D. H. ANDREWS & E. C. KETCHUM.

DYNAMO ELECTRICAL MACHINE.

APPLICATION FILED JAN. 17, 1912.

1,069,095. Patented Aug. 5, 1913.

Fig. 1.

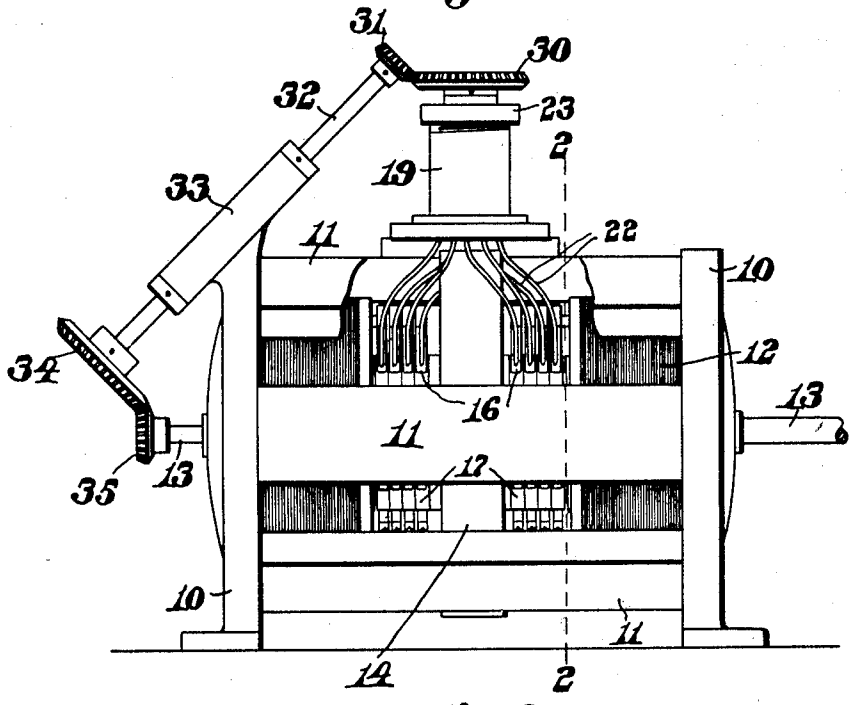

Fig. 2.

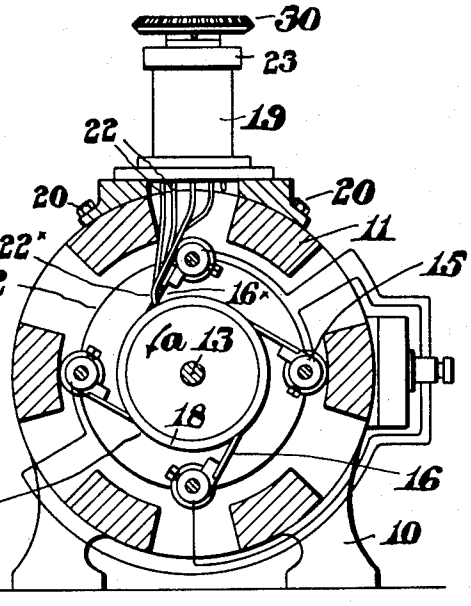

Fig. 3.

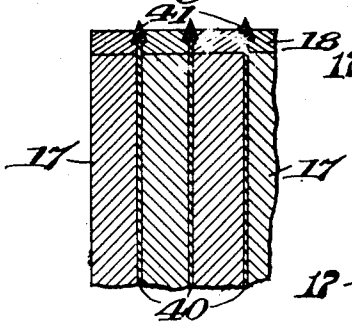

Fig. 4.

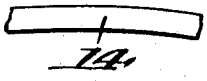

Fig. 5.

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UNITED STATES PATENT OFFICE.

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DYNAMO-ELECTRICAL MACHINE.

1,069,095. Specification of Letters Patent. Patented Aug. 5, 1913.

Application filed January 17, 1912. Serial No. 671,740.

To all whom it may concern:

Be it known that we, DAVID H. ANDREWS and ERNEST C. KETCHUM, citizens of the United States of America, and residents of Newton, in the county of Middlesex and State of Massachusetts, and Boston, in the county of Suffolk and State of Massachusetts, respectively, have invented certain new and useful Improvements in Dynamo-Electrical Machines, of which the following is a specification.

This invention relates to dynamo electrical machines and particularly to that class of such machines in which the armature is composed of a plurality of disks and is driven direct at a high velocity from a high-speed motor, electric contact being made between said disks and their brushes by means of a film of mercury deposited upon the peripheries of said disks adjacent to said brushes.

The object of the present invention is to provide a means for preventing the film of mercury bridging across the space between two adjoining disks and electrically connecting them.

The invention consists in certain novel features of construction and arrangement of parts which will be readily understood by reference to the description of the drawings and to the claims hereinafter given.

Of the drawings: Figure 1 represents an elevation of a machine embodying the features of this invention. Fig. 2 represents a vertical section of the same, the cutting plane being on line 2—2 on Fig. 1. Fig. 3 represents a detail in section of a portion of the armature. Fig. 4 represents an elevation of a portion of one of the insulating rings, and Fig. 5 represents an end elevation of one of the disks of the armature and its surrounding ring.

Similar characters designate like parts throughout the several figures of the drawings.

In the drawings, 10 represents end pieces supported by suitable legs and connected together by means of the members 11. Upon each end piece 10 is mounted a field magnet 12 in the center of which revolves a shaft 13 extending through and beyond the ends of the end pieces 10. Within the confines of the connecting members 11 and midway between the end pieces 10 is an intermediate member 14 on which is supported a plurality of brush holders 15, each of which is provided with a brush 16 contacting with the periphery of a disk armature 17 revoluble with the shaft 13. Each of the armature disks 17 which are of steel is provided with an annular peripheral band 18 of copper which serves to conduct the current of electricity quickly to and from all portions of the periphery of said disk.

This dynamo electrical machine is constructed and operates substantially the same as that shown in Letters Patent No. 826,668, issued July 24, 1906, to Ernest C. Ketchum, the various disks of the two armatures 17 on either side of the intermediate member 14 being connected in pairs and through the brushes 16 into series, as fully explained in said patent. As has been disclosed in said patent, it was found to be advisable to provide the periphery of the armature disk, revoluble at such a high speed, with a thin film of amalgam of mercury or similar material. This amalgam acts as a lubricant and prevents undue wear of either the brush 16 or the annular copper ring 18 with which it contacts and even when passing over inequalities in the surface of the ring a perfect connection is assured at all times.

In Letters Patent No. 966,840, issued to the same inventor Aug. 10, 1910, was described an invention that had for its particular object the provision of a means for supplying this thin film of amalgam of mercury to the periphery of the armature disks 17. In order to accomplish this object a receptacle 19 is secured to the upper connecting members 11, the bottom of said receptacle being provided with a plurality of passages therethrough equidistant from the center of said receptacle, from which pas-

sages extend a plurality of tubes 22, one for each disk forming a part of the armature 17. Each of these tubes 22 is so formed as to have its delivery opening adjacent to the periphery of one of the armature disks and to one of the brushes 16 co-acting therewith.

In order to provide a means for depositing the mercury upon the periphery of each disk in the immediate vicinity of the contacting end of the brush 16*, said brush is provided with an opening therethrough near said contacting end and one of the tubes, as for instance, 22* (see Fig. 2) is extended therethrough with its delivery end close to the periphery of said disk. As the disk revolves in the direction of the arrow *a* on Fig. 2 of the drawings, any mercury deposited on the periphery of the disk is immediately carried to the contacting end of the brush 16* and insures an electric contact between said brush and disk under all conditions.

The receptacle 19 is provided with a cap 23 threaded to the upper end thereof and having perforations therethrough for the admission of the atmosphere to act upon the amalgam of mercury or other liquid contained within the receptacle 19. The receptacle 19 is provided with suitable separating mechanism all as shown and described in said Letters Patent No. 966,840, said mechanism being driven by a bevel gear 30 which meshes with a bevel pinion 31 on a shaft 32 mounted in a suitable bearing formed upon or secured to one of the end pieces 10 and having secured to its opposite end a bevel gear 34 meshing with a bevel pinion 35 secured to and revoluble with the armature shaft 13.

In the operation of the mercury dropper the receptacle 19 is partially filled with mercury and when the dynamo is in operation the revolution of the shaft 13, through the intermediate driving mechanism, causes the operation of the separating mechanism whereby a portion of mercury or other liquid contained within said receptacle 19 when this portion of the mercury will pass through the tube 22 to said armature disks. This delivery of the mercury to the disk causes a film thereof to be deposited on the copper peripheral band of the disk and thereby lubricates the same and makes a perfect contact at all times with the coacting brushes.

The film of mercury is automatically constantly replenished by the portion of mercury selected from the contents of the receptacle 19 and transferred by means of the separating mechanism to one or the other of the feed tubes 22 leading to the different armature disks.

The disks 17 of the armature are separated by thin disks of insulating material such as mica and the copper rings 18 are in a similar manner separated by annular insulating members 41 preferably triangular in cross section. These annular members 41 are positioned in grooves 42 in the side faces of said rings 18 and extend beyond the peripheries thereof, thereby forming separating walls which prevent any of the mercury deposited upon one of the copper rings 18 from bridging across to the next ring and forming a false circuit. Without these separating walls extending beyond the periphery of the armature this difficulty has been found to exist, but the objection has been entirely overcome by the use of the annular members 41, and the mercury deposited on each ring 18 is confined to its own ring.

The annular members 41 preferably have a thin outer edge so that there is no outer surface upon which mercury may lodge.

It is believed that the operation and many advantages of the invention will be thoroughly understood from the foregoing.

Having thus described our invention, we claim:

1. In a dynamo electrical machine, an armature consisting of a plurality of disks, insulating plates between said disks, and annular V-shaped insulating members interposed between said disks and extending beyond the peripheries thereof.

2. In a dynamo electrical machine, an armature consisting of a plurality of disks, an annular copper band surrounding the periphery of each disk, insulating members between said disks, and annular insulating members between said copper bands and extending beyond the peripheries of said bands.

3. In a dynamo electrical machine, an armature consisting of a plurality of disks, an annular copper band surrounding the periphery of each disk and having grooves in its side faces, insulating members between said disks, and annular insulating members between said copper bands embedded in said grooves.

4. In a dynamo electrical machine, an armature consisting of a plurality of disks, an annular copper band surrounding the periphery of each disk, insulating members between said disks, and annular V-shaped insulating members between said copper bands and having their thinner edges extending beyond the peripheries of said bands.

5. In a dynamo electrical machine, an armature consisting of a plurality of disks having peripheral copper bands and insulating members interposed between said disks having tapered edges extending beyond the peripheries of said disks.

6. In a dynamo electrical machine, an armature consisting of a plurality of disks

having peripheral copper bands and insulating members interposed between said bands the edges of which extend beyond the peripheries of said bands and form continuous walls.

7. In a dynamo electrical machine, an armature consisting of a plurality of disks having peripheral copper bands and annular insulating members between said copper bands and extending beyond the peripheries thereof thereby forming continuous walls.

Signed by us at 4 Post Office Sq., Boston, Mass., this 6th day of January, 1912.

DAVID H. ANDREWS.
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Witnesses:
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