ON THE DYNAMO-ELECTRIC CURRENT AND ON CERTAIN MEANS TO IMPROVE ITS STEADINESS.

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The author, after alluding to the early conception by Dr. Werner Siemens of the dynamo-electric or accumulative principle of generating currents, makes reference to the two papers on the subject presented, the one by Sir Charles Wheatstone and the other by himself, to the Royal Society in February, 1867. The machine then designed by him, and shown in operation on that occasion, is again brought forward with a view of indicating the progress that has since taken place in the construction of dynamo-electrical machines, particularly those by Gramme and Siemens von Alteneck. The paper next points out certain drawbacks to the use of these machines, both of them being subject to the disadvantage that an increase of external resistance causes a falling off of the current; and that, on the other hand, the short circuiting of the outer resistance, through contact between the carbon electrodes of an electric lamp, very much increases the electric excitement of the machine, and the power necessary to maintain its motion, giving rise to rapid heating and destructive sparks in the machine itself.

An observation in Sir Charles Wheatstone's paper is referred to, pointing to the fact that a powerful current is set up in the shunt circuit of a dynamo-electric machine, which circumstance has then been taken advantage of to some extent by Mr. Ladd and Mr. Brush, in constructing current generators.

The principal object of the paper is to establish the conditions under which dynamo-electric machines worked on the shunt principle can be made to give maximum results. A series of tables and diagrams are given, the results of experiments conducted by Mr. Lauckert, electrician, employed at the author's works, which lead up to the conclusion that, in constructing such machines on the shunt principle, the resistance on the rotating helix has to be considerably reduced by increasing the thickness of the wire employed, and that on the magnets has to be increased more than tenfold, not by the employment of thin wire, but by augmenting the length and weight of coil wire employed.

The results of this mode of distributing the resistances is summarized as follows:

1. That the electro-motive force, instead of diminishing with increased resistance, increases at first rapidly, and then more slowly towards an asymptote.
2. That the current in the outer circuit is actually greater for a unit and a half resistance than for one unit.
3. With an external resistance of one unit, which is about equivalent to an electric arc, when thirty or forty webers are passing through it, 2.44 horse power is expended, of which 1.29 horse power is usefully employed, proving an efficiency of 53 per cent., as compared with 45 per cent. in the case of the ordinary dynamo-machine.
4. That the maximum energy which can be demanded from the engine is 2.6 horse power, so that but a small margin of power is needed to suffice for the greatest possible requirement.
5. That the maximum energy which can be injuriously transformed into heat in the machine itself is 1.3 horse power, so that there is no fear here of destroying the insulation of the helix by excessive heating.
6. That the maximum current is approximately that which would be habitually used, and which the commutator and collecting brushes are quite capable of transmitting.

Hence the author concludes that the new machine will give a steadier light than the old one, with greater average economy of power; that it will be less liable to derangement, and may be driven without variation of speed by a smaller engine; also that the new machine is free from all objection when used for the purposes of electro-deposition.

This construction of machine enables the author to effect an important simplification of the regulator to work electric lamps, enabling him to dispense with all wheel and clock work in the arrangement. The two carbons being pushed onward by gravity or spring power, are checked laterally by apointed metallic abutment situated at such a distance from the arc itself, that the heat is only just sufficient to cause the gradual wasting away of the carbon in contact with atmospheric air. The carbon holders are connected at the iron core of a solenoid coil, of a resistance equal to about fifty times that of the arc, the ends of which coil are connected to the two electrodes respectively. The weight of the core (which may be varied) determines the force of the current that has to pass through the regulating coil in order to keep the weight in suspension, and this in its turn is dependent upon the resistance of the arc. The result is that the length of the arc is regulated automatically, so as to maintain a uniform resistance signifying uniform development of light. —*Engineering.*

THE HELIOGRAPH.

The English Government is again indebted to the Heliograph for the receipt of an important dispatch received from the seat of war in Afghanistan, announcing the result of an attack on British troops, in which their enemy suffered severely. The message is dated Camp Ghuzni, April 22d, and was received in London on the following day.

The value of the heliograph in war operations is becoming more apparent every day; in this instance the message probably could not have been delivered so speedily by electric telegraph. The Heliograph does not require the route to be kept open. The line of communication can not be cut, for the simple reason that the signalling takes place over the heads of the enemy, and the stations required are few and far between.—A ten inch mirror, and this is the size of the ordinary field heliograph, is capable of reflecting the sun's rays in the form of a bright spot or flare to a distance of fifty miles, the signal at this interval being recognizable without the aid of a glass. That is to say two trained sappers, each provided with a mirror can readily speak to one another, supposing the sun is shining, within a interval of fifty miles between them, provided their stations are sufficiently high, and no rising ground intervenes to stop the rays. The adjustment of the military heliograph is a very simple matter.—An army leaves its base where a heliograph station is located, and after travelling some miles desires to communicate with those they have left. A hill in the locality is chosen and a sapper ascends with his heliograph, which is simply a stand bearing a mirror, swung like the ordinary toilet glass, except that besides swinging horizontally, it is also piovoted, so as to also move vertically. Behind the mirror in the very centre, a little of the quicksilver is removed, so that the sapper can go behind the instrument and look through a tiny hole in it towards the station he desires to signal.

Having sighted the station by adjusting the mirror, he next proceeds to set up in front of the heliograph a rod, and upon this rod is a movable stud. This stud is manipulated like the foresight of a rifle, and the sapper, again standing before his instrument, directs the adjustment of the stud, until the hole in the mirror, the stud, and the distant station are in line. The heliograph is then ready to work, and in order to flash signals, so that they may be seen at a distance, the sapper has only to take care that his mirror reflects the sunshine, on the stud just in front of him.

A WONDERFUL METEOR.

MACON, GA., June 30, 1880.

At about twelve o'clock last night a meteor as large as a barrel, starting from the zenith, plunged down the north-eastern sky and exploded near here with a report that reverbrated for thirty seconds and shook the earth even at this point. The meteor was about five seconds in falling, during which time the city was lit up as though by a powerful electric light. Much excitement prevailed in the negro quarter—the inhabitants rushing into their houses, closing the doors and filling the air with screams and prayers. The time between the disappearance of the phenomenon and the report was about three minutes. This would make the distance from Macon about forty miles.