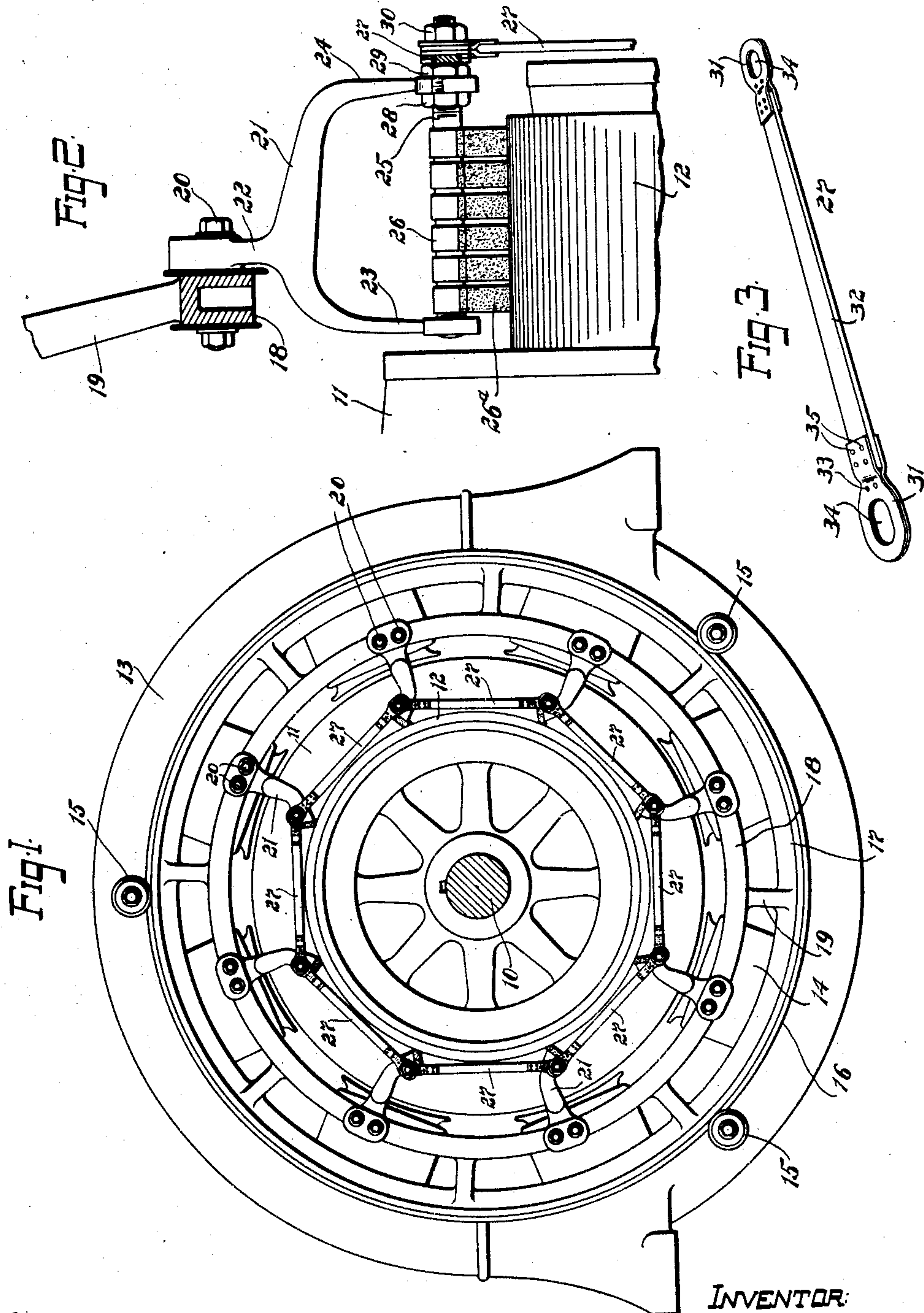


No. 887,639.

PATENTED MAY 12, 1908.

L. R. HORNING.  
DYNAMO ELECTRIC MACHINE.  
APPLICATION FILED FEB. 28, 1906.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

LOUIS R. HORNUNG, OF NORWOOD, OHIO, ASSIGNOR TO THE BULLOCK ELECTRIC MANUFACTURING COMPANY, A CORPORATION OF OHIO.

## DYNAMO-ELECTRIC MACHINE.

No. 887,639.

Specification of Letters Patent.

Patented May 12, 1908.

Application filed February 28, 1906. Serial No. 303,370.

*To all whom it may concern:*

Be it known that I, LOUIS R. HORNUNG, citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Dynamo - Electric Machines, of which the following is a full, clear, and exact specification.

My invention relates to dynamo-electric machines and especially to the means for bracing the brush-studs, and brush-forks or other supports for the brush-studs.

It has been found that in machines of large diameter having long brush-forks extending from the brush-yoke and in machines having long commutators and hence brush-studs of considerable length, there is considerable vibration in the brush-forks and studs when the machine is operated at high speed, which vibration causes a disagreeable chattering of, and injurious sparking at, the brushes.

The object of my invention is to so brace and connect the brush-forks and studs that this vibration and sparking is entirely eliminated.

In carrying out my invention, I interconnect the brush-studs by straight stiff links or rods. Each of these connecting links or rods consists preferably of an insulating portion provided with two metallic caps or end-pieces which engage the studs.

My invention further consists in the details of construction and combinations of elements described in the specification and set forth in the appended claims.

For a more complete understanding of my invention, reference is had to the accompanying drawings, in which

Figure 1 is an end-elevation of a machine equipped with my invention, parts of the machine being omitted for the sake of clearness; Fig. 2 is a sectional elevation of a portion of the commutator-end showing a brush-fork in elevation and the brush-yoke and a connecting link in section; and Fig. 3 is a perspective of one of the connecting links or bars.

Referring now to the figures of the drawing, I have shown at 10 the shaft of a dynamo-electric machine on which is mounted the armature 11 and commutator 12. Surrounding the armature is a field-frame 13 having inwardly extending pole-pieces 14. At the commutator-end of the field frame are a plurality of rollers 15, (three being shown in this case,) which support the brush-yoke 16 in the

customary manner. This yoke as in the well known construction consists of an outer ring 17, adapted to engage the supporting rollers 15 and an inner ring 18 joined to the outer ring 17 by inwardly and laterally extending arms 19. Connected to the inner ring 18 by bolts 20 and insulated therefrom are a number of brush-forks 21, the number of the latter depending upon the number of poles in the machine. Each brush-fork consists of a radial portion 22 by which it is connected to the inner ring 18 of the brush-yoke and a pair of arms 23 and 24 extending toward the commutator. Each brush-fork supports at the inner ends of the arms 23 and 24, a brush-stud 25, which supports as in the usual manner, a number of brush-holders 26 and brushes 26<sup>a</sup> arranged side by side, along the commutator.

In some machines especially in machines of large diameter the arms of the brush-forks are frequently of considerable length and in some types of machines the arms of the brush-forks are spaced a considerable distance apart and hence long brush-studs must be employed. In either case there is considerable vibration in the arms of the brush-forks and brush-studs when the machine is operated at high speed, causing the chattering and sparking previously referred to. To avoid this vibration, I firmly brace all the brush-studs by connecting all the latter together by straight, stiff links, bars, or rods 27. As is clearly shown in Fig. 2, each brush-stud extends beyond the outer arm 24 of the corresponding brush-fork and is threaded to receive the nuts 28 and 29, which are on opposite sides of the arms 24 and hold the studs in position, and to receive the nuts 30 which are employed to hold the connecting links in place.

By referring to Fig. 3 it is seen that each link or bar 27, consists of two metal cap or end-pieces 31, and an intermediate straight insulating portion 32 made preferably of wood. Each end or cap-piece 31 in this case, consists of two pieces of metal, held together by rivets 33, and each is provided with an elongated opening 34 to be engaged by the brush-stud. The end-pieces are secured to the intermediate wooden portion by rivets 35. The ends of two links are mounted on each brush-stud and are held in position between the nuts 29 and 30, which links extend in opposite directions to the adjacent studs on



both sides of the first mentioned stud. It is seen that the group of links or bars form a continuous chain which extends entirely around the machine. It is also seen that the  
 5 straight links or bars extending from stud to stud are short chords of the circle in which the brush-studs are located, which circle is concentric with the axis of the machine.

I aim in my claims to cover all modifica-  
 10 tions which do not involve a departure from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent is:—

1. In a dynamo-electric machine, a plu-  
 15 rality of brushes, a number of brush-studs greater than two, and straight insulated links joining adjacent brush-studs for the purpose of bracing same to prevent vibration thereof.

2. In a dynamo-electric machine, a brush-  
 20 yoke, brush-forks supported thereby, brush-studs supported at the inner ends of said forks, and arranged in a circle about the shaft axis, and a plurality of links connecting the corresponding ends of the brush-studs, said  
 25 links being chords of said circle.

3. In a dynamo-electric machine, a plural-

ity of brush-studs, supports therefor, and straight insulated links or bars connecting the outer ends of said studs.

4. In a dynamo-electric machine, a plural- 30  
 ity of brush-studs, and links or bars connecting the outer ends of adjacent studs, each link or bar consisting of a straight wooden portion and a pair of metallic caps or heads  
 engaging the ends thereof. 35

5. In a dynamo-electric machine, a pair of  
 brush-studs, and a link or bar joining said  
 studs, said link consisting of a straight insu-  
 lating rod having metallic caps or end por-  
 tions engaging the studs. 40

6. In a dynamo-electric machine, a plural-  
 ity of brush supporting members arranged in  
 a circle about the shaft axis, and bracing  
 links connecting corresponding ends of said  
 members, said links forming a polygon in- 45  
 scribed in said circle.

In testimony whereof I affix my signature,  
 in the presence of two witnesses.

LOUIS R. HORNUNG

Witnesses:

HARRIET SULPHIN,  
 FRED J. KINSEY.