B. A. BEHREND.

BRUSH STUD SUPPORT.

APPLICATION FILED SEPT. 16, 1905.

931,376. Patented Aug. 17, 1909.

Fig. 1.

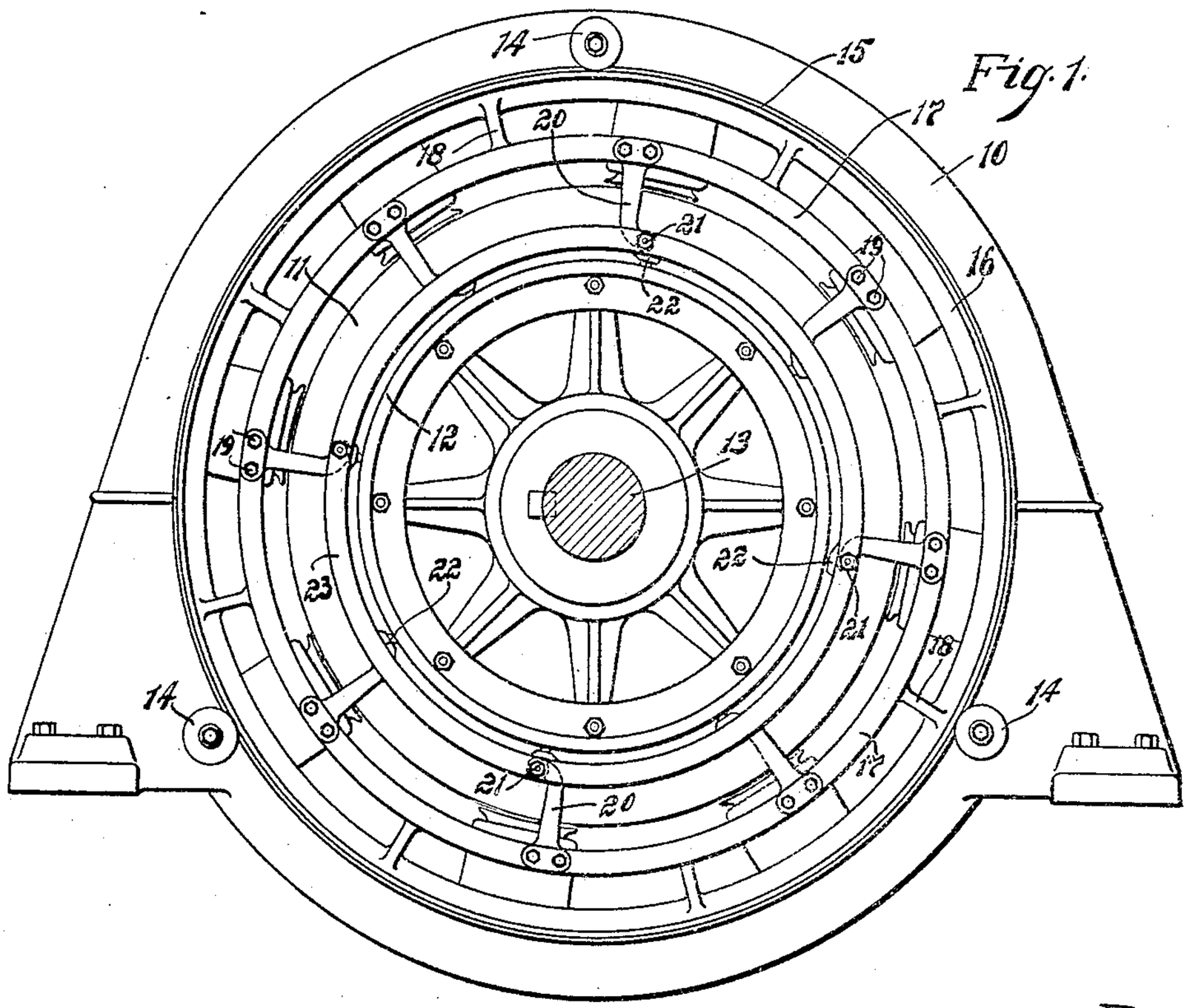


Fig. 2.

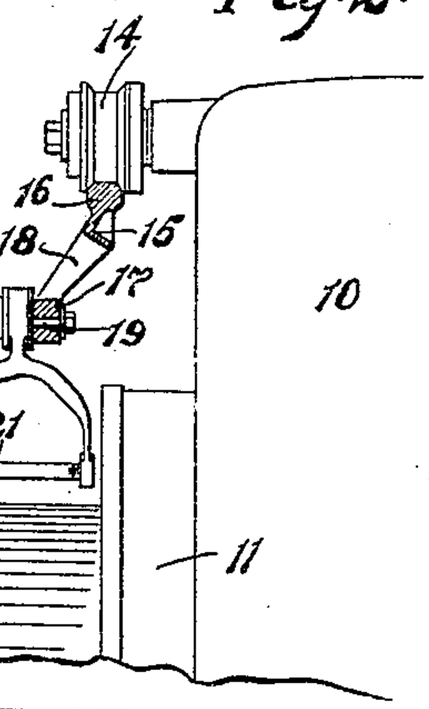


Fig. 3.

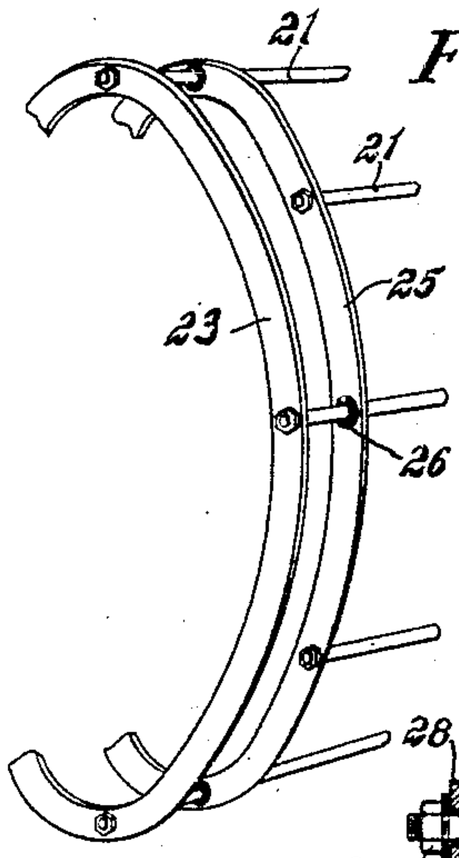
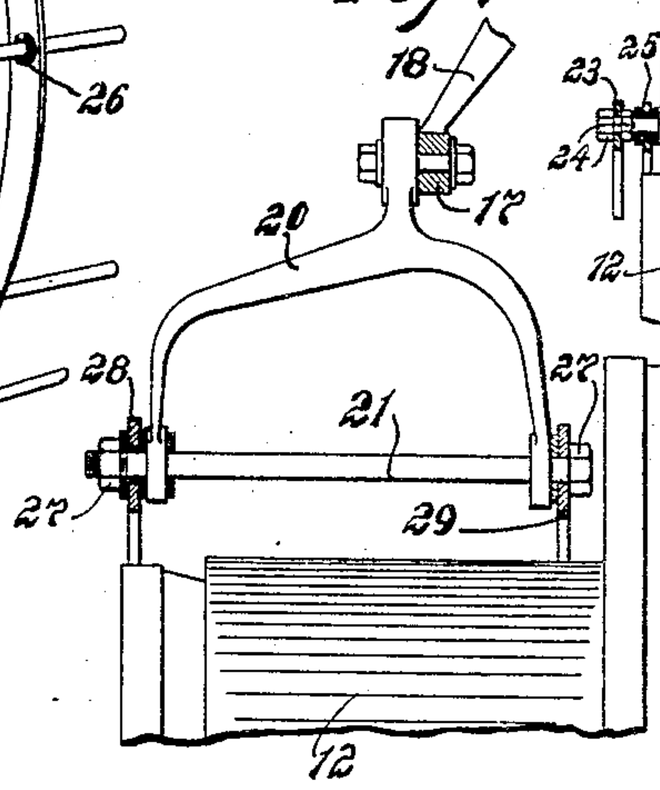


Fig. 4.



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UNITED STATES PATENT OFFICE.

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BRUSH-STUD SUPPORT.

No. 931,376. Specification of Letters Patent. Patented Aug. 17, 1909.

Application filed September 16, 1905. Serial No. 278,806.

To all whom it may concern:

Be it known that I, BERNARD ARTHUR BEHREND, a 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 Brush-Stud Supports, of which the following is a full, clear, and exact specification.

My invention relates to dynamo electric machines and especially to the means for supporting or bracing the brush rod forks of machines of large diameter.

It has been found that in machines of large diameter having long brush rod forks extending from the brush yokes that there is considerable vibration in the brush forks 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, therefore, to so support or brace the brush forks, that this vibration is entirely eliminated.

A further object is to so connect and arrange the supports or braces, that the latter will also serve as cross connectors for the groups of positive and negative brushes.

In carrying out my invention, I join all the brush supports by a continuous ring, whereby the supports will be braced and all vibration eliminated.

In another aspect, my invention consists of a dynamo electric machine having a plurality of positive and negative brushes, and braces for the brush supports which are so arranged and connected as to serve as cross connectors for the positive and negative brushes respectively.

More specifically considered, my invention consists in a multipolar dynamo electric machine, having a plurality of brush forks, each of which carries at its inner end a brush stud, alternately arranged groups of positive and negative brushes on said studs, and combined braces and cross connectors for said forks and studs comprising two metal rings connected to the studs adjacent the opposite arms of said forks, one of said rings being metallically connected to the positive brush stud but insulated from the negative studs, the other ring being metallically connected to the negative studs but insulated from the positive studs, whereby the forks are well braced, the positive and negative brushes are connected together respectively, and the current will be evenly distributed at both ends of the commutator.

My invention still further consists of the details of construction and combination 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; Fig. 2 is a partial side sectional elevation of the machine shown in Fig. 1; Fig. 3 is a perspective with parts broken away of the two combined braces and connectors showing more clearly the connections between the latter and the brush holder studs; and Fig. 4 is a partial side sectional elevation showing a modified arrangement of the braces and connectors.

Referring more specifically to the figures of the drawing; I have shown at 10, the field frame surrounding the armature 11 carrying the commutator 12, which armature and commutator are mounted on shaft 13. Supported in rollers 14 on the field frame, is the large brush yoke 15, consisting of the outer ring 16, inner ring 17, and the intermediate radially inwardly and axially outwardly extending arms 18. Supported at intervals around the inner ring 17 by means of bolts 19, are the brush forks 20. Each brush fork carries at the inner ends of the arms a brush stud 21, on which are mounted in any suitable manner a number of brush holders 22, carrying brushes which bear upon the commutator 12. It is to be understood that there will be as many brush forks and groups or brushes as there are poles, and these groups or brushes are alternately positive and negative.

In order that the vibration in the brush forks may be eliminated I connect the ends of the brush studs supported at the ends of the arms of the forks by rings of metal. In Figs. 1—2 and 3, the two bracing rings are connected to the ends of the brush studs remote from the field frame, which project beyond the brush fork for that purpose. In order that the bracing rings may serve also as cross-connectors for the positive and negative brushes respectively, I metallically connect one ring to the brush studs which

support the positive brushes, and the other ring, I metallically connect to the brush studs which support the negative brushes. As clearly shown in Fig. 3 the brush studs are not all of the same length, the long and short studs being alternately arranged. The long studs are joined together and metallically connected by the ring 23 which is securely held in position by the nuts 24. Joining all the alternate and shorter brush studs, and metallically connected thereto, is the ring 25. As is shown in Figs. 2 and 3 each longer brush stud extends through the inner ring 25, and is insulated therefrom by insulation 26. It will thus be seen that the brush forks are well braced and all vibration will be eliminated, and that furthermore the cross connecting rings usually attached to the outer end of each brush fork are dispensed with.

While in this case I have shown brush studs of two different lengths, it is evident that the brush stud metallically connected to ring 25 might as well be of the same length as the brush studs braced by and metallically connected to ring 23, in which case the studs that are metallically connected to ring 25 would be insulated from ring 23 in the same manner that the longer studs are insulated from ring 25 as shown in Figs. 2 and 3.

It has been found that when both cross connectors are connected to either end of the brush studs that the greater portion of the current is carried by the brushes adjacent the cross connectors, the amount of current carried by the different brushes on each stud gradually decreasing from the brush adjacent to the cross connectors to the brush adjacent the other end of the stud. The result is that part of the brushes are overloaded, and one portion of the commutator is heated to a greater extent than the other, resulting in the twisting or distorting of the commutator bars. Now in order that the current may be distributed equally over the commutator, and through the brushes at both ends of the commutator, I have modified slightly the construction shown in Figs. 1—2 and 3 by arranging the braces and cross connectors at each end of the brush studs. This construction is shown in Fig. 4. It will be seen from this figure that each brush stud is extended slightly beyond both sides of the fork arms, and fastened to the extensions of the studs by nuts 27, are the rings 28 and 29. It will be seen from this figure, that each ring braces all the brush forks and that each brush stud is metallically connected to a ring at one end, and fastened to though insulated from a ring at its opposite end. As in the former case one ring is metallically connected to all the brush studs carrying the positive brushes, and the other ring is metallically connected to all the brush studs carrying the negative brushes. It will be understood without further illustration that the stud adjacent to the one shown in Fig. 4 will be metallically connected to ring 28 and insulated from 29.

I aim to cover in my claims all modifications which do not depart from the spirit of my invention.

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

1. In a dynamo-electric machine, a frame, a plurality of brush-holder rods adjacent to the commutator surface and parallel to the axis of the machine, means for supporting said rods from said frame, and a continuous bracing ring mechanically connecting the ends of all of said rods.

2. In a dynamo-electric machine, a plurality of brush forks, brush-holder rods supported at the inner ends thereof adjacent to the commutator surface, and a metallic ring for mechanically connecting the ends of all of said rods.

3. In a dynamo-electric machine, a commutator, a plurality of brush studs arranged around said commutator, means for supporting said studs, brushes carried by said studs, and a ring mechanically connecting all of said studs and electrically connecting alternate studs.

4. In a dynamo-electric machine, the combination of a commutator, a plurality of brush studs arranged around said commutator, means for supporting said studs, brushes carried by said brush studs, and a plurality of rings each mechanically bracing all of said studs and electrically connecting alternate studs.

5. In a multipolar dynamo electric machine, a plurality of brush forks, brush studs supported therein, and means comprising a pair of metallic rings for bracing and mechanically interconnecting all said forks or studs, each ring being electrically connected to some of said forks or studs only.

6. In a multipolar dynamo electric machine, a plurality of brush forks, alternately arranged positive and negative brush studs supported thereon, and means for bracing said forks and studs comprising a pair of metallic rings, one of said rings being electrically connected to the positive studs only and the other ring being electrically connected to the negative studs only, and one of said rings being mechanically fastened to all of said studs.

7. In a multipolar dynamo electric machine, a plurality of brush forks, alternately arranged positive and negative brush studs supported thereon, and combined braces and cross connectors for said forks and studs comprising a pair of metal rings connected to the ends of the studs, one ring being electrically connected to all the positive brush studs only and the other ring being electrically connected to all the negative brush studs only.

8. In a dynamo electric machine, a plu-

rality of brush forks, brush studs supported on said forks and arranged alternately positive and negative, brushes and holders carried by said studs, and combined braces and cross connectors for said studs comprising metal rings connected to opposite ends of said studs, one of said rings being electrically connected to the positive studs only and the other ring being electrically connected to the negative brush studs only.

9. In a dynamo electric machine, a plurality of brush forks, brush studs supported thereon, and combined braces and cross connectors for said forks and studs comprising two metal rings mechanically connected to all of said studs adjacent the opposite arms of said forks, one of said rings being electrically connected to the positive brush studs but insulated from the negative studs and the other ring being electrically connected to the negative studs but insulated from the positive studs, whereby the forks will be well braced, the positive and negative brush studs will be connected together respectively and current will be evenly distributed at both ends of the commutator.

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

BERNARD ARTHUR BEHREND.

Witnesses:

RUBY ROBINSON,

ELIZABETH C. BRITTON.