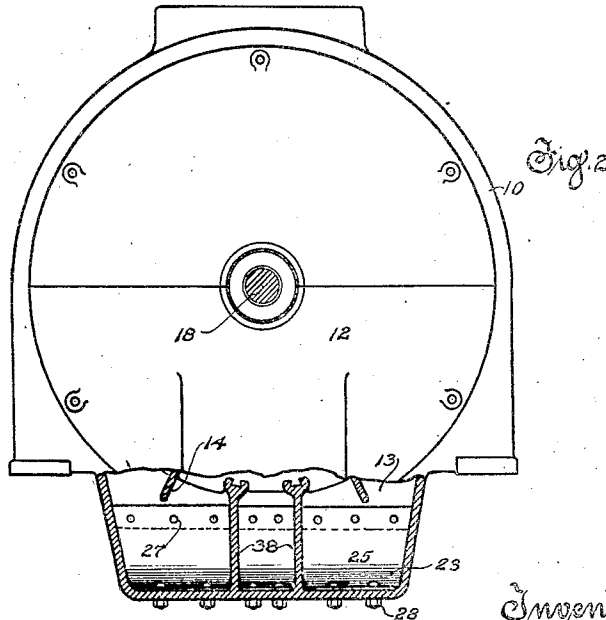
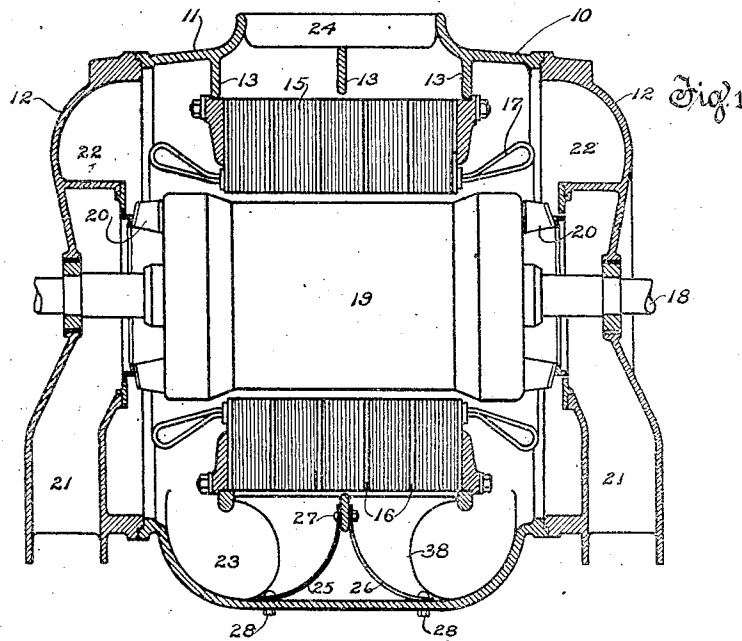


R. B. WILLIAMSON.
DYNAMO ELECTRIC MACHINE.
APPLICATION FILED OCT. 6, 1909.

1,080,556.

Patented June 25, 1912.

2 SHEETS-SHEET 1.



Witnesses

John L. Johnson

Chas. L. Byron

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Robert B. Williamson

By Chas. E. Long
Attorneys

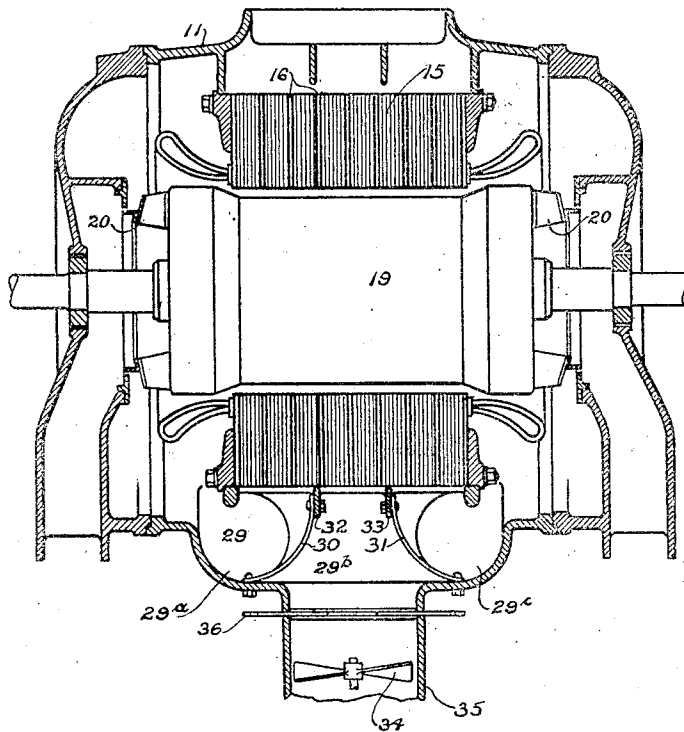
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2 SHEETS-SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

ROBERT B. WILLIAMSON, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO ALLIS-CHALMERS COMPANY, A CORPORATION OF NEW JERSEY.

DYNAMO-ELECTRIC MACHINE.

1,030,556.

Specification of Letters Patent.

Patented June 25, 1912.

Application filed October 6, 1909. Serial No. 521,384.

To all whom it may concern:

Be it known that I, ROBERT B. WILLIAMSON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Dynamo-Electric Machines, of which the following is a full, clear, and exact specification.

This invention relates to dynamo-electric machines and particularly to high speed turbo generators which are inclosed in housings for the purpose of securing good ventilation of the heated parts and to deaden the noise incident to high speeds of rotation.

In a well known type of inclosed turbo generator, air is drawn by fans or blowers on the ends of the rotor into the housing through suitable conduits at the ends thereof and is conducted to an air chamber at the bottom of the housing below the stator core, and then passes upwardly through the axially spaced passageways provided in the stator core so as to cool the latter. Although this construction and method of ventilation is very effective and answers the requirements generally it has been found that in some machines an insufficient volume of air is forced through the passageways near the middle of the stator core, causing at this part of the machine a higher temperature rise than at the ends, and this insufficient ventilation at the middle of the machine has been found to be due, in a large measure, to the fact that the streams or currents of air supplied by the blowers at opposite ends of the rotor and entering opposite sides of the air chamber provided at the bottom of the machine, act upon or oppose one another and cause a swirling or eddying action in the chamber, with the result that the air does not pass very readily and in a sufficient volume into the middle passageways of the core.

One of the objects of the present invention is to avoid the opposing action of the air entering opposite sides of the chamber, to eliminate the swirling and eddying of the air in the chamber, and to guide the air upwardly into the passageways of the stator core, so that a larger volume of air is forced through the middle passageways.

A further object is to provide means whereby a certain portion of the stator core,

in this case the middle portion, may be supplied with air independently of the blowers at the ends of the rotor, so that any desired volume of air may be caused to pass through the passageways near the middle of the stator and the temperature rise in this part of the core maintained as low or even lower than at the ends of the machine which may be cooled by air supplied by the blowers of the rotor.

In carrying out one part of my invention I provide in the air chamber, which, as stated before, is located at the bottom of the housing and receives the air from the blowers, air deflectors which not only prevent the air entering one side of the chamber acting on or opposing the air entering the opposite side but also guide the air upwardly so that it will pass readily into the passageways and the eddying and friction of the air in the chamber will be minimized.

In carrying out another part of my invention I provide means whereby certain portions of the stator core are cooled by air supplied by the blowers on the rotor and another portion, in this case the middle portion, is cooled by a source of air external to the machine. This is preferably accomplished by providing deflectors in the air chamber and arranging the same in a manner such that the chamber is divided into compartments, the two end compartments receiving the air from the blowers on the rotor and supplying the same to the passageways which communicate with said compartments, and the middle compartment being supplied with air from an external source and delivering the same into the passageways which communicate therewith. In this manner the middle of the machine as well as the ends can be cooled very effectively, and the temperature rise in no part of the machine will be excessive.

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

For a better understanding of my invention, reference is had to the accompanying sheets of drawings wherein—

Figure 1 is a vertical sectional view of a turbo-generator constructed in accordance with one form of my invention. Fig. 2 is an

end view of the same with the lower portion of the housing removed to show the inner construction. Fig. 3 is a vertical longitudinal sectional view showing a modification of my invention.

Referring now to the figures of the drawings, and first to Figs. 1 and 2, a housing 10 has been shown consisting of a middle portion 11, and end portions 12—12 secured thereto, the portion 11 having axially spaced inwardly extending circumferential ribs 13 and circumferentially spaced inwardly extending ribs 14 (see Fig. 2). Supported on the ribs of the portion 11 of the housing is an annular stator core 15 having a plurality of axially spaced circumferential ventilating passageways 16 and an armature winding 17. Extending through openings in the end portions 12—12 of the housing is a shaft 18 on which is mounted a rotor 19 provided at its ends with blowers 20—20. In the end portions 12 of the housing are air conduits 21—21 which extend upwardly about the shaft and are provided with annular openings adjacent the blowers arranged in a manner such that the latter draw the air from the conduits 21—21 into annular chambers 22—22 between the end portions 12—12 of the housing and the stator core. At the lower portion of the housing below the stator core and communicating with the different ventilating passageways 16 in the latter is an air chamber 23 which receives the air from the chambers 22 and supplies the same to the passageways 16 so as to cool the stator core, the air after passing through these passageways escaping from the housing through suitable outlet openings or chimney 24 provided at the top of the housing.

In the usual construction the air supplied by the blowers 20—20 at the opposite ends of the rotor enters opposite sides of the chamber 23 in a manner such that these streams of air oppose one another causing a swirling or eddying action in the chamber and by reason of the opposing action of the streams of air entering the chamber, one blower may supply more air than the other. To avoid this result and to guide the air upwardly toward the passageways, I provide in the chamber 23 curved air deflectors 25 and 26, which as shown in Figs. 1 and 2, are of sheet metal secured by bolts or rivets 27 to the lower portion of the middle circumferential rib 13 and by bolts or rivets 28 to the bottom wall of the chamber 23, though they may be cast integrally with the portion 11 of the housing. Inasmuch as the chamber 23 is divided longitudinally by ribs 28 as shown in Fig. 2, each of the deflectors 25 and 26 is formed in sections which are located between the ribs and between the latter and the side walls of the chamber. This provision of the deflectors has been found

by practice to improve materially the cooling action of the air supplied by the blowers, and in fact at the middle of the machine the temperature rise is many degrees less than if the deflectors are not provided.

In Fig. 3 I have shown a modification of my invention wherein the air supplied by the blowers at the ends of the rotor cool the end portions of the stator only, while the middle portion of the stator is cooled by air supplied by means external to the machine. In this case the stator, rotor and the main portion of the housing have the same construction as the corresponding parts shown in Figs. 1 and 2, the construction at the lower part of the housing only being varied, and it will be understood that the parts of Fig. 3 which are not specifically referred to are the same as those previously described. In this case, as in the preceding construction, I provide in the air chamber 29, which corresponds to the air chamber 23 shown in Figs. 1 and 2, curved deflectors 30 and 31 which, as here shown, are spaced apart dividing the air chamber 29 into three compartments 29^a, 29^b and 29^c, the compartment 29^b being in communication with several of the circumferentially spaced passageways 16 at the middle of the core and the compartments 29^a and 29^c communicating with the passageways 16 in the end portions of the stator core. In this case the deflectors are secured to two axially spaced circumferential ribs 32 and 33 and to the bottom of the chamber 29 in the same manner as previously described, though here too they may be cast integrally with the portion 11 of the housing. As will be apparent from this figure, the blower 20 at one end of the rotor supplies the air to the compartment 29^a and hence to the passageways 16 which communicate therewith, and the other blower at the opposite end of the rotor supplies the air to the compartment 29^c and to the passageways of the stator which communicate therewith, the streams or currents of air being guided upwardly by the deflectors, as in the first case, and the air supplied by one blower being prevented by the deflectors from opposing or in any way affecting the air supplied by the other blower. The middle compartment 29^b and the passageways of the core which communicate therewith instead of being supplied with air by the blowers on the rotor are supplied with air by a fan or blower 34 which may be driven independently of the rotor and in this case is located in a conduit 35 communicating with the compartment 29^b. It will be seen that with this arrangement any desired volume of air may be supplied to the middle portion of the stator core and the temperature rise in this portion of the core will be no greater and may be even less than the temperature rise in the end por-

tions. In order that the relative volumes of air supplied to the middle and end portions of the stator core may be controlled and varied at will, I provide in the conduit 5 35 suitable dampers 36, which may be adjusted so as to vary the effective air opening between the blower 34 and the compartment 29^b.

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 15 by Letters Patent is:—

1. In a dynamo-electric machine, a stator having axially spaced ventilating passageways, removable means for grouping said passageways, a rotor, fans or blowers on the 20 ends of the rotor for supplying air to the passageways in the end portions of the stator core, and means external to the machine for supplying air to the passageways at the middle portion of the stator core.

2. In a dynamo-electric machine, a stator having axially spaced circumferential passageways, removable deflectors for grouping said passageways, a rotor, blowers on the 25 ends of the rotor, a housing inclosing said stator and rotor and adapted to conduct the air from said blowers to the passageways in the end portions of the stator core, and means for supplying air from a source external to the machine to the passageways 30 in the middle portion of the stator core.

3. In a dynamo-electric machine, a stator having axially spaced circumferential ventilating passageways, a rotor having blowers at its ends, a housing inclosing the stator 35 and rotor and provided with an air chamber at the lower portion thereof, removable deflectors for dividing said chamber into compartments which communicate with different groups of ventilating passageways in the stator, the end compartments receiving the 40 air from said blowers, and means external to the machine for supplying air to the middle compartment.

4. In a dynamo-electric machine, a stator provided with axially spaced circumferential ventilating passageways, a rotor having 45 blowers at its ends, a housing inclosing the stator and rotor and provided with an air receiving chamber at the lower portion thereof, removable curved air deflectors in 50 said air chamber and dividing the same into

compartments, the end compartments receiving the air from the blowers on the ends of the rotor, and means external to the machine for supplying air to the middle 50 compartment.

5. In a dynamo-electric machine, a stator having axially spaced circumferential passageways, removably fixed means for grouping said passageways, a rotor provided at 55 its ends with fan blades, means for conducting the air from said fan blades to the passageways in the end portions of the stator, means external to the machine for supplying air to the passageways in the middle portion of the stator, and means for varying 60 the relative proportions of air supplied by said external means and by the fans on the rotor.

6. In a dynamo-electric machine, a stator 65 having axially spaced ventilating passageways, removable means for grouping said passageways, a rotor, and fans or blowers at the ends of the rotor for supplying air to the passageways in different portions of 70 the stator core.

7. In a dynamo-electric machine, a stator having axially spaced circumferential passageways, removable deflectors for grouping said passageways, a rotor, blowers on the 75 ends of the rotor, and a housing inclosing said stator and rotor and adapted to conduct the air from said blowers to the passageways in different portions of the stator core. 80

8. In a dynamo-electric machine, a stator having axially spaced circumferential ventilating passageways, a rotor having blowers at its ends, a housing inclosing the stator and rotor and provided with an air cham- 85 ber, and removable curved deflectors for dividing the chamber into compartments which communicate with different groups of ventilating passageways in the stator, the blowers at one end of the rotor supplying 90 ventilating air to one group of ventilating passageways and the blowers at the other end to another group of ventilating passageways. 95

Milwaukee, Wis., Sept. 10, 1909. 105

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

ROBERT B. WILLIAMSON.

Witnesses:

CHAS. L. BYRON,
ROB. E. STOLL.