe or shade holder. Music holder. Rein holder. Sash holder.
Horse power, A. M. Wead 473,683
Hose clamp, F. T. Weidaw 473,537
Hose pipe, J. A. Stevens 473,716
Hot air evaporator or drier, J. H. Crozier 473,452
Hot water and hot air heater, combination, F. C. Peteler 473,475
Hub, R. Green 473,837
Hub, vehicle, G. & P. Blechschmidt 473,607
Hub, vehicle, I. M. Warner 473,596
Hydraulic elevator, J. E. Barry 473,811
Hydrocarbon burning apparatus, J. H. Bullard (r) 11,236
Ice plow, T. H. Reeves 473,782
Incubator, E. Harrison 473,664
Indicator. See Cash indicator.