## Business and Personal.

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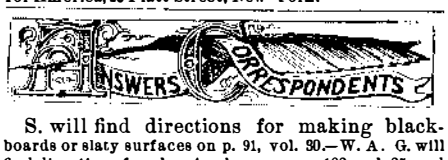


S. will find directions for making blackboards or slaty surfaces on p. 91, vol. 30.—W. A. G. will find directions for cleaning brass on p. 102, vol. 25, and for bronzing it on p. 331, vol. 29. For removing mildew, see p. 133, vol. 27.—N. V. H. will find full directions for gilding picture frames on p. 75, vol. 28.—C. R. H. can copper his iron wire by the process described on p. 154, vol. 26, or galvanize it as detailed on p. 59, vol. 24.—G. C. L. will find a recipe for black indelible ink on p. 273, vol. 28, and for red on p. 139, vol. 28. Directions for making rubber stamps are given on p. 156, vol. 31.

(1) G. L. H. asks: Of what is the composition made that is used by dentists in filling teeth, in place of gold? Is it of such a nature as to make an electric battery of one's mouth, if gold is used also? What is the probable effect upon the health? A. Improper union of metals in the filling of a tooth is frequently a source of irritation to the dental pulp. Tin foil is sometimes placed in the bottom of a cavity, and the operation finished with gold. In many, not in all instances, this composition produces a galvanic action, which, if not removed, will quickly destroy the pulp.

(2) N. A. W. says: I have a small spring of running water which seems to be a favorite resort for crawfish, notwithstanding my earnest efforts to exterminate them. Is the presence of these crawfish in the spring an indication of pure or impure water? A. Crawfish or crayfish (*astacus fluviatis*) are found not only in springs, but more or less in every brook and river. In the Mammoth Cave of Kentucky, a species has been discovered. They are not considered injurious to the water, and their presence is not an index whether the water is pure or not, though they are found more frequently in pure water.

(3) S. A. T. asks: How can I make an attractive light in a store window? A. Use a carbureter, described on p. 379, vol. 30.

What can I put in paste to keep the swarms of small flies from breeding in it? A. A little carbolic acid.

How can I coat nails with copper? A. A saturated solution of sulphate of copper in water is what is usually employed for this purpose. The articles to be copperedshould first be freed from grease by immersion in lye water, washed, and immersed in dilute sulphuric for a short time.

Can I nickel plate an article after it has been coppered, simply by dipping for a quarter of a second? A. We can find no record of such nickel plating as you speak of.

(4) E. R. asks: I am using a lamp that has 93 cotton wicks in it, and is about a yard and a half long, burning alcohol, for singeing the long fibers of cloth. As the alcohol is expensive, what oil can I substitute for it that would be safe, cheaper, and yet make little or no smoke? A. We know of no oil that will replace your alcohol. If your place is supplied with gas, a modification of the Bunsen gas lamp might be used with advantage, and would certainly be much cheaper than the method you now employ.

(5) H. S. B. says: I have been studying methods of decomposing kainit into Epsom salts, sulphate of potash, and common salt. Can you assist me to solve the problem? My samples contain sulphate of magnesia 32·50, sulphate of potash 23 52, chloride of sodium 20·55, chloride of magnesia 4·21; the rest is insoluble residue. A. Your best plan would be to state your methods; to write at length the various ways which suggest themselves would require too much space.

(6) D. S. H. says: 1. I have a spy glass with 5 glasses; it is 3 feet long and defines the moons of Jupiter well. Will a telescope with 5 glasses, of the same length, do as well? A. No. 2. Could one be made with 2 glasses, suitable for a beginner? A. No. An object glass must be made in two pieces, one each of crown and flint glass, or the image has colored fringes, is distorted, and injures the eyesight.

(7) E. G. asks: What is the easiest and cheapest way of cleaning dirty cotton waste? A. Boil it in a strong solution of common soda in water, and save the resultant soapy liquid to keep your drills and reamers wet when boring iron.

(8) E. J. K. asks: What is the right process for tempering steel to make it cut French burr stone or hardest flint, or to make it drill the hardest steel, such as rat-tail files? A. Forge your tools, if of English steel, at a moderate red heat, but not hot enough to scale; do not hammer it after it has lost its redness. Heat it to a low red heat; for hardening, dip it in salt water with the cold chill taken off, and temper it to a brown, dipping it according to the instruction given by Mr. Rose on p. 21 of our current volume. If you are using American chrome steel, heat it to a yellowish heat for forging, to a low red for hardening, and quench right out.

(9) L. M. D. asks: What is animal charcoal? A. Animal charcoal is made from bones and animal matters, and is a very valuable substance, on account of the extraordinary power it possesses of removing coloring matters from organic solutions; it is used for this purpose by the sugar refiners and scientific and manufacturing chemists.

What is animal glycerin? A. It is obtained by the action of alkalies on natural fats. Stearin, for instance, when boiled with a caustic alkali, is converted into a stearate of the alkali metal and glycerin. It is now produced in very large quantities and perfect purity in the decomposition of fatty substances by means of superheated steam. Glycerin is a nearly colorless and very viscid liquid, of specific gravity 1·27. It has no action on vegetable colors.

(10) P. M. S. O'F. asks: Are a perspective drawing and photograph, of the same object, from the same point of view or distance, identically alike? A. No.

(11) B. B. B. asks: 1. Why does some water eat or corrode the lead pipes in wells? What property must be in the water in order to dissolve lead? Is water drawn through lead poisonous? A. Lead is acted upon by distilled water and by rain water. Water, by reason of its affinity for the oxide of lead, acts like an acid upon metallic lead. Lead pipes through which such water passes in a short time become covered with a pellicle of carbonate of lead, which is an energetic poison. The presence of a very small quantity of foreign matter in the water, and especially of sulphate of lime, usually arrests this action, and renders the use of lead pipes in a majority of cases not hazardous. 2. Is galvanized iron pipe injurious to the water? A. No. In this case a film of the oxide is formed on the zinc, which is insoluble in water, and, for this reason, protects it from further oxidation. 3. What kind of pipe is the best through which to draw water for drinking purposes? A. Pipes lined with block tin.

(12) J. W. S. asks; How are photographic impressions transferred to lithographic stones in order to be printed from? A. Osborne's process is to take a negative on glass coated with collodion, as usual. A piece of gelatinized paper is now exposed to the action of light under the negative. The copy is covered with transfer ink; this is done by running it through a press in contact with a stone which has already received a coating of such ink. The paper, thus blackened, is made to float upon the surface of boiling water, the blackened side up. It is next taken out and washed with a sponge; the parts acted upon by light hold fast to the ink, while all other parts are completely washed off. A stone is now slightly warmed and put in the press; upon it is placed the positive print (inverted) after it has been dampened. The whole is then pressed. On removing the paper the ink is found attached to the stone and a reverse picture is made on the stone. 2. Are gelatin prints more readily transferred to stone than silver prints? A. Yes. You should consult a practical lithographer as to your other questions.

(13) E. V. W. says: About a year ago I replaced a small lead pipe with a 1 inch galvanized iron pipe. To my great annoyance, this iron pipe has almost closed with a hard substance resembling iron ore. How can I clear the pipe? A. The pipe probably has become filled with carbonate of lime, magnesia, iron, etc., deposited by the spring water, especially the carbonates of lime and iron. If it is practicable, muriatic acid could be used to dissolve the deposits. But the trouble is in the mineral constituents of the water and not in the tube. If the excess of lime and other salts which the water contains were previously precipitated out of it (as is sometimes done by the addition of lime water in a settling reservoir), the difficulty might be overcome.

(14) J. A. asks: 1. Will a current from a common magneto-electric machine induce magnetism in an electro-magnet? A. Yes. 2. If so, how does it compare in power with the Daniell battery current? A. This depends upon the size of the machine used. 3. If a magnet supports 5 lbs. in contact with its poles, how much will it support at ½ inch and ¼ inch distance respectively? A. The attraction would vary inversely as the square of the distance from the poles. 4. In a Daniell battery, having 3 square feet of copper surface, and also 3 square feet of zinc surface, the whole comprising only 1 cell, how much sulphate of copper and how much zinc will be required to keep it in its most powerful state of action for a week? A. Enough sulphate of copper to keep the outer solution constantly saturated. Sulphate of zinc is not necessary. 5. How long must the silk-covered No. 22 copper wire (covering the iron cores of an electromagnet) be to obtain the greatest magnetic force of such a battery? The battery is to be but 2 feet from the electromagnet. A. You have forgotten to state the size of core.

Where is the fallacy in the following demonstration that 2 equals 1? Let $x=1$ and $y=1$. Then $x=y$, $x^2=xy$, and $x^2-y^2=xy-y^2$. Dividing the last equation by $x-y$, $x+y=y$, or $y+y=y$ or $2y=y$, $2=1$. A. In dividing the equation, $x+y=y+\frac{-2y^2}{x-y}$ and not $x+y=y$. $x^2-y^2=xy-y^2$ divided by $x-y$ is equal to $x+y=y+\frac{-2y^2}{x-y}$.

(15) W. R. asks: 1. To be a machinist, should I continue practice in drawing? A. It is important that you should understand the art of drawing. 2. Which branch of figures ought I to study? A. For facilitating calculation, you should master arithmetic, algebra, geometry, trigonometry, and logarithms. 3. What books shall I read on mechanics, etc.? A. You will find a good elementary treatise on mechanics in Silliman's "Physics."

(16) R. K. says: In Mr. J. Rose's recipe for case hardening, he says: Use 1 gallon urine to a certain quantity of bone, etc. Would a certain quantity of sal ammoniac do as well? A. The urine is the best, and the hoof and leather process is better than the bone dust.

(17) C. G. M., Norrtelje, Sweden—We doubt whether birch wood sawdust has any value. It might be well for you, however, to insert a notice in our "Business and Personal" column.

(18) X. X.—The electrical treatment under the care of an experienced physician will doubtless benefit you.

(19) J. H. H. asks: What ought I to do in order to be a good engineer? A. It will be necessary for you to have education and practice, to become a good engineer. There are numerous good schools for giving the former, and shops for the latter.

(20) F. L. asks: At what speed should a 50 inch circular saw run in oak, elm, and cotton wood? A. Between six and seven hundred revolutions a minute would be a good speed.

(21) J. J. says: Mr. Rose in his late article on vise work says that, if his instructions are followed a polish may be obtained much finer than by using oil stone, or by any other method. Can filing be done so fine that the marks are not visible? A. Yes.

(22) W. S. J. says: I suggest the following for car ventilation: Air to be received at the head of engine by funnel-shaped apparatus, and carried back to the cars by proper connections. Suitable means for distributing it to be placed in the cars, so as not to create too much draft. In winter the air could be passed through the engine furnace for the purpose of warming it. What are the objections to this? A. The idea is by no means novel.

Our place is supplied with water by the Holley system. In drawing water I have often noticed regular pulsations in the flow, which I attributed to the pumps situated a mile from town. How long does it take to transmit the above pulsation? A. It is instantaneous.

Can you give an explanation of the duplex system of telegraphy? A. You will find it clearly explained in Pope's work on telegraphing.

(23) G. says: I send you two specimens of tyre turnings (one from each end of a piece 65 feet long, which broke at the point indicated) turned from a locomotive driving wheel 4½ feet in diameter. Have you any knowledge of longer turnings? A. Your specimen of turnings is an excellent one, on account of its thickness. We have seen longer ones, up to 170 feet long, but considering the coarse feed your shaving was cut at it is an unusually fine specimen.

(24) W. J. W. asks: 1. Is it a practicable thing to use a rubber hose to carry steam to an engine that is movable, the boiler being stationary? A. Yes. 2. How far can it be carried, out of doors, with the thermometer at −20° Fah.? A. It would not be economical to carry it any distance without covering it well.

(25) E. C. H. says: The balloon Buffalo ascended from that city on July 4. I estimate that the cost of filling this balloon (91,000 cubic feet) with hydrogen gas would be upwards of $2,000. Is this a correct estimate? What kind of gas was this balloon inflated with, and what did it cost? A. Balloons are ordinarily filled with illuminating gas, which costs about three dollars a thousand cubic feet.

In filing a handsaw, should the file be held level across the saw (for cross-cutting), or at an angle? A. At an angle.

1, What is the history of the gyroscope? A. See p. 91, vol. 31. 2. Is $5,000 reward offered for a scientific explanation of it? A. No.

Is there any machine, for cutting up the odds and ends of cigars, that works satisfactorily without first pressing the bulk to be cut? A. We do not know of any.

(26) J. H. H. asks: What is the amount of coal it will require per hour to retain steam in a boiler at a certain pressure per square inch, said steam being first raised to that pressure? In other words, what amount of coal must be used to restore the heat lost by radiation only? A. This is a question that must be determined by experiment for each individual case.

(27) C. E. T. asks: Can malleable cast iron be welded? A. We believe not.

(28) F. L. P. asks: What distance will a boat travel down stream, if she will make eight miles an hour up stream, and the current is four miles an hour? A. Twelve miles an hour.

(29) J. M. C. says: I have a number of loose tiles, in a large tiled floor. I have had them relaid in new cement, after chiseling out the old, which was crumbled to powder; but they loosen again. Can you suggest any composition to reset them in, that would be impervious to water and would harden firmly enough to keep them steady? A. Put a little lime into the cement mortar, that it may not set too soon, and grout it in; that is to say, have it so thin that it will flow into all the interstices of the adjoining tiles. Have plenty of depth of mortar under the tiles; and as you lay the latter, press it down upon the mortar, but leave the face of it projecting about ⅛ of an inch above the other tiles; as the mortar hardens, press the tile down, so as to bring it even with the others at about the time the mortar is set.

(30) C. P. says: Suppose that the roof of a building has a span of 100 feet, length 200 feet, and pitch 45°. The weight of roof is 20 or 30 lbs. per square foot. What is the rule to find the required strength of girders and trusses to sustain it? A. For form of truss and rules to determine the size of the various timbers and bolts of which it is constituted, consult Hatfield's "American House Carpenter," article "Framing."

(31) D. B. T. says: I propose to serve compressed air to customers in the same way that gas is now served, only that the air will be under a pressure of 500 lbs. to the inch, more or less. At this pressure, it will have a refrigerating power far superior to that of ice, when allowed to expand in contact with any article which it may be desired to freeze. The mechanical energy contained in the air may be used at the same time that its frigorific powers are expended, which will make it doubly valuable for domestic purposes. The hottest places in our cities could be rendered delightfully cool, at a small cost compared with the use of ice for the same purpose. It would soon be as common to see persons turn on the air to cool their houses, as it is now to see them turn on the gas to light them. A. If you have such a successful air compressor, you will find a large demand for it for operations in which compressed air is at present employed.

(32) W. J. W. says: I am putting up an engine for the purpose of running a cotton gin. I have a well, but the water is brackish. What effect will it have on the boiler? A. It will probably make scale in the boiler if you do not blow off frequently.

(33) I. H. L. asks: 1. When waterworks have a stand pipe, is the water forced to the top of the pipe to get the necessary pressure, or is the upper end of the stand pipe closed and the water forced through the street pipes (or elevated to a reservoir) by compression of the air in the stand pipe? A. A stand pipe is closed at the top. 2. Can you explain the principle of the Chicago water works, which use a stand pipe and a small reservoir built of boiler iron, but not nearly as high apparently as the stand pipe, nor large enough to contain one tenth of the water used. A. In Chicago the water flows through the mains from the reservoir which is kept full by the pumping engine.

(34) R. B. & R. C. say: We are young men wishing to be mechanical engineers. Is the Cooper Institute of New York a good place to get a thorough training? Could we get employment in the trade to enable us to live in New York, for the purpose of studying at the Institute? A. The instruction at the Cooper Institute is free, and is given in the evening, so that if you could get a situation in this city, you could pursue your studies very well.

(35) F. W. asks: 1. Will you give me a rule or determining the pitch of a propeller screw? A. It must be ascertained by measurement. 2. What sized wheel is suitable for an engine with cylinder of 8 inches bore and 10 inches stroke? A. One about 30 inches in diameter. 3. What sized boat is suchan engine capable of driving? A. One 40 feet long.

(36) C. W. M. says: I send you a piece of a flue taken from our engine for you to give your opinion as to the cause of its being eaten away in the manner shown. All the flues and the boiler are more or less injured in the same way. A. We have seen similar action in marine boilers where fresh water from surface condensers with copper tubes was fed into the boilers. You do not send enough particulars to enable us to give an explanation of your case.

(37) L. & V. say: We have a boat 18 feet long by 12 feet wide, with full oval bottom. We wish to run her by steam, in swift water. Can you give us proportions of engines to run her well? A. The boat is too small to make a very efficient steamer.

(38) J. S. W. asks: Can a telescope be constructed to magnify as you draw out the two sections, commencing with the telescope closed and looking at a 50 cent piece 200 yards distant? It will at first appear very small; but if I draw one section out, will the object appear the larger the further it is drawn? A. Such a telescope has the pancratic eyepiece; the pair of eye lenses recede from the inner pair, thus increasing the magnifying power.

(39) J. W. says: I made a telescope on the plan given in the SCIENTIFIC AMERICAN, p. 7, vol. 30 1. My meniscus is 1¾ inches in diameter, of 48 inches focus. The eyepiece is ¾ inch in diameter, and 2½ inches focus, and is made to slide. I use a 6 inch double convex lens, but I am disappointed, as it does not in any way answer. Would an achromatic objective improve it at all? Is the object lens too small? A. A 3 or 3½ inch achromatic about 4 feet focus is recommended. The best eyepieces do not screw in, but slide into the rackwork tube or sliding tube, as the case may be, and cost $4 each Powers from 80 to 150 or 200. The foci of the two lenses, in a simple instrument, should meet as you describe. 2. I have a mind to make another telescope; but before I begin, I would like your opinion in regard to lenses. What should be the focus of a 3 or 3½ inch achromatic objective to obtain the best result? Also what is the best kind for an eyepiece, and what shouldbe the focus? A. See our remarks to G. J. J., No. 77, on this page.

(40) A. W. H. asks: Can you give me a recipe for something to mix with plaster of Paris to make it non-porous? A. There is nothing we know of that will render plaster non-porous without injuring at the same time its hardening properties.

(41) J. T. M. says: I have a small refracting telescope, a good one for its size. Could I use the eyepiece (consisting of 4 glasses) in connection with an object glass of longer focal distance, and make a good serviceable glass of it with a longer or larger tube? A. An eyepiece which is adapted for a short telescope may be used for a long one. The converse, however, is not the case.

(42) P. J. K. asks: I propose to make a telescope, and I think that a 4½ inch meniscus lens, with about 72 inches focus, with a ⅝ inch eyepiece, with about 1 inch focus (plano-convex) would make a good instrument. Do you think this would answer? Would an object glass (double convex) of same size and focus, with double concave eyepiece, be better? Would such an instrument show Jupiter's moons and their eclipses, Saturn's rings and moons, and the planets Venus and Mercury? A. You would have to place a cardboard screen over the lens with a hole in it an inch and a quarter in diameter. Get an achromatic spy glass instead, and unscrew the two front lenses of the eyepiece.

(43) C. W. S. asks: I made one of those cheap telescopes that you gave instructions for in your paper last winter, and I now wish to make one with an object glass of, say, 4 or 5 inches in diameter. What would the glasses for such an instrument cost, and what should be the inside diameter of the tube, length of the same, and length of focus? Could I make the tube of wood, as done in the smaller one? A. A fine American instrument in our possession, made in 1866, is 4 inches aperture, 60 inches focus. It is equatorially mounted on hollow cast iron axes, and is adjustable for latitude on a tripod of black walnut 5 feet 2 inches high, with 3 inch circles. The hour circle is divided to minutes, and the declination circle reading, by vernier, to two minutes of arc. Object glass cell is provided with collimating screws. The tube is conical, of polished black walnut in 3 strips glued together, and is 4 feet 2 inches long. Length from cell to end of rack tube, closed, a little less than 5 feet. There is a pancratic terrestrial eyepiece, and five Huyghenian ones, whose powers are 60, 96, 160, 210, and 320; 96 is the power most in use. A diagonal prism, and a finder telescope, one inch aperture, are also attached. The cost was $296.50. The necessary parts would cost: Lens $100, and 2 eyepieces $8, for a skillful mechanic; for the tyro, the tube and rackwork, $80, and tripod with ironwork, $35, should be added.

(44) S. L. G. says: In Spencer's "Psychology," vol. I, p 520, he speaks of the "vast catastrophe of which the star *Epsilon Coronæ* was lately the seat," etc. What was the catastrophe referred to? A. Very hot and therefore dissociated oxygen and hydrogen, suddenly cooled in large quantities, unite to form water, with evolution of heat and light. At one period of its evolution, a star consists of a more or less continuous liquid film surrounding a bubble of glowing gas. If this film be suddenly ruptured by pressure from within or by collision from without, the uprush of gas expands, cools down to the combining or burning temperature, and explodes. Such explosions constantly take place in the sun. Tongues of flame dart 100,000 miles from its surface with a crash that may be dimly imagined by those who have set fire to oxyhydrogen soap bubbles.

(45) W S asks: 1. When, in what constellation, and by whom was the comet lately visible discovered? A. It was discovered by M. Coggia, at Naples, April 7, 1874, in the breast of *Camelus*. 2. Has it ever appeared before? A. No. 3 What is its inclination to the ecliptic? A. 66°. 4. Where does it cross the ecliptic? A. It crossed the ecliptic on July 24, between *Gemini* and *Cancer*. 5 Did it pass through its perihelion before or after crossing the elliptic? If so, where? A. Its perihelion passage was on July 8, 60,000,000 miles from the sun. On November 4 it will be near the star *Alpha Chamæleontis*, in the southern hemisphere, and about as bright as when it was first discovered.

(46) F. D. H. asks: 1. What form of battery is used in exploding powder, gun cotton, etc.? A. The Grove, in connection with a small coil. 2. What is the arrangement of the wires, etc.? A. By arrangement of the terminal wires in such a manner that the spark leaps through the discharge thus igniting it.

(47) M. B. says: 1. I have a telescope which, besides the objective, has four lenses. These lenses are arranged in couples, in two small cylinders. Please tell me the respective names of each of these lenses. A. The glass nearest the objective is the object lens, the next is the amplifying lens, then comes the field lens, and, finally, the eye lens, next the eye. 2. When the instrument is open as far as possible, the first lens is 2½ inches from the objective. The eye piece has its focus 1⅝ inches distant. Please describe the objective which would give the greatest power, and tell me the required power. The lens should be 1⅝ inches in diameter. How can I estimate the power of a telescope? A. As we have before stated in answers to correspondents, the magnifying power of telescopes is equal to the stellar focus of the objective divided by that of the eyepiece, the focus of the common negative eyepiece being equal to half the focus of the field lens. 3. Which is the best way to find the focus of the lens? Is it by getting an inverted image? A. Practically the principal focus is the distance at which the lens gives the sharpest image of the sun.

1. Can surveying and engineering be better learned in college than in an office? A. For civil engineering, both kinds of training are necessary. A knowledge of Gillespie's "Land Surveying" will enable you to survey, with good instruments. Send to Cornell University, Ithaca, N. Y., or to Sheffield Scientific School, New Haven, Ct., or to Rensselaer Polytechnic Institute, Troy, N. Y., for catalogue. 2. What are the requirements of a good civil engineer? A. From 4 to 6 years mental training (with subsequent practice), costing, including board, etc., from $500 to $1,000 per year. 3. Are surveying and engineering generally practised by the same person? A. Yes. 4. What are the wages of a good civil engineer? A. From $2,000 to $6,000.

(48) G. W. L. and others ask: What is an easy way of making mirrors of different sizes? A. The process, improperly called silvering mirrors, is rather a delicate operation; and inasmuch as the chances of failure are so great, as also the amount of time consumed, few amateurs will have their first efforts crowned with success in this direction. The process consists in applying a layer of tinfoil alloyed with mercury to the posterior side of the glass plate. To do this requires a perfectly smooth level table (marble is usually employed). The foil is placed perfectly flat on the table, every wrinkle smoothed out. The plate being in readiness, perfectly clean and polished, a little mercury is at first poured on the foil, and carefully spread with a wooden roller. Mercury is then poured on the foil to a depth of about 1 32of an inch. The plate is now slid on to the table in such a manner that the supernatant mercury is carried off, thus preventing air bubbles from destroying the coating; at the same time great care must be taken not to disturb the foil. After this, a weight is carefully placed on the plate, and the table slightly tipped so as to allow the superfluous mercury to run off. The plate is then covered with cloth, and very heavy weights placed on it, in which position it is allowed to remain for 24 hours. The weights are then gradually removed and the angle of the table gradually increased, until the glass stands almost vertical, with the amalgam still adhering to it. The edges are then trimmed. Many days are consumed in these operations, especially with large mirrors; in some cases a month is required before the mirror is ready for use.

(49) M. E. L. says: In your answer to G. F. P., July 25, you say that the moist air in the hollow copper lightning rods amounts to nothing. So do I; but is not the copper rod ¾ inch in diameter, with an outside surface of 1½ inches and the inside surface nearly the same, superior to the ¾ inch solid iron rod recommended by you? If not, why do you crown your solid iron rod with a copper point? A. Copper is a better conductor of electricity than iron, in about the ratio of its increased cost. The large surfaces you speak of are undoubtedly desirable, but the iron rod referred to fully answers all requirements, at the same time being superior for strength and stiffness. The placing and connections of the rod deserve as much attention as its composition and conductivity. It is desirable to have the rod's connection with the earth as intimate as possible, for, if partly insulated by sticking its end into the surface a few feet, the fluid not finding a sufficient anode to the earth in this direction, will find its path through the building and its metal work, thereby rendering the rod a danger rather than a protection to the building.

(50) T. C. P.—Steam canal boats are in common use.

(51) G. B. S. asks: 1. Are creosote and paraffin made from paraffin oil? A. Creosote is made from wood tar, from which paraffin is also obtained. 2. What is paraffin oil used for? What is its thickness compared with lard oil? A. Paraffin oil is one of the products of the distillation of Boghead cannel coal. It is extensively used for lubricating machinery, for which it is admirably adapted, since it does not become oxidized or thickened by exposure to air, and it evaporates but slowly.

(52) W. P. W. asks: If an underground wooden tank or cistern is filled with common spring water by a force pump from a neighboring pond, how long will it keep good, for stable and barnyard use? Will it spoil under these circumstances quicker than rain water? A. It can be used for your purpose, and it will not spoil more quickly than rain water.

(53) W. L. B. asks: Can I have the same power with my zinc cup by coating it with quicksilver? I have to use the battery so frequently that it is very troublesome to keep it clean, and the sulphate consumes the zinc so fast that it soon eats a cup away. A. Yes. The zinc should be always kept properly amalgamated.

(54) J. A. L. asks: 1. Is it necessary to have a coil and secondary current of electricity to get a spark sufficient to light gas? A. It is not always necessary; but this depends upon the number of cells employed. 2. Is it best to have the secondary current? A. Yes.

(55) N. C. asks: How are carbon plates made for electric batteries? A. They are made either of the graphitoidal carbon deposited in the gas retorts, or by calcining in an iron mold an intimate mixture of coke and bituminous coal, finely powdered and strongly compressed.

(56) J. N. B. asks: What sort of metal can vessels be made of, so as not to be acted upon by sulphurous acid gas and its aqueous solution? A. Vessels made of pure lead can be used for your purpose.

(57) C. M. N. asks: How can I wind a spring and have it tapered to a point at each end? A. Cut a thread upon a lead mandril tapered at each end, wind your spring upon it in the usual way; then, when you heat the spring to harden it, the mandril will melt out.

(58) S. W. asks: In the winter when vegetation is not active, what becomes of the carbonic acid gas which is expired into the air? A. It is retained in the air. Analyses made of the air, during both the summer and winter, show neither increase nor decrease of carbonic acid, the total variation being inappreciable when compared with the incredible bulk of the terrestrial atmosphere.

(59) H. P. asks: What will harden or toughen the skin of the chin, to make it less sensitive when shaving? A. This is due to a very thin and sensitive skin. There is no application of which we are aware that will be of benefit.

(60) G. R. B. asks: Can you tell me of a paint or varnish of a dead black color, which will not glisten in the brightest sunlight? Hunters are often discovered to game by the glistening of their guns, which such a varnish would prevent. A. We know of nothing that will answer your purpose so well as lamp black and turpentine.

(61) H. L. C. asks: If a rubber bag, containing common dry air, be sealed airtight and placed under water, will it be compressed by the water to a smaller bulk than it had before it was immersed? If so, to what extent? A. It would; and the compression depends upon the depth of immersion. 2. Would the uplifting power of air contained in a like bag be greater at a depth of 10 feet than at a depth of only 1 foot? A. No.

(62) J. B. T. asks: If we weigh the materials of which a vessel (containing 60 gallons) is made, then weigh the vessel full of air, what would be the difference in weight? And would not the vessel weigh less if the air was exhausted from it than the materials would weigh before the vessel was made? A. There would be no difference in weight.

Why do springs afford more water in the summer or hot months than they do in the winter? A. They do not.

Are not never failing springs produced by the heat from the central fire, passing through subterranean aqueducts and bringing the water to the surface of the earth? A. No.

Is not the atmosphere produced by the central fire, the heat or cold on any particular part of the surface of the earth being governed by the vertical or oblique rays of the sun? A. No.

1. How long will it take an iron ball 2 feet in diameter, brought to a white heat, to cool down? A. This would depend upon the temperature of the surrounding atmosphere. 2. Is it not the water that it gets from the air and surrounding objects that cools it down? A. Only partially. 3. How long will it take an iron ball 2 feet in diameter, brought to a white heat, to cool down if kept in a furnace where the atmosphere (to use an illustration) is kept to a white heat? A. Under these conditions, the ball would not cool at all.

(63) A. H. K. asks: What will prevent peaches from decaying and falling off just previous to becoming fully ripe? A. The dropping of your fruit is due to the curculio, or more properly speaking, *canotrachelus nenuphar*. The best remedy is jarring the trees, catching the larvæ in sheets, and burning them. See Packer's "Guide to the Study of Insects," pages 489 and 490.

By what means or marks can I distinguish the male from the female mocking bird at the age of about 7 or 8 weeks, fully fledged? A. We cannot tell you how to distinguish them at that age.

(64) R. W. C. asks: If a machine for aerial navigation should be invented, what do you think would be the moral result upon our race? Do you think it would tend to the advancement of light and truth, or that the good would be overcome by the perpetration of crime and misery? A. We think that the result could not be other than elevating.

What is a perpetual motion? Is it a machine that will never wear out, or one that will run until it wears out? A. The latter is probably the better definition.

1. What is the best chemical composition for sensitizing paper for the reception of photographic images? A. The paper is steeped in a solution of chloride of sodium in water, dried, and immersed in a solution of nitrate of silver in water, and dried in a darkened room. 2. What time is required for the impression? A. This is dependent upon the quality and intensity of illumination.

(65) W. D. C. asks: Is a bed, lounge, or chair, standing on glass casters and in the center of the room, a perfectly safe place for a person during a thunderstorm? A. No. The lightning seeks a pathway to the earth through the best conductors; and as the human body is a better conductor than chairs or other ordinary articles of furniture, a person sitting as you suggest will be likely to be struck if the electrical fluid enters. The glass insulators offer no protection. The only real security is a good arrangement of lightning rods upon the exterior of the building to prevent the electricity from entering.

(66) H. L. D. asks: How is the phosphorescent safety lamp, used in powder magazines, etc., in France, constructed? A. Take a piece of phosphorus not larger than a pea, place it in a phial of the whitest and clearest glass, with enough boiling hot sweet oil upon it to fill a third of the bottle; put a cork in and hermetically seal it. To use it, remove the cork and allow the air to enter the phial, then cork it again, and the part of the vessel not filled with oil will become as luminous as a large lamp. It can be used for six months without replenishment. Use white phosphorus and pure oil.

(67) T. S. says: A hot metallic teapot was placed upon a waiter. In consequence of it, the paint or other composition with which the waiter is covered was discolored and blistered. How can I restore it to its original color and brightness? Shall I use ordinary lead paint mixed with boiled linseed oil? What kind of varnish must I add that will neither peel off nor stick when fingers, cloths, or slightly warm dishes are placed upon it? A. First clean thoroughly with soap and water and a little rottenstone; then dry by wiping and exposure at the fire. Mix a quantity of good copal varnish with some bronze powder, and apply with a brush to the denuded parts. After which set the tray in an oven, at a temperature of 212° to 300° Fah., until the varnish is dry. Two coats will make it equal to new.

How can I make labels adhere to tin? A. Use flour paste, with two tablespoonfuls of coarse sugar in every quart.

(68) C. M. H. asks: Can you mention any substance having the following properties: Light in color, soluble or slightly soluble in water, hard at atmospheric temperatures, and capable of liquefaction by a heat from 200° to 500° Fah.? You can perhaps mention some gums or resin, salts or alkalies, etc., possessing those properties. A. Borax, sodic carbonate, potassic carbonate, phosphate of soda and ammonia, gum arabic, etc. all have these properties.

(69) A. G. asks: 1. What is the composition of the tin foil in which tobacco is put up? A. Tin foil is made from tin which is first cast into an ingot then laminated to a certain extent, and afterward beaten out with a hammer. 2. How can it be made into solder? A. The alloy of tin and lead in equal parts forms the plumber's solder. The soft solder is composed of tin 3 parts, bismuth 5 parts, and lead 2 parts.

(70) W. H. H. T. asks: 1. Are there any authenticated cases of petrifaction (of either animal or vegetable matter) which have taken place in historical times? If so, where can some of the specimens be found? A. Such cases are daily occurring. On certain of the Caribbean Islands petrifactions on a large scale have occurred during historical times. 2. In the case of the man who was said to be petrified (mentioned on p. 81 of your vol. 31) would not the weight of the body (if it had not increased in bulk after burial) exclude all idea of it having been turned to lime, silica, or alumina? A. We do not see that it would.

(71) J. F. A. asks: Will an induction coil of ¼ inch spark do for giving shocks? A. Yes.

(72) L. A. G. says: The *Science Record* for 1874 (p. 574), describes a portable field camera oscura and how to make one. I have tried to make one after the method described, but fail to get an image on the paper unless it is held within about 3 inches of the mirror. I want it to cast an image from 18 to 20 inches away from the mirror. The dimensions of my instrument are: Box 4x8 inches; lens 2½ inches in diameter with a 1 inch focus, made to slide in and out of the box distance of box from table, 20 inches. Why do I not get an image farther away from the mirror? What is there wrong about the instrument? A. The distance from the lens to the table, measured along the path of the rays, should equal the conjugate focus of the lens (when it is focussed upon the foreground). Your lens should be of 24 inches focus.

(73) T. A. H. asks: 1. Which is best for a celestial telescope, a lens of 4 inches diameter and 48 inches focus, or one 1¼ inches diameter of 48 inches focus? Would there be any difference except in field? What should be the diameter and focus of the eyepiece? A. The toy you mention is useless if over 1 inch aperture, as the aberrations impair distinct vision See p. 7, vol. 30, and read our answers to correspondents since. 2. Would such a glass show Saturn's rings? A. Not distinctly.

(74) R. asks: What is meant by north, south, east, and west, as applied to the stars? For instance, you say in your last number that Borelli's comet may be found 7° east of *Gamma Ursæ Minoris*; and when I look for this star, some book tells me that it is so many degrees east or west of some other star. A certain star is said, in Burritt's "Geography of the Heavens" to be the westernmost star in the Dipper. Now the Dipper is changing its position relatively to an observer all the time, and the same star which is the westernmost one, when the constellation is low down in the horizon, appears to me to be the easternmost one when it gets to be nearly over our heads. A. The points of the compass should not be used in referring to celestial objects. Right ascension, expressed in time from 0 to 24 hours, indicates distance of a star from the first meridian or vernal equinox, that is, its longitude. Declination, expressed in + or − degrees, minutes, and seconds of arc, indicates the distance of a star north or south of the celestial equator, that is, its latitude. The figures following the letters, R. A. and D, thus define the exact place of a body in the heavens or upon the map.

(75) W. W. E. says: I have noticed that you state that a certain star was moving in the direction of the earth at 54 miles per second. Is the course of that star across the orbit of the earth, or is it in a line with its orbit, or at a tangent, or on a radial line, with its orbit? In six months, the earth will have passed half of the distance around the sun; what direction then to the earth will the falling star have? Will it still be toward the earth? A. All stars are drifting about in space, the sun (at the rate of 4 miles every second) toward *Lambda Herculis;* so that at the very remote arrival of Arcturus, we shall be traveling elsewhere.

(76) T. P. says: A friend of mind positively asserts that no human being can see a cloud 5 miles distant. Will you please give me good authority on the fact? A. The mean hight of clouds is much less than 5 miles, but Dalton says that they have been seen at full 5 miles above the surface, passing over the highest peak of the Andes.

Has a balloon ever ascended to a hight of 10 miles? A. The greatest hight on record is that attained by Mr. Glaisher, who, in 1862, made an ascent to an altitude of 7 miles. At this hight it was difficult to sustain life.

(77) G. J. J. says: 1. I have a meniscus of 48 inches focal length. Which will be the better for an object glass, this, or a double convex lens of 4 or 6 inches diameter? What would be the focal distance of such a lens, and would its magnifying power be much greater than that of the meniscus? A. Both would be useless as object glasses. 2. What kind of an eyepiece would such a lens (double convex) require? A. With a double concave eye lens, it would form the Galilean telescope. 3. Does the focus of an object glass fall before, behind, or on the eyepiece? A. The focus of an object glass falls in front of the Ramsden or positive eyepiece, within the Huyghenian or negative eyepiece, and behind the Galilean or double concave eye lens. 4. Can you recommend me to some treatise which explains the subject of the foregoing? A. See Dick's "Practica Astronomer."

What preparation or starch is used to give a fine gloss to shirt bosoms? A. A lump of paraffin is melted in with the starch.

Can you give a recipe for bleaching skeleton leaves and flowers? A. Bleach with chloride of soda, after macerating the leaves in water, until the epidermis is readily displaced.

(78) T. C. K. says: I have tried the cheap telescope described in your paper. I could see distant objects in the daytime very well, and the moon at night but for the stars it was a complete failure. All that I could see was a little round ball, colored red or blue Can you tell me the cause? An optician says that a double convex lens would be better than the meniscus What should be the size and focus of two double convex lenses, which will show to a certainty Jupiter's moons, Saturn's belt, etc? A. An achromatic object glass of 50 inches focus and 1½ inches diameter, with a power of 50, will show sun spots (on a white surface), Jupiter's moons, the rings of Saturn, and bright stars and planets in the daytime. A double convex lens of 4 feet focus must not be over 1 inch in aperture if we increase the aperture to 2 inches, we must lengthen the focus to 14 feet to obtain an image free from prismatic colors. We therefore buy achromatics exclusively.

(79) R. W. says: I have about 4 gallons of sulphate of nickel and ammonia that I spoiled by putting in a vat lined with pine pitch. The cyanide and ammonia seem to be affected, which spoils the conducting power of the solution. When I put articles in the bath to be plated, they all turn black. Is there any way in which I can recover that solution? A. Various methods have been tried, but they are so tedious and require so much labor that you could not recover the nickel and convert it again into the double sulphate economically, on the small quantity of 5 gallons.

(80) W. H says: You once gave a recipe for waterproof glue as follows: 12 ozs. glue with sufficient water to dissolve it. Add 3 ozs. rosin, melt down in a carpenter's glue pot, and then add 4 ozs. turpentine or benzine. It does not mix well. I also tried softening the glue in water, then dissolving in linseed oil; but it curdled and is too slow in drying. I should like to have a glue as nearly colorless as possible. A. A glue which is said not to be affected by moisture may be prepared by dissolving 1 oz. sandarac and 1 oz. mastic in half a pint of alcohol, and adding 1 oz. white turpentine. A very thick glue is then to be made, to which some isinglass is to be added. The alcoholic solution is to be heated to boiling in a vessel, and poured gradually, with constant stirring, into the warmed glue, until the whole is intimately mixed together. The mixture is finally to be strained through a cloth, and is then ready for use, and is to be applied hot. It dries quickly, becomes very hard, and pieces of wood united with it do not separate in water.

(81) J. H. J. asks: Is there any process by which small iron castings can be changed into malleable iron after they are cast, so that they can be welded or hammered like wrought iron? A. Malleable castings, as made at present, cannot be worked like wrought iron. They are only rendered less liable to crack.

How much coal do ocean steamers, from 3,000 to 4,000 tuns, burn in a day? A. From 40 to 60 tuns.

(82) H. S. asks: How is the brown imitation of bamboo on fishing rods made? A. By charring the wood, and then polishing.

(83) J. E. E. of Pa. says, in answer to A. A., J.'s query as to filtering water for boilers: Build a circular well of very soft-burnt building brick in the center of your water tank; lay the brick (on edge) in water cement (Portland preferred). Select bricks that are sound, having no holes or cracks through them. Fill your tank outside the well; it will readily soak through the brick. Take your water from the inside of the well for your boilers. Should the pores of the brick occasionally fill up so that the water will not soak through fast enough, use a scrub brush to clean off the outside. This makes a cheap filter for almost any impure water.

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

C. W. J.—Your impressions are very imperfectly made, especially the Roman coin. The one of the date 1311 is a Spanish coin, but doubtless not as old as the Roman. Their age shows nothing very important. Coins older than these are to be found in circulation at this day. They were doubtless brought over long after Columbus discovered America, and obtained in traffic by the Indians; and, being considered of value by them, were buried with them, as was their custom.—J. W. H. —The specimens are magnetic oxide of iron, mixed with some quartz, etc. The pure magnetic oxide of iron should contain over 72 per cent of iron. What it does actually contain, whether it has any constituent which would unfit it for iron-making, and what is the value and extent of the ore, must be ascertained by a technical chemist.

W. W. says: In the locality of Binghamton, N. Y. (lat. 42° 06′ N., long. about 76° 14′ W.) I prove conclusively that, for a long series of years previous to 1806, the declination of the magnetic needle was eastward, at the average ratio of 3·72′ per annum, that at that period (variously and indefinitely stated by authors) the eastern motion ceased, while the directive tendency of the needle was 2° 49′ west of the pole. Subsequent to that, the declination has been westward, at about the same ratio, showing now an accumulated secular variation of 7° west, as deduced from my last astronomical experiment. Now what I wish to learn is this: Whether the period of revolution of the needle, from east to west and *vice versa*, is a regular or uniform period, I mean of about the same number of years? If it is, what is the extent of that period? For your scrutiny and criticism, allow me to state that the diurnal westerly motion of the needle is only to be discovered in full force between the vernal and autumnal equinoxes: and that this variation amounts to about half as much in winter as in summer (as several authors of celebrity have stated) seems to be doubtful: as from the most minute observations I have been able to make during the time I have mentioned, the diurnal variation has been found to be 13′ or 14′; while between the autumnal and vernal equinox, variation has been *nil*, or scarcely appreciable. [Will some of our readers who have investigated this subject in particular or have made it a study, please answer this question?—EDS.]—M. V. H. asks: What do sign painters use to produce that brilliancy in gold letters or gold leaf which they apply on shop and store windows?

## COMMUNICATIONS RECEIVED.

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

On Tender Bones. By Z. M. P. K.

On Railroad Rolling Stock. By F. G. W.

On Measuring the Width of a Stream. By W. H.

On Creeping Rails. By A. S. M.

On a Novel Projectile. By C. R. S.

On Practical Mechanism. By T. W. P.

Also enquiries and answers from the following:

S. R.—E. E.—L. F.—C. G.—X. Y.—N. F. P.—D. T. W. —L. M. B.—Q.—F. R. S.—M. A.

## 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 enquiries analogous to the following are sent: "Please to inform me where I can buy a machine for turning broom handles, also for cutting barrel heads? Where can I purchase the best water wheel? Which work on modern architecture is considered the best? What are the prices of best German silver instruments? Where can I obtain printed sheets of playing cards?" All such personal enquiries 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.]

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Wrench, pipe, C. H. Fulmer ..... 154,471

## APPLICATIONS FOR EXTENSION.

Applications have been duly filed and are now pending for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned:

30,719.—PAPER FOLDING MACHINE.—C. Chambers, Jr. November 11.

31,330.—COLLARS FOR CARRIAGE WORK.—M. Seward. January 20.

## EXTENSIONS GRANTED.

29,917.—DRAW BRIDGE.—L. Schneider & J. A. Montgomery.

29,920.—MORTISING MACHINE.—H. C. Smith.

29,923.—PLANING MACHINE.—H. D. Stover.

## DESIGNS PATENTED.

7,709.—HARNESS ROSETTE.—J. V. Waldron, N. Y. city.

7,710.—STOVES.—T. F. Hamilton, Geneseo, Ill.

7,711 to 7,714, inclusive.—TASSEL DROPS.—R. K. Slaughter, Brooklyn, N. Y.

## TRADE MARKS REGISTERED.

1,945.—BAKING POWDER.—Cloud & Co., Evansville, Ind.

1,946.—MEDICINE.—Frese & Co., Hamburgh, Germany.

1,947.—CLOCKS.—F. Kroeber, Hoboken, N. J.

1,948.—GIN.—M. Lieman & Co., New York city.

1,949.—PLOWS, ETC.—A. Speer & Sons, Pittsburgh, Pa.

## SCHEDULE OF PATENT FEES.

On each Caveat ..... $10
On each Trade Mark ..... $25
On filing each application for a Patent (17 years). $15
On issuing each original Patent ..... $20
On appeal to Examiners-in-Chief ..... $10
On appeal to Commissioner of Patents ..... $20
On application for Reissue ..... $30
On application for Extension of Patent ..... $50
On granting the Extension ..... $50
On filing a Disclaimer ..... $10
On an application for Design (3½ years) ..... $10
On application for Design (7 years) ..... $15
On application for Design (14 years) ..... $30

## CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA AUGUST 22 TO 31, 1874.

3,776.—T. A. D. Forster and E. L. Stowell, Philadelphia' Philadelphia county, U. S. Improvements on tooth paste, called "The Sphinx Tooth Paste." August 22, 1874.

3,777.—W. Robertson, Yorkville, York county, Ont. Improvements on cloth shrinking and drying machines, called "Robertson's Cloth Shrinker and Dryer." August 22, 1874.

3,778.—L. Richards, Philadelphia, Philadelphia county, Pa., U. S. Implement for cutting and gaging butter and lard, called "The Complete Butter and Lard Cutter and Gage." August 22, 1874.

3,779.—J. Johnson, Brooklyn, Kings county, N. Y., U. S. Improvements in ball casters, called "Johnson's Universal Caster." August 22, 1874.

3,780.—W. H. Weagant, Morrisburgh, Dundas county, Ont. Improvements on window blinds, called "Weagant's Improved Window Shade." August 22, 1874.

3,781.—E. Osborn, Spencer, Tioga county, N. Y., U. S. Improvements on running gear for wagons, etc., called "Elijah Osborn's Cross Platform Gear for Wagons, etc." August 22, 1874.

3,782.—H. B. Sherwood, Mill Point, Hastings county Ont. Improvements in tool handles for files, chisels, drawing knives, etc., called "Sherwood's Improved Tool Handle." August 24, 1876.

3,783.—H. P. Becker and N. Underwood, Jr., Dixon City, Lee county, Ill., U. S. Improvements on machines for scouring and polishing grain, called "Becker's Grain Scouring and Polishing Machine." August 22, 1874.

3,784.—W. H. Taylor, Baldwinsville, Onondaga county, N. Y., U. S., and C. Potter, Schenectady, Schenectady county, N. Y., U. S. Improvements on harness pad trees, called "Taylor's Harness Pad Tree." August 24, 1874.

3,785.—D. W. Bailey, Watertown, Middlesex county, Mass., U. S. Improvement in concrete, adapted to roads, walks, floors, water works, etc., called "Improved Composite Concrete and Mode of Applying the Same." August 24, 1874.

3,786.—T. Sparham, Brockville, Leeds county, Ont. A fireproof paint, called "Sparham's Fireproof Paint." August 24, 1874.

3,787.—O. Thompson, East Flamborough, Wentworth county, Ont. Improvement in railway car couplers, called "Thompson's Railway Car Coupler." August 22, 1874.

3,788.—E. L. Fenerty, Halifax, N. S. Improvements on the heel fastenings of his improved skate fastenings under letters patent No. 180, bearing date Dec. 15, 1869, called "Canadian Club Skate." August 24, 1874.

3,789.—J. Sharp, Horton, Renfrew county, Ont. Improvements on spinning fibrous materials, called "Sharp's Improvements in Spinning." August 24, 1874.

3,790.—G. R. Prowse, Montreal, P. Q. Improvements on the construction of fire extinguishers, called "Prowse's Improved Fire Extinguisher." August 24, 1874.

3,791.—G. K. Smith, Waterloo, Black Hawk county, Iowa, U. S. Improvements in the composition and process of making a metal for casting plows, called "Smith's Composition for Plows. August 24, 1874.

3,792.—S. Moore and H. Rogers, Sudbury, Mass., U. S. Useful manufacture of preparation of leather or leather board for use in making shoes or various other articles, called "Resinated Leather or Leather Board." August 24, 1874.

3,793.—K. Corbet, Owen Sound, Grey county, Ont. Improvements in the art or process of raising, heating, and distributing hot water simultaneously, called "Corbet's Process of Raising, Heating, and Distributing Hot Water." August 24, 5874.

3,794.—William Harkness, Providence, Providence county, R. I., U. S. Improvements on apparatus for and methods of making illuminating gas, called "Harkness' Gas Apparatus." Aug. 24, 1874.

3,795.—H. W. Spratt, 4 Lee Road, Lee Parish, Kent county, Eng.—Improvements on voting apparatus, called "The Voting Machine." Aug. 31, 1874.

3,796.—T. Rowan and J. R. Reid, Glasgow, Lanark county, Scotland. Improvements on floor cloths, called "Rowan & Reid's Carpet Floor Cloth." Aug. 31, 1874.

3,797.—I. E. Moye, Clifton, Welland county, Ont. Composition of matter to be used as a liniment for the cure of rheumatism, sprains, etc, called "Moye's Star Liniment." Aug. 31, 1874.

3,798.—C. Hoffman, New York city. Improvements on grates, called "Hoffman's Furnace Grate." Aug. 31 1874.

3,799.—J. Thompson, Bramley, Simcoe county. Ont Improvements on gates, called "Thompson's Improved Gate." Aug. 31, 1874.