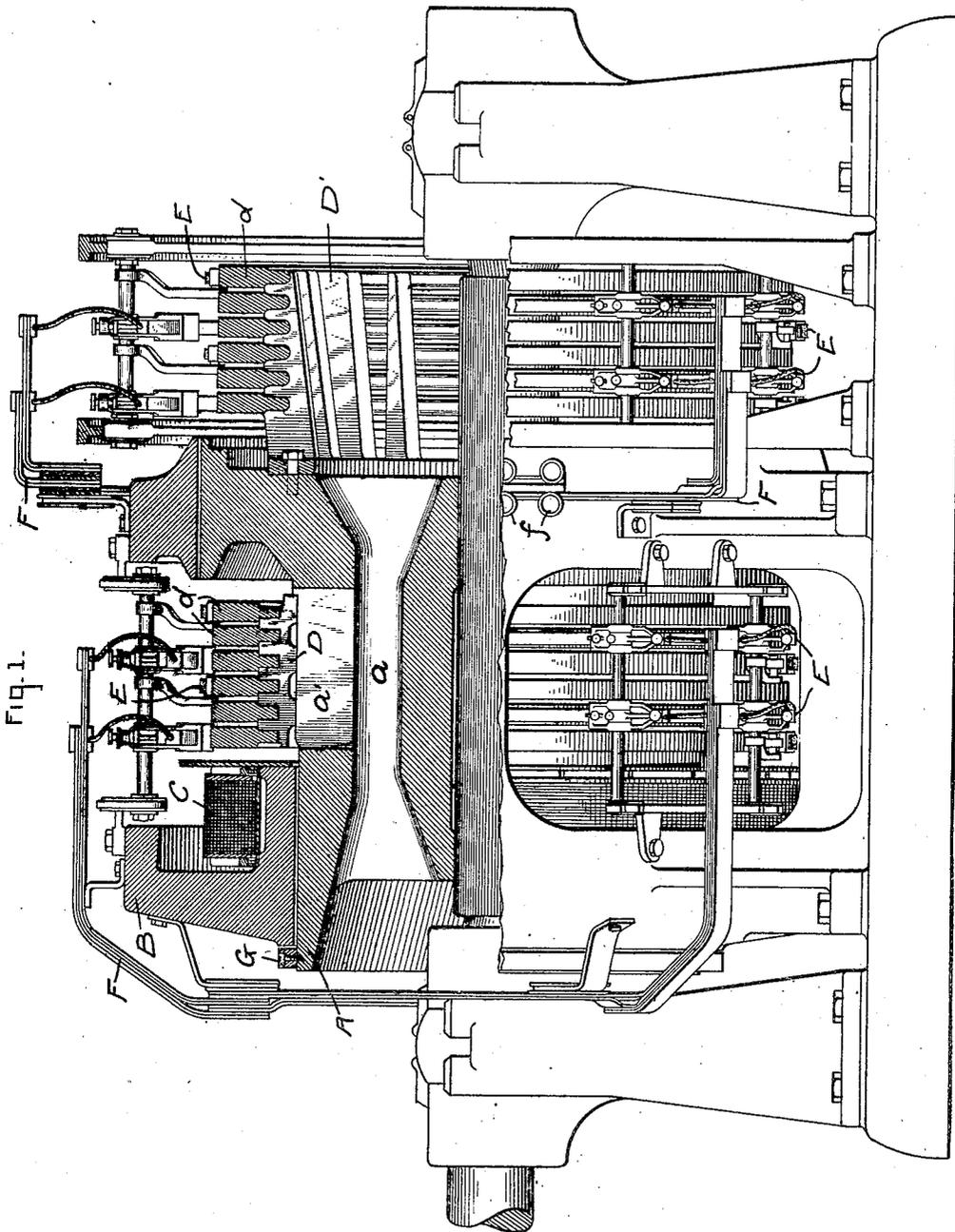


J. E. NOEGGERATH.
DYNAMO ELECTRIC MACHINE.
APPLICATION FILED JUNE 1, 1908.

937,462.

Patented Oct. 19, 1909.

2 SHEETS—SHEET 1.



WITNESSES

M. Ray Taylor
J. Ellis Ellis.

INVENTOR
JAKOB E. NOEGGERATH.

BY *Albert S. Dand*

ATTY

UNITED STATES PATENT OFFICE.

JAKOB E. NOEGGERATH, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

DYNAMO-ELECTRIC MACHINE.

937,462.

Specification of Letters Patent.

Patented Oct. 19, 1909.

Application filed June 1, 1908. Serial No. 435,857.

To all whom it may concern:

Be it known that I, JAKOB E. NOEGGERATH, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a specification.

My invention relates to dynamo-electric machines, and in certain of its aspects relates specifically to unipolar machines, but in other aspects it is limited only to machines having certain characteristics which, while ordinarily found in unipolar machines, are sometimes present in machines of other types.

One feature of my invention relates to the collector-rings of the machine. Where large currents are to be collected, as, for instance, in low-voltage unipolar machines, it is ordinarily desirable to employ sets of collector rings, the several rings of each set being in electrical connection with each other.

One feature of my invention consists in forming a set of collector rings out of a single casting, which is cut in such a manner as to form a plurality of rings separated by air-spaces. The casting is preferably formed with interior radial webs which serve to unite the collector rings mechanically, and also act as vanes to force air through the spaces between the collector rings when the machine is running. The armature is so formed as to permit a free flow of air to the rings.

Another feature of my invention relates to means for balancing end thrusts, due to an unsymmetrical arrangement of the field magnet. In small unipolar machines, particularly, it is sometimes cheaper to employ an unsymmetrical arrangement of the field magnet with a single field coil, rather than a symmetrical arrangement which ordinarily requires two field coils. In such a case, an end-pull on the armature is likely to be produced. One feature of my invention consists in providing means for balancing this end-pull consisting of a mass of magnetic material, as, for instance, a steel ring surrounding the end of the armature, and adapted to be attracted in an axial direction by the flux of the field magnet.

Still another feature of my invention consists in means for reducing or removing the stray field from a part of the machine. A

machine having a winding concentric with the shaft is likely to produce a strong stray field at its ends, which may injuriously affect an engine coupled to the machine or other apparatus close to the machine.

One feature of my invention consists in providing a conductor in circuit with the armature, and so arranged that the armature current flowing through it produces a magneto-motive force neutralizing the stray flux of the field magnet at that point.

My invention will best be understood by reference to the accompanying drawings, in which—

Figure 1 shows a side elevation, partly in cross-section, of a unipolar machine arranged in accordance with my invention; Fig. 2 shows a detail of the means for balancing end-pulls; Figs. 3 and 4 are detail views of one set of collector rings; and Fig. 5 is an end-elevation of the machine.

Referring first to Fig. 1, A represents the armature, and B the field magnet of a unipolar machine. C represents the field winding, which comprises a single coil concentric with the armature. The flux produced by this coil passes into and out of the armature through the two air gaps shown. The armature carries two sets of collector rings, which are formed out of two castings D and D', in electrical contact with the body of the armature. Each casting is cut or slotted circumferentially, so as to form a plurality of collector rings *d*. The uncut portions of the casting form internal radial webs, as is best shown in Fig. 4, which webs serve both to unite the rings *d* mechanically, and to act as the vanes of a blower for forcing air through the spaces between the collector rings. The casting D is mounted near the center of the armature between the two air gaps of the machine, and the armature is provided with passages or tunnels *a*, extending in an axial direction, and radial holes or passages *a'* extending from the passages *a* outward to the surface of the armature. Through these passages a free flow of air to the collector rings is produced by the blower action of the webs of casting D when the machine is in motion. The other casting D' is bolted to the end of the armature and forms in effect an overhanging flange. It will be understood that the current of the machine is generated in the body of the armature, itself, between the two sets of collector rings, and

is led off through the rings; all the collector rings of each set, of course, being electrically as well as mechanically connected by the interior webs. The collector-ring arrangement shown, is thus adapted for a low-voltage high-current machine. For leading off the current induced in the armature, brushes E are provided mounted on suitable studs and connected to the conductors or bus-bars F, which serve to connect together all the brushes on each set of collector rings, and to connect the two sets of brushes to the terminals of the external circuit. At the end of the machine, adjacent to the field coil C, the conductor F is led circumferentially nearly around the machine, as is shown in Fig. 5. The connections from the brushes to the conductor F are distributed, these connections being shown at f^1 , f^2 and f^3 . The connection to the external circuit, however, is made at f , near one end of the conductor F. The result is that the current flowing from the brushes through conductor F flows in a general circumferential direction, and consequently induces a magnetic force along the axis of the machine. This magnetomotive force opposes and tends to neutralize the stray field which would otherwise be produced at the end of the machine by the field winding C. The field magnet is provided with large holes, affording free access to the brushes bearing on the casting D.

It will be seen, from Fig. 1, that the field magnet is not symmetrical with respect to the armature. With the construction shown, there is a tendency for the field winding to pull the armature to the left. To counter-balance this pull I provide a ring G of iron or steel, surrounding the end of the armature close to the field magnet. The flux passing from the field magnet into this ring produces a pull on it tending to move the armature to the right. This pull neutralizes the pull on the armature itself. The position of ring G is preferably made adjustable in an axial direction. A convenient arrangement for doing this is indicated in Fig. 2, in which the armature is provided with a plurality of holes g at varying distances from its end, into which holes the screws or bolts holding ring G may enter.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In a dynamo-electric machine, a revolving armature having collector rings, a plurality of said rings comprising a set formed of a single casting in electrical contact with the body of the armature.

2. In a dynamo-electric machine, in combination with the armature, a casting in electrical contact with the armature slotted to form a plurality of collector rings, separated by air spaces.

3. In a dynamo-electric machine, in combination with the armature, a casting carried

by the armature and slotted to form a plurality of collector rings separated by air spaces, and having internal radial webs mechanically uniting the rings and serving in operation to force air through the spaces between the rings.

4. In a dynamo-electric machine, in combination with the armature, a casting carried by the armature and slotted to form a plurality of collector rings separated by air spaces, the body of said armature being formed with passages adapted to permit a free flow of air outwardly through the spaces between said rings.

5. In a dynamo-electric machine, in combination with the armature, a casting carried by the armature and slotted to form a plurality of collector rings separated by air spaces, and having internal radial webs mechanically uniting the rings and serving in operation to force air through the spaces between the rings, the body of said armature being formed with passages adapted to permit a free flow of air to the spaces between said webs.

6. In a dynamo-electric machine, a revolving armature, a field magnet unsymmetrical with respect to the armature, whereby an end-pull is produced on the armature, and a mass of magnetic material carried by the armature in position to be attracted by the field flux so as to counter-balance the end-pull on the armature itself.

7. In a dynamo-electric machine, a revolving armature, a field magnet unsymmetrical with respect to the armature, whereby an end-pull is produced on the armature, and a mass of magnetic material carried by the armature in position to be attracted by the field flux so as to counter-balance the end-pull on the armature itself, said mass being adjustable in position to vary the attraction thereon of the field flux.

8. In a dynamo-electric machine, a revolving armature, a field magnet having a winding concentric with the armature and unsymmetrically arranged with respect thereto, whereby an end-pull is produced on the armature, and a magnetic ring surrounding the armature in position to be attracted axially by the field flux.

9. In a dynamo-electric machine, a revolving armature, a field magnet having a winding concentric with the armature and unsymmetrically arranged with respect thereto, whereby an end-pull is produced on the armature, and a magnetic ring surrounding the armature in position to be attracted axially by the field flux, said ring being axially adjustable in position.

10. In a dynamo-electric machine, a revolving armature, a field magnet having a winding concentric with the armature, means for collecting the current induced in the armature, a stationary conductor located

near the end of the machine and extending in a circumferential direction nearly around the machine, a connection from a point near one end of said conductor to an external circuit, and a connection from a point near the other end of said conductor to certain of said current collecting means whereby the current collected thereby flows through the greater part of said conductor and produces an axial magneto-motive force opposing the stray field of the field magnet.

11. In a unipolar dynamo-electric machine, a revolving armature, a field magnet having a winding concentric with the armature, means for collecting the current induced in the armature, a stationary conductor located near the end of the machine and extending in a circumferential direction nearly around the machine, connections from a plurality of separated points on said conductor to said collecting means, and a connection from a point near one end of said conductor to the external circuit.

12. In a unipolar dynamo-electric machine, a revolving armature having an overhanging flange at one end, said flange being slotted to form a plurality of collector rings separated by air spaces.

13. In a unipolar dynamo-electric machine, a revolving armature, and a casting surrounding the central portion of the armature and slotted to form a plurality of col-

lector rings separated by air spaces, the armature being provided with passages adapted to permit the flow of air through the armature body to said rings.

14. In a unipolar dynamo-electric machine, a revolving armature having an overhanging flange at one end, said flange being slotted to form a plurality of collector rings separated by air spaces and having interior radial webs mechanically uniting said rings and acting to force air between the rings in operation.

15. In a unipolar dynamo-electric machine, a revolving armature, and a casting surrounding the central portion of the armature and slotted to form a plurality of collector rings separated by air spaces, the armature being provided with passages adapted to permit the flow of air through the armature body to said rings, and said casting having interior radial webs in engagement with the periphery of the armature serving to unite said rings mechanically and to force air between said rings in operation.

In witness whereof, I have hereunto set my hand this 29th day of May 1908.

JAKOB E. NOEGGERATH.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.