

(No Model.)

C. F. WINKLER.
DYNAMO ELECTRIC MACHINE.

No. 431,134.

Patented July 1, 1890.

Fig. 1.

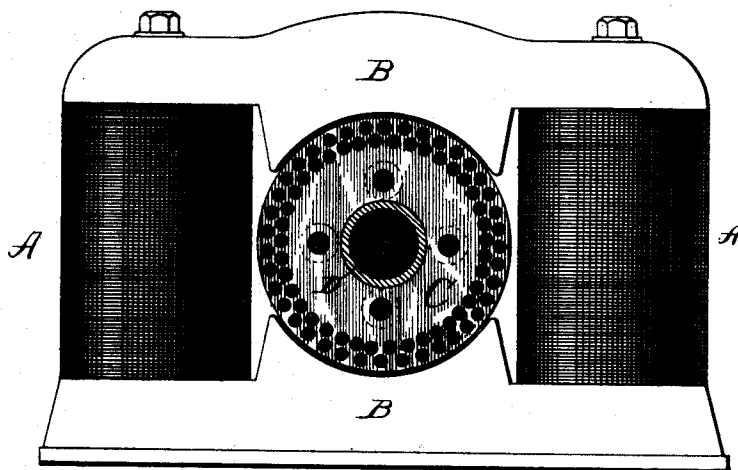


Fig. 5.

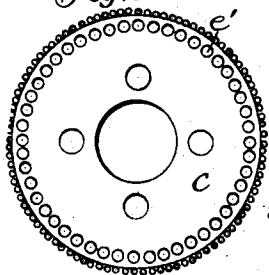


Fig. 2.

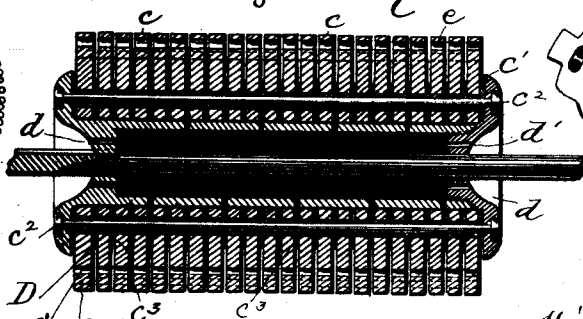


Fig. 6.

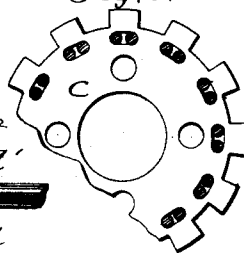


Fig. 3.

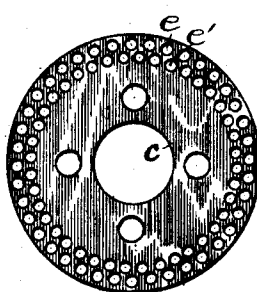


Fig. 7.

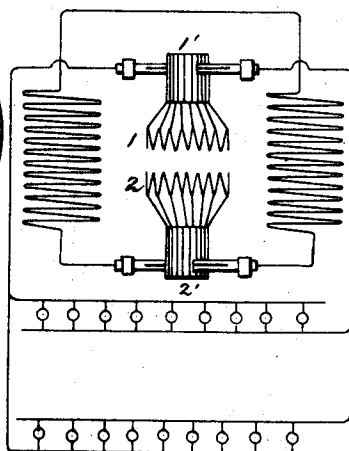
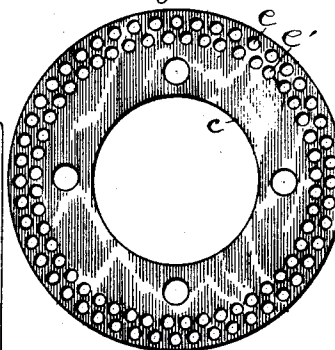


Fig. 4.



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DYNAMO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 431,134, dated July 1, 1890.

Application filed September 16, 1889. Serial No. 324,034. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. WINKLER, a citizen of the United States, residing in Troy, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a specification.

This invention relates to dynamo-electric machinery, with particular reference to the armatures of the same.

The objects of the invention are, first, to provide an armature having two independent circuits or sets of coils having outlet through separate commutators, and winding said circuits or coils in such a manner that the magnetic resistance due to the distance between the iron core and the faces of the pole-pieces is reduced to a minimum; second, to utilize and dispose of the currents generated in the circuits in such a manner that the simplest and most delicate form of regulation may be adopted; third, to provide a method of winding or disposition of the two conductors upon the armature, whereby a current of the highest electro-motive force may be induced in one of them, while a current of lower tension may be induced in the other, the arrangement being such that the whole of the usual available wire-space is utilized by the high-tension conductor, no part of the same being sacrificed by reason of the second circuit, ample provision being made for the latter in such a manner that it does not interfere in the least nor occupy any of the space usually occupied by the conductor of a single-circuit armature. The addition of the second circuit therefore does not increase the size of the armature, nor does it increase the magnetic resistance; fourth, to provide what may be termed a "harmless machine," and, fifth, to construct an armature of the Siemens type in such a manner that the heads or ends of the same will not be greatly extended by reason of the crossing of the conductors at those places.

With these objects in view my invention consists of the construction, which will now be described with reference to the accompanying drawings, in which—

Figure 1 represents a section of the armature with the field-magnets in elevation; Fig. 2, a longitudinal section of the armature. Figs. 3 and 4 are side views, respectively, of the plates of disks used in the Siemens and Gramme type of armature. Figs. 5 and 6 are views of modified constructions, and Fig. 7 is a diagram of the circuits in my machine.

Referring to the drawings by letter, A A represent the field-magnets, and B B the pole-pieces of the dynamo or motor.

C represents the armature.

In Figs. 1 and 2 I have illustrated the type of armature known as the "Siemens;" but it will be obvious that my invention is applicable to Gramme armatures. I have shown the armature built up of a number of perforated iron plates or disks *c*, which are strung upon a brass sleeve *D*, which surrounds the shaft. These plates may be stamped out of iron, drop-forged, or cast. If cast, they may be treated by any of the improved processes for rendering cast-iron similar in quality to wrought-iron. The perforations in the plates are to be then treated or surrounded by dipping or otherwise with enamel, porcelain, or some other insulating material. The sleeve is hollow to form an air-space, and one of its heads is made integral therewith, while the other *d* is detachable therefrom and is made in the shape of a screw-cap, which engages with internal threads cut in the end of the sleeve. This cap and the integral end of the sleeve form the points of connection or support between the armature and the shaft. The heads of the sleeve are perforated, as shown at *d'*, to admit air to the air-chamber within. These heads or ends of the sleeve are also dished or concave, as shown, so that when a Siemens winding is crossed over the heads of the armature the same may be forced into these depressions or cavities in the heads of the sleeve, and thus shorten materially the length of the armature and enabling me to build a more compact and rigid structure. The heads of the sleeve, besides performing the functions already mentioned, also serve to retain the disks in position. The obvious manner of placing these disks is to slip them over the end of the sleeve when the cap is

removed until the proper number have been adjusted, then screwing the cap into place, and compressing all together. As a further means of screwing the disks together and preventing rotary movement with respect to one another, I bore longitudinal holes directly through the plates and the heads of the sleeve, and after inserting therein a bushing of insulating material c' , I put in bolts c^2 and countersink the heads of the same in the heads of the sleeve, in the manner shown. I also may insert between every two plates and surrounding the bolts a small washer c^3 , of insulating material, which will hold the plates apart, thus thoroughly insulating them and offering means of ventilation. A current of air will pass through the heads of the sleeve into the air-chamber, and thence through the perforations in the sleeve to the air-spaces between the plates.

The core so far described is now ready to receive the winding of wire. In Figs. 1, 3, and 4 I have shown two series or rows of holes e and e' . The outer row of holes is placed as near to the periphery of the disks as possible, and the inner row is placed at any desired distance from the outer row, this distance being regulated by the electro-motive force which it is desired to obtain in the conductors occupying this second or inner row of holes. The holes in the several disks stand in longitudinal lines in the armature, so that the conductors may be readily threaded through them. As above stated, this armature is designed to carry two separate circuits. These circuits are represented by 1 and 2 in Fig. 7. Each circuit has its separate commutator $1'$ and $2'$. In winding this armature the circuit occupying the inner row of holes is put on first. Either one or a number of wires may be strung through each hole. If the armature is of the Siemens type, the crossed-over wires at the head may be forced into the depressions in the heads of the sleeve. After this circuit is in place and connected with the commutator the second circuit is strung through the outer row of holes. This circuit will lap over the inner circuit at the heads. In the case of a Gramme the so-called "dead-wire" of the outer circuit is wrapped directly over the dead-wire of the inner circuit in an obvious manner. It will be seen at a glance that, other things being equal, the current induced in the outer circuit will be of higher electro-motive force than that induced in the inner circuit; and, furthermore, that the electro-motive forces of the currents in the two circuits may be predetermined with respect to each other by the distance of the holes in each row from the periphery of the iron core. To obtain the highest electro-motive forces, it will probably be best to wind the outer circuit directly on the periphery of the iron core, as illustrated in Figs. 5 and 6, in which case the inner available wire-space on the periphery of the armature may be

utilized for the outer circuit and the inner circuit will in no wise interfere with such location of the outer circuit. It is therefore obvious that the second or inner circuit does not practically augment the bulk or space occupied by the armature, inasmuch as it utilizes portions of the same which were not before utilized.

In Fig. 6 a Pacinotti ring is illustrated, wound with two circuits. In this case the second circuit is strung through perforations located on the iron directly under the teeth or projections of the iron.

Having two circuits on my armature and being able to obtain any kind of current, I am at liberty to use them as I please. I may feed incandescent lamps from one circuit and arc lamps from another, or I may supply any form of translating device from one circuit and energize the field-magnets with the other circuit. I prefer to utilize the circuits as latterly suggested, because in this way I can use the simplest form of regulating mechanism and can regulate with the greatest delicacy and least sparking at the brushes. By shifting the brushes of the field-circuit I can regulate the strength of the field to the most delicate degree and without any sparking. The shifting of the brushes on the ordinary form of machines is usually accompanied by sparking because of the heavy current carried in the main circuit in which the brushes are located; but no injury by sparking need occur on a circuit carrying so little current as is necessary to energize the field-magnets. Another reason why I prefer to utilize the circuits of the armature to energize the field-magnets is because of the harmlessness of the machine under such condition.

It is a very dangerous experiment for a person to break with his bare hands the main circuit of a high-potential generator, either by removing the brushes from the commutator or parting the conductor at any point, for the reason that the reaction or "kick" of the field-magnets is so great as to give a severe shock to the person, beside injury to the machine. This will happen in all cases where the field-magnets are in series or in a shunt to the main circuit. In my machine the field-magnets have no connection whatever with the main circuit. Consequently there can be no reaction of the field-magnets when the main circuit is broken. The field remains constant so long as the position of the brushes and the speed remain constant.

Having thus described my invention, I claim—

1. An armature for dynamo-electric machines carrying two separate circuits, one of which is wound entirely inside or underneath the other, thereby locating it more or less remote from the periphery of the armature and correspondingly affecting the electro-motive force induced therein.

2. An armature for dynamo-electric ma-

chines carrying two separate circuits, both
being strung through holes in the armature-
core, one of which is wound entirely inside
or underneath the other, thereby locating it
5 more or less remote from the periphery of
the armature and correspondingly affecting
the electro-motive force induced therein.

In witness whereof I have hereunto signed
my name in the presence of two subscribing
witnesses.

CHARLES F. WINKLER.

Witnesses:

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