

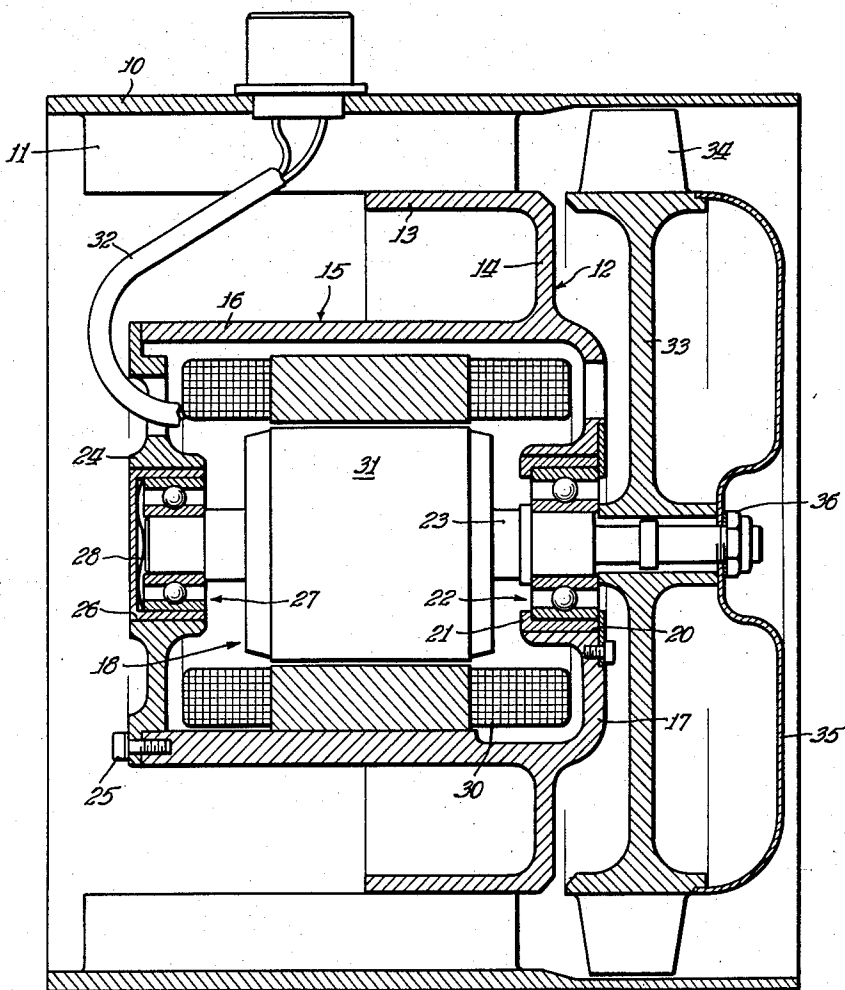
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AXIAL FLOW FANS

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AXIAL FLOW FANS

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1 Claim. (Cl. 230—117)

This invention relates in general to axial flow fans and drives therefor, and more particularly to an arrangement for fan driving motor within a housing for supporting a fan and a driving motor therefor. From another aspect, this invention relates to an improved means of effecting co-axial assembly of fans and fan driving motors within casings to effect efficient axial flow fans.

An object of this invention is the provision of a fan and motor casing to comprise an axial flow fan in which the motor and fan may be readily mounted aligned within the housing which housing itself is also the heretofore necessary separate motor housing.

In volume production of small fans utilizing motors assembled by volume production methods, it had heretofore been necessary to provide a motor casing within the fan housing to receive a motor, itself also having a casing—a serious expense item. This was necessary in part because of improper alignment of the various parts of the fan housing causing non-uniformity of clearance between fan blades and fan housing wall could result unless separate casings within the housings and motor casings were used. This invention provides an axial flow fan wherein an outer housing, stator blades and motor casing are cast in monobloc construction whereby the motor casing of the fan housing is itself the outer casing of the motor.

Accordingly, it is an object of this invention to provide an improved axial flow fan and a more particular object to provide an axial flow fan in which the fan housing and motor casing are so constructed and arranged that the working parts of the electric motor may be readily mounted in its housing and properly aligned.

Another object of this invention is the provision of a mounting for the motor drive in an axial flow fan integrally connected to the stator which in turn is integrally connected to or a part of an outer annular wall to comprise an axial flow fan housing.

It is a further object to provide an improved axial flow fan having a driving motor carried by a fan and motor housing all of which are cast in monobloc construction whereby the motor casing is an integral part of the fan housing.

Still another object of this invention is the provision of a yoke or an end wall of the casing which aligns the motor parts internally and supports the bearing means for the motor shaft.

Other objects and a fuller understanding of this invention may be had by referring to the following description and claim taken in conjunction with the accompanying drawing in which the figure is a longitudinal cross-sectional view of the fan and motor housing showing to advantage the monobloc construction of the outer casing, vane or stators and the rotor housing.

Turning now to the drawing disclosing a preferred embodiment of this invention, the axial flow fan housing comprises a monobloc cast structure having an outer annular wall 10 and a plurality of radially directed air guide vanes 11, integrally connected thereto and inwardly

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directed therefrom. Vanes 11 are appropriately spaced about the axis of the housing and shaped to produce the desired effect on the flow of air developed by the fan later described. The inner ends of the vanes 11 are integrally connected to a supporting section, indicated in its entirety as 12, having an annular axially extending intermediate wall 13 and a radially inwardly extending wall 14. The radially inner end of wall 14 is integral with a motor housing or inter-fairing, indicated in its entirety as 15, which comprises an annular axially extending inner wall 16 and a radially inwardly directed front wall 17 to form a cup-like hub member open at one end, the left end as shown in the drawing, in which to receive the working parts of an electric motor, indicated in its entirety as 18. The radially inwardly directed front wall 17 is provided with an axial aperture 20 and a radially inwardly directed flange 21 which forms a supporting structure for a suitable bearing means, such as ball bearings 22 and the electric motor shaft 23. At the open end of the motor casing or inter-fairing 15 there is provided a yoke 24 suitably apertured to receive fastening means such as bolt-like members 25 to suitably secure the yoke to the motor casing. Yoke 24 is centrally and axially apertured as at 26 to receive an axially suitable bearing means, such as ball bearings 27 axially aligned with front bearing means 22 for supporting the other end of shaft 23. A spring means, such as leaf spring, 28 is provided between the yoke 24 and the end of the shaft to properly align and urge the shaft 23 to the right within the motor housing. Motor stator 30 is affixed to the inner periphery of motor housing wall 16 and cooperates with the motor 31 in the usual manner. Wiring 32 suitably connects the motor stator 30 to a suitable source of power, not shown, in the conventional manner. At the right end of the shaft 23 there is provided a radially extending fan rotor element 33 fixedly mounted on the shaft 23 for rotation thereby. A plurality of radially outwardly extending rotor blades 34 are provided on the circumference of the rotor element 33. The circumference of the rotor 33 has the same outer diameter as the outer diameter of the supporting section 12 so as to provide axial alignment of the rotor blades 34 and the stator blades 11. It should be noted here that the outer diameter of the supporting section 12 is to be selected according to the design requirements of the blower. A rotor cap 35 of generally cup-like shaped form having the same outer diameter as the rotor element 33 is connected thereto, and rotor element and rotor cap are affixed to shaft 23 in any convenient manner such as by threaded nut means 36. Upon rotation of the blades by the motor, air is directed past the stator in the conventional manner.

It is to be understood that this invention in its broadest aspects, is the monobloc construction whereby an outer casing such as 10, a stator such as 11, a supporting section such as 12 and the motor housing such as 15 are of integral construction permitting the motor casing to be later machined so that the working parts of an electric motor such as 18, bearing means such as 22 and 27 for a shaft such as 23 may be suitably aligned for close clearance operation within an axial flow fan housing.

Where the various parts of this invention have been referred to as located in a right or left or an upper or lower or inward or outward position, it will be understood that this is done solely for the purpose of facilitating description and that such references relate only to the relative positions of the parts as shown in the accompanying drawing.

Also, it is to be understood that many changes and modifications may be made without departing from the principles and scope of the invention and that the invention is designed and comprehended within the scope

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of the appended claim which should be given a scope consistent with the prior art.

What is claimed is:

In an axial flow fan structure comprising an electric motor having a fan mounted thereon with a hub and outwardly extending blades, the improvement comprising a monobloc cast structure having an outer annular wall and a plurality of annularly spaced inwardly extending vanes connected to the outer annular wall, means defining a supporting structure comprising an intermediate annular wall formed with an inwardly extending radial member, the inner ends of the vanes being connected with said intermediate wall, an inner annular wall, said inwardly extending radial member being connected to said inner annular wall, and a radially inwardly directed front wall connected to said inner annular wall, said

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inner annular wall and said radial front wall together forming a cup-like housing, said cup-like housing forming a part of the housing of the electric motor and being adapted to have a motor stator affixed to its inner periphery when the motor parts are assembled in said housing.

References Cited in the file of this patent

UNITED STATES PATENTS

10	2,320,708	Yost -----	June 1, 1943
	2,397,169	Troller et al. -----	Mar. 26, 1946
	2,488,945	Troller et al. -----	Nov. 22, 1949
	2,541,251	Honerkamp et al. -----	Feb. 13, 1951

FOREIGN PATENTS

15	69,101	Netherlands -----	Nov. 17, 1951
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