

tial oils can best be used to give an agreeable odor to flour paste? A. Oil of cloves. 3. Please give a recipe for a good mucilage, one that will keep? A. Gum arabic solution perfumed with oil of cloves. 4. When I make a gum out of dextrine, it is of a brown color. How can I make it white without disturbing its keeping qualities? A. Use pure dextrine. Filtering through bone black will tend to improve it.

(2809) M. M. asks: 1. What is the E. M. F. of a plunging bichromate battery with 2 carbon and 1 zinc plates 4x6 inches each? A. Very nearly 2 volts. 2. How many amperes of current will it give? A. On a short circuit of 0 resistance the battery would yield a current of from 4 to 8 amperes. 3. What is the voltage of the simple electric motor described in SUPPLEMENT, No. 641? A. It requires a current having from 8 to 12 volts E. M. F. 4. What is its current capacity and what part of a horse power will it develop with the battery mentioned? A. It requires a current of 6 to 8 amperes and will develop about 1/2 horse power under favorable conditions.

(2810) W. G. asks: Can you tell me 1. How I can clarify bleached shellac varnish, for use on drawings? A. Long settling might answer. 2. Also if there is anything better for the purpose than the above varnish? A. Try Canada balsam or dammar varnish thinned with turpentine, or if you wish an alcoholic solution, use gum sandarac varnish.

(2811) C. A. W. asks: 1. What would you dissolve phosphorus in, so you could apply it with a brush on a wall to have it luminesce at night? A. Olive oil. Balmian's luminous paint is better. See SUPPLEMENT, Nos. 229, 249, 497. 2. What is the fastest printing press in the United States, and how many impressions will it take, and how many completed papers will it print a minute? A. The Hoe perfecting press; it will print and fold 500 eight page papers a minute, the size of the page being about 17 by 22 inches. 3. What pay does the average machinist get, and is that a good trade for a young man to learn? A. It would be hard to strike an average that would be worth anything; the wages vary from \$2 to \$5 a day. It is a good trade, but requires intelligence and hard work to get to the top. 4. How do you temper drills, so they will bore the hardest steel known? A. Heat to dull redness and plunge into a strong solution of zinc chloride. This hardening is only superficial and will have to be repeated after the drill is ground.

(2812) H. L. J. asks: Will you please inform me how to prepare canvas for oil painting? A. Nail the canvas on the stretcher, then give it a coat of thin glue size. Allow this to dry, then apply paint of the desired tint with a palette knife. The paint should have about the consistency of that sold in artist's tubes.

(2813) H. J. D. asks how to make white stain for the bottoms of shoes. A. Leather is bleached with a solution of oxalic acid. It is apt to injure the leather.

(2814) G. R. asks what the chemical ingredients are in the smoke emitted from soft coal. A. Principally carbon and vapor of water, with possibly minute quantities of hydrocarbons.

(2815) McF. & Co. ask: Why cannot water be made by gravity to run through a square coil of pipe, such as is sometimes used in the heaters when laid in a horizontal position? By pouring water in at the top it will not run out at the lower end. We think we know the air prevents it, but why does it? We certainly know the water is heavier than the air, and think that three inches or four inches of head should force both the air and water down and up through the returns of pipe and down out through bottom outlet, but it won't. We have tried it. A. A coil, either square or circular, with a number of turns, when laid on its side, forms a series of siphons, in which, if there is but one turn, water will flow through when the ends terminate on a level with the top and bottom of the coil. When there are two turns, the head where the water is poured in must be twice as high as the diameter of the coil, with three turns, three times the height and so on. The coil becomes a series of siphons, each siphon after the first re-enforcing the preceding siphon by its own hydrostatic pressure. Thus the first coil or siphon overflows and the water drops to the bottom of the second, and seals the air in the down leg and forcing the water up the next leg, the air remaining in the down leg, and so on through a series, each upward leg of water adding its quota of hydrostatic pressure to be overcome by adding to the height of the water inlet.

(2816) T. P. A. writes: Suppose the + wire of an incandescent circuit is grounded, the - wire being perfectly insulated, does any current go to ground? If not, what is the object of ground detectors? A. If one wire is grounded and the other is perfectly insulated, there would be no circuit, and as a consequence the current would not flow. Perfect insulation, however, is impossible. With the best there will be a small leakage, but this is negligible. The object of a ground detector is to determine when both branches of the circuit are grounded to such an extent as to interfere with the working of the circuit. 2. I have been told I could get a shock by grounding, say + wire, the - being perfectly insulated. I say no. What do you say? A. Generally enough of the current will find its way to the ground by leakage to give a serious shock. In the case of some arc light circuits, a ground connection through the body has proved fatal.

(2817) G. R. asks: Between what ages can a boy serve as a "page" in the national House of Representatives? What is the salary paid, and do they get pay monthly, whether House is in session or not, and about how many pages are required in that House? A. The House of Representatives has thirty-two pages, who get \$75 per month during the session, nothing when House is not in session. A boy is eligible at 12 years of age and can remain as long as he has a good political backing up to 24 years of age.

(2818) F. F. V. asks: If 25 open gas jets are burning to the best advantage in a room 18 by 18 feet, and the same amount of gas is burnt in an improved gas stove, in a room the same size, will the temperature register the same in both rooms, and if so, why? And if not, why? A. There will be but little

difference in the total amount of heat. The gas jets would overheat the top of the room, while the gas stove would equalize the heat by heating the air near the floor, and would also produce a general circulation and equalization of the heated air throughout the room. The thermometer, if hung high, would indicate in favor of the gas lights.

(2819) J. R. asks: How are plans for exterminating Australian rabbits entered for the prize with the New South Wales government? A. Address Hon. F. Abigail, Sec. for Mimes, Sydney, New South Wales.

(2820) J. A. W. asks: 1. Can you furnish me with a book containing the recipes for making gold, silver and nickel solutions? A. We supply Watt's "Electro-Deposition of Metals," \$3.50 by mail. Also see SUPPLEMENT, No. 310, for a very good article on the subject. 2. Can you furnish me with a recipe for coating brass that will wear well and withstand the action of hot potash and cyanide of potassium? A. This is almost an impossibility. You might cover with an India rubber tube, or even deposit India rubber on it by deposition. This would have then to be vulcanized, preferably by treatment with chloride of sulphur dissolved in naphtha, followed by heating toward the boiling point of water.

(2821) H. H. writes: Can you give me a receipt for an ink (waterproof) that will do just as well for drawings as the so-called India ink? A. We recommend you to rub up India ink in a solution of shellac in borax water. If it were not for its corroding qualities, an ammoniacal solution of shellac would give an absolutely waterproof vehicle for India ink.

(2822) C. L. H. asks: I am a stamp collector wishing to know how to make adhesive paper to hinge stamps in an album. A. Nothing is really better than solution of gum arabic just perfumed with oil of cloves. Postage stamp mucilage has often been published, as follows:

- Dextrine 2 parts.
- Acetic acid 1 "
- Water 5 "
- Alcohol 1 "

(2823) J. V. D. writes: I have a quantity of cider that has taken up a taste from a cistern coated with tar. Is there any way by which the taste can be removed or neutralized? A. Try placing a bag of bone black in a sample of the cider. Success is doubtful.

(2824) A. B. asks how to cement polished glass to cast iron (planned smooth). I have tried Major's cement; it sticks good, but in taking it off with hot water, small pieces of glass break off and spoil it. I wish to know if there are other cements that will hold as tight as Major's, but can be removed without injury to the glass, and how to do it. It must be a liquid cement. A. Soak fine white glue or gelatine in water over night. Pour off the surplus water and add molasses equal to about 25 per cent of the bulk of glue. Heat gently and stir until the mixture is formed. You can vary the proportion of molasses to suit. Glycerine may be used instead of molasses.

(2825) A. W. B. asks: 1. What causes the singing noise that is heard on telegraph poles? A. The noise is due to the vibration of the telegraph wires, produced by the movement of the air. 2. Has alcohol ever been frozen? If so, at what temperature? A. Alcohol has been rendered viscid by low temperature, but never solidified. 3. Can the simple electric motor be arranged to produce the electric light, and how? A. Yes. By using a cast iron field magnet and winding the magnet and armature with No. 20 wire. 4. What is the best work on physics? A. It would be difficult to say which is best. For the advanced scholar, Daniell, Ganot, or Deschanel can be recommended, while "Experimental Science" is suited to all interested in physics. 5. Are the paper conductors in the simple Holtz machine placed on the same side of the apertured disk, and next to the revolving disk, when they are in position? A. They are both on the side of the disk remote from the revolving plate.

(2826) M. A. H. writes: What number complies with the following proposition: That if 5-7 of its 2 be multiplied by 9-12 of 5-10 of its 4 and then add 4543542399999527344295 to the product, and then extract the 6 of the result, then divide by 20 and add 13 to the quotient, the final result is equal to 30? A. The easiest way is to commence at the bottom and work upward as far as possible. Thus 30-13=17=the quotient last named. Multiply this by 20, giving 340, which by the statement is the 5th root of the sum of the long number given (4543542399999527344295) and of a certain other number. Then 340^5=454354200000. From this the given number must be subtracted, giving 0-4772655705. By the conditions 5-7x^2+9-12x-10+x^3=0-4772655705. The first member of the equation reduces to 225-840x^2 and the whole equation reduces to x^3=1-78177813. Solving, preferably by logarithms, we find x=2.

NEW BOOKS AND PUBLICATIONS.

ELECTRICITY IN DAILY LIFE. Illustrated. New York: Charles Scribner's Sons. 1890. Pp. xv, 288. Price \$3.

The articles on electricity which have appeared in Scribner's Monthly Magazine during the past year are here collected into book form, producing a volume similar in its way to American Railways, produced by the same firm in the same way. The reputation of the authors of this work and the choice of topics are the best guarantee of its excellence. The illustrations are of the quality familiar to the readers of the magazine, and are also very numerous and pertinent to the subjects treated. It forms about as good a popular presentation of the subject as has yet been put before the public.

The Illustrated American.—This beautiful weekly publication, which is now issued in an improved form, so as to bind into conveniently sized volumes for the library, continues to be of as fine quality as ever. The issue for the week ending January 31 has, as opening article, the Geo. I. Seney collection of paintings, with an excellent portrait of Mr. Seney. Many of the pictures of the celebrated collection are reproduced, and

marginal cuts give the portraits of the famous artists whose works are displayed. The reproductions are admirable, giving all the softness and general effect of the original works. The great collection of Mr. Seney, which has a wide reputation for its excellence, is soon to be disposed of at auction in this city, and the Illustrated American gives the record of its masterpiece. Another article in this number describes and illustrates "Sioux Women at Home" as seen at the Pine Ridge Agency. The everyday life of the agency Indian is well shown, with graphic pictures of the semi-civilized product reproduced from photos taken on the spot. Another article is devoted to the U. S. S. Philadelphia, and, with numerous illustrations, gives an excellent idea of the great flagship of the North Atlantic squadron. Music, literature, history, and last, not least, "Women," receive their need of attention in this issue.

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INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

January 27, 1891, AND EACH BEARING THAT DATE.

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

Table listing inventions and their patent numbers, including entries such as Adding machine, R. Corbin (445,240), Alarm, See Steam generator alarm (445,285), and many others.

Table listing inventions and their patent numbers, including entries such as Door securer, P. Hise (445,273), Dredging machine, W. H. Wheeler (445,268), Dry closet, portable, W. H. Powell (445,513), and many others.