colonies. The historical or business year in England began on the first da of Jannary as established by the Romans. The ecclesiastical calendar embracing the civil or legal year previous to 1752 began on the 25th of March, and events between the 1st of January and 25th of March were usually dated with both years, as February 11, 173½. The date of Washington's birth was fixed in the colonies to correspond with the new regulation; 1700 was a leap year under the Julian calendar, but not under the Gregorian.

(6022) C. B. W. asks (1) if the motor described in SUPPLEMENT, No. 641, can be run from an alternating current. A. No. 2. If not, how must it be wound to run from an alternating current? A. See our SUPPLEMENT, Nos. 692, 717, 944, for alternating current motors. 3. What size wire should be used to have it run with 100 volts and 10 amperes? A. Use No. 28 wire on field and armature. 4. If I should make the field magnet on motor 641 twice as wide, which would be five inches, and the armature core twice as large, which would be four inches, and put twice the amount of wire on the machine, would it be twice as strong as described in the SUPPLEMENT? A. In general terms, doubling all the lineal dimensions gives sixty-four times the power. But as you only double a portion, you may expect four or five times the power. 5. Can the motor 641 be run from the Crowfoot gravity battery? A. Not satisfactorily.

(6023) I. R. writes: 1. Can a storage battery be charged from an alternating circuit of 50 volts? If so, will the curent from the battery be direct? A. A storage battery cannot be charged from an alternating circuit. 2. What is the main difference between an alternating and direct current motor? A. Several kinds of alternating current motors have been invented. We have described several in our SUPPLEMENT, Nos. 692, 717, 944, to which we refer for their peculiarities. 3. Can a 1,200 volt continuous arc circuit be tapped in such a way as to get a current of 50 volts? A. There is no such thing as a current of 50 volts. By a shunt connection you can get such a potential difference. We advise you not to do it, as you expose yourself to great danger.

(6024) S. J. S. asks: How does the heat from the sun penetrate through the intense cold of the upper regions, and warm the surface of this planet? A. Heat is supposed to be a state of molecular motion or vibration conveyed through space in the medium of the luminiferous ether. A medium having no effect upon the progress of planetary bodies, yet capable of transmitting the pulsations of heat, light, magnetism and electricity. It is probable that heat does exist in space to a very low degree in its radiant form and only develops into active energy by resistance of planetary bodies to its vibratory transmission.

(6025) W. F. asks: 1. What per cent of power developed at power house is lost in transmitting for street car propulsion of the three following methods: Cable, electricity (trolley system) and compressed air? A. No exact figures can be given, except that under average conditions the electric road may be pronounced the cheaper. 2. What SUPPLEMENTS or books would furnish me with information about compressed air? A. See SUPPLEMENT, Nos. 799, 857, 893, 510, 766, 900. Also SUPPLEMENT catalogue, sent by mail. 3. Why is compressed air not more used for street car propulsion? A. It is too expensive and cumbersome. See SUPPLEMENT, Nos. 176, 177, 182, 553, 637, 747, 845, 866, 890, 903, 904.

(6026) H. R. C. asks: 1. Does the induction coil increase both the tension and quantity of current or just the tension alone? A. The regular induction coil increases the tension and lowers the current strength. It also produces a sort of alternating current. 2. I used common table salt in place of sulphur of copper in making a gravity cell. When I connect a small motor in the circuit it runs very rapidly at first and then stops. What is the cause? A. The cell rapidly polarizes, the combination is in every way a very poor one. 3. How can the Leyden jar be charged with a gravity cell? A. Connect the knob to one pole and the outer coating to the other. The charge will be so minute as to be appreciable only by very delicate instruments. 4. Why are the magnetic poles continually changing? A. The reason is unknown.

(6027) C. L. writes: I have three storage batteries, and I would like to get some idea of what power I can get from them if attached to a proper motor. Each cell has 14 plates (7 to each pole), 6½×9 inches (measured only the part that was supposed to be in the solution), making a total of 42 plates in the three cells. Can such cells be arranged to give small power for long time or large power for short time? A. Your battery will give about 18 amperes and 6 volts or 54 amperes and 2 volts, according to connection. The series connection (18 amp. 6 volts) is preferable. This gives $\frac{108}{746}$ horse power. The cells can be used from this as a maximum down as low as desired, according to the motor used.

(6028) F. C. H. writes: We are putting in a steam heating plant in a large hospital. The boilers, five in number, must be situated on practically the same level as the building to be heated, unless an excavation at least 18 feet deep and 40×60 is made for them. Is the gravity system of such advantage that you would advise this excavation, at an enormous expense, or would it be better to have the return water conducted into a receiver with automatic pump attached, so that the water could be delivered into the boilers? A. The sinking of the boilers in an excavation for the convenience of a return system is not desirable, in view of the well known appliances of the present day for returning the water of condensation to the boilers. A small cellar with tank and automatic pump, below the line of return pipes, is the cheapest and most satisfactory system. 2. In ventilating a large hospital would it be better to propel by fans warm air into the rooms through registers placed near the ceiling, expecting this pressure of air, assisted by the steam heated ventilating stacks, to force the foul air out through shafts near the mop board of each room, or would it be best to permit the hot air to escape through the heated basement corridor through registers placed near the ceiling, and connect fans with foul air ducts, drawing the foul air out of the room through registers near the floor, this draught to cause the hot air to circulate rapidly through the room, warm it and pass out through the foul air ducts, the latter plan being the reverse of the former? A. The plenum or pressure system similar to the first named gives the most satisfactory results for both winter and summer ventilation. It partially counteracts unequal heating on different sides of the building from outside wind pressure. It prevents indraughts from the windows by the draught of the fan in the other system. The heating and ventilation of a hospital for the insane is too important a matter for a general categorical answer. The plans should be passed upon by an expert in heating and ventilating such buildings. 3. Can you give me the colors used in making different colored sidewalk tile out of a mixture of Portland cement and sand? A. Venetian red, black oxide of manganese, and chrome yellow are the principal coloring matters of cement walks.

(6029) W. L. B. asks: In that class of rheostats where change of resistance is caused by change of pressure on a carbon powder, is lampblack suitable for the powder? If not, where could I obtain carbon powder that would be? A. We advise you to use powdered battery or electric light carbon. If the latter, see that the copper plating is dissolved before powdering. Lampblack would give very high resistance.

(6030) W. W. P. asks: 1. What would be the effect if I were to wind a flat iron ring with a continuous winding instead of alternating them, and place it in the fields of the Morday alternating machine? Would I receive a great deal of current with low voltage, *i. e.*, direct current? A. This might be done with a proper commutator and connections. It is not advisable. 2. How many watts do you require for one man power? A. 746 watts=1 horse power, or 93 (about)=1 man power. 3. I wish to produce Tesla currents. What is the simplest way for reproducing some of his experiments on a small scale? A. There is no simple way. We refer you to Tesla on "Alternating Currents," $1, and Tesla's "Inventious, Researches and Writing," just published, $4 by mail.

(6031) C. A. D. asks: Can you inform me the degree of heat necessary to transform limestone from its natural state into lime? And what length of time is required to complete the process in an ordinary furnace? Does it require a gradual heat, or would a blast furnace expedite the process? A. 36 to 48 hours may be needed to burn a kiln of lime, and a white heat is attained in the process. The carbon of the fuel acts to facilitate the operation by its reducing action. Gradual heating is not needed.

(6032) Reader writes: A says that a black overcoat is warmer than a light colored one of equal weight, because the dark colored cloth absorbs the rays of light, while the light colored reflects them. B gives reasons which are almost identical for saying that the light colored coat is the warmer. Which is right? A. In general terms the black coat would be warmer in the sun—the white one in the shade or at night.

(6033) M. M. asks: What is the ratio of the volume of high pressure cylinder to that of the intermediate pressure cylinder in a triple expansion engine, also the ratio of the intermediate to the low pressure cylinder? Also, what are the cylinders' diameter and stroke of the largest triple expansion engine? A. The ratio of the volumes of the cylinders of triple expansion engines varies somewhat with different makers, and to meet the requirements of expansion for steam at various pressures, as well also the capacity of a receiver, if one is used. The usual practice for marine engines is for steam at 100 to 130 pounds pressure 1, 2·25, 5, and for 150 pounds pressure 1, 2·55, 6·90 as the relative volumes of the three cylinders. The cylinder diameters of one of our largest ocean steamers having two engines of 10,000 horse power each are 45, 71, and 113 inches with 60 inch stroke.

(6034) Inquirer, Newfoundland, asks: 1. Would an ordinary kerosene lamp, with a sheet iron drum placed just upon its chimney so that the heat from it may radiate slowly through the apartment, heat the apartment better than the lamp without the above attachment? A. The absolute heating power of a lamp will not be increased by the absorption by and radiation of a metal drum through which the heat passes, but the action of low radiant heat from such a source seems in some way to modify the susceptibility of the nerves to the sense of heat, and in that way appears to increase it. 2. Would the comparative heating value be the same whether the room had a chimney or not? A. The effect of a chimney opening into a room is to carry off heat, and may only be considered as a ventilator. 3. In case of feather bed on which a person with mild form of scarlet fever (scarlatina) lay till recovery, would it be sufficient disinfection to fumigate once or twice with good disinfectant, for three or four hours at a time, and then put bed in open air; or would it be necessary to take feathers out of tick, and wash case and feathers? Please state best way to disinfect in above case. A. The method of disinfecting as described may be proper and safe, if disinfectants such as carbolate of camphor or other approved methods are applied to the inside of the mattress and a quarter pound of camphor left among the feathers for a season. Such a bed should not be used by other children under six months. The safest way where there are other children is to disinfect and thoroughly wash everything appertaining to bedding and clothing.

(6035) P. S., N. O., asks: What horse power will a gasoline engine having two cylinders 4¼×6 inches stroke give at 350 revolutions? What speed will above engine drive a 21 feet long, 5 feet 6 inches beam boat, propeller 18 inches, 3 blades, 4½ feet pitch? A. The two-cylinder gasolene engine will have from 5 to 7 horse power, according to the perfection of the explosive mixture of gasolene vapor and air. It will propel the boat at from 7 to 8 miles per hour. The engine will not run with the speed named when attached to the propeller. 250 revolutions will be its speed for the above boat speed.

(6036) R. W. S. asks if the valve of a high speed locomotive has to be changed to a shorter throw when running at a high rate? A. The throw of the valves in all locomotives and link valve gear engines is controlled by the link motion. The movement of the link from the dead point out in either direction controls the cut-off of the valve from 0 to the largest opening that is allowed by the construction, the amount of cut-off being generally designated by the check notches on the clamp arc.

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