

A NEW DYNAMO-ELECTRIC MACHINE.

We give an engraving of a new continuous-current dynamo-electric machine, recently perfected by Mr. Clinton M. Ball, of Troy, N. Y. This inventor has been engaged during some years past in building machines similar in type to the alternating current machine of Hefner-Alteneck (recently described in the SCIENTIFIC AMERICAN SUPPLEMENT), especially in respect to the absence therein of solid metal parts in the armature, the latter being constituted in the form of a disk composed of a series of coils without iron cores, arranged and adapted to be moved in a magnetic field consisting of a series

of poles of alternately opposite polarity on the same side of the disk, and facing opposite sides of the disk. Mr. Ball has perfected several forms of continuous-current machines of this general type, and from among them we have selected two forms, which we illustrate. These machines have been operated with entire success at Troy; and samples of the machine are either already installed at the Paris Exhibition of Electricity, or are on their way to that destination, forming a part of the joint exhibit made by the "White House Mills" and Mr. Ball.

The bipolar machine, Fig. 1, reproduces the effects of the well-known Gramme machine, over which it possesses important advantages. Its special peculiarities and advantages may be briefly summed up as follows: The armature is composed of coils, six in number, each of which occupies a sector of the disk of 60°. These coils are made self-supporting in the disk, without iron cores or metallic parts other than the wire of which they are composed, and are connected in a continuous circuit. The commutator plates are six in number and constitute the terminals of offshoots from the junctions between two contiguous coils. These commutator plates are usually disposed spirally about the axis of the arbor of the machine so as to show at opposite ends an angular displacement from axial parallelism of 30°. From this it results that during rotation a pair of diametrically opposite coils in the armature are by-circuited during one twelfth of a revolution at the neutral point of the machine, and this effect recurs successively through the entire series of coils. It will be understood that an important advantage is gained by this arrangement, inasmuch as the resistance of the inactive coils of the armature is thereby eliminated from the internal circuit of the machine. This machine, used as a generator, presents striking and powerful effects with small expenditure of power. It may be used as a very perfect form of an electro-magnet motor. It runs without serious sparking at the commutator, and is simple and compact in construction. A further noticeable feature, which exists furthermore in all machines of this type, is the absence of any noticeable external magnetic field when running.

The other machine, Fig. 2, is a compound multipolar continuous-current machine, embodying characteristics of fundamental arrangement which distinguish it from all others; while, as before stated, in some of its theoretical aspects it resembles the machine of Hefner-Alteneck described in the article in the SUPPLEMENT.

The machine represented in the engraving, it will be noticed, has only six opposite pairs of poles in the field system. The continuous current armature system of the machine has eight elements, and the commutator twenty-four plates. The armature is otherwise composed in two sections or layers, the major section of which is utilized through a commutator or contact rings of ordinary construction for doing work upon the external circuit, while the continuous-current section maintains the magnetism of the field.

In this machine, developed and constructed long before the publication of any descriptions of Hefner-Alteneck's machine, the currents are commutated continuously, somewhat as in his machine, the commutator connections being so made that while the contact brushes remain in a fixed position, the currents are brought to them from the consequent electrical poles of the armature—the consequent points, during rotation, assuming successively different positions in relation to the field, and completing the cycle of changes during

half of a revolution of the armature. During this time, furthermore, the line bisecting the armature and marking the consequent electrical points, has twice traveled over the complete circuit of the field in advance of rotation. In the case of a machine having more poles in the field than armature elements, the movement of this line would be retrograde; however, if the multiple of half the number of field poles into the number of armature elements remained the same, the number of changes would be the same in either case.

It will be seen that this machine differs from that of

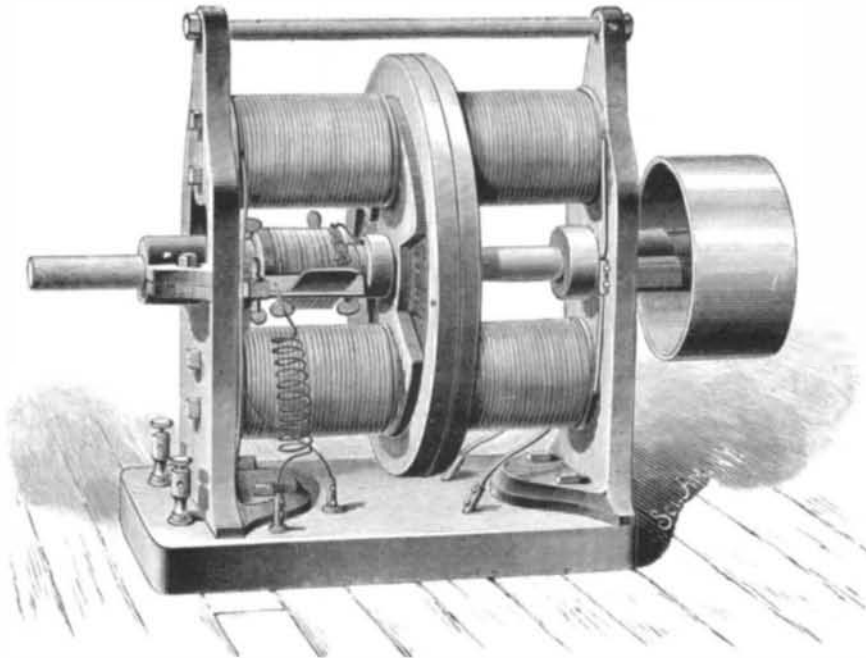


Fig. 1.—BIPOLAR DYNAMO-ELECTRIC MACHINE.

Hefner-Alteneck in respect to the proportion of armature elements to the number of poles of the magnetic field—the Ball machine, having a larger number of armature elements than of field poles, while his has a less number. The arrangement selected by Mr. Ball is more favorable to a simplification of details of construction without detriment to the efficiency of the machine.

At a speed of rotation of 950 to 1,000 per minute, and with an expenditure of 5½ to 6 horse power, this machine has proved capable of maintaining a series of ten to

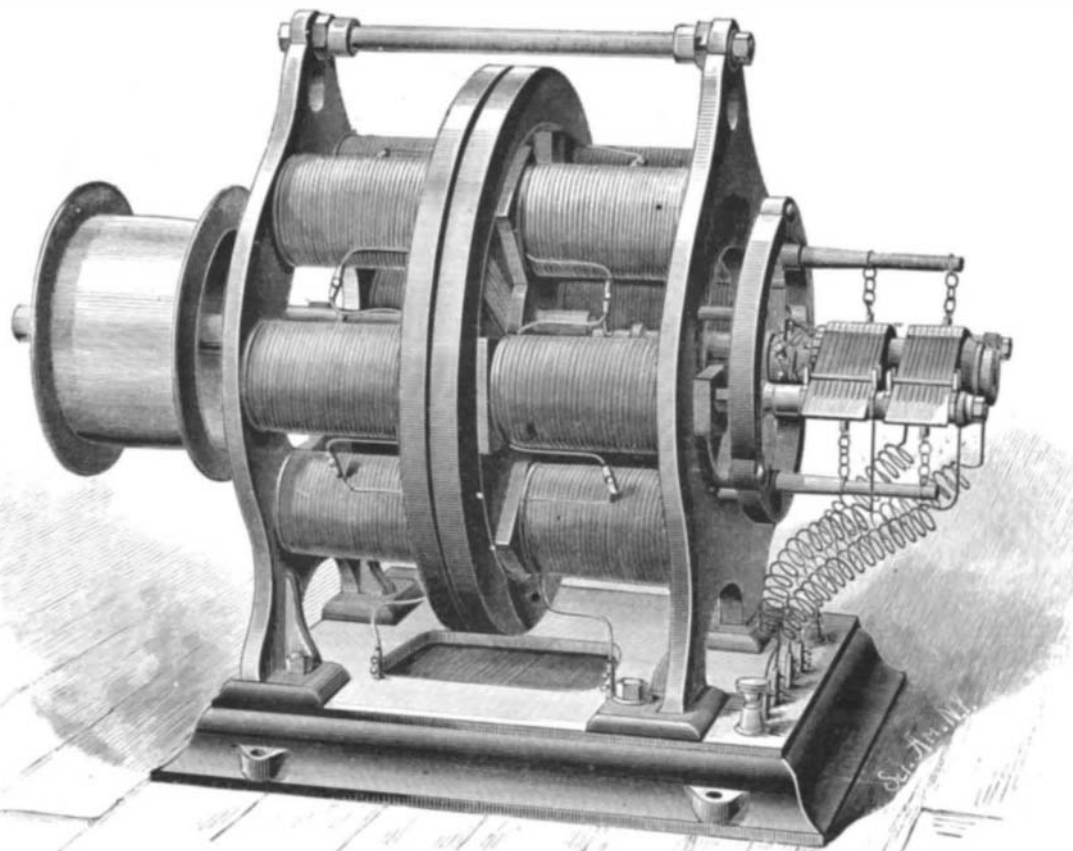


Fig. 2.—COMPOUND MULTIPOLAR CONTINUOUS-CURRENT MACHINE.

twelve arc lights of good power. The machine weighs only 850 lb.

RECENT INVENTIONS.

Mr. Samuel B. Jenks, of Grand Rapids, Mich., has patented an improved electric belt for medical or therapeutic purposes. The invention consists in an electrode for an electric belt, having a sponge fastened in a cup-shaped button on the belt.

An improved adjustable notching cutter has been patented by Mr. Philander H. Elwell, of Cincinnati, O. This invention relates to an improvement on the die or cutter usually employed to form the re-entrant angles or corners in enve-

lope blanks, and is applicable to every description of envelope, each bit being for this purpose composed of an angular piece of steel, one of whose leaves or limbs is perforated to receive a screw bolt having at its mid-length an eye that engages over another bolt, which is made square in the middle to receive a wrench.

Mr. Frank H. Carr, of Bancroft, Mich., has patented an improved device for coupling cars automatically and releasing or detaching them safely and conveniently.

An improved incubator has been patented by Mr. Joseph Colson, of Brentwood, N. Y. The object of this invention is to utilize to the best advantage the heat developed by the flame of the lamp by which the incubator is warmed.

An improved electric gas-lighting device has been patented by Mr. George J. Murdock, of Binghamton, N. Y. It consists in a sliding valve or cut-off controlling the supply of gas to the burner, which valve is attached to the armature of an induction coil contained in a casing and supported on the end of a hollow arm, through which the gas passes before reaching the burner. Wires lead from the poles of the coil to the opposite sides of the slot of the burner, and when the circuit is closed the gas valve or cut-off is opened, permitting the gas to pass to the burner, when it is ignited by the spark caused by the interruption of the circuit.

Mr. Ivan Carlier, of Hot Springs, Ark., has patented improvements in absorption ammonia ice machines for the purpose of preventing steam or vapor from being mixed with the ammonia gas which is produced in this machine, and for avoiding an undue pressure in the ammonia boiler. The invention consists in combining a smaller boiler with the main liquor ammonia boiler, these two boilers being connected by top and bottom tubes.

Mr. Fredrick E. McKinley, of Wellington, Kan., has patented an improved school desk and seat. The invention consists in combining an ink stand socket with a desk having apertures and a stationary bar that supports as well as pivots it.

An improved harness saddle has been patented by Mr. James H. Carrick, of Traer, Iowa. The yoke is widened at the lower part, and provided with flanged side edges, forming chambers for receiving side straps, in combination with the skirts, terret, screws, and nut plates, and carrying loops.

An improved folding basket has been patented by Mr. James H. Dennis, of Newark, N. J. The object of this invention is to construct baskets in such a manner that they can be folded into small space for convenience in transportation.

Messrs John Kienzy and Charles F. Davis, of Bridgeport, Conn., have patented an improved faucet which consists in a tube bent downward at the outer end, and provided at its inner end with a valve seat, on which a valve fits, attached to a screw spindle contained in a cylindrical inclined arm of the main tube.

An improvement in the treatment of furnace slag has been patented by Mr. Alexander D. Elbers, of Hoboken, N. J. This invention has for its object the rapid and cheap conversion of fluid slag and its solidification into such shapes as to materially increase its utilization. The inventor allows the fluid slag to spread swiftly in the revolving gutter, which, by preference, is made in adjustable sections and of iron or steel plates, into which it flows by a spout which is made movable so as to direct the course

of the flow. The apparatus, to which the gutter is fastened, is best constructed in the form of a so-called "arrousel," which can be quickly turned, and the size of the apparatus will depend on the quantity of slag which is to be run into the gutter. After the apparatus is set in motion, the first layer of the slag, as it flows from the trough into the revolving gutter, will almost instantly become chilled by contact cooling with the bottom and sides of the gutter, while the subsequent layers have to be mainly solidified by the rapid air circulation on their surface. As the liquid slag unites or welds readily with the underlying already solidified but still very hot slag, a weld of all the layers as they accrue during rotation is to be expected.