B. G. LAMME.

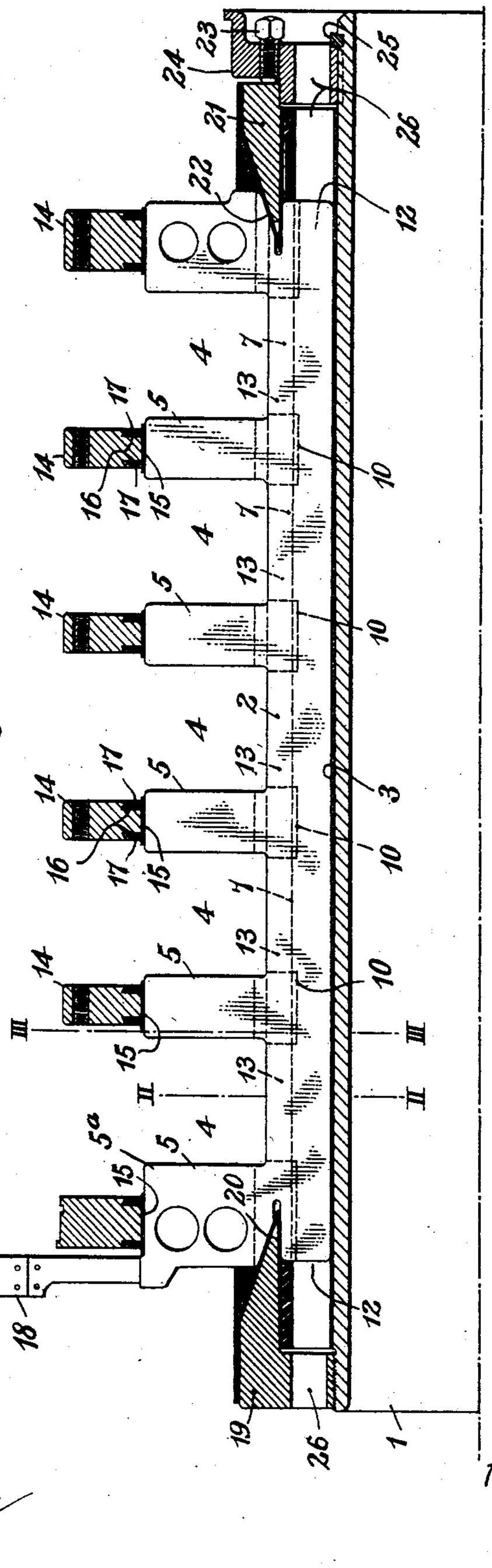
COMMUTATOR FOR DYNAMO ELECTRIC MACHINES.

APPLICATION FILED OCT. 7, 1908.

931,130. **Patented Aug. 17, 1909.**

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

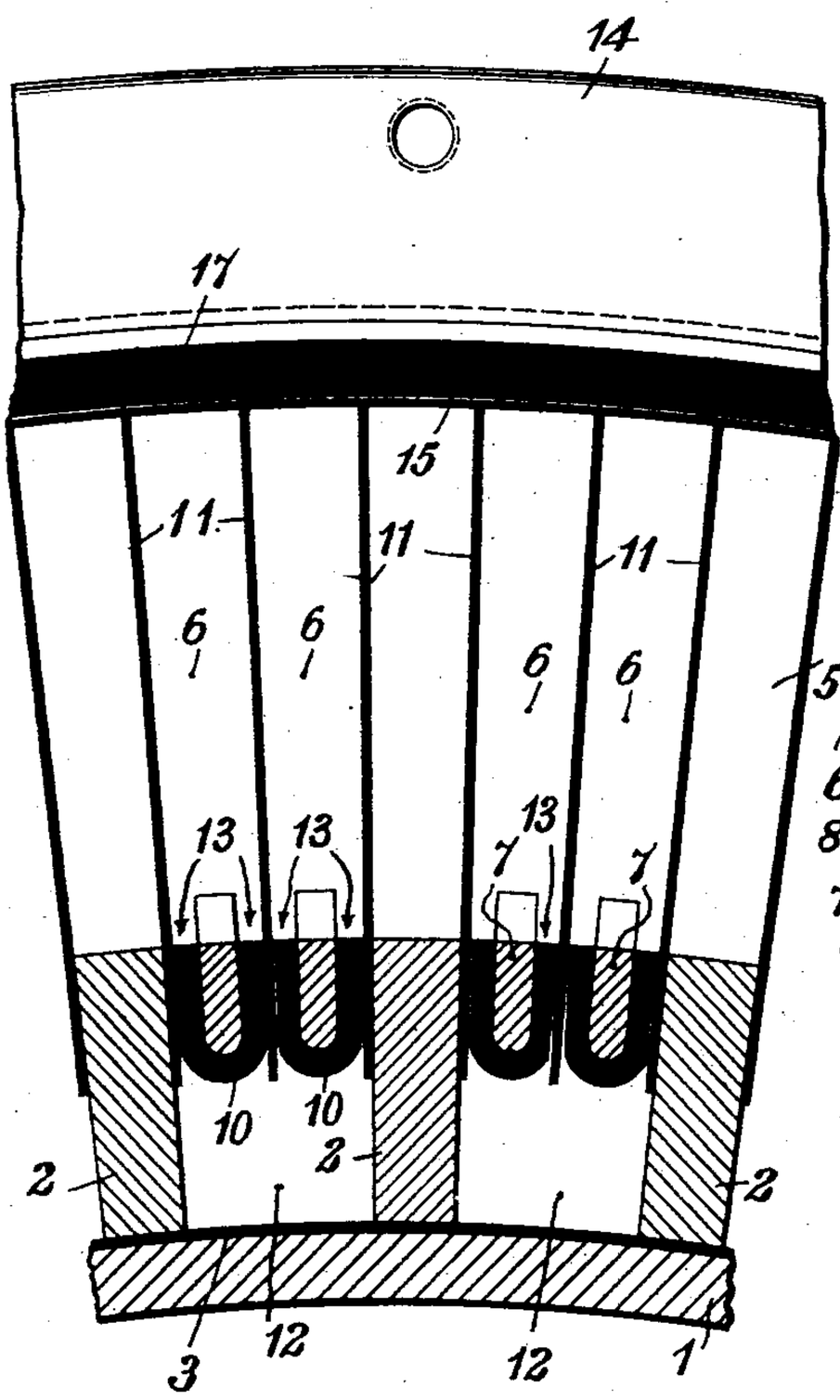
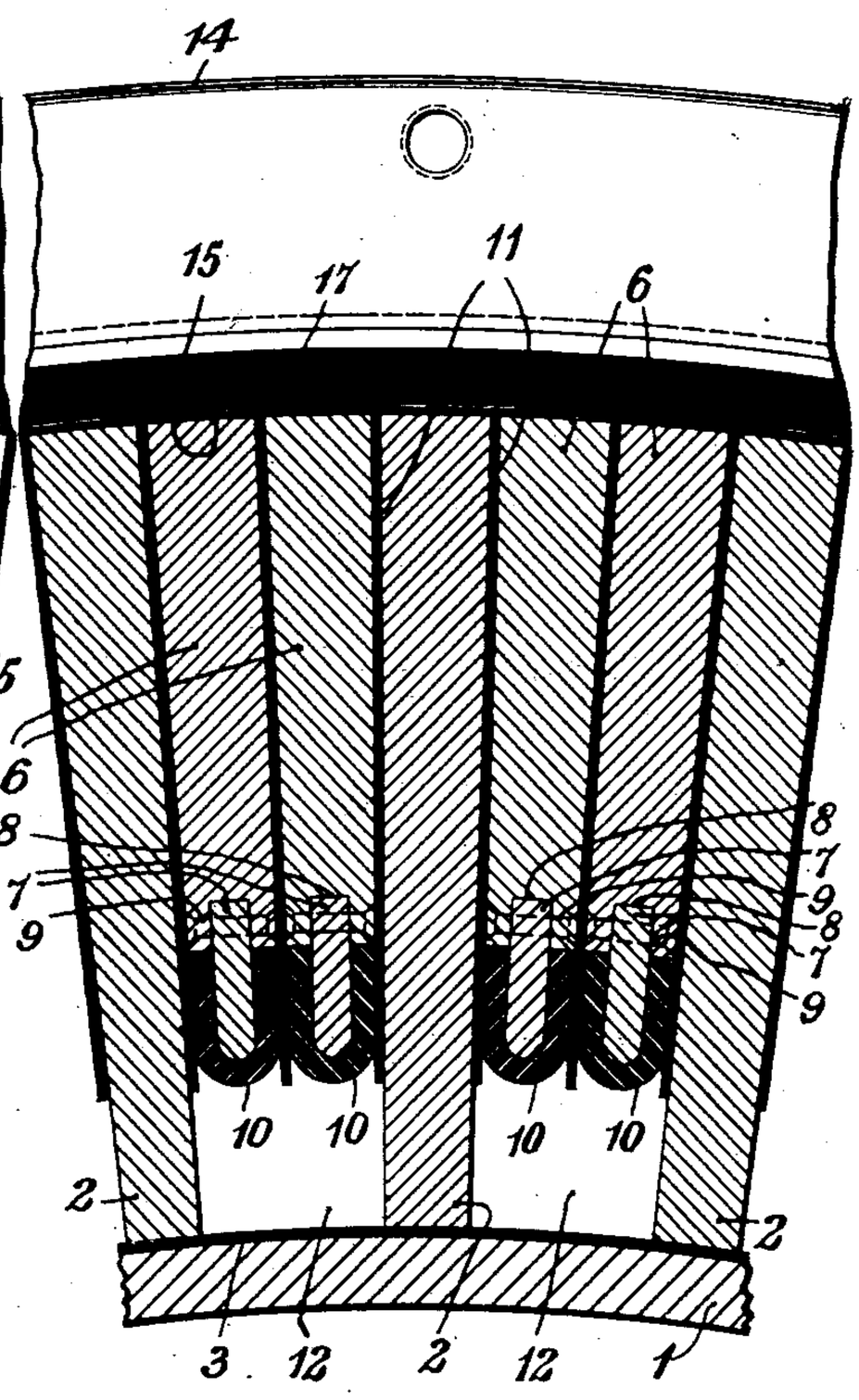


Fig. 3.



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COMMUTATOR FOR DYNAMO-ELECTRIC MACHINES.

No. 931,130. Specification of Letters Patent. Patented Aug. 17, 1909.

Application filed October 7, 1908. Serial No. 456,556.

To all whom it may concern:

Be it known that I, BENJAMIN G. LAMME, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Commutators for Dynamo-Electric Machines, of which the following is a specification.

My invention relates to dynamo-electric machines of the commutator type and it has for its object to provide a simple device of this character that shall be specially adapted for use with high speed machines of large capacity, such as direct current turbine-driven generators.

In order to obtain a relatively large working surface without abnormally increasing the total length of the commutator, it has heretofore been proposed to so construct the commutator as to provide annular projections having a plurality of exposed plane surfaces which are perpendicular to the axis. Commutators constructed in the manner just referred to are very hard to ventilate and consequently tend to become overheated in operation.

According to my present invention, I have so improved the construction of the commutator that the centrifugal forces to which it is subjected, when operating at high speeds, are completely counteracted and a forced circulation of air is automatically established where it is most useful for cooling purposes.

Commutator cylinders of the usual type have sometimes been cooled by forcing air across their working surfaces parallel to their axes but this method is found to be ineffective under high speed operation because the cool air is thrown from the surfaces centrifugally.

The segments of my improved commutators are of unequal depths so that ventilating ducts parallel to the axis are thus formed and I connect the shallow segments in longitudinal rows by any suitable means, such as relatively thin conducting strips disposed in radial planes, said strips being either integral with or fastened to the bars and separated by radial passages that communicate with the aforesaid ducts.

When the commutator is in operation, the warm air adjacent to the working surfaces of the commutator is thrown outward by centrifugal action and cool air is taken in at the ends of the commutator through the longitudinal ducts, a circulation of air being thus established.

My improved method of ventilating commutators is not restricted in its application to commutators of the so-called radial type and may be employed with similar devices of any well known construction.

Figure 1 of the accompanying drawings is a longitudinal section of a portion of a commutator constructed and ventilated in accordance with my invention. Figs. 2 and 3 are sectional views on the lines II—II and III—III of Fig. 1.

Referring to the drawings, the device here illustrated comprises a substantially cylindrical sleeve or bushing 1 and a plurality of notched bars or segments 2 which are mounted on the bushing in radial planes and are separated therefrom by an insulating sleeve 3. The bars 2 are similar to each other and the notches 4 with which they are provided are so cut that the edges of the bars adjacent to the notches lie in parallel planes to form contact surfaces perpendicular to the axis of the commutator and so that the projections 5 form a plurality of rings.

The outwardly projecting portions of adjacent bars are separated from each other by wedge blocks 6 which constitute short bars, and serve to complete the ring projections. The blocks 6 are connected in longitudinal rows by relatively thin conducting strips 7 and are relatively shallow so that they are materially separated from the bushing 1 to provide longitudinal ducts 12.

The outer edges of the strips 7 are fitted into notches 8 in the bottoms of the blocks 6 and are held in position by rivets 9, the arrangement of parts being such that the bottoms of the notches 4 in the bars 2 lie in substantially the same cylindrical surface as the outer edges of the narrow strips.

The inner edges of the connecting strips 7 are preferably rounded and insulating channel strips 10 of U-shaped section are fitted over the portions of the strips 7 which are directly under the wedge-blocks, said blocks being separated from each other and from the bars or segments by thin plates or layers 11 of insulation, which lie in radial planes.

Between adjacent wedge-shaped blocks in the same row, the strips 7 are some distance apart, the spaces between them being unobstructed in order that radial ventilating passages 13 may be provided to communicate with the ducts 12. The outer ends of the annular projections or rings 5 are finished into cylindrical surfaces on which steel shrink rings 14 are mounted. The rings 14 are insulated from the commutator segments by wrappings or sleeves 15 of insulation and their inner edges are provided with annular recesses 16 in which insulating rings 17 are located in order to increase the surface distance between the bars and the rings.

Each of the bars 5 and blocks 6 which constitute the inner annular ring projection 5^a is provided with an outwardly extending neck 18 of conducting material by which it is connected to the coils of the dynamo-electric machine of which the commutator forms a part.

The inner end of the bushing 1 is provided with a clamping V-ring 19 which is screw-threaded onto the bushing and engages suitable recesses 20 in the ends of the bars. A second V-ring 21 is provided at the opposite ends of the commutator and engages recesses 22, in the commutator bars, the rings being forced toward each other by set screws 23 which are screw-threaded through a collar or wiper-ring 24 that is held in position by a key 25. The V-rings and the wiper-ring are all provided with annular segmental openings 26 which are in alinement with the longitudinal passages 12.

The V-rings are made relatively light since the shrink-rings 14 are adapted to oppose the centrifugal forces which tend to displace the bars when the commutator is in operation.

It will be understood that structural modifications may be effected within the scope of my invention, if desired.

I claim as my invention:

1. A commutator comprising a bushing or cylinder, a plurality of notched bars or segments disposed on the surface thereof in radial planes to form annular projections and means for establishing ventilating passages longitudinally adjacent to the surface of the bushing and radially between the annular projections.

2. A commutator comprising a bushing or cylinder, a plurality of notched bars or segments disposed on the surface thereof in radial planes to form annular projections, wedge blocks interposed between the bars or segments in the annular projections for establishing ventilating passages longitudinally adjacent to the surface of the bushing and radially between the annular projections.

3. A commutator comprising a plurality of notched bars or segments radially disposed and separated by relatively short wedge-shaped blocks located adjacent to the notches and electrically connected in longitudinal rows.

4. A commutator comprising a bushing or cylinder, a plurality of notched bars or segments disposed on the surface thereof in radial planes to form annular projections, wedge-blocks interposed between the bars or segments in the projections and relatively thin strips of conducting material joining the inner ends of the wedge-blocks in longitudinal rows.

5. In a commutator, the combination with a plurality of notched segments or bars assembled in radial planes to provide a series of wedge-shaped projections, of wedge-blocks interposed between the projecting ends of the bars, relatively thin conducting strips connecting the blocks in longitudinal rows and shrink rings mounted on the annular projections and insulated therefrom.

6. A commutator comprising a bushing or cylinder, a plurality of radial bars mounted thereon, relatively short wedge-blocks constituting bar segments and interposed between the bars at intervals to provide longitudinal and radial passage ways, said blocks being electrically connected in longitudinal rows.

7. A commutator comprising a bushing or cylinder, a plurality of radial bars mounted thereon and notched to provide annular projections in the commutator, relatively short wedge-blocks, constituting bar segments and interposed between said notched bars in said annular projections for establishing ventilating passages longitudinally adjacent to the surface of the bushing and radially between the annular projections.

In testimony whereof, I have hereunto subscribed my name this 30th day of Sept., 1908.

BENJ. G. LAMME.

Witnesses:
E. LIVINGSTON,
BIRNEY HINES.