F. JEFFREY.

COMMUTATOR CONSTRUCTION.

APPLICATION FILED OCT. 25, 1909.

970,233.

Patented Sept. 13, 1910.

Fig. 1

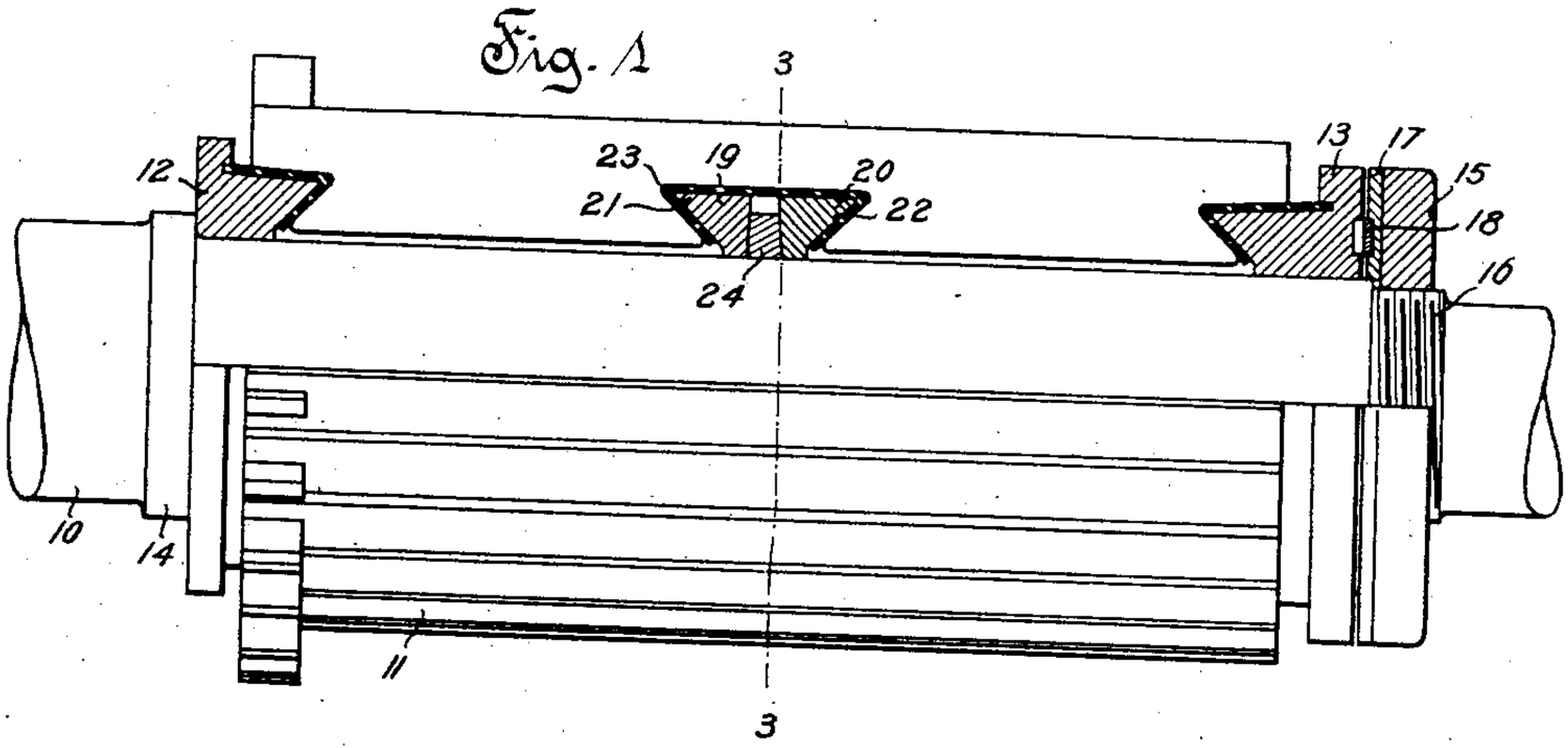


Fig. 2

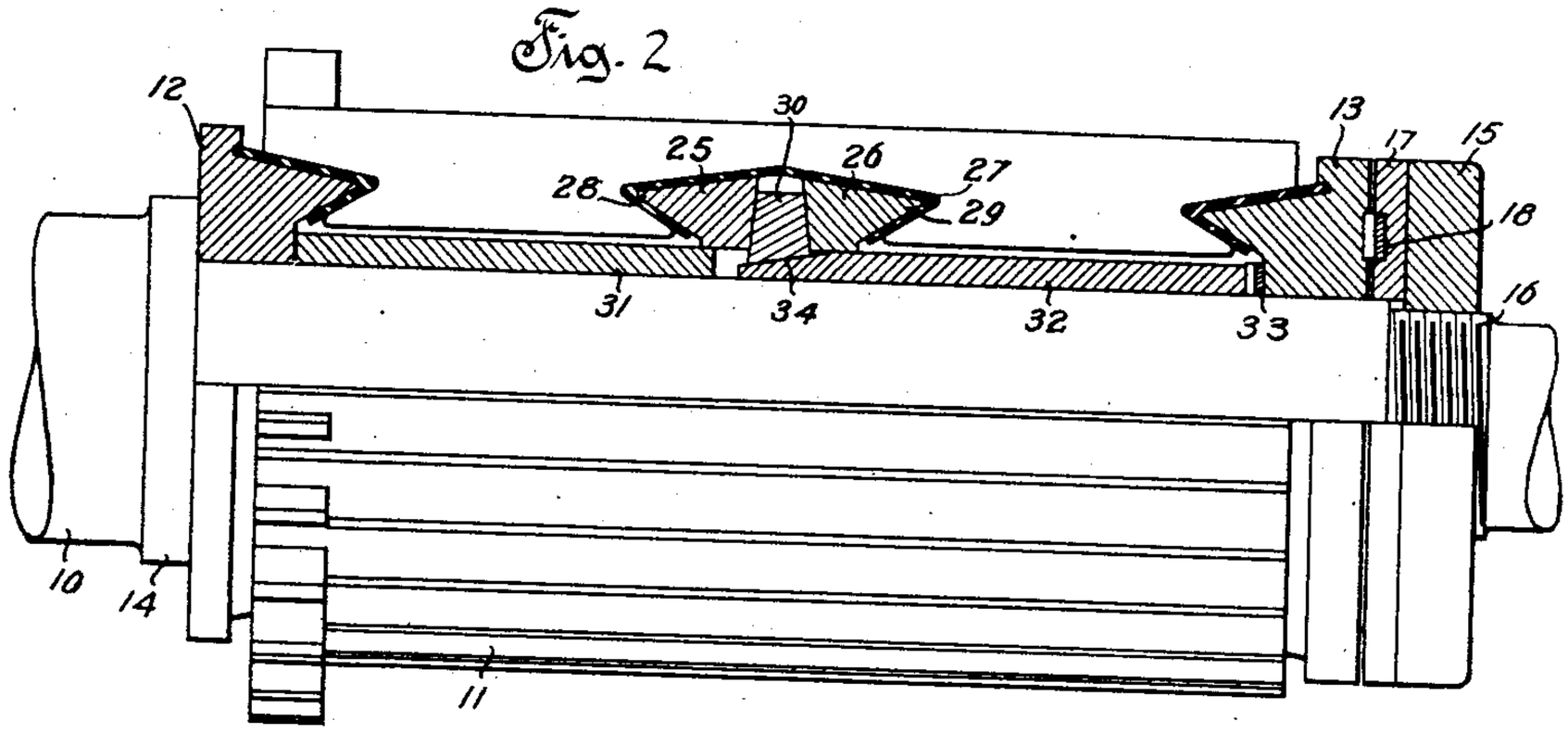
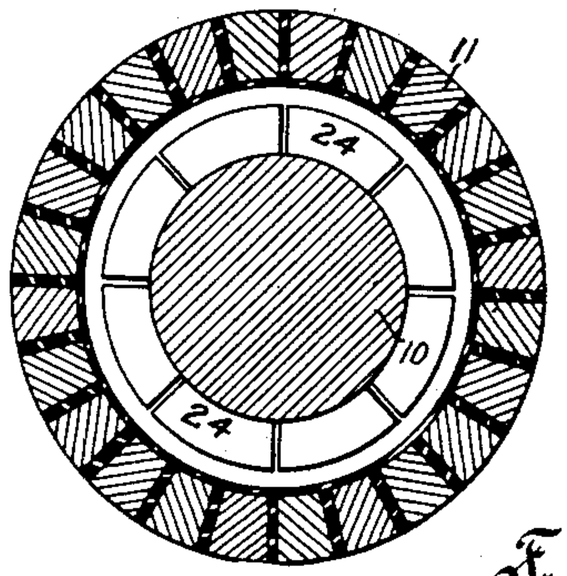


Fig. 3



Witnesses

Robt. E. Stoll

Chas. L. Byron

Inventor

Fraser Jeffrey

By Chas. E. Lord

Attorney

UNITED STATES PATENT OFFICE.

FRASER JEFFREY, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO ALLIS-CHALMERS COMPANY, A CORPORATION OF NEW JERSEY.

COMMUTATOR CONSTRUCTION.

970,233. Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed October 25, 1909. Serial No. 524,345.

To all whom it may concern:

Be it known that I, FRASER JEFFREY, a subject of the King of England, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Commutator Constructions, of which the following is a full, clear, and exact specification.

This invention relates to commutators for dynamo-electric machines such as turbo generators and other machines of large current output and requiring commutators of considerable length.

More specifically the invention relates to means for supporting the commutator segments, and has for one of its objects the provision of means for supporting and securing the segments in a manner such that they will not buckle, expand unevenly or be distorted by heat, and cannot be twisted or shifted from their proper positions by centrifugal force.

A further object is to provide supporting and clamping rings adapted to engage and support the segments between their ends and to provide means whereby the rings can be effectively and easily tightened and securely held in position, the rings and tightening means being so arranged that the segments can be quickly assembled and clamped in position without requiring a commutator of large external diameter and without requiring access to the interior of the commutator for the purpose of tightening the intermediate clamping rings.

In carrying out my invention I provide in addition to the clamping rings at the ends of the commutator, a pair of clamping rings which engage a dove-tail slot having oppositely disposed V-shaped portions provided on the inner surface of the commutator and between the ends of the segments, and I spread the clamping rings so as to force them tightly into the V-shaped portions of the slot by means of wedges located between the rings. In accordance with one form of my invention the wedges are adapted to be forced outwardly so as to spread the clamping rings to cause them to tightly engage the segments, by the action of centrifugal force, and in another form of my invention the wedges are adapted to be moved outwardly between the clamping rings so as to spread the latter by means operated from one end of the commutator and preferably by a sleeve which engages the wedges and is adapted to be shifted axially inward by a nut which is utilized for tightening the commutator segments and end clamping rings.

My invention may be further briefly summarized as consisting in certain novel features of construction and combinations and arrangements of parts which will be described in the specification and set forth in the appended claims.

For an understanding of my invention reference is had to the accompanying sheet of drawings wherein—

Figure 1 is a side sectional elevation of a commutator and support, the commutator being constructed and supported in accordance with my invention. Fig. 2 is a view similar to Fig. 1 showing a modified form of my invention. Fig. 3 is a transverse sectional view through the commutator shown in Fig. 1 substantially along the line 2—2.

Referring now to the figures of the drawing, 10 represents a supporting member for the commutator having long commutator segments designated by the reference character 11, the commutator being in this case supported by the shaft of the machine. The segments 11 are provided at their ends with V-shaped slots which receive the usual V-shaped end clamping rings 12 and 13, the rings being insulated from the segments and resting on the shaft 10. The segments and end rings 12 and 13 are clamped together and held against a shoulder 14 on the shaft by means of a nut 15 which engages a threaded portion 16 of the shaft, the ring 12 engaging the shoulder and the nut 15 being adjacent the ring 13 and separated therefrom by a washer-like member 17 and a spring ring 18 located between the washer 17 and ring 13.

The end clamping rings are sufficient for securely holding in position segments of short commutator, but when long commutator segments are employed, the latter must be supported between their ends as well as at their ends so as to prevent the segments buckling and being distorted or shifted by heat or centrifugal force. Steel shrink rings have often been employed for supporting the commutator segments midway between their ends, and, while these rings hold the segments very effectively they are objectionable for the reason that they occupy consid-

erable of the active commutator surface. To support the segments midway between their ends and at the same time do away with the shrink rings I employ in the construction shown in Fig. 1 V-shaped clamping rings 19 and 20 which are mounted on the shaft 10 and engage V-shaped portions 21 and 22 of an undercut or dove-tail slot provided at the inner surface of the commutator substantially midway between its ends, the rings being separated from the segments by insulation 23. In both forms of my invention shown in the drawings the intermediate clamping rings 19 and 20 are adapted to be forced and held tightly in the slots by wedges.

In Figs. 1 and 3 the wedges are designated by the reference character 24 and these wedges are located between the rings and have opposite tapered faces or sides which engage the adjacent faces of the two rings, the adjacent faces of the latter being correspondingly tapered. It will be seen that if the wedges are shifted radially outward the rings will be spread apart and will be forced tightly into the V-shaped portions of the slots. In the construction shown in Fig. 1 these wedges are adapted to be forced outwardly so as to spread the rings by centrifugal force, this construction being adapted particularly for high speed machines such as turbo generators.

In the modification shown in Fig. 2 the segments 11 of the commutator are, as in the first instance, supported at their ends by V-shaped clamping rings 12 and 13, which engage V-shaped slots in the ends of the segments and are mounted upon the shaft 10. These segments are likewise supported midway between their ends by a pair of clamping rings which are adapted to be spread apart by wedges between the rings but in this modification the wedges may be shifted outwardly by hand. In this case, the intermediate clamping rings are designated by the reference characters 25 and 26, and these rings, as in the first instance, are separated from the segments by insulation 27 and engage V-shaped portions 28 and 29 of an undercut or dove-tail slot provided at the inner surface of the commutator midway between its ends. The adjacent faces of the two rings are tapered, and between the rings and engaging the tapered faces of the latter are spreading wedges 30. The clamping rings 25 and 26 do not engage directly the shaft 10 but are mounted respectively upon a pair of sleeves 31 and 32 which surround the shaft between the latter and the commutator segments. The sleeve 32, which is adjacent the clamping ring 13 and is separated therefrom by a spring ring 33, is adapted to be shifted axially inward as the clamping nut 15 is tightened and this movement of the sleeve 32 is utilized for shifting the wedges 30 outwardly. This is accomplished in this case, in the following manner:—The inner end of the sleeve 32 which projects beyond the clamping ring 26 is tapered, as shown at 34, and the inner ends of the wedges 30 are correspondingly tapered and rest upon the tapered portion 34 of the sleeve, the result being that when the sleeve is shifted axially inward by the clamping nut 15, the wedges 30 will be shifted outwardly and the clamping rings 25 and 26 will be spread and tightened at the same time that the end rings 12 and 13 are tightened.

The means which I have shown for supporting the segments is very effective and reliable for holding the segments at all times in their proper positions, and do not render the assembling of the commutator in the least difficult.

It will be seen that the constructions which I have provided, and particularly the means for tightening the inner clamping rings, permit the use of commutators of a small external diameter and do not require a hollow shaft or spider, inasmuch as access to the interior of the commutator is not necessary for the purpose of adjusting and tightening the inner rings.

I do not desire to be confined to the exact details shown but aim in my claims to cover all modifications 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 commutator composed of segments and having between its ends on the interior thereof an undercut slot, means for clamping the segments at their ends, and means for supporting and clamping the segments between their ends comprising a pair of clamping rings in said slot and wedges located between the rings and each engaging the adjacent faces thereof, said wedges serving when shifted outwardly to spread the rings so that the latter will tightly clamp the segments.

2. In a dynamo-electric machine, a commutator support, a commutator comprising a plurality of segments arranged about the support, clamping rings engaging the segments at their ends, said segments having between their ends and on the interior thereof a dove-tail slot having oppositely disposed V-shaped portions, a pair of clamping rings in said slot and having their adjacent faces tapered, a plurality of wedges between the rings and each engaging the tapered faces of both rings, said wedges serving when shifted outwardly to spread the rings so as to force the latter into the V-shaped portions of the slot.

3. In a commutator of a dynamo-electric

machine, a plurality of segments, clamping rings at the ends of the segments, said segments being provided between their ends and on the interior of the commutator, with a dove-tail slot having V-shaped portions, a pair of clamping rings located in the slot, wedges between the clamping rings and each engaging the adjacent faces thereof, and means for shifting said wedges outwardly so as to spread the rings and to force the latter into the V-shaped portions of the slot.

4. In a dynamo-electric machine, a commutator support, a commutator consisting of segments arranged about the support and provided between their ends and on the interior of the commutator with a dove-tail slot having oppositely disposed V-shaped portions, means for clamping the segments at their ends, a pair of clamping rings located in the dove-tail slot, wedges between the rings and each engaging the adjacent faces thereof, and means operated from one end of the commutator for moving the wedges outwardly so as to spread the rings and to force the latter into the V-shaped portions of the slot.

5. In a dynamo-electric machine, a commutator support, a commutator comprising a plurality of segments arranged about the support, clamping rings engaging the segments at their ends, said segments having between their ends and on the interior of the commutator a dove-tail slot having oppositely disposed V-shaped portions, a pair of clamping rings located in said slot, wedges between the rings each engaging the adjacent faces thereof, means for moving said wedges outwardly so as to spread the rings and to force the same into the V-shaped portions of the slot comprising a sleeve between the commutator segments and the support and engaging the wedges, and means for shifting said sleeve axially inward.

6. In a commutator of a dynamo-electric machine, a support, commutator segments arranged about the support, means for clamping the segments at their ends, said segments having between their ends and on the interior of the commutator a continuous dove-tail slot having oppositely disposed V-shaped portions, a pair of clamping rings in said slot, wedges located between the rings and each engaging the adjacent faces thereof, a movable clamping nut for tightening the end clamping means, a sleeve surrounding the support within the commutator and adapted to be shifted axially by said clamping nut, said sleeve having a tapered portion engaged by the inner ends of the wedges so that when the nut is shifted to tighten the end clamping means, said wedges are shifted outwardly so as to force the clamping rings into the V-shaped portions of the slot.

7. In a dynamo-electric machine, a commutator support, a commutator comprising a plurality of segments arranged about the support, clamping rings engaging the segments at their ends, a nut on the support and serving to tighten the segments and end clamping rings, said commutator having between its ends and on the interior thereof an undercut slot, an intermediate clamping ring located in said slot and adapted to support the segments between their ends, wedges for forcing the ring into the slot, a sleeve surrounding the support and engaging the wedges, said sleeve being adapted to be moved axially inward by said nut when the latter is tightened so as to shift the wedges outwardly and force the ring tightly into the slot.

Milwaukee, Wis., Oct. 14, 1909.

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

FRASER JEFFREY.

Witnesses:

CHAS. L. BYRON,

ROB. E. STOLL.