No. 886,035. PATENTED APR. 28, 1908.

B. A. BEHREND.

DIRECT CURRENT TURBO GENERATOR.

APPLICATION FILED OCT. 31, 1906.

Fig. 1

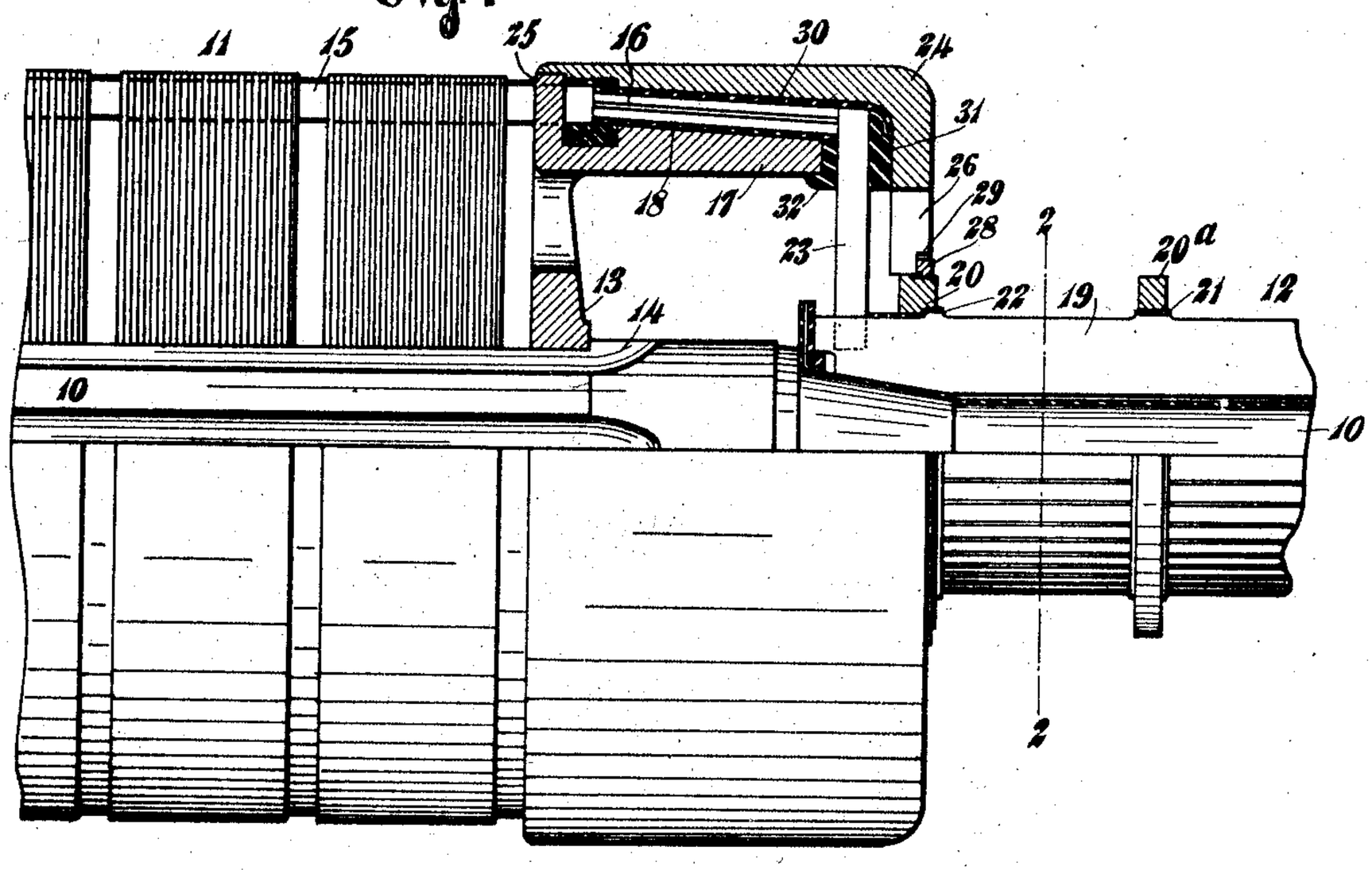
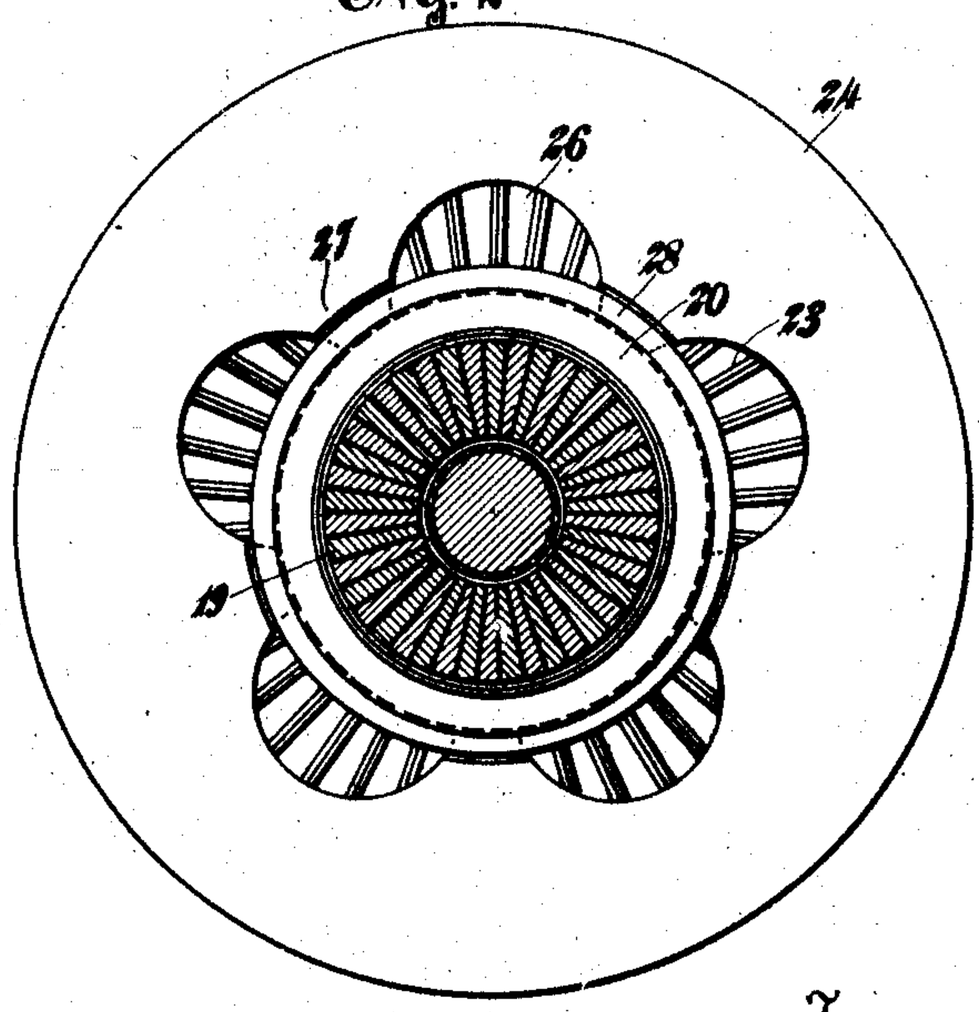


Fig. 2



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DIRECT-CURRENT TURBO-GENERATOR.

No. 886,035. Specification of Letters Patent. Patented April 28, 1908.

Application filed October 31, 1906. Serial No. 341,377.

To all whom it may concern:

Be it known that I, BERNARD A. BEHREND, 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 Direct-Current Turbo-Generators, of which the following is a full, clear, and exact specification.

My invention relates to dynamo-electric machines, and particularly to high-speed machines of the direct-current type, such as direct-current turbo-generators.

In high-speed rotors, it is necessary to provide means for holding in position the portions of the coils which project beyond the core, so that the latter are not displaced or distorted by centrifugal action at high-speeds of rotation. It has been proposed to surround these projecting portions of the coils by heavy rings or bands. When rings are employed for this purpose it is necessary to provide some means for supporting and centering the rings and for preventing a movement or displacement thereof axially of the machine.

In direct-current machines, considerable difficulty has been experienced in providing adequate supporting and protecting means for the coils at the commutator-end of the armature, for the reason that the commutator necks or leads connecting the coils to the commutator render difficult proper supporting of coil retaining rings. Accordingly band wires have usually been relied upon for this purpose. The latter expedient is not satisfactory for all types of machines for the reason that at high speeds the band wires are in danger of breaking or becoming loose.

The main object of my invention is to provide means for securely supporting and retaining in position an end-ring for the ends of the coils which project beyond the commutator-end of the core.

A further object is to provide an armature for high-speed machines which is simple in construction and compact and able to withstand the enormous stresses at high speeds without danger of any of its parts being displaced or injured.

In carrying out my invention I provide an end-ring for the ends of the coils at the commutator-end of the machine, which ring extends inwardly to, or adjacent to, a clamping device or ring for the commutator, the clamping ring supporting and retaining the end-ring in position. In the preferred form of my invention the clamping ring is threaded externally and is provided with a nut which bears against the end-ring and thus holds the latter in position.

My invention further consists in certain novel details of construction and combinations and arrangements of parts described in the specification and set forth in the appended claims.

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

Figure 1 is a partial sectional elevation of an armature equipped with my invention; and Fig. 2 is a section through the commutator along the line 2—2 of Fig. 1.

Referring now to the figures of the drawing, 10 represents the shaft on which the armature core 11 and commutator 12 are mounted. The core consists of laminæ clamped between end-members, one of which is shown at 13. The shaft in this case is provided with longitudinal grooves or flutes 14 for supplying air to the ventilating ducts 15 arranged at intervals between the laminæ. The core carries an armature winding having end portions 16 which project beyond the ends of the core. The projecting portions of the coils at the commutator end of the armature rest upon a bracket or shoulder 17 extending outwardly from the end member 13. The bracket in this case is provided with an inclined outer surface and the coils are separated therefrom by suitable insulation 18.

The bars 19 of the commutator are held in position by heavy clamping rings in this case shrink-rings, two of which are shown at 20 and 20[a] respectively, the shrink-ring 20 being at the end of the commutator adjacent the core. The shrink rings are separated from the commutator bars by suitable insulation 21. The bars are provided in this instance with ridges 22 and the shrink-ring 20 is provided at one side with a suitable recessed portion adapted to fit over the ridges 22, so that a movement of the shrink-ring axially away from the core is prevented. The commutator bars are connected to the ends of the coils by radial commutator leads or necks 23.

Surrounding the projecting portions 16 of the coils is a protecting end ring 24 made preferably from steel. The inner end of the ring engages a recessed portion of the slotted flange 25 of the end-member 13 and the outer portion of the ring extends inwardly over the commutator necks toward the shrink-ring 20. The inwardly extending portion of the ring is preferably provided with ventilating openings 26 forming arms 27. The inner ends of the arms 27 may engage the outer surface of the shrink-ring 20 or there may be a slight clearance between the arms and shrink-ring if desired. In the present instance the inner ends of the arms rest upon the ring 20 so that the ring 24 is well centered. The shrink-ring 20 is threaded externally, at least for a portion of its width, and the threaded portion is provided with a nut 28 which engages a notched or recessed portion 29 in the inner ends of the arms 27 of the end-ring. The purpose of this nut, as is evident, is to hold the end-ring 24 in position and to prevent axial movement thereof. It is seen that the ridges 22 on the commutator bars prevent the shrink-ring 20 from being moved along the commutator bars, when the nut 28 is tightened. The commutator bars, if desired, may be provided with slightly inclined seats for the shrink-ring 20 instead of the ridges 22. In some cases, however, it will be unnecessary to provide special means for preventing movement of the shrink-ring 20, the pressure between the ring and the bars alone being relied upon for this purpose. In the latter case the ring 20 can be placed over the commutator bars from the opposite ends of the commutator, and the commutator necks or leads can therefore be riveted to the bars before the latter are assembled. The end-ring 24 is separated from the coils by insulation 30, and the commutator necks are separated from the ring 24 and bracket or shoulder 17 respectively by insulation 31 and 32.

It is seen that I have provided a very rigid structure consisting of a few parts which are firmly held in position, and that there is no danger whatever of accidental displacement of any of the parts at high speeds of rotation. It is also seen that the protecting ring 24 is well supported, centered and retained in position.

It is apparent that the structure here shown may be modified to a considerable extent without departing from the main purpose of my invention and I aim in my claims to cover all such modifications.

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

1. In a dynamo-electric machine, an armature core, coils carried thereby, a commutator, a clamping device for said commutator, and a protective end-ring surrounding the ends of the coils and extending inward to said clamping device.

2. In a dynamo-electric machine, an armature core, coils carried thereby, a clamping ring for the commutator bars, an end-ring surrounding the ends of the coils and extending adjacent said clamping ring, and means on said clamping ring for retaining the end-ring in position.

3. In a dynamo-electric machine, an armature core, coils carried thereby, a commutator, a shrink-ring surrounding the commutator, and a protective end-ring surrounding the ends of the coils and extending inward and engaging said shrink-ring.

4. In a dynamo-electric machine, an armature core, coils carried thereby, a commutator ring or band surrounding the commutator bars, an end-ring surrounding the ends of the coils and extending adjacent said commutator ring, and a nut on said commutator ring for retaining the end-ring in position.

5. In a dynamo-electric machine, an armature core, coils carried thereby, a commutator, a shrink-ring surrounding the commutator, a protective end-ring surrounding the ends of the coils and extending inward into engagement with said shrink-ring, and a nut on said shrink-ring engaging said end-ring to retain the latter in position.

6. In a dynamo-electric machine, an armature core, coils carried thereby, a commutator, a shrink-ring surrounding the commutator, and a protective end-ring surrounding the ends of the coils and extending inward adjacent said shrink-ring said end-ring having ventilating openings.

7. In a dynamo-electric machine, an armature core, coils carried thereby, a commutator, a shrink-ring surrounding the commutator, a protective end-ring surrounding the ends of the coils, said end-ring having radial arms extending inward to said shrink-ring, and a nut on said shrink-ring engaging the inner ends of the arms.

8. In a dynamo-electric machine, an armature core, coils carried by said core having their ends projecting beyond the end of the core, a protective end-ring surrounding the ends of the coils, a commutator, and a clamping device for retaining the commutator bars in place and for preventing a displacement of said end-ring.

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

BERNARD A. BEHREND.

Witnesses:
ARTHUR F. KWIS,
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