WHAT IS A DYNAMO?

THERE are no doubt quite a few men running electric light and power machinery successfully, who are at sea as to the manner in which each part of the dynamo performs its required duty, and also the relation which one part bears to the other, and how and why it produces an electric current for either supplying electric lighting by means of the lamps, or power by means of motors. The purpose of this article, then, is to make such an explanation as it is hoped will be the means of enlightening them in this particular. For this purpose there has been selected the plain Gramme ring armature machine; by Gramme ring is meant a type or pattern of one of the original dynamos built some 12 years ago by M. Gramme, of Paris, and which consisted of two electro-magnets, whose poles or extremities face each other, and between which is revolved a ring, consisting of either fine iron wires wound around a cast iron spider or frame, or laminas (layers) of sheet iron clamped together in the same position, and bolted to the spider or frame, this ring then being wound with insulated copper wire of proper size, for the current and voltage required, in a diametrically opposite direction to that occupied by the iron wire or laminas attached to the spider. This brings us to just what that armature has to accomplish in the part it plays, it is a well known fact that when a wire is passed over the face of a magnet, that a current is produced or generated in that wire, and as the armature in the above case is nothing more or less than a succession of wires lying side by side around the entire ring, which ring is revolved between the faces of the poles of the magnet, it will readily be seen that as they pass along the face of the magnets a current is continuously produced therein, which current will flow in either a positive or negative direction, accordingly as either the positive or negative pole is being passed by the wire or wires. Every one of these wires that are passing in front of the magnet being after all only a continuous winding around the iron wire or lamina, it also follows that each one of the windings is collecting, as it were, a certain amount of current from such magnets, and as this current must have an outlet to produce a commercial product, the segments of the commutator with the brushes bearing thereon are so arranged that as these wires one after the other are about to pass out of the magnet's influence, they make contact with the proper segment and take the discharge from the wires to the line.

The fields or magnets spoken of above, are simply a mass of iron, either cast, or wrought, or laminated, wound with insulated copper wire, through which is passed continuously a small part (or all) of the current that is being generated by the armature as explained above; this then produces an electro-magnet, or in other words charges the iron of the field magnets with magnetism to saturation, or nearly so, in consequence of which we have the wires of the armature which are revolving in front of it charged with a current, as explained in the first part of this article.

The next question from one who is not posted would be, "why and wherefore does it cause a current to be generated in the armature?" to which it can be answered—simply because there is a magnetic circuit established from pole to pole through the intervening air space, which for convenience sake is called the passage of lines of force—invisible to be sure, but nevertheless known to exist these lines always taking a direction from positive pole to negative pole, the cutting of which by the wires of the armature being then the cause of the current produced in those wires. These lines of force would take an extended rotary path, or to be more explicit, a widely separated one, were it not that the iron wire or lamina of the armature has such an attraction for them, that they are concentrated or bunched, and brought into close relation with one another, the result of which is that the copper wire of the armature has the advantage of being able to cut through nearly all of them. we say nearly all, because it is a well known fact that some dynamos are so constructed that their pole projections are so close together that there is more or less of a leakage of magnetic current from pole to pole that should and otherwise would pass through the armature and do service in increased current at the brushes. From the brushes the current passes to the line. Of course there are different windings and arrangement of armature wire than those spoken of above, but the principle governing all of them is about the same, be the dynamo an arc or an incandescent, an alternator, or a generator, be it either for 10 volts or 5000, or 1-100 ampere, or 1,000 amperes.

The electric magnet spoken of above is a mass of iron around which is placed spools of insulated copper wire, and through which is passed a current of electricity, either from a dynamo or a battery, which current makes the iron magnetic, but only as long as there is current passing through the wire; the moment the circuit is discontinued the magnetism in the wire ceases, hence the name electro-magnet, meaning a magnet produced by an electric current only.

The poles of a magnet is that part of the iron whose ends project through the spools of copper wire, so that some dynamos have two poles, others more, and as in the case of alternating current dynamos, some have quite a number, they being then known as multipolar (many poles) machines.

The commutator of a dynamo is that part of a machine on which the brushes bear for the purpose of collecting the current, and is, as in the above dynamo, composed of flat pieces of copper known as segments, which are built together in the form of a drum, and are clamped closely together around the shaft of the machine, being well insulated between each piece or segment by a layer of mica or some other non-conductor.

PERSONAL.

Mr. James Baird has been appointed engineer of the new water works plant at Woodstock, Ont.

The death of Mr. Geo. Worthington, founder of the New York *Electrical Review*, to whose instrumentality was largely due the founding of the National Electric Light Association and the New York Electric Club, caused a widespread feeling of regret in electrical and journalistic circles.

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