(No Model.)

D. A. SCHUYLER.

ARMATURE FOR DYNAMO ELECTRIC MACHINES.

No. 318,664. Patented May 26, 1885.

Fig. 1.

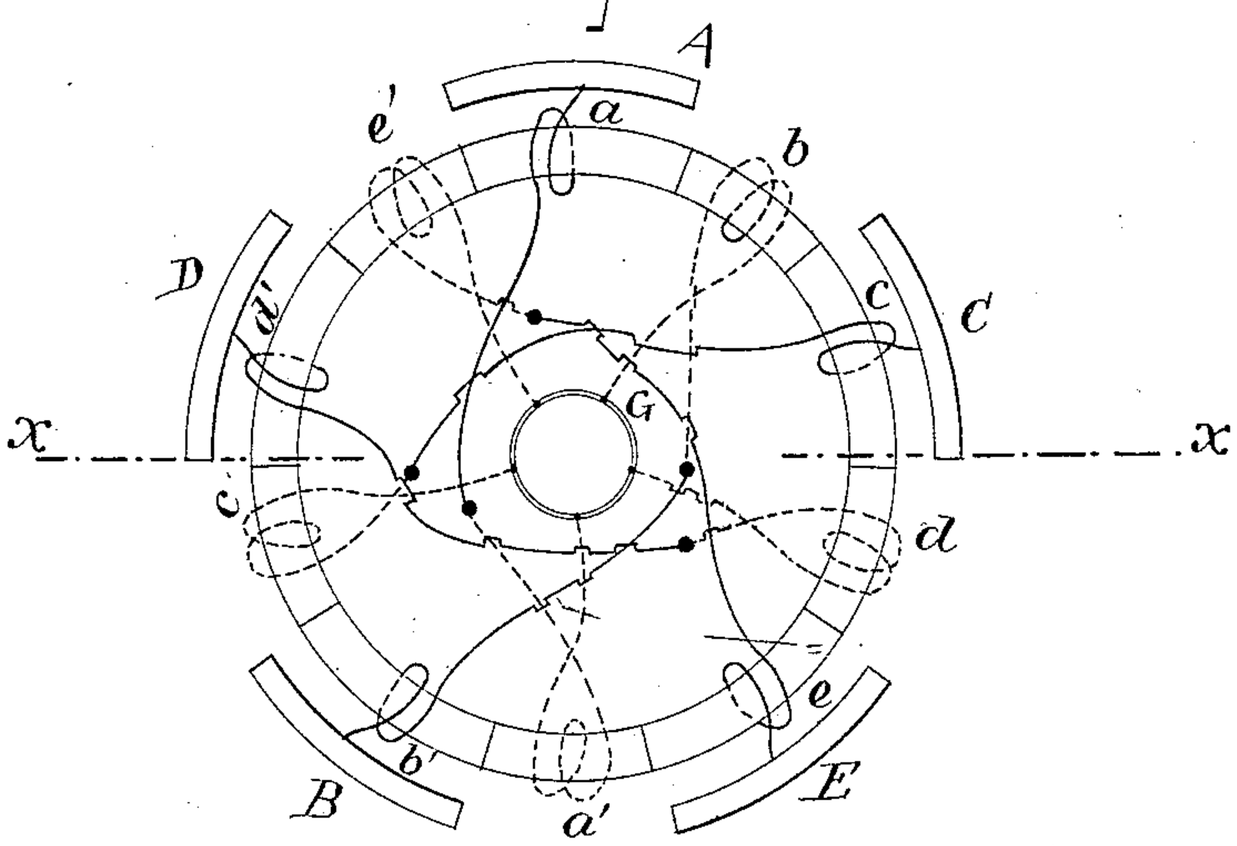


Fig. 2.

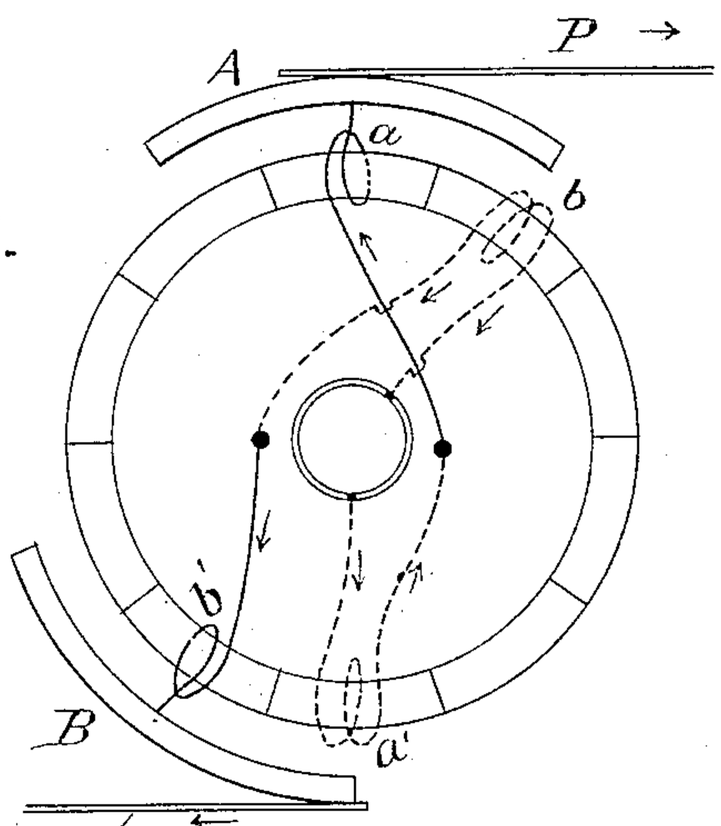
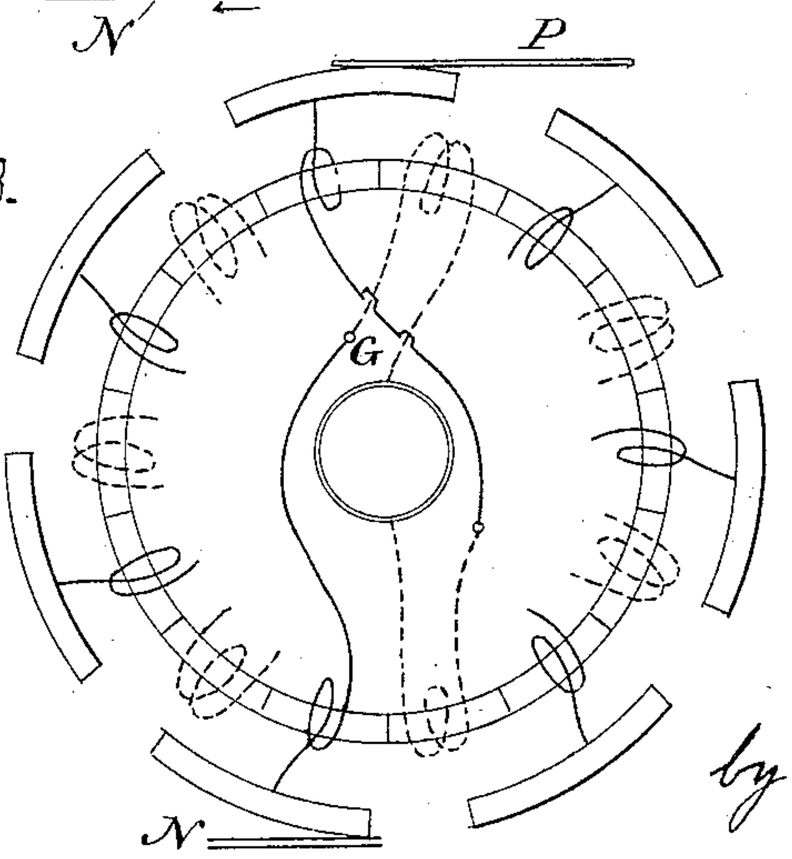


Fig. 3.



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ARMATURE FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 318,664, dated May 26, 1885.

Application filed December 27, 1882. Renewed February 12, 1884. Again renewed March 28, 1885. (No model.)

To all whom it may concern:

Be it known that I, DANIEL A. SCHUYLER, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a specification.

My invention relates to the method of connecting the armature coils or bobbins of a dynamo-electric machine, and is designed more especially for application to those forms of machine in which is employed an armature constructed of a ring or cylinder having bobbins wound around its circumferential axis.

My invention consists in connecting the same ends of diametrically-opposite bobbins, or bobbins that are for the time being of opposite polarity to one another, while the remaining or free ends of said bobbins are connected one to a commutator-segment and the other to a common electrical joint, to which the remaining pairs of bobbins are connected in a similar way, the connections of successive pairs being, however, reversed, so that if two contiguous pairs of bobbins be taken the circuit for the current generated will be from a commutator-segment which is for the time being, say, positive, to a bobbin, to a diametrically-opposite bobbin, to the common joint, to a third bobbin on the same side of the armature as the first-named bobbin, to a bobbin diametrically opposite the third bobbin, and to a negative commutator-segment. As will be seen, however, from the subsequent description, the same course of current may be said to exist in any two pairs in which the two bobbins connected immediately to commutator-segments are generating currents of opposite polarity; and while, therefore, the tension of current is that arising from the connection of four bobbins in series, there will be also in a machine having a multiplicity of pairs of bobbins a quantity of current due to the simultaneous connection of a number of sets of four in multiple arc.

Figure 1 illustrates the application of my invention to a ring-armature with ten bobbins. Fig. 2 shows four bobbins only of said armature for the purpose of illustrating more clearly the manner of connecting up and the path of the currents generated. Fig. 3 illustrates an armature having fourteen bobbins.

In describing the method of connecting up the bobbins it will be convenient to refer to them as arranged in pairs, although it is to be understood that in fact the electrical principle and the method of collecting and utilizing the currents generated involves a consideration of not less than four bobbins, since no current can be taken off from the armature or from any bobbin thereof that does not have circuit through four bobbins.

Referring, then, to Fig. 1, *a a'*, *b b'*, *c c'*, *d d'*, *e e'* indicate five pairs of bobbins on a ring-armature, in the opposite bobbins of each of which pairs there will be generated simultaneously during the revolution of the armature currents of opposite polarity, if, as is usually the case, said armature is revolved between two diametrically-opposite field-of-force poles. Supposing that the bobbins are wound all in the same direction, the inner end of the bobbin *a* is connected to the inner end of the diametrically-opposite bobbin *a'*, while the outer end of the latter is connected to a ring, plate, or equivalent device, G, common to other bobbins, and mounted in any suitable manner on the armature, said ring or plate forming a common electrical joint.

The outer end of bobbin *a* is connected in the ordinary manner to a commutator-segment, A, constructed and used in the ordinary way in connection with suitable commutator-brushes on opposite sides of the commutator, to take the effective current generated in said bobbin in each half-revolution while it is passing from one neutral point to another. This may be through any desired arc of revolution less than one hundred and eighty degrees in each half-revolution, if the armature be used between two opposite field-of-force poles. In the contiguous pair of bobbins *b b'* the connections of corresponding ends are the reverse of those of the pair *a a'*.

The inner and outer ends of *b* are connected, respectively, to a diametrically-opposite bobbin, *b'*, and to the common joint G in the same manner as the two ends of bobbin *a*, while the inner and outer ends of *b'* are connected to bobbin *b* and to a commutator-segment, B, in the same manner that the ends of *a* are connected

to the commutator-segment A and diametrically-opposite bobbin *a'*. The commutator-segment is like segment A and the remaining segments, and, as usual, constructed and used in connection with the commutator-brushes, so as to maintain a connection with the bobbin with which it is immediately connected during the proper intervals in each half-circle of the bobbin's circumferential path.

In the next pair of bobbins, *c c'*, the connections are the same as those of the first pair, *a a'*, while the connections of *d d'* are the same as those of *b b'*. The connections are thus reversed throughout the successive pairs, as will be readily seen by following the connecting lines of the bobbins, so that, taking the bobbins successively around the circumference of the armature, every other bobbin has the same connections as bobbin *a*, while the alternate bobbins have the same connections as bobbin *b*. The same connection might be followed out with any number of bobbins equal to four, or a multiple of four plus two. Such a number is necessary in order to obtain a symmetrical arrangement of bobbins and of commutator-segments.

Fig. 2 illustrates the manner in which the electric circuit is formed for bobbins that are generating current. P indicates, say, the positive collecting-brush, and N the negative, while the arrows indicate the direction of flow of the currents.

The same conditions will obviously exist in the case of any four bobbins, two of which are connected directly to commutator-segments, and are also for the time being of opposite polarity, and the tension of the current will be evidently that due to the connection of four bobbins of the armature in series. Where a multiplicity of bobbins is used it is likewise obvious that the current will be taken during portions of the revolution of the armature from sets of four bobbins in multiple arc, as can be seen from an inspection of Fig. 1, regarding those bobbins above the line X X as generating positive, and those below said line negative, current.

It will be noticed that, taking any given set of four bobbins—as, for instance, the set *a a'*, *b b'*, Fig. 2—the connection with one of the commutator-brushes would be severed before the connection with the other is broken, owing to the fact that there is an uneven number of commutator-segments. Such prior disconnection of one segment will not, however, remove all the four bobbins from circuit, since the bobbin immediately connected with the other segment and the diametrically-opposite bobbin, which are generating useful current, will be connected through the common joint with some other two bobbins in series that may for the time being have the same polarity and connection to a commutator-segment as the two whose segment has just been disconnected.

In Fig. 3 is illustrated the symmetrical arrangement of segments and bobbins which is secured when fourteen bobbins are employed. As before, the bobbins in succession are supposed to be alternately connected at the same end directly to a commutator-segment and to a diametrically-opposite bobbin, while the opposite ends are alternately connected to a diametrically-opposite bobbin and to the common joint. This arrangement followed out results, as indicated, in seven commutator-segments symmetrically arranged. These segments, as in the instances before described, are supposed to be of the ordinary or suitable length. They are shortened in the drawings in order to better show the principle of connection.

I do not limit myself to a cylindrical or ring armature, but may obviously apply the method of connecting the coils and commutator herein described to other forms of dynamo-machine embodying the well-known construction in which the currents are set up in the coils by the direct magnetization and demagnetization, or reversal of magnetism in independent cores for said coils.

What I claim as my invention is—

1. In a dynamo-electric machine, an armature whose diametrically-opposite bobbins have their inner or outer ends, as the case may be, connected together, while their remaining or free ends are connected the one to a commutator plate or segment and the other to a common electrical joint.

2. In a dynamo-electric machine, an armature whose pairs of diametrically-opposite bobbins have their inner ends connected together, while their outer ends are connected the one to the commutator and the other to a common joint, the connections of the successive bobbins being, however, reversed, so that every other bobbin in progression around the armature has its two ends connected the one directly to a commutator-segment and the other to a bobbin on the opposite side of the armature, while the alternate bobbins have their corresponding ends connected the one to a bobbin on the opposite side of the armature and the other to a common electrical joint, whereby the current is taken from said bobbins in sets of four in series.

3. The combination, with the armature for a dynamo-electric machine, of a series of bobbins equal in number to four or a multiple of four plus two, a connection from every other bobbin to a common electrical joint, a series of commutator-segments equal to half the number of bobbins, to which the alternate bobbins are directly connected at one end, and electrical connections from the opposite ends of said bobbins to the diametrically-opposite bobbins connected to the common electrical joint.

Signed at New York, in the county of New York and State of New York.

DANIEL A. SCHUYLER.

Witnesses:

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THOMAS TOOMEY.