

UNITED STATES PATENT OFFICE

2,347,517

DYNAMOELECTRIC MACHINE

Dean F. Smalley, East Lynn, Mass., assignor to
General Electric Company, a corporation of
New York

Application July 1, 1942, Serial No. 449,214

5 Claims. (Cl. 171-252)

My invention relates to dynamo-electric machines and more particularly to an improved cooling and ventilating construction for such machines.

An object of my invention is to provide an improved dynamo-electric machine having a double end ventilating system.

Another object of my invention is to provide a dynamo-electric machine having an improved ventilating system providing for the entrance of ventilating medium at both ends thereof without substantial interference between the flow of ventilating medium from the different ends of the machine.

Further objects and advantages of my invention will become apparent and my invention will be better understood from the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming part of this specification.

In the drawing Fig. 1 is a side elevational view of a dynamo-electric machine, partly broken away, incorporating an embodiment of my improved ventilating arrangement; Fig. 2 is a perspective view of the motor frame shown in Fig. 1, partly broken away to illustrate the ventilating passage walls of the frame; and Fig. 3 is a perspective view of a motor frame provided with another embodiment of my invention.

Referring to the drawing I have shown a dynamo-electric machine, such as an induction motor, having a rotatable member provided with a laminated core 10 of magnetic material having a squirrel cage winding 11 associated therewith and provided with ventilating medium circulating impeller blades 12 formed integral with the winding 11. The rotatable member core 10 is mounted on a vertically extending shaft 13 which is supported by ball bearings 14 and 15 arranged adjacent each end thereof. The rotatable member is adapted to react electro-dynamically with the stationary member of the machine which is provided with a laminated core 16 of magnetic material having an exciting winding 17 associated therewith and being secured in assembled relationship by end rings 18 supported in an enclosing frame 19. End shields 20 and 21 are secured to the frame 19 at both ends thereof and the lower end shield 21 is formed with supporting legs 22 which extend to a mounting ring 23 adapted to support the motor. These end shields 20 and 21 are provided with ventilating intake openings 24 and 25, re-

spectively, and baffles 26 and 27 secured to the inner sides of these end shields over the ventilating intake openings 24 and 25 are arranged to direct ventilating medium from these openings toward the ventilating medium impellers 12 on the rotatable member. When the motor is in operation, the impellers 12 draw ventilating medium through the end shield intake openings and circulate it over the stationary member windings 17 and out through ventilating medium passages formed between the stationary member core 16 and the frame 19, as indicated by arrows in the drawing. These ventilating medium passages are formed by a plurality of walls in the frame 19 which include longitudinally extending walls 28 defining upwardly extending ventilating passages and another longitudinally extending wall 29 arranged intermediate the walls 28 for dividing the upwardly extending passage into two sections. A circumferentially or transversely extending wall 30 is arranged adjacent the upper end of the upwardly extending passage formed between the walls 28 to redirect the ventilating medium transversely or circumferentially of the machine. A downwardly extending ventilating medium passage is formed between longitudinally extending walls 31, and the transversely extending walls 30 are arranged to redirect the downwardly directed ventilating medium into a transverse or circumferential direction. A downwardly extending passageway also is formed between the ends 32 of the transverse walls 30 to permit the downward passage of the ventilating medium entering the upper portion of the motor. The ventilating medium which passes through this latter passage meets and joins in substantially the same direction of flow with the redirected ventilating medium from the upwardly directed passages without substantially interference, and the combined ventilating medium from the downwardly and upwardly extending ventilating passages passes out of the machine through the same circumferentially extending or transverse exhaust openings 33 formed in the outer wall of the frame 19. The direction of flow of ventilating medium through these various passages is indicated by arrows on the drawing. In order further to assure against the entrance of foreign substances, such as dripping liquids, into the motor, a cover 34 is secured over the upper end shield 20 and is provided with a substantially imperforate end portion and a skirt portion 35 which extends downwardly over the upper end shield. Ventilating medium intake openings are formed by the open

lower end 36 of the cover skirt 35 and these openings are arranged adjacent an imperforate portion of the upper end shield 20. A space is provided between the upper end shield 20 and the cover 34 to provide ventilating medium passages therebetween by arranging supporting legs 37 at the lower end of the cover skirt portion 35 which rest on the upper edge of the frame 19. The cover 34, the upper end shield 20, and the frame 19 all are secured together by a pair of bolts 38 to the upper ends of which lifting eyes 39 are secured.

In Fig. 3 I have shown a modification of the construction shown in Figs. 1 and 2 wherein the general construction and arrangement of the motor are essentially the same as that shown in these latter two figures, and the principal difference resides in the arrangement and construction of the ventilating passage walls of the frame of the motor. In this construction the frame 19 is provided with longitudinally extending wall portions 40 and circumferentially or transversely extending wall portions 41 which are interconnected by diagonal wall portions 42 to provide downwardly extending passages 43 communicating with exhaust openings 44 formed in the side wall portion of the frame 19 and to provide upwardly extending ventilating medium passages 45 communicating with exhaust openings 46 also formed in the side walls of the frame 19. The upwardly extending ventilating passages are further defined by upwardly extending walls 47 formed adjacent the openings 46 and joined to circumferentially extending lower walls 48 of the openings 46. Drainage slots or openings 49 are formed between an end of a core supporting wall 50 and an end of a wall 41 over the opening 46 to provide for drainage of liquids from above this wall 41. The direction of ventilating medium flow in this type frame is indicated by arrows in Fig. 3, and there is no interference or mixture of the ventilating medium which passes through the upwardly and the downwardly extending passages. With both of these constructions the eddying or interference of the ventilating medium passing from the two ends of the machine is substantially eliminated and a more efficient ventilating system provided.

While I have illustrated and described particular embodiments of my invention, modifications thereof will occur to those skilled in the art. I desire it to be understood, therefore, that my invention is not to be limited to the particular arrangements disclosed, and I intend in the appended claims to cover all modifications which do not depart from the spirit and scope of my invention.

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

1. A dynamo-electric machine including a rotatable member having a vertically extending shaft and a stationary member having a core of magnetic material and a winding associated with said core, a supporting frame about said core, end shields having ventilating openings therein secured to said frame at both ends thereof, ventilating exhaust openings in said frame, and means including ventilating passage walls in said frame for providing downwardly extending ventilating passages and substantially separate upwardly extending ventilating passages between said frame and said stationary member core, said walls being constructed and arranged substantially to direct ventilating medium

through said passages in intimate heat exchanging relationship with said core and to redirect ventilating medium downwardly from said upwardly extending passages to the same exhaust openings through which ventilating medium from said downwardly extending passages is exhausted without substantial interference between ventilating medium from said upwardly and said downwardly extending ventilating passages.

2. A dynamo-electric machine including a rotatable member and a stationary member having a core of magnetic material, a supporting frame about said core, end shields having ventilating openings therein secured to said frame at both ends thereof, a cover secured to said frame over the upper end thereof having a skirt portion extending downwardly over the end shield at the upper end of said frame and being open adjacent the lower end thereof, said cover being spaced from said end shield to provide a ventilating passage therebetween, ventilating medium exhaust openings in said frame, and means including ventilating passage walls in said frame for providing downwardly extending ventilating passages and substantially separate upwardly extending ventilating passages between said frame and said stationary member core, said walls being constructed and arranged substantially to direct ventilating medium through said passages in intimate heat exchanging relationship with said core and also from said upwardly extending passages and from said downwardly extending passages to substantially the same direction of flow and to the same exhaust openings without substantial interference between ventilating medium from said upwardly and said downwardly extending ventilating passages.

3. A dynamo-electric machine including a rotatable member and a stationary member having a core of magnetic material, a supporting frame about said core, end shields having ventilating medium intake openings therein secured to said frame at both ends thereof, a cover secured to said frame over the upper end thereof having a skirt portion extending downwardly over the end shield at the upper end of said frame and being open adjacent the lower end thereof, said cover being spaced from said end shield to provide a ventilating medium passage therebetween, ventilating exhaust openings in said frame, and means including ventilating medium passage walls in said frame for providing circumferentially and downwardly extending ventilating medium passages and substantially separate upwardly extending ventilating medium passages between said frame and said stationary member core, said walls being constructed and arranged substantially to direct ventilating medium through said passages in intimate heat exchanging relationship with said core and to redirect ventilating medium downwardly from said upwardly extending passages to join with the ventilating medium from said downwardly extending passages to exhaust from said exhaust openings without substantial interference between ventilating medium from said upwardly and said downwardly extending ventilating passages.

4. A dynamo-electric machine including a rotatable member and a stationary member having a core of magnetic material, a supporting frame about said core, end shields having ventilating medium intake openings therein secured to said frame at both ends thereof, a cover secured to said frame over the upper end thereof having a skirt portion extending downwardly over the end

shield at the upper end of said frame, said skirt having ventilating openings therein arranged adjacent an imperforate portion of said end shield, said cover being spaced from said end shield to provide a ventilating medium passage therebetween, ventilating medium exhaust openings in said frame, and means including ventilating medium passage walls in said frame for providing circumferentially and downwardly extending ventilating medium passages and substantially separate upwardly extending ventilating medium passages between said frame and said stationary member core, said walls being constructed and arranged substantially to direct ventilating medium through said passages in intimate heat exchanging relationship with said core and to redirect ventilating medium downwardly from said upwardly extending passages to join with the ventilating medium from said downwardly extending passages to exhaust from said exhaust openings without substantial interference between ventilating medium from said upwardly and said downwardly extending ventilating passages.

5. A dynamo-electric machine including a rotatable member having a vertically extending shaft and a stationary member having a core of magnetic material and a winding associated with said core, a supporting frame about said core,

means for securing said core in said frame, end shields having ventilating medium intake openings therein secured to said frame at both ends thereof, a cover secured to said frame over the upper end thereof having a skirt portion extending downwardly over the end shield at the upper end of said frame, said skirt having ventilating openings therein arranged adjacent an imperforate portion of said end shield, said cover being spaced from said end shield to provide a ventilating medium passage therebetween, ventilating medium exhaust openings in said frame, and means including ventilating passage walls in said frame for providing downwardly extending ventilating medium passages and substantially separate upwardly extending ventilating medium passages between said frame and said stationary member core, said walls being constructed and arranged substantially to direct ventilating medium through said passages in intimate heat exchanging relationship with said core and also from said upwardly extending passages and from said downwardly extending passages to substantially the same direction of flow and to the same exhaust openings without substantial interference between ventilating medium from said upwardly and said downwardly extending ventilating passages.

DEAN F. SMALLEY.