Nov. 15, 1949 E. W. HUBSCHER 2,488,409

MOTOR VENTILATION

Filed Nov. 30, 1946

Fig. 1.

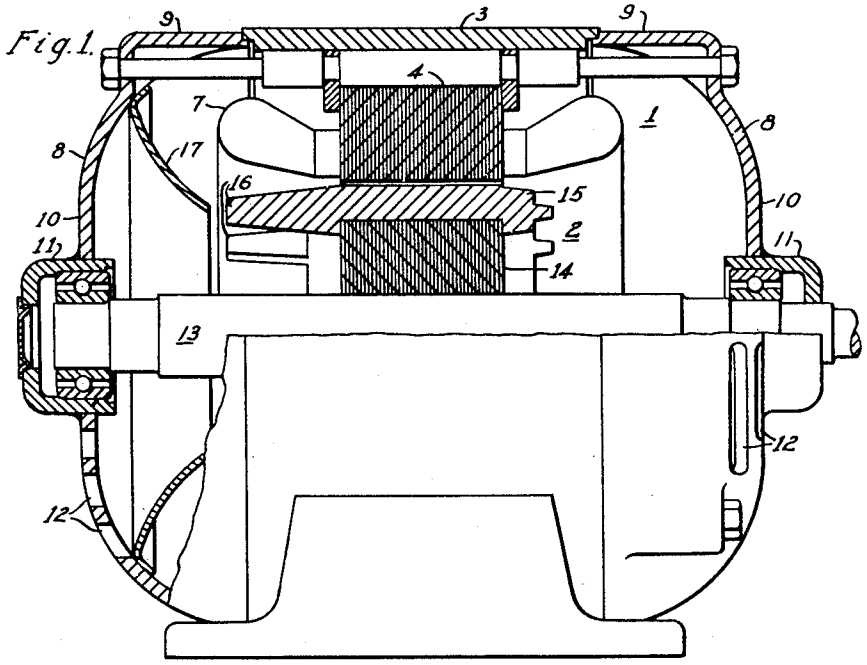
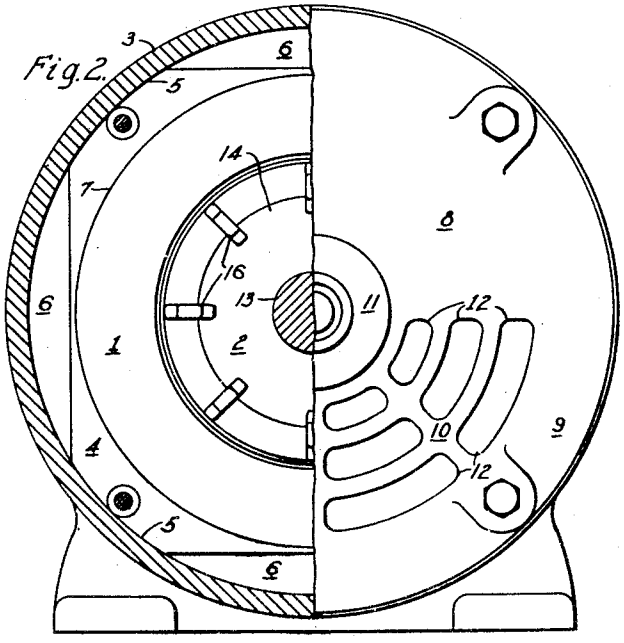


Fig. 2.



WITNESSES:

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Patented Nov. 15, 1949 2,488,409

UNITED STATES PATENT OFFICE

2,488,409

MOTOR VENTILATION

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Application November 30, 1946, Serial No. 713,272

1 Claim. (Cl. 172—36)

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My invention relates to an improved economical method and means for cooling dynamo-electric machines, and it has particular relation to the cooling of the smaller integral-horsepower sizes of commercial open and protected squirrel-cage motors.

Heretofore, open and protected squirrel-cage motors have been cooled with a single-end ventilating-system, comprising a separate fan or blower which was pressed on the shaft at the exhaust-end of the machine, this blower being disposed inside of the exhaust-end bracket, so that it would discharge its air through the air-vent openings in the end of the bracket in which it was located. This construction utilized the fan as an exhaust-blower for drawing air axially through the machine. It was an effective ventilating-means, but it involved a fairly large fan, and some more or less costly machining operations, although it suffered the handicap of having eddy-formation, and some loss of pressure-head, because of the high radial component of the air-stream after leaving the blower, in combination with the necessity for bending that air-stream and discharging it through restricted air-vent openings in the end-bracket at that end of the machine.

An object of my present invention is to provide an improved motor-ventilating system in which the conventional air-flow is reversed.

A more specifically stated object of my invention is to provide a single-end-ventilated motor, having a cast squirrel-cage winding having blower-blades cast integrally with one of the end-rings of the squirrel-cage structure, in combination with a stationary air-shield or baffle which extends inwardly from the bracket at that end of the machine, so as to force the blower to operate as a pressure-blower, for drawing air into the machine through the bracket-openings at its end, and then forcing the air axially through the machine and expelling it through the bracket-openings at the other end of the machine. The fact that these blower-blades are an integral part of the squirrel-cage casting results in an extremely good heat-flow from the squirrel-cage winding to the blower-blades, and thus makes these blades act as an increased heat-radiating surface for cooling the squirrel-cage winding of the motor, besides ventilating the stator-member in the same manner as the previously used system having a separate blower at the exhaust-end of the machine.

With the foregoing and other objects in view, my invention consists in the elements, parts,

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combinations, structures and systems hereinafter described and claimed, and illustrated in the accompanying drawing, wherein

Figure 1 is a side view, partly in longitudinal section, showing one form of application of my invention, in a squirrel-cage motor; and

Fig. 2 is an end view, with parts broken away.

I have shown my invention as being embodied in a single-end-ventilated squirrel-cage motor or other dynamo-electric machine, comprising a stator-member 1 and a rotor-member 2. The stator-member 1 has a rigid frame-ring 3 which constitutes an imperforate enclosure-ring for the machine. The frame-ring 3 supports a laminated stator-core 4 which makes contact with the frame-ring at only a few spaced points 5, around the periphery of the core, thereby providing intermediate, axially disposed, ventilating-ducts 6 between the stator-core and the frame-ring. The stator-core also carries a stator-winding 7.

The machine is provided with two brackets 8, one at each end of the machine. Each bracket has an imperforate peripheral portion 9 in engagement with an end of the frame-ring 3. Each bracket 8 also has a perforated end-portion 10, having a centrally disposed bearing 11, and one or more air-vent perforations 12 therein.

The rotor-member 2 has a shaft 13 which is rotatably supported in the bearings 11. A rotor-core 14 is provided on the shaft, in operative relation to the stator-core 4. This rotor-core 14 carries a cast squirrel-cage winding 15 having a plurality of fan-blades 16, extending out, preferably axially, from one end of the squirrel-cage member 15, and cast integrally therewith. By the word "cast," I mean to include brazing or any other forming-process for producing a molecularly integral structure.

In accordance with my invention, the bracket 8 at the fan-end of the machine is provided with an inwardly extending air-shield or baffle 17, which is connected to the imperforate peripheral part 9 of that bracket, and which extends down into juxtaposition to the ends of the fan-blades 16.

In operation, it will be noted that the rotor-core 14 is imperforate below the squirrel-cage bars, that is, it has no axially extending ducts therein. This circumstance, in combination with the stationary air-shield 17, causes the rotor-blades to draw air inwardly through the openings 12 in the adjacent bracket 8, and then to force the air axially through the stator-ducts 6, and thence out through the openings in the other bracket 8, at the other end of the machine.

As previously intimated in my statement of

objects, the construction of the fan-blades 16, as integral extensions of the squirrel-cage casting 15, makes these blades operate as extended heat-radiating surfaces, for conducting heat directly out of the squirrel-cage element, and transferring it to the air-stream, thus resulting in a more direct rotor-ventilation than was achieved in previous designs. At the same time, the stator-element is cooled by the end-to-end air-flow through the stator-ducts 6 between the stator-core 4 and the frame-ring 3, the same as in the previous designs.

The manufacturing cost of my improved motor is appreciably less than that of the motor which it replaces, and tests have shown that it adequately meets the ventilating-requirements of the smaller sizes of a completely redesigned and rerated line of squirrel-cage motors, in which cost-reduction, and increased ratings for given frame sizes, have been coupled with an effort to achieve a pleasing appearance.

While my preliminary tests have had to do primarily with the smaller ratings of this line of motors, it will be understood that my invention is not altogether limited thereto. Furthermore, while I have illustrated my invention in only one preferred form of embodiment, it should be understood that the invention is susceptible of changes in form and size and shape, and like features. I desire, therefore, that the appended claim shall be accorded the broadest construction consistent with their language.

I claim as my invention:

A squirrel-cage dynamo-electric machine, comprising a stator-member and a rotor-member; said stator-member having a rigid frame-ring constituting an imperforate enclosure-ring, and a stator-core supported by the frame-ring, said stator-core making contact with the frame-ring at only a few spaced points around the periphery of the core, thereby providing intermediate, axially disposed, ventilating-ducts between the stator-core and the frame-ring; a stator-winding carried by the stator-core; a bracket at each end of the machine, each bracket having an imperforate peripheral portion in engagement with an end of the frame-ring, each bracket further having a perforated end-portion having a centrally disposed bearing and having one or more air-vent perforations therein; said rotor-member having a shaft rotatably supported in said bearings, and having a rotor-core carried by said shaft in operative relation to the stator-core; a molecularly integral squirrel-cage winding carried by the rotor-core, having a plurality of fan-blades extending out from one end of the squirrel-cage member and formed molecularly integrally therewith; and an air-shield connected to the imperforate peripheral part of the bracket at said fan-end of the machine, said air-shield extending down into juxtaposition to the fan-blades; said rotor-core being imperforate below the squirrel-cage bars, whereby the fan draws air inwardly through the adjacent bracket, and forces it axially through the stator-ducts and thence out through the other bracket.

ERIC W. HUBSCHER.

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