

No. 853,283.

PATENTED MAY 14, 1907.

W. L. WATERS.
COMMUTATOR.

APPLICATION FILED MAR. 10, 1904.

2 SHEETS—SHEET 1.

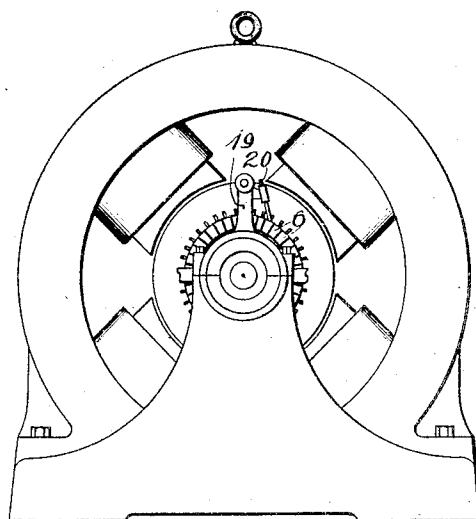


Fig. 1.

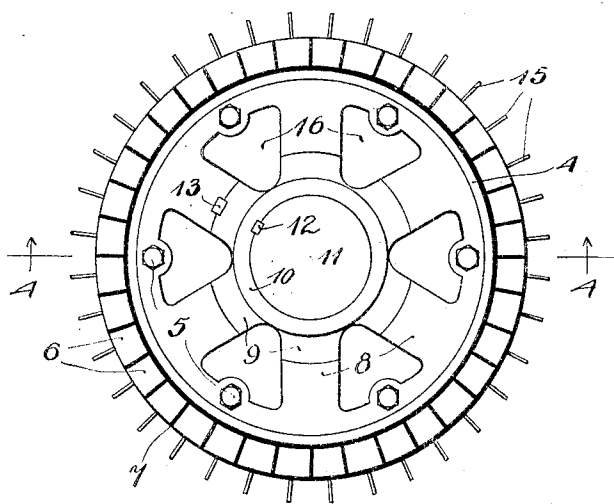


Fig. 2

Witnesses:

Arthur H. Boettcher,
Charles J. Schmidt.

Inventor

William L. Waters

By

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Attorney.

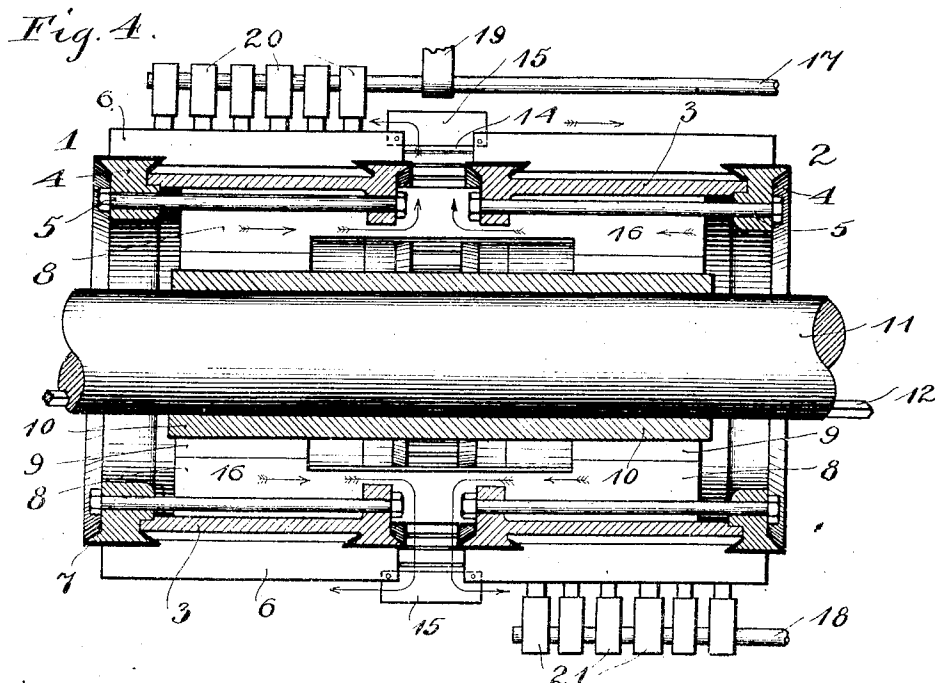
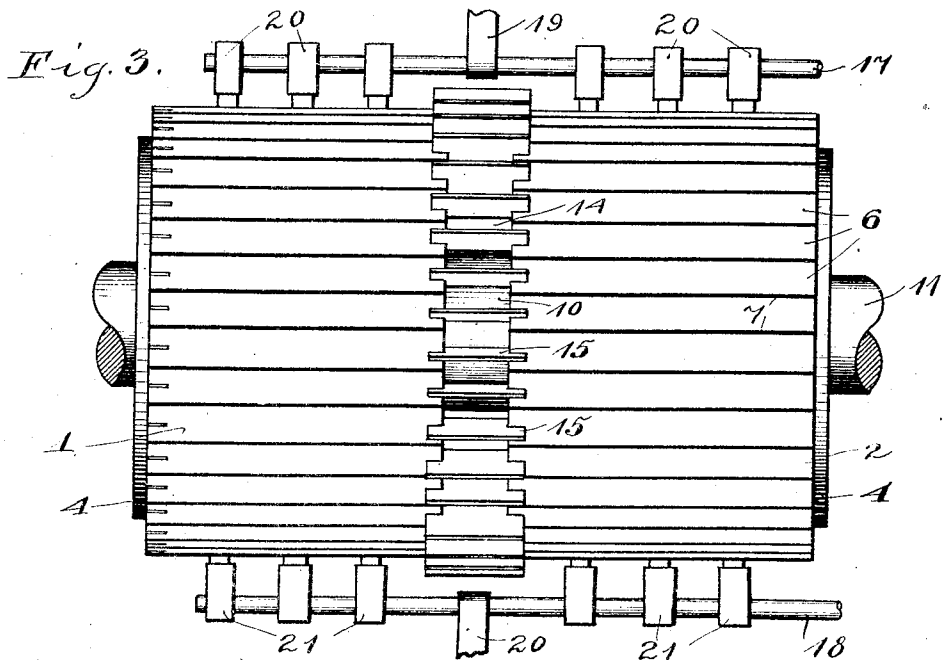
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UNITED STATES PATENT OFFICE.

WILLIAM L. WATERS, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO NATIONAL
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COMMUTATOR.

No. 853,283.

Specification of Letters Patent.

Patented May 14, 1907.

Application filed March 10, 1904. Serial No. 197,490.

To all whom it may concern:

Be it known that I, WILLIAM L. WATERS, a subject of the King of England, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, United States of America, have invented a certain new and useful Improvement in Commutators, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to commutators, and particularly to the construction of long commutators adapted for electric machines in which a plurality of brushes are employed engaging the commutator; and my invention provides improved means for ventilating and cooling such commutators.

Long commutators of the prior art, in addition to being very difficult to construct, have been very unsatisfactory, on account of heating which results, and although it has been possible to keep the exposed ends of the commutator cool, it has been very difficult to prevent overheating of the interior portion thereof.

My invention provides for a commutator in which free circulation of air is permitted entirely through the interior of the commutator, whereby all parts thereof are accessible to air and equally cooled. I provide what may be called a single compound commutator, consisting practically of two separate commutators mounted side by side with an air space between them, the opposite and corresponding segments of the commutators being connected together by conductors, preferably in the form of plates, which extend outwardly from the surface of the commutator bars. I also provide air channels through the interior of the commutator, directly below the segments, and with this construction the cool surrounding air is drawn through the outer ends of the commutator and thrown outwardly between the parts of the commutator by virtue of the fan-like action of the conductor plates connecting the segments. These separate commutators may be mounted side by side on the armature shaft and mechanically connected together, or the framework or shells of the commutators may be cast integral.

The brushes riding on the commutator may be so disposed that the positive and the

negative brushes are equally distributed over both halves of the commutator. On account of the advantages as regards heating and sparking, however, the better arrangement would be to distribute all the positive brushes over one half of the commutator and all the negative brushes over the other half of the commutator. Any other disposition of the brushes, however, may be employed, as desired.

By reference to the accompanying drawings, my invention will be more thoroughly understood.

Figure 1 is an end view of a dynamo electric machine to which my improved commutator is applied; Fig. 2 is an end view of a commutator of my construction; Fig. 3 is an elevated view of the commutator mounted upon a shaft; and Fig. 4 is a longitudinal sectional view taken on line 4—4 of Fig. 2.

Like characters of reference refer to like parts throughout the figures.

The commutator consists of the halves 1 and 2, each half consisting of a supporting shell 3, a clamping ring 4, and bolts 5—5 for drawing the shell and clamping ring together, whereby the commutator segments 6—6 may be securely clamped in place, insulation 7 being disposed, as is well known, to entirely insulate the segments from the supporting frame and from each other. A plurality of spokes or legs 8—8 extend radially inward from the shell 3, and register with the stubs or spokes 9—9 radiating from a hub 10, which is held in place on the shaft 11 by a key 12. A key 13 may be disposed between any one of the spokes 8 and the corresponding stub, whereby the commutator is held to the hub 10. The stubs 9 may extend entirely along the common hub 10, or, as shown, a separate set may be provided under each shell. The spokes 8 extending from each shell, however, are mechanically connected together, and, as shown, are preferably integral, whereby the shells of the halves of the commutator are rigidly connected together, and may be cast integral. An air space 14 intervenes between the two halves, and corresponding opposite commutator bars may be electrically united by a conductor, or, as shown, are connected by a flat bar 15, which may be of sheet copper, and the inner edge of which may be countersunk and soldered into the commutator bars, the upper end thereof extending

outwardly from the surface of the bars. As the commutator now rotates, cool air will be drawn toward the interior of the commutator, through the channels 16, and by the fan-like action of the bars or plates 15, this cool air will be drawn outwardly between these plates, and a considerable draft of air will be blown and forced over the surface of the commutator bars, as indicated by the arrows. Thus the entire interior of the commutator is well ventilated and continually traversed by cooling air, and at the same time the contact surface of the commutator is continually cooled. By arranging the clamping rings at the ends of the commutator the assembling thereof can be accomplished just as readily as the assembling of a single commutator.

Brush holders 17 and 18, supported by frames 19 and 20, are disposed above the surface of the commutator, and the brushes on each holder may be equally spaced over the entire commutator length, as shown in Fig. 3, or, as shown in Fig. 4, all the positive brushes 20 may be distributed over one of the halves and the negative brushes 21 may be distributed over the other half.

My invention thus provides an improved long commutator, the construction of which is very simple, and of which all the parts are continually accessible to cool air, which assures uniformity of temperature of the parts and prevents undue local heating.

Instead of dividing the commutator into two parts, as shown, it may be divided into more parts, and other changes in the arrangement and construction may also be made without departing from the spirit of the invention.

I claim as new, however, and desire to secure by Letters Patent:

1. A commutator consisting of two halves disposed side by side but separated from

each other by an air space, plates electrically uniting opposite bars of the halves, said plates extending radially from the axis of the commutator halves and beyond the outer surface of the commutator bars, and longitudinal air passages extending entirely through said halves and communicating with the space between said halves and between the connecting plates, the fan-like action of said plates upon rotation of the commutator causing air to be drawn into the ends of said halves and directed outwardly between said plates and over the commutator surface.

2. A commutator consisting of like halves, each consisting of a supporting shell and a clamping ring, commutator bars secured between said shell and ring, said halves being disposed side by side but separated by an air space, spokes extending from said shells, means for uniting said shells, longitudinal air passages extending entirely through said halves between said spokes and communicating with the space between the halves, and thin radial conductor plates uniting opposite commutator bars and extending beyond the commutator surface.

3. A commutator consisting of like halves mounted side by side but separated from each other, commutator bars for each half, an integral shell for supporting each set of bars, thin plates of conductive material bridging the space between opposite bars and extending beyond the commutator surface, and longitudinal air passages through said shell communicating with the space between the bars.

In witness whereof, I hereunto subscribe my name this 18th day of Feb. A. D., 1904.

WILLIAM L. WATERS.

Witnesses:

CHAS. D. KNIGHT,
WALTER J. RICHARDS.