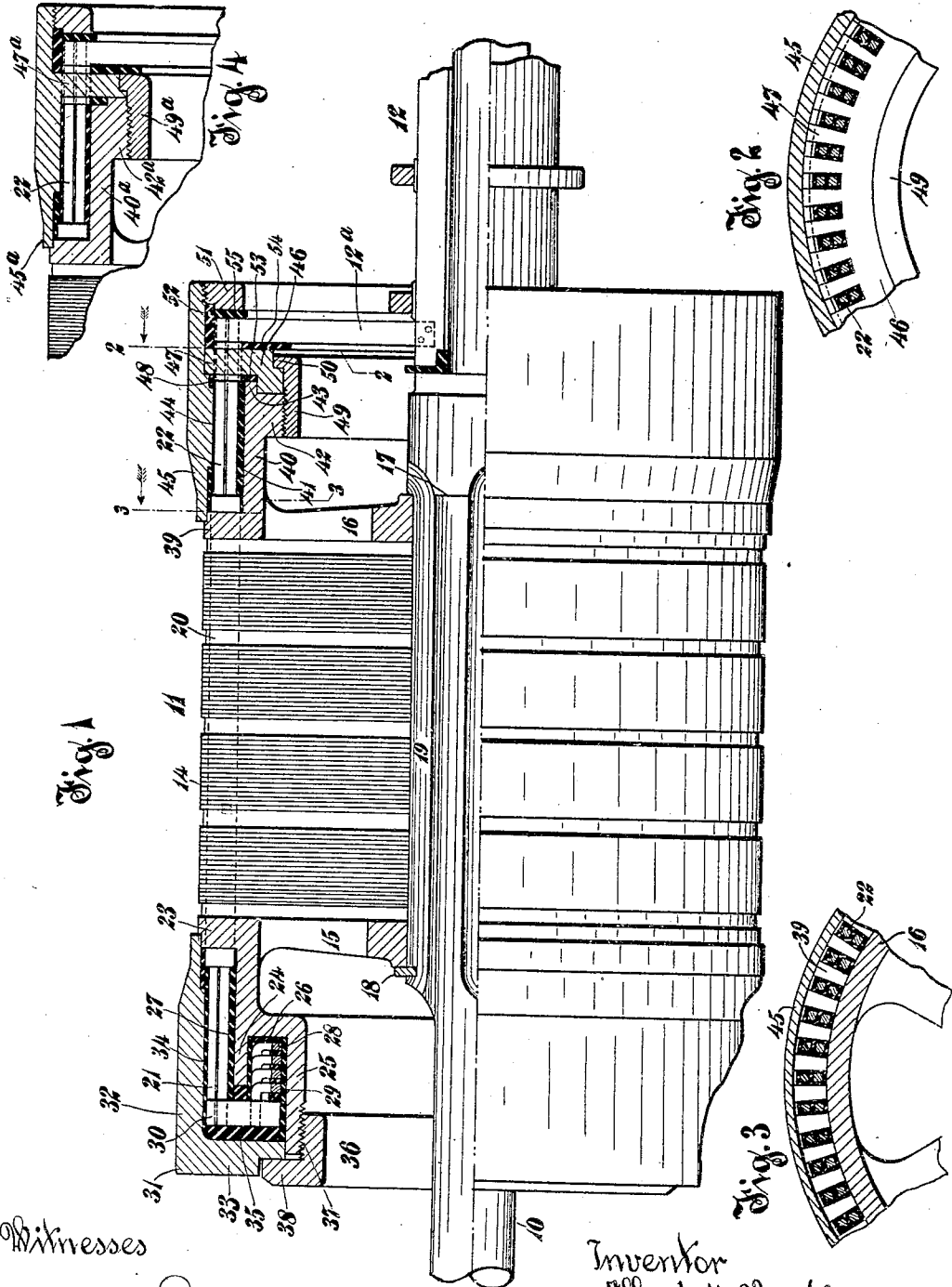


A. H. WOUTERS.
DYNAMO ELECTRIC MACHINE.
APPLICATION FILED NOV. 3, 1906.

933,220.

Patented Sept. 7, 1909.



Witnesses

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UNITED STATES PATENT OFFICE.

ALFRED H. WOUTERS, OF NORWOOD, OHIO, ASSIGNOR TO ALLIS-CHALMERS COMPANY,
A CORPORATION OF NEW JERSEY, AND THE BULLOCK ELECTRIC MANUFACTURING
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DYNAMO-ELECTRIC MACHINE.

933,220.

Specification of Letters Patent.

Patented Sept. 7, 1909.

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To all whom it may concern:

Be it known that I, ALFRED H. WOUTERS, belonging to the Kingdom of the Netherlands, 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, particularly to high speed machines of direct current type, such as direct-current turbo-generators.

One of the objects of my invention is to provide an armature for high speed machines, in which all the parts projecting beyond the ends of the core are held firmly in position and well protected against centrifugal action.

A further object is to provide an armature for high speed machines which is strong, durable and compact.

My invention 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 longitudinal sectional elevation of a machine equipped with my invention, parts being broken away; Fig. 2 is a partial section along the line 2—2 of Fig. 1 looking in the direction of the arrow; Fig. 3 is a partial section along the line 3—3 of Fig. 1 looking in the direction of the arrow; and Fig. 4 shows a modification of the structure at the commutator end of the machine.

Referring now to the figures of the drawing I have shown at 10 a shaft on which is mounted the armature 11 and commutator 12 of a high speed direct-current machine. The armature core consists of groups of slotted laminae 14, clamped between end-members 15 and 16. End-member 16 abuts against a shoulder 17 on the shaft, and end-member 15 is held in position by clamping ring 18 engaging a groove in the shaft. The shaft, in this case, is provided with longitudinal grooves or flutes 19, which communicate with all the ventilating spaces 20 between the groups of laminae. The conductors of the armature winding located in the

slots of the core extend beyond both ends thereof as shown at 21 and 22. The different coils of the winding are connected to the commutator 12 by commutator leads 12^a.

The end-member 15 is provided with a slotted flange 23 flush with the outer surface of the laminae, forming teeth between which the conductors pass, and is provided beyond the end of the core with the bracket or extension having two cylindrical or annular shoulders, projections, or flanges 24 and 25 concentric with respect to the axis of the shaft. The inner annular flange 25 extends beyond the end of the outer flange 24, and between the two flanges 24 and 25 is an annular recess or pocket 26. The projecting ends 21 of the conductors are supported by the annular flange 24, suitable insulation 27 being interposed between the conductors and the shoulder. Located within the annular pocket or recess 26 and supported by the annular flange 25 are four equi-potential cross-connectors 28 arranged side by side, the conductors being insulated from one another and from the walls of the pocket by insulation 29. The main conductors extend outward a short distance beyond the end of the annular flange 24, and are connected to the equi-potential cross-connectors by straps 30. The equi-potential connectors fit tightly within the pocket so that they can not be accidentally displaced. These equi-potential cross-connectors are so well known that further description and illustration are considered unnecessary.

To prevent the projecting portions 21 of the conductors from being displaced or distorted at high speeds, I surround the conductors with an end-ring 31. The end-ring 31 consists of a cylindrical portion 32 and an inwardly extending portion 33. The inner end of the cylindrical portion 32 rests within a recess or groove in the slotted flange 23 of the end-member 15, and the inwardly extending portion 33 rests upon the end of the inner annular flange 25. The slotted flange 23 of the end-member and the end of the annular flange 25 are preferably carefully turned down in a lathe so that the end-ring 31 is accurately centered relatively to the axis of rotation. The conductors are separated from the cylindrical portion 32 of the ring by insulation 34, and the straps 30 and outer ends of the conductors are sepa-

rated from the inwardly extending portion 33 of the end-ring by insulation 35. The end-ring 31 in this case is held in position and prevented from moving endwise by a nut 36 having a screw-threaded portion 37 engaging a suitably threaded inner side of the outer end of the inner annular flange 25. The nut is provided with an outwardly extending flange or shoulder 38 engaging a notched or undercut portion of the inwardly extending portion 33 of the end-ring. It is not essential that the flanges 24 and 25 be cylindrical, as they may be conical or inclined, particularly the outer shoulder or bracket 24.

The end-member 16 is provided with a slotted flange 39 through which the conductors pass and with a cylindrical or annular bracket 40, which supports the ends 22 of the conductors which extend beyond the commutator end of the core, insulation 41 being inserted between the conductors and the shoulder. The bracket 40 is provided on its inner side with a threaded flange or shoulder 42 and with a second shoulder 43.

Surrounding the projecting ends of the conductors 22 and separated therefrom by insulation 44 is a ring 45 which serves the same purpose as the ring 31 at the opposite end of the machine. The inner edge of the ring engages a notch or groove in the flange 39 of the end-member. On account of the inwardly extending commutator leads the outer portion of the ring can not be supported and centered as is the ring 31 at the opposite end of the armature. For this purpose I provide just within the commutator leads 12^a, a centering and supporting ring 46 which fits tightly within the shoulder 43 of the annular bracket 40 and is provided at its periphery with teeth 47 which extend outward between and beyond the conductors 22. The teeth engage a shoulder 48 on the inner surface of the ring and thus not only center and support the latter, but also prevent its endwise displacement. The ring 46 is held in position against the flanges or shoulders 42 and 43 by a nut 49 which engages a threaded portion of the flange 42 and is provided with a shoulder 50 which engages a recessed or notched portion of the ring 46. The inner side of the outer end of the ring 45 is threaded to receive a nut 51 for forcing the ends 22 of the main conductors in a direction parallel to the axis of the machine. This nut also protects the coils and leads, particularly the joints between said parts, preventing the collection of dirt or dust and a possible short circuit. The main conductors and the commutator leads 12^a are separated from the ring 45, ring 46 and nut 51 by insulation 52, 53, 54 and 55. With this construction access can be had to the connections between

the coils and commutator leads without first removing the end ring. Also the connections can be made after the ring is in position. These are important advantages. While I have shown the centering and supporting ring 46 clamped to the bracket 40 by a nut 49, I do not wish to be confined to such an arrangement as the ring 46 may be supported in any other desired manner. For example it may be supported directly upon the shaft between the end member 16 and the commutator leads 12^a.

In Fig. 4 I have shown a modification of the structure at the commutator-end of the machine. In this instance the coils 22 are surrounded by a ring 45^a having integral teeth or fingers 47^a which extend inwardly between the coils. The inner ends of the teeth are engaged by a nut 49^a which is mounted on a threaded portion of the flange 42^a of the annular bracket 40^a. Thus by means of the teeth or fingers and the nut the end-ring is supported, centered and retained in position.

It is seen that all the parts of the armature, particularly the parts which extend beyond the ends of the core, are fully protected both against displacement by the action of centrifugal force and from injury. Also the protecting rings are well supported and centered.

I do not wish to be confined to the exact details shown as many changes can be made without departing from the spirit and scope of my invention, and I aim in my claims to cover all such changes.

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

1. In a dynamo-electric machine, a core, conductors carried thereby and having end-turns projecting beyond the same, a bracket supporting said end-turns and having a portion projecting beyond the latter, an annular member surrounding said end-turns and having an inwardly extending portion, and means for retaining said annular member in position comprising a threaded nut engaging said bracket and said inwardly extending portion of the annular member, said inwardly extending portion engaging and being centered on the outer surface of said projecting portion of the bracket.

2. In a dynamo-electric machine, a core, conductors carried thereby and projecting beyond the end thereof, a bracket on which said projecting portions of the conductors are supported, said bracket having a portion projecting outwardly beyond the conductors, an annular member surrounding the conductors, said member consisting of a cylindrical portion and an inwardly extending portion which engages and is centered on the outer surface of said outwardly projecting portion of the bracket, and means for retaining said conductors in position com-

prising a threaded ring or nut engaging the outer end of the bracket and said inwardly extending portion of said annular member.

3. In the rotor of a dynamo-electric machine, a core, conductors carried by the core and projecting beyond the ends thereof, an end member supporting the projecting ends of said conductor at one end of the core, said member having an annular recess or pocket, conductors located in said recess or pocket, an annular member surrounding the ends of the conductors and having a portion extending inwardly over the ends of the conductors and over said recess or pocket, and means engaging said inwardly extending portion of the annular member and serving to draw the latter inwardly so as to hold the conductors firmly in position.

4. In the rotor of a dynamo-electric machine, a core, conductors carried by the core and projecting beyond the end thereof, an end member supporting the projecting ends of the conductors, said end member having a portion projecting beyond the conductors and having also an annular recess or pocket, cross connectors located in said recess or pocket, a coil protecting ring surrounding the projecting portions of the conductors and having a portion extending inwardly and resting upon said portion of the end member which projects beyond the conductors, and a nut threaded on the end member and engaging said inwardly projecting portion of the ring.

5. In a rotor of a dynamo-electric machine, a core, conductors carried by said core and projecting beyond the ends thereof, an end-member supporting the projecting ends of said conductors at one end of the core, said end-member having an annular recess or pocket, equi-potential cross-connectors located in said recess or pocket, a ring surrounding the projecting ends of said conductors and means for retaining said ring in position comprising a nut engaging said end-member and ring.

6. In an armature, a core, conductors carried by the core and extending beyond the end thereof, a member at the end of the core, said member having two concentric annular flanges, the outer flange supporting the projecting portions of the conductors, and the inner flange extending outwardly beyond the ends of the conductors, cross connectors located between said flanges and connected to said conductors, and an annular member surrounding the projecting portions of the conductors and having a portion extending inwardly over the ends of the conductors and engaging the outer surface of the inner flange.

7. In a dynamo-electric machine, an armature core, armature conductors extending beyond the end of the core, a bracket supporting the projecting portions of the coils, a

commutator, commutator leads connecting the armature conductors and commutator bars, a ring surrounding the projecting portions of the conductors, means for centering the ring comprising a member having radial teeth projecting between the conductors, and means for securing said member to the bracket.

8. In a dynamo-electric machine, an armature core, armature conductors extending beyond the end of the core, an inner support for the conductors, a ring surrounding the conductors, and means for retaining said ring in position comprising a plurality of members extending between the conductors and a nut engaging the support.

9. In a dynamo-electric machine, an armature core, conductors carried thereby and projecting beyond the end thereof, a bracket at the end of the core and supporting the projecting portions of the conductors, an annular member surrounding the projecting portions of the conductors, means for retaining said annular member in position comprising a member having teeth extending between the conductors and a nut clamping said toothed member to the bracket.

10. In a dynamo-electric machine, an armature core, conductors extending outwardly beyond the ends of the core, a bracket at the end of the core and supporting the projecting portions of the conductors, a commutator, commutator leads connecting the conductors to the commutator bars, a ring surrounding the projecting portions of the conductors and having a shoulder, and means for centering and retaining the ring in position comprising a plurality of teeth extending outwardly between the projecting portions of the conductors and engaged by said shoulder on the ring.

11. In a dynamo-electric machine, an armature core, conductors carried by the core and projecting beyond the end thereof, an annular member at the end of the core and supporting the projecting portions of the conductors, a commutator, commutator leads connecting the conductor to the commutator bars, a ring surrounding the projecting portions of the conductors, said ring having a shoulder on its inner surface and having a portion extending beyond the ends of the conductors, means for retaining said ring in position comprising a member having teeth which extend outwardly between the projecting portions of the conductors and are engaged by said shoulder, and means for supporting and retaining in position said toothed member.

12. In a dynamo-electric machine, an armature core, conductors carried by the core and projecting beyond the end thereof, an annular member at the end of the core and supporting the projecting portions of the conductors, a commutator, commutator leads

connecting the projecting portions of the conductors to the commutator bars, a ring surrounding the projecting portions of the conductors, and means for supporting said
5 ring comprising a member located at the outer end of the annular member which supports the conductors and having teeth which project radially outwardly beyond the projecting portions of the conductors, and
10 means for securing said toothed member to said annular member.

13. In a dynamo-electric machine, an armature core, conductors extending beyond the ends of the core, an end-member for sup-
15 porting the projecting portions of the conductors at one end of the machine, a ring surrounding said projecting portions, and means for securing the ring in position comprising a second ring having fingers or
20 teeth which extend between and beyond the conductors and means for holding said second ring in engagement with said end member.

14. In a dynamo-electric machine, a rotary member comprising a core, conductors
25 carried by said core and extending beyond the end thereof, an end-ring surrounding the projecting portions of the conductors, said ring being internally threaded, and a
30 nut engaging the threaded portion of the

ring for protecting the ends of the coils and for forcing said conductors in a direction parallel to the axis of the machine.

15. In a dynamo-electric machine, an armature comprising a core and coils, said
35 coils projecting beyond the core, an end-ring surrounding the projecting portions of said coils, commutator leads extending from said coils, and a nut on said end-ring and engaging the ends of the coils and the com-
40 mutator leads.

16. In a dynamo-electric machine, an armature comprising a core, coils carried by said core and projecting beyond each end
45 thereof, a bracket at each end of the core supporting the projecting portions of the coils, a commutator, commutator leads connected to the projecting portions of the coils at one end of the core, a ring surround-
50 ing the projecting portions of the coils at each end of the core, and means for securing the rings in position comprising clamping nuts engaging the brackets.

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

ALFRED H. WOUTERS.

Witnesses:

ARTHUR F. KWIS,
GEO. B. SCHLEY.