

No. 758,631.

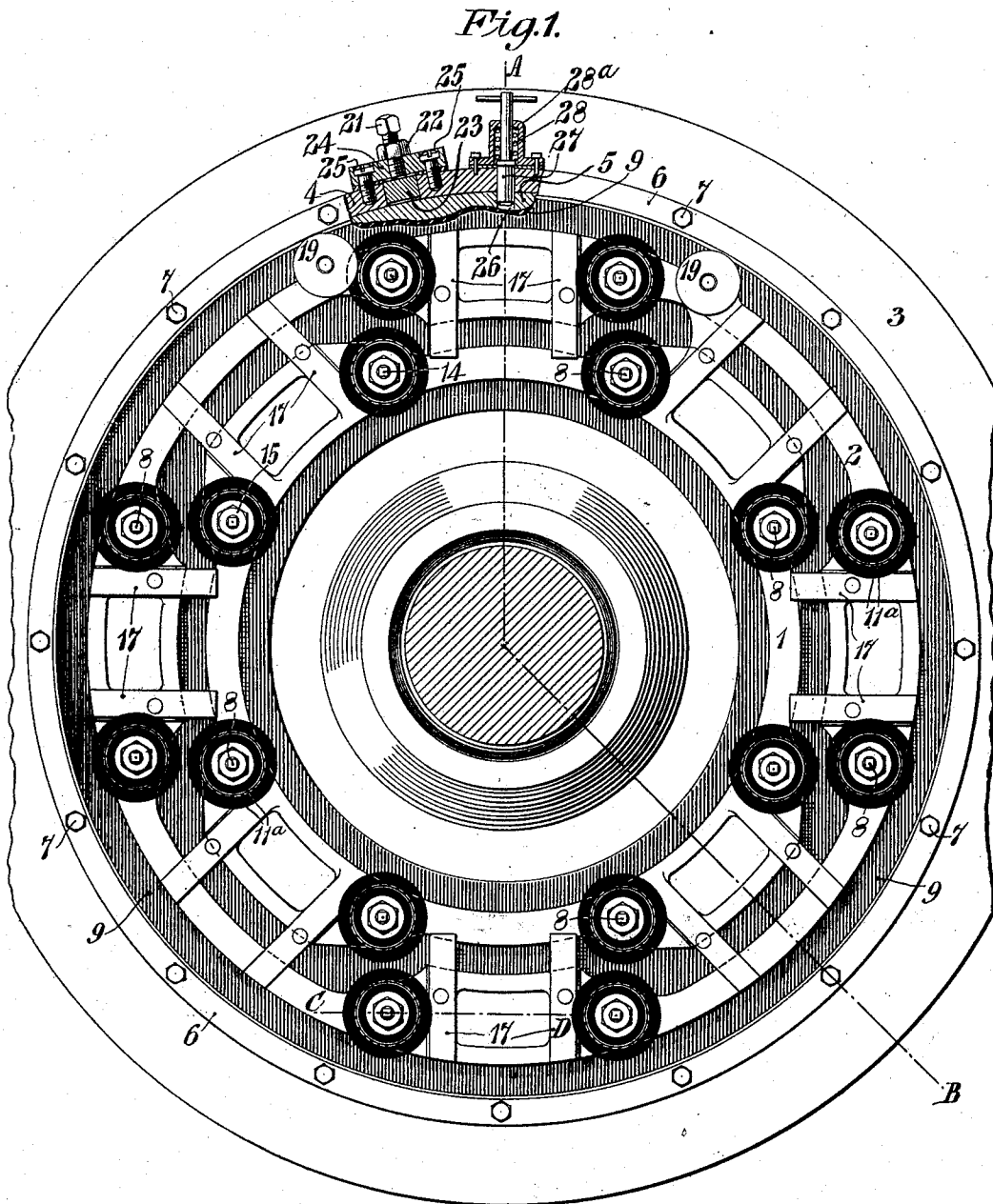
PATENTED MAY 3, 1904.

K. F. ELMERS.  
COLLECTOR RINGS AND BRUSH HOLDERS.

APPLICATION FILED SEPT 26, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

*C. L. Belcher*  
*J. H. Miller*

INVENTOR

*Karl F. Elmers*

BY

*Wesley S. Carr*  
ATTORNEY

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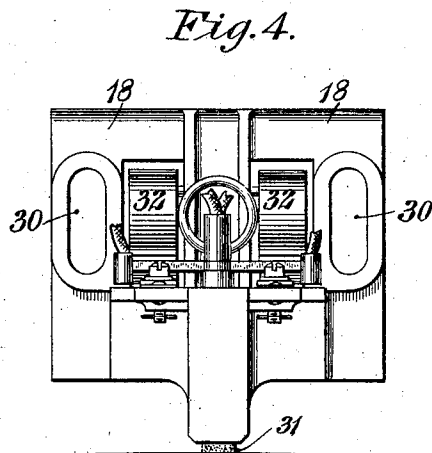
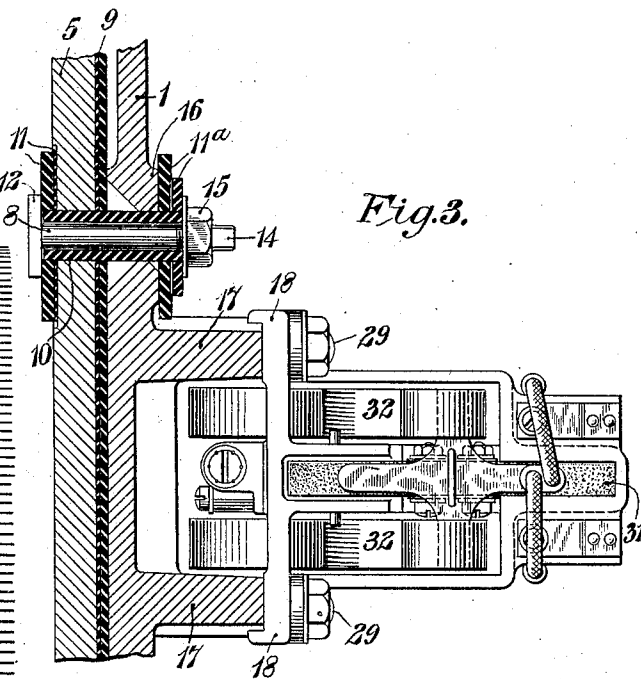
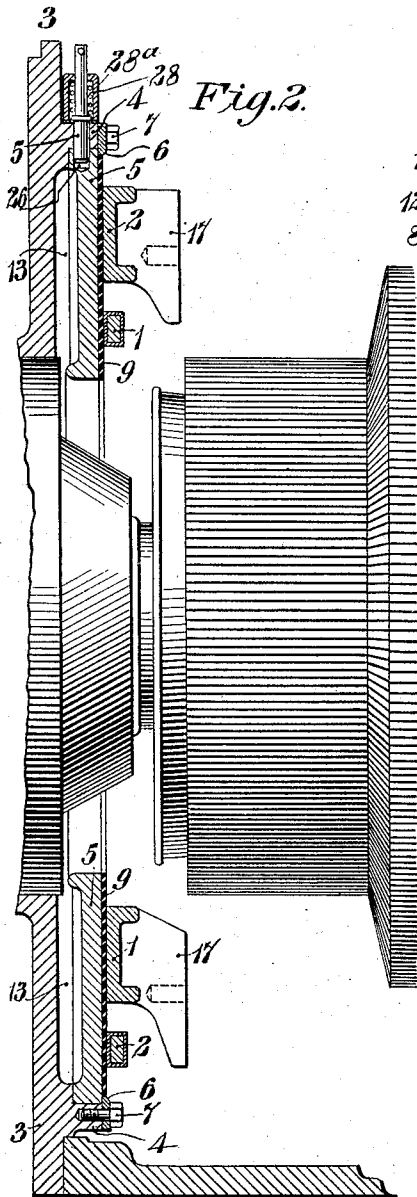
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## UNITED STATES PATENT OFFICE.

KARL F. ELMERS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

## COLLECTOR-RINGS AND BRUSH-HOLDERS.

SPECIFICATION forming part of Letters Patent No. 758,631, dated May 3, 1904.

Application filed September 26, 1903. Serial No. 174,769. (No model.)

*To all whom it may concern:*

Be it known that I, KARL F. ELMERS, a subject of the King of Sweden and Norway, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Collector-Rings and Brush-Holders, of which the following is a specification.

My invention relates to brush-holder collector-rings for electrical machines; and it has special reference to apparatus of this character which is applied to railway-motors or other small machines in which the available space therefor is limited.

The peripheral space occupied by the brush-holders of railway-motors of the direct-current type has not hitherto been such as to present a serious problem, because of the small number of brush-holders and the consequent simplicity of the collector-rings. In the construction of single-phase alternating-current motors, however, it is desirable to have a larger number of poles than is common in direct-current motors, and more brushes are therefore necessary, since one brush per pole is required when cross connections are not used and at least one brush per pair of poles in any case. With a large number of poles the cross connections become complicated and are for that reason objectionable. Hence it has become necessary to reduce to a minimum the peripheral space occupied by the brushes and to employ collector-rings that are complicated as compared with those of direct-current machines.

The principal object of my invention is to provide brush-holder collector-rings for electrical machines having a relatively large number of brushes which shall occupy a minimum amount of space and at the same time be securely and adjustably supported and effectively insulated.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of the collector-rings and the end bracket which supports them, the brushes being removed and a small

portion of the structure being broken away in order to show the fastening devices for the rocker-arms. Fig. 2 is a view in section through the collector-rings and the end bracket on the line A B of Fig. 1, the commutator-cylinder being shown in elevation. Fig. 3 is a view in section through the motor end bracket and collector-rings on line C D of Fig. 1 and showing also in plan a brush-holder as it appears when fastened to its collector-ring. Fig. 4 is a view in end elevation of the brush-holder shown in Fig. 3.

As shown in Figs. 1 and 2, the collector-rings 1 and 2 are supported by an end bracket 3, the inner face of which is provided with a laterally-projecting ring 4. The inner diameter of the ring 4 is approximately the same as the outer diameter of an annular plate 5, upon which the collector-rings 1 and 2 are mounted, and said ring 4 serves as a circular guide for said plate 5. Another annular ring 6, the outer diameter of which is substantially the same as the outer diameter of the ring 4 and the inner diameter of which is somewhat less than the outer diameter of the annular plate 5, serves to retain the plate 5 in position, said retaining-ring 6 being secured to the annular ring 4 by means of tap-bolts 7.

The collector-rings 1 and 2 are secured concentrically to one face of the annular plate 5 by means of bolts 8, an annular sheet of insulating material 9 being interposed between said parts. The bolts 8, which secure the collector-rings 1 and 2 to the annular plate 5, are surrounded by bushings 10, of insulating material, and fiber washers 11 are placed between the heads of the bolts 8 and the plate 5. Similar washers 11<sup>a</sup> are placed between the nuts 15 and the collector-rings 1 and 2. The bolts 8 have thin flat heads 12 in order that they may be accommodated in the narrow space 13 between the ring 3 and the plate 5. Since there is no ready access to the heads 12 of the bolts 8 when the annular plate 5 is mounted on the end bracket 3, the threaded ends of said bolts are extended and made square, as indicated at 14, in order that a wrench may

be applied thereto for holding the bolt stationary when it is desired to adjust the nut 15. At the points where the bolts 8 pass through the collector-rings are provided with strengthening-bosses 16. The said rings are also provided with raised parallel guides 17, upon which the brush-holder brackets 18 are mounted, and with suitable seats 19 for the attachment of the leads.

10 The correct positions of the brushes having once been determined, the annular plate 5 is clamped in position by means of a set-screw 21, which is provided with a lock-nut 22. A suitable portion of the annular ring 4 is cut

15 away, and a clamp-block 23, of harder material, is inserted to fill the space, a bridging-piece 24 being fastened to the ring by means of screws 25 and having a screw-threaded hole above the block 23 to receive the set-screw 21.

20 A hole 26 is also drilled through the annular ring 4 and a suitable distance into the edge of the annular plate 5, and a pin 27 is inserted in said hole and is retained in position by a spring 28, which is inclosed in a box 28<sup>a</sup>. The

25 object of this device is to insure the bringing back of the brushes to their proper and previously-determined positions after they have once been moved.

The brush-holder brackets 18 are fastened, by means of tap-bolts 29, directly to the guides 17 on the collector-rings 1 and 2, adjustment in a radial direction being permitted by slots 30 in the brackets, through which the bolts 29 pass.

35 The brush 31, springs 32, and the various supporting, guiding, and adjusting devices for the said parts which are shown in the drawings are not of my invention, and I therefore deem a detailed description of the said parts

40 unnecessary.

It will be understood from the drawings and the foregoing description that I have provided brush-holder collector-rings for electrical machines which occupy a minimum amount of

45 space and are so constructed as to occupy the space which is most available and are provided with brush-holders which are easily adjusted and are so disposed that an exceptionally large number of them may be distributed

50 around the periphery of the commutator.

By supporting the brush-holders directly from the collector-rings on which they may slide I am enabled to employ a small number of parts and the brush-holder may be removed

55 from the motor without disturbing connections or other parts.

I do not wish my invention limited to the number of brush-holders shown and described or to the minor details, which obviously may

60 be varied considerably within limits without

departing from the reasonable scope of said invention.

I claim as my invention—

1. In an electrical machine, the combination with a plurality of concentric collector-rings 65 each adapted to support a plurality of brushes, of a circumferentially-adjustable, annular plate to which said collector-rings are attached.

2. In an electrical machine, the combination 70 with a plurality of concentric collector-rings each adapted to support a plurality of brushes, of a circumferentially-adjustable, annular plate to which said collector-rings are clamped and means for locking said plate in any position 75 to which it may be adjusted.

3. In an electrical machine, the combination with a plurality of concentric collector-rings each adapted to support a plurality of brushes, of a circumferentially-adjustable, annular 80 plate to one face of which said collector-rings are clamped and from which they are insulated, means for clamping said plate in any position to which it may be adjusted and means for locking the plate in an invariable position for 85 service.

4. In an electrical machine, the combination with a plurality of concentric collector-rings each adapted to support a plurality of brushes, of an annular supporting-plate, a bracket in 90 which said plate is adjustably mounted and means for locking said plate in operative position.

5. In an electrical machine, the combination with a plurality of concentric collector-rings 95 each adapted to support a plurality of brushes, of an annular supporting-plate to which said collector-rings are clamped and from which they are insulated, a bracket having an annular seat for said plate, means for clamping the 100 plate in any position to which it may be circumferentially adjusted and means for locking it in an invariable position for operation.

6. In an electrical machine, the combination with a commutator-cylinder, of a plurality of 105 concentric collector-rings the axes of which are coincident with that of the commutator-cylinder, a circumferentially-adjustable, annular plate to which said collector-rings are clamped, a bracket upon which said plate is 110 supported and means for locking said plate in its operative position.

In testimony whereof I have hereunto subscribed my name this 15th day of September, 1903.

KARL F. ELMERS.

Witnesses:

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J. C. MORSE.