B. A. BEHREND.

DYNAMO ELECTRIC MACHINE.

APPLICATION FILED NOV. 27, 1905.

940,632.

Patented Nov. 16, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

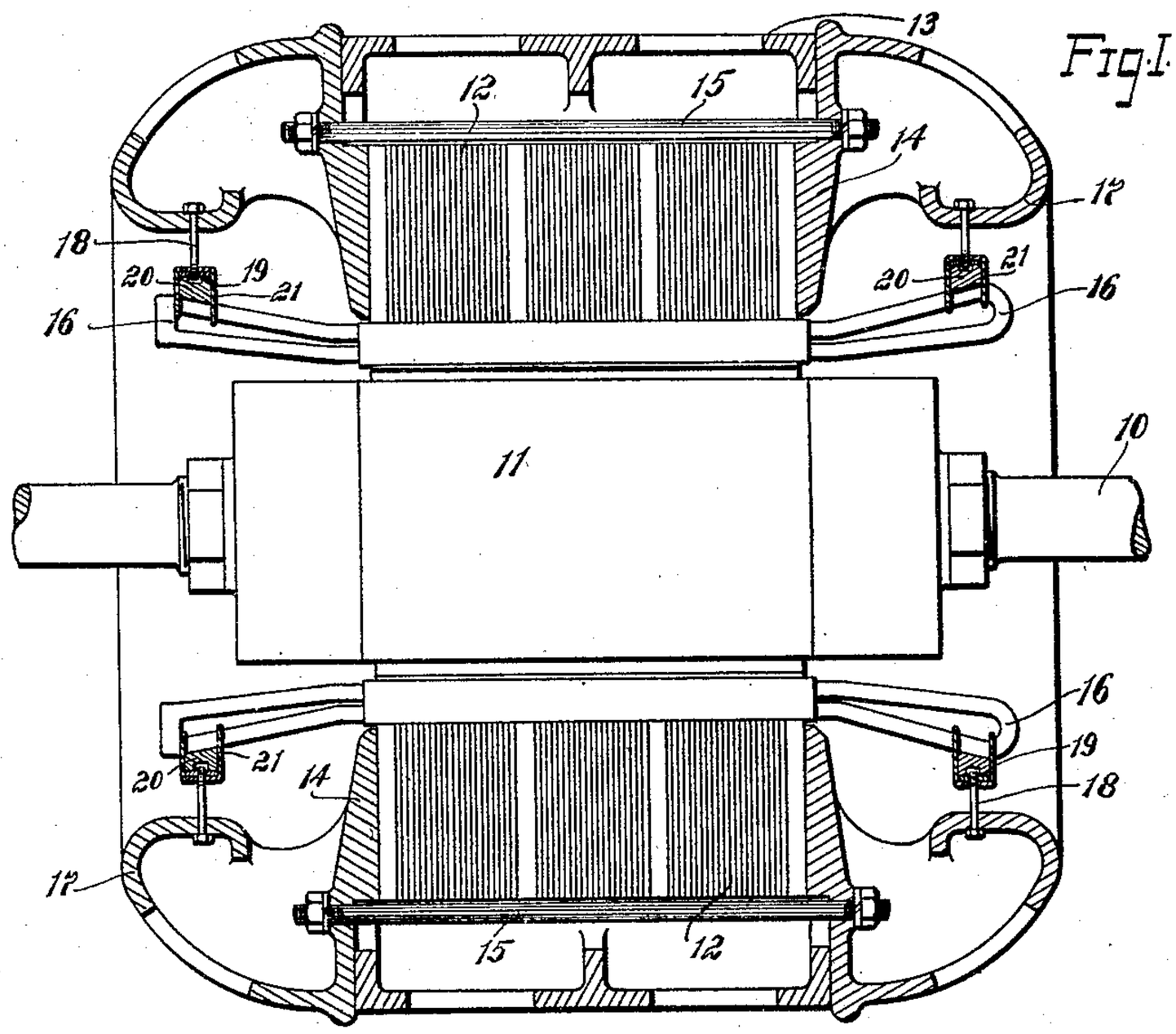
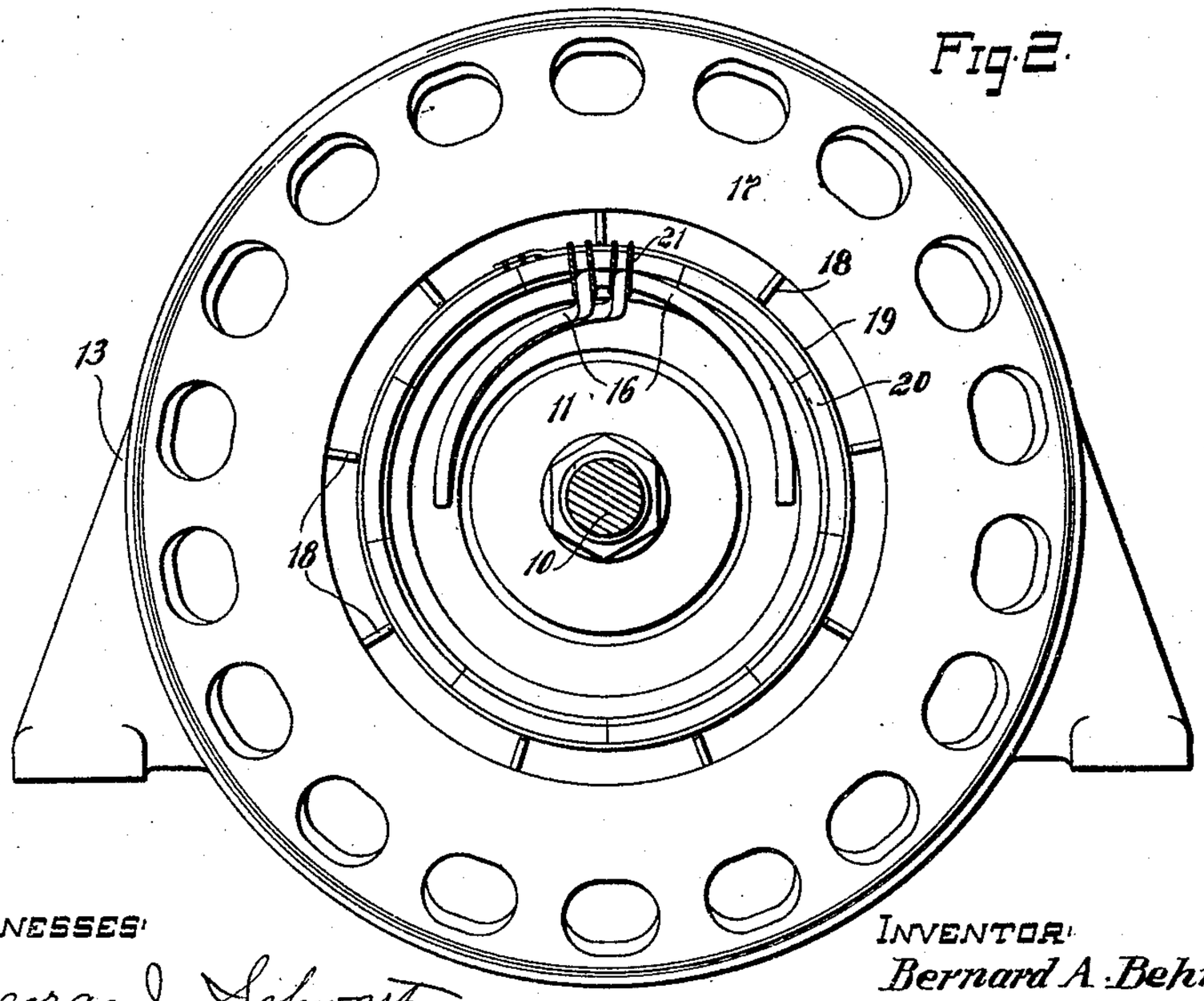


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

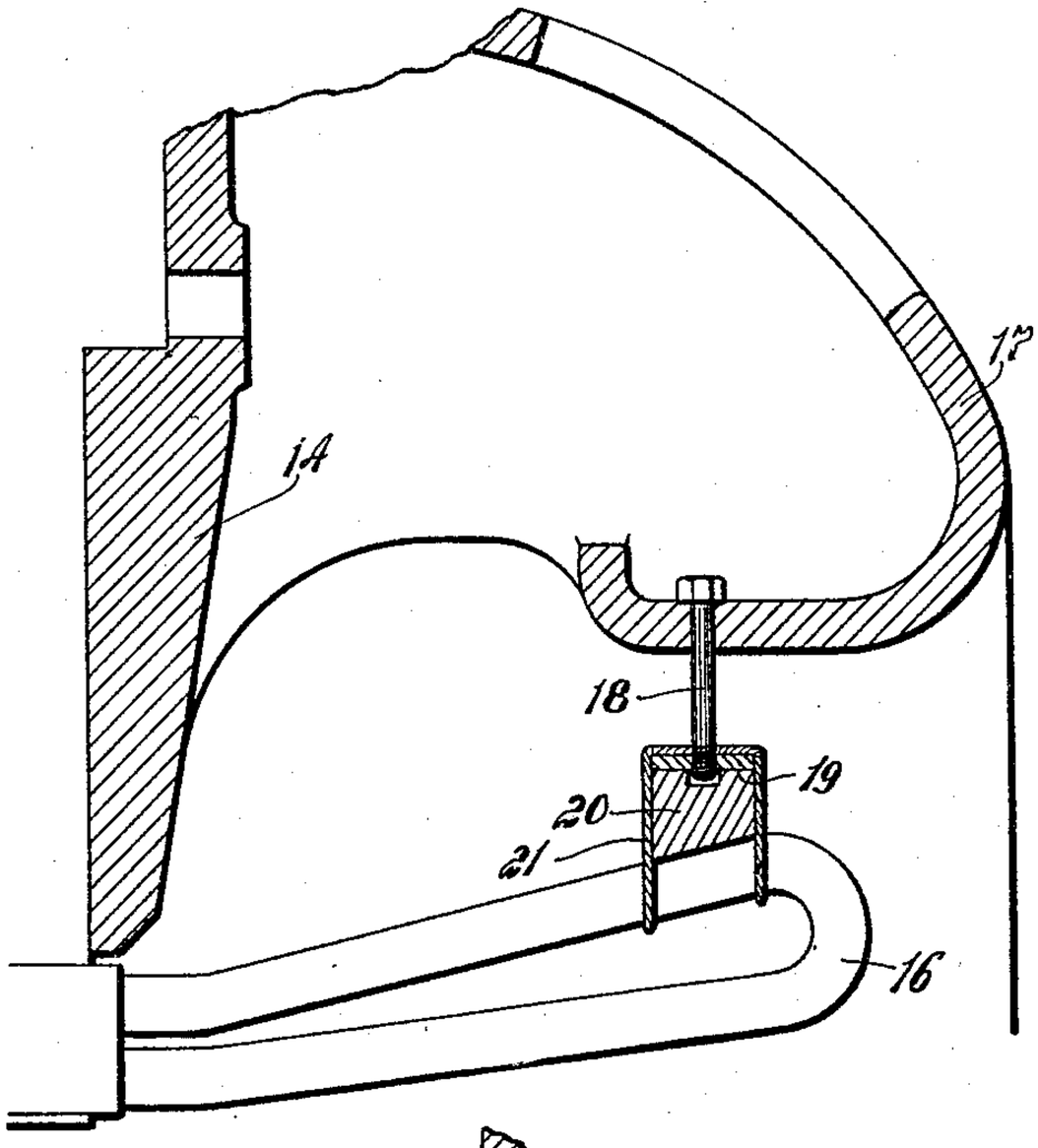


Fig. 4.

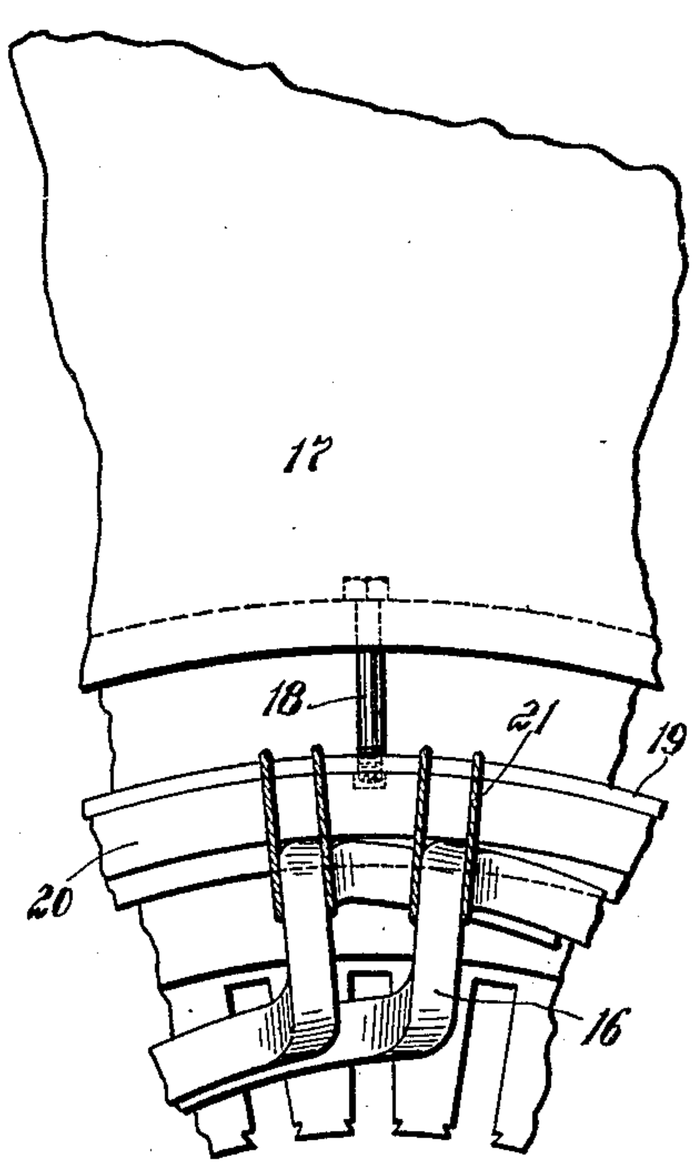
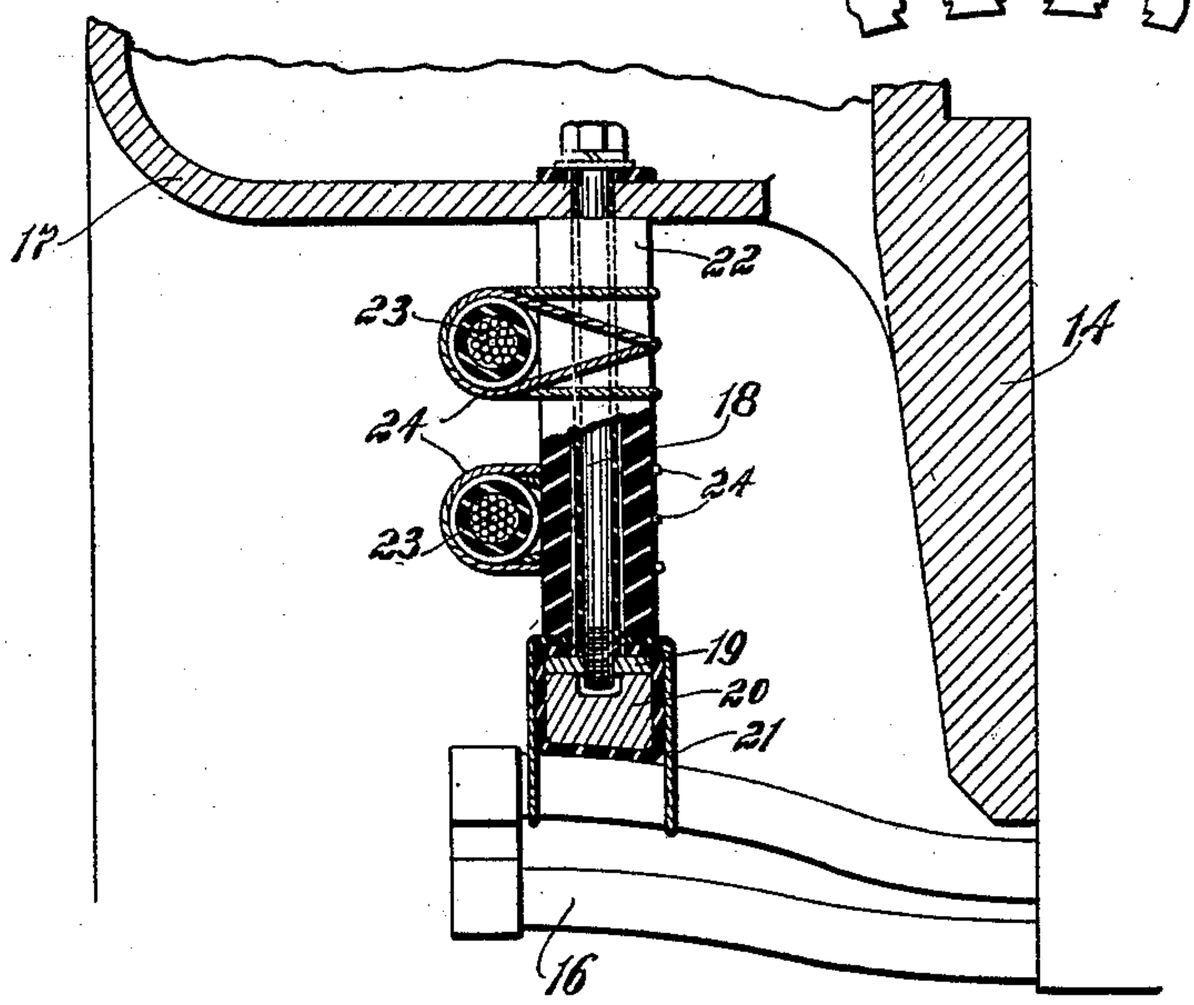


Fig. 5.



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UNITED STATES PATENT OFFICE.

BERNARD ARTHUR BEHREND, OF NORWOOD, OHIO, ASSIGNOR TO ALLIS-CHALMERS COMPANY, A CORPORATION OF NEW JERSEY, AND THE BULLOCK ELECTRIC MANUFACTURING COMPANY, A CORPORATION OF OHIO.

DYNAMO-ELECTRIC MACHINE.

940,632. Specification of Letters Patent. Patented Nov. 16, 1909.

Application filed November 27, 1905. Serial No. 289,221.

To all whom it may concern:

Be it known that I, BERNARD ARTHUR 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 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 supporting and holding in position the end-turns of the stator coils.

In a large multiphase generator of the rotating field type as ordinarily constructed, the outer ends of the armature coils are left unsupported. Between adjacent coil end-turns there exist magnetic actions due to the fields enveloping said end-turns. Under ordinary working conditions the magnetic actions are not sufficient to cause any damage. However, it has been found that if the armature is accidentally short circuited said magnetic fields become so great and the magnetic actions between the adjacent coil end-turns are so intensified as to distort and twist the end-turns out of place, causing considerable damage. The object of my invention is to so support and hold the end-turns of the coils that this danger of injury to the coils due to the magnetic actions, in case of accidental short circuit of the armature, will be avoided.

In carrying out my invention, I provide a support for the end turns of the coils of the armature winding, which is preferably a distributed winding, and separately or independently secure each coil to the support by some means such as binding tape or cord.

More specifically considered, my invention consists of a dynamo-electric machine having a stationary member comprising an armature core, a supporting frame and end-shields or end-bells, armature coils having end-turns extending beyond the core, bolts extending radially from each end-shield, an end-turn supporting ring secured to the inner ends of the bolts of each end-shield, and means for fastening the end-turns to the supporting rings, whereby all danger of displacement of the end-turns is avoided.

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

Reference is had to the accompanying drawings in which—

Figure 1 is a longitudinal sectional elevation of a large turbo-alternator provided with my invention; Fig. 2 is an end view of the same only two of the armature coils however being shown; Fig. 3 is an enlarged detail of the end-turn supports shown in Fig. 1; Fig. 4 is an enlarged detailed end-view of the support and Fig. 5 illustrates a slightly modified form of my invention.

Referring to the figures of the drawing I have shown at 10 a shaft carrying the ordinary rotating field 11 of a turbo-generator. The stator comprises a slotted core 12 consisting of groups of laminæ held to the frame 13 and to the end-heads 14 by horizontal bolts 15. The armature winding is in this case an ordinary distributed winding held into the slots of the core in any suitable manner and provided with end-turns or portions 16 which project beyond the core. End-shields or end-bells 17, in this case integral with the end-heads 14, surround the end-turns. As the machines are ordinarily constructed these end-turns are left unsupported. It has been found however that in case the armature is short circuited that the end-turns will be twisted or distorted out of their normal positions, due to the interactions of the intense fields surrounding the adjacent armature coils. In order that this danger of injury to the coils may be avoided I support the end-turns and hold them in relatively fixed position in such a manner that all danger of displacement in case of short circuit is practically eliminated.

The end-shields 17 are each provided with curved inwardly extending portions. Extending radially from the curved portion of each end-shield 17 are a number of bolts 18 arranged at intervals around the entire shield. These bolts are threaded at their inner ends and are screwed into and support an iron ring 19. Mounted on the inner surface of the iron ring is a wooden ring 20 built up preferably of a number of sections. As shown in the drawings the end-turns 16 rest against the inner surface of the wooden ring and each turn is bound to the wooden and iron rings by cord, wire or tape 21, or any other suitable flexible binding material.

In Fig. 5 the bolts 18, in addition to supporting the rings and the end-turns, support

the ordinary end connectors, which connect the different poles of each phase. The bolts are shown as insulated by tubes 22. Two cross connectors are shown at 23 bound to the insulating tubes 22, by cord or wire 24. It is to be understood that as many cross connectors as desired may be supported in the manner shown.

It will be seen that the end-turns of the coils will be effectively held in position and that displacement will be impossible. The construction is simple and the parts can be easily assembled or removed when desired.

I do not wish to be confined to the details of construction, but my invention is susceptible of considerable modification. I aim in the appended claims to cover 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 stationary armature comprising a core, a distributed armature winding comprising coils having portions projecting beyond the core, a stationary supporting member for the projecting portions of the coils, and separate means fastening each coil independently to said supporting member.

2. In a dynamo-electric machine, a stationary armature, armature coils having end-turns extending beyond the ends of the armature core, end heads and shields, supports for the end-turns secured to the end shields, and means engaging the end-turns and the supports for securing the end-turns to the supports.

3. In a dynamo-electric machine, a stationary armature comprising a core and supporting frame, a distributed armature winding comprising coils having end-turns extending beyond the core, a supporting ring for the end-turns, and means binding the end-turns to the supporting ring.

4. In a dynamo-electric machine, a stationary armature comprising a core, a distributed armature winding comprising coils having end-turns extending beyond the core, an end-turn supporting ring, and means for fastening each end-turn separately and independently to the ring.

5. In a dynamo-electric machine, a stationary armature comprising a core, a core supporting frame, a distributed armature winding comprising coils having end-turns extending beyond said core, supporting rings for the end-turns secured to the frame of the machine, and means engaging the rings and end-turns for fastening said end-turns to the supporting rings.

6. In a dynamo-electric machine, a stationary armature and supporting frame therefor, armature coils having end-turns extending beyond the core, an overhanging shield or bell at each end of the frame, a coil end-turn supporting ring secured at intervals to each end-shield or bell, and means for fastening each end-turn independently to a supporting ring.

7. In a dynamo-electric machine, a stationary armature comprising a core and supporting frame, end-shields or bells, armature coils having end-turns, radial bolts extending at intervals from each of said end-shields, a ring supported on the inner ends of the bolts extending from each end-shield, and means for binding the end-turns to said rings.

8. In a dynamo-electric machine, a stationary member comprising an armature core, a supporting frame and end-shields or bells, armature coils having end-turns extending beyond the core, bolts extending radially from each end-shield, an end-turn supporting ring secured to the inner ends of the bolts of each end-shield, means for fastening said end-turns to the supporting rings, and end connectors supported on said radial bolts.

9. In an alternating current dynamo-electric machine, a core and an end member, armature coils having end-turns, connectors between the coils of the poles of each phase, and insulated bolts mounted on the end member for supporting the end-turns and end-connectors.

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

BERNARD ARTHUR BEHREND.

Witnesses:

LAURA E. WELCH,

ARTHUR F. KWIS.