

A. Light passing through a magnetized ring is not reflected, but in the case of polarized light, its plane of polarization is rotated. 15. Is there any known mechanical means of feeding a wheel forward through successive steps, which steps shall be perfectly gaugeable, and be as desired any portion of the circumference? I desire a positive motion, with stops to prevent slipping or the passage of wheel beyond proper points. A. We think a worm wheel, driven by a worm operated by a pawl and ratchet, would answer your purpose.

(3167) S. M. K. asks: 1. Have you any description of a simple air engine of about one-eighth to one-sixteenth horse power? A. You will find caloric engines described in SUPPLEMENT, Nos. 49, 162, 623, 633, 536, 573, 695 and 727. 2. Have you a description of a simple steam engine of about one-eighth or one-sixteenth horse power? A. SUPPLEMENT, No. 279, contains a description of such an engine. 3. How can I make a boiler to be put on a stove for use in connection with a small steam engine? A. For small boilers consult SUPPLEMENT, No. 702. 4. Have you directions for making a simple electric motor? A. See SUPPLEMENT, No. 641. 5. How to make a dynamo for 6 or 8 lights? A. Consult SUPPLEMENT, No. 600. 6. How to make a battery for running small electric lights? A. See SUPPLEMENT, No. 792. 7. What is a good treatment for dandruff? A. Wash the head in a weak solution of borax.

(3168) E. J. H. asks: 1. How can a luxuriant growth of beard be permanently removed from the face without serious injury to the skin? Will you suggest a course of experiments likely to give the desired result? A. In our SUPPLEMENT, Nos. 176 and 353, you will find the results of the electrolytic method. 2. By Act of Congress, March 22, 1862, \$60,000,000 in currency was made full legal tender money. How long did it remain in circulation at par with gold, and at what time, and for what reason was it withdrawn from circulation? A. In December, 1861, the banks suspended specie payments, and there was thereafter a premium on gold until the resumption of specie payments by the government in 1879. The government was sustained, through 1861, by treasury demand notes, payable in coin, but the first legal tender act was for the issue of \$150,000. It passed the House of Representatives February 24, 1862, and passed the Senate and was signed by the President the next day. The total authorized issues of legal tenders were \$450,000. Subsequent to the war up to 1874, \$44,000,000 of legal tenders were retired, as part payment of an acknowledged debt by the government, further payments being restricted because of their acknowledged convenience as currency when the ability of the government to maintain them at par had been demonstrated. During the war and up to 1874, \$48,151,000 of fractionary currency were issued, the greater part of which being redeemed before the resumption of specie payments.

(3169) C. E. R. asks for the mode used in varnish works to bleach shellac, and if chlorine is used, the cheapest form to make it. A. Two pounds chloride of lime are made into a paste with water, which is strained through a cloth. The residue on the cloth is washed out with two pints of water. For each pound of chloride of lime add 4 ounces carbonate of potassium dissolved in 1 pint of water. Two pounds of shellac have meanwhile been digested in 1 gallon of alcohol for a few days. The above fluid is added with constant stirring to the alcoholic solution. After half an hour enough hydrochloric acid is added to show an acid reaction. The shellac is precipitated as a white tough mass, which is freed from the acid by rinsing and is washed with hot water until the latter comes off clear. The shellac is kneaded or worked into strips and is dried upon a platform or board in the air. The alcohol can be recovered by distillation. Enough carbonate of potash should be added to the original chloride of lime solution to precipitate all the lime. The quantity given is approximate only. Each sample will require a different amount.

(3170) C. I. sends following receipt and asks concerning its merits: "A patented shoe blacking, which contains no acid, is made in Germany by dissolving casein in a solution of borax or soda and adding resinates of iron, besides the usual boneblack, grease, and sugar. A brilliant luster is imparted by casein, and the resinates of iron gives a deep black color." A. The receipt is suggestive and worthy trying. The doubtful point is as to its lasting black color. The resinates of iron is made by saponifying resin with caustic soda, dissolving in water and adding to a solution of copperas. The iron salt will be precipitated. Filter, wash, and dry it for use. Carbon blackings are given in many places in the SCIENTIFIC AMERICAN.

(3171) S. L. asks: 1. Which is the best non-conductor of heat—felt, asbestos, or air? A. Asbestos. 2. Will air enclosed in a vessel hermetically sealed expand by heat? If so, how much, and with what force? A. Air, at atmospheric pressure and with a temperature of 32° Fah. will, when heated to 680°, give a pressure of 15 pounds above that of the atmosphere. 3. Is a partly vacuum a better non-conductor of heat than air? A. Yes. 4. What causes the explosion of kerosene lamps, and stoves. Is it because the gas from the oil comes in contact with the oxygen of the air or with the flame? A. The explosion of kerosene lamps and stoves is caused by the mixture of petroleum vapor driven off by the burner and air. 5. Which is the lightest of all gases? A. Hydrogen. 6. If a vacuum were created in a vessel, would it be lighter than if charged with the lightest gas? A. Yes.

(3172) P. C. T. asks: 1. What is the so-called "bottled electricity" used for headache and the curing of catarrh? A. The bottle contains no electricity. It is simply filled with sponge, and the sponge is saturated with oil of mustard. 2. Where does the first electrical impulse come from in the dynamo, as there is no magnetism present when the machine is at rest? A. If there were no magnetism in the cores of the field magnet the machine could not be started. The field magnet of every dynamo retains a little magnetism, which is sufficient to start the inductive process.

(3173) R. E. Jr., says: We want to use the water in our mines for boilers, and it is impregnated

with sulphur, iron, copper, etc. What method can we use to purify it so as not to be destructive to the iron? A. The best chance of purifying the water is to add enough lime water to precipitate its impurities, and to allow it to settle. Or you may let it stand in wooden tanks with scrap iron. Either method is imperfect and your boilers will undoubtedly suffer whatever you do. After standing over scrap iron, the lime treatment might be used in addition.

(3174) H. McD. asks for any known liquid, outside of alcohol, that will not evaporate by exposure, and only freezes at a very low temperature. A. Glycerine.

(3175) S. M. B. writes: Can you give me any information of any one who has a process or method of removing salt and alkali from water so that it will render or make the water fit or suitable for making steam? A. Salt and alkali cannot be removed from water in any practical way for boiler use. Run the boiler by the hydrometer, adding new water to keep it at a constant degree of saturation. Blow off frequently from the bottom to expel deposited matter.

(3176) F. A. S. asks how many pounds of wire there are on armature and on field magnet of the small electric motor described in "Experimental Science," page 497. A. We cannot give the exact amount of wire on the motor referred to, but we think there is about one-third pound on the armature and 1 pound on field magnet.

(3177) E. V.—To make a mould for ornaments, etc.: Soak 12 ounces of gelatine for a few hours in water until it has absorbed as much as it can, then apply heat, by which it will liquefy. If the mould is required to be elastic, add 3 ounces of molasses and mix well with the gelatine. If a little chrome alum be added to the gelatine, it loses its property of again being dissolved in water. A saturated solution of potassium bichromate brushed over the surface of the mould, and allowed to become dry and afterward exposed to sunlight for a few minutes renders the surface so hard as to be unaffected by moisture. To prevent the plaster sticking, brush with olive oil.

(3178) F. H. F.—Since making our former answer as to the heaviest locomotive used on any railroad in the world, we are informed that the Canadian Locomotive Works, at Kingston, Ont., is building four locomotives for the Chignecto Ship Railway, each of which will have a weight of 45,000 pounds on each of four pairs of drivers, or a total of 180,000 pounds, light, for each locomotive. We know of no locomotives so heavy as this at present in use.

(3179) A. D. B. asks (1) for the relative proportion of piston area and length of stroke in gasoline engines, considering the expansive force of the gas (not any particular make of engine). A. There is no fixed rule for the proportions of gas engines; some makers think a stroke at least double the diameter of the cylinder is advisable, while others make the diameter of the cylinder and the stroke the same. 2. How many volumes should the charge be compressed? A. About three. 3. What are the best proportions of gasoline gas and air for greatest force? Also for greatest expansion. A. Eight or nine volumes of air to one of gasoline vapor gives the best results. 4. Would it be practical (considering economy) to admit gas and air (of the proper mixture) in proportion to the load, the same to be compressed in the same space of a full charge? A. A variable mixture does not work well in practice.

(3180) C. A. H. asks: In rewinding a small electric motor, say about one-eighth horse power, to adapt it to Edison 105 volt circuit, what should the resistance be in the fields and armature, and the best way to connect up shunt or series? A. The resistance of the machine should be such as to use the amount of current required for the power needed. An electrical horse power is 746 watts. A watt is one ampere multiplied into a volt. If you require one-eighth horse power, you will need about 93 watts. Your E. M. F. is 110 volts; therefore, if you divide the voltage by the number of watts, you will have the current in amperes required, which is 118 amperes. Now, to arrive at the total resistance of the machine, you will divide the voltage by the amperage, which will give you 92 ohms. Of this amount, if the machine is series wound, the resistance of the field magnet should be about one-half that of the armature, while if it is shunt wound, the resistance of the field magnet should be about fourteen times that of the armature.

(3181) S. R. S. asks: How can I remove a wart? A. Cover the skin around the wart with lard; apply over the surface of the growth one or two drops of strong hydrochloric or nitric acid; then keep the part covered up until the scab separates.

(3182) C. G. C. asks: How can I remove rust stains from nickel plate? A. Grease the rust stains with oil, and after a few days rub thoroughly with a cloth moistened with ammonia. If any spots still remain, remove them with dilute hydrochloric acid and polish with tripoli.

(3183) W. P. S. asks: 1. How can I make the black enamel used on bicycles? A. For temporary use to cover places where the enamel has been chipped, use asphaltum dissolved in turpentine. If the whole machine needs japanning, send to the factory and have it japanned. 2. What cement must I use to cement on the tire? A. Melt together equal parts of pitch and gutta percha; use hot. 3. What cement can be used to mend cuts? A. Use the following: carbon bisulphide, 5 oz.; gutta percha, 5 oz.; pure unvulcanized rubber, 10 oz.; fish glue, 2½ oz. Use no more than necessary, and bind the tire firmly with string until the cement has set. 4. What oil is used to oil bicycles and typewriters? A. Use sperm oil.

(3184) E. H. R. asks how to remove ink stains from an oak desk. A. Try a mixture of two parts of cream of tartar and one of powdered alum.

(3185) F. B. D. asks how to make tin foil labels adhere to block tin collapsible tubes. A. Use a mixture of the best fish glue and gum arabic dissolved in water. A little glycerin may be added to advantage.

(3186) J. C. asks: 1. What kind of wax is used in making wax flowers, and how is it prepared? A. Use nothing but the purest virgin white wax; a little of the finest grade of Venice turpentine is added to render it ductile. It must not be melted in an iron pan; use tin or enamel ware; when stiff leaved are to be made, a little spermaceti may be added. The colors in fine powder are mixed with essence of lavender and this paste is mixed in with the wax. Pour in moulds while still warm. 2. How is beeswax bleached? A. Melt the wax in a jar and put into it sodium nitrate in the proportion of one ounce to the pound of wax; add afterward by degrees two ounces of sulphuric acid diluted with ten times its weight of water. Keep the wax warm and stir. Let it stand a short time, then fill up the jar with hot water, and allow the whole to cool. Afterward wash with water to remove any nitric acid stains that may remain, or finely shred it and expose to the sun for several days.

(3187) A. M. asks: How can I obtain a fine gloss on collars and cuffs? A. Melt 2½ lb. of the very best A. 1 paraffine wax over a slow fire. When liquefied, remove from the fire and stir in 100 drops of citronella. Have ready some round tin pie plates (new); place them on a level table, coat them slightly with sweet oil, and pour about six tablespoonfuls of the enamel into each tin. The pan can be floated on water to cool it. Break up into pieces the size of a lozenge. Two of the pieces added to each pint of starch will cause the smoothing iron to impart the finest possible finish, leaving the clothes perfumed. See SUPPLEMENT 577.

(3188) W. S. B. says: 1. In toning prints they sometimes assume a deep red color, which cannot be removed, although the print is left in the solution for hours. The redness sometimes covers the whole print and is sometimes in spots. I wash my prints in running water for half an hour. What is the cause and how can it be remedied? A. The redness is due to too acid a toning bath, or insufficient gold in the bath. See that the toning bath is alkaline, and test with a piece of red litmus paper, which should turn blue if the bath is alkaline. 2. Are time exposures preferable to instantaneous? A. Yes.

(3189) T. P. R. asks how to prevent photographs from fading. A. See formula on page 10621, SCIENTIFIC AMERICAN SUPPLEMENT, No. 665. Keep the photograph in a dark place.

(3190) J. Z. G. asks why lead castings sometimes crack while cooling. A. The cracking of lead castings is due to shrinkage, and generally occurs in sharp angles. All metals are liable to shrinkage cracks in the recessed angles, unless filleted.

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INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

July 14, 1891.

AND EACH BEARING THAT DATE.

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

Table listing inventions with patent numbers and names of inventors. Includes items like 'Acid, manufacture of tartaric, R. W. Schedler', 'Addressing machine, G. S. Couch', 'Armature for dynamo-electric machines, E. W. Rice', etc.

Table listing inventions with patent numbers and names of inventors. Includes items like 'Carriage, baby, Davis & Dicks', 'Carriage, spring, J. D. Brunner', 'Carriages, shifting seat for, J. E. Clarkson', etc.