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PATENT SPECIFICATION

DRAWINGS ATTACHED

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911,310

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COMPLETE SPECIFICATION

Improvements in or relating to Electric Fans

We, THE GENERAL ELECTRIC COMPANY LIMITED, of Glen House, Stag Place, Victoria, London, S.W.1, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to electric fans and more particularly, though not exclusively, to ceiling fans.

In previous constructions of electric fans, it has been necessary for quite a large amount of machining to be done on various component parts of a fan to ensure that a uniform air gap is obtained and maintained between the rotor and stator of the fan motor and it is an object of this invention to reduce the amount of machining necessary without detracting from the efficiency of the fan.

According to the present invention, in an electric fan comprising an external rotor and an internal stator, a plate integral with the rotor and forming part of the rotor core, extends externally from the outer periphery of the rotor core to support accurately brackets carrying bearings between rotor and stator, the rotor being provided with fan blades.

Preferably, the plate is sandwiched between laminae of the rotor core. Further, the brackets may enclose the rotor and stator.

In order that the invention may be clearly understood, one construction of an electric ceiling fan in accordance with the invention will now be described by way of example, with reference to the accompanying drawing which shows a sectional side elevation of the fan.

Referring now to the drawing, the ceiling fan comprises two main parts, an external member 1 which is the rotor encircling an internal member 2 which is the stator of the fan mounted solidly on a stationary shaft 3. The fan is arranged in use to be suspended from the ceiling of a room and one end of the shaft 3 projects upwards from the stator 1 and is attached to a pendant conduit 4 descending from the ceiling, by means of a sleeve 5 passing over the upper end of the shaft 3 and the lower end of the pendant conduit 4 and affixed to these members by split pins 6 passing through holes in the shaft and the sleeve and the pendant conduit and sleeve respectively. The shaft 3 itself is hollow and electrical leads 7 pass from the pendant conduit 4 through the shaft 3 to the stator windings 8.

The rotor 1 is composed of a number of annular steel laminae 9 encircling the stator 2 and in the middle of the stack of laminae there is placed a special steel stamping or plate 10 having the same internal diameter as the rest of the laminae 9, but having an external diameter greater than the external diameter of the laminae 9 thereby forming a flange 11 around the outer periphery of the rotor core. The steel stamping 10 is not perfectly circular in external shape but has three projections 12 from the flange 11, these projections being equally spaced 120° apart around the said core.

The stator 2 is positioned relative to the rotor 1 by means of two flanged sheet steel bearing brackets 14, 15 of cup form. These brackets are connected at three points, intermediate the projections 12, to the flange 11 of the rotor 1 by means of rivets (or screws) 16. It is essential that the holes 17 in the flange 11 and the holes 18, 19 in the brackets 14, 15 and the rivets themselves be closely toleranced to ensure the correct minimum clearance and a uniform radial air gap 20 between the stator 2 and the rotor 1; the flange 11 therefore provides a datum for locating the position of the rotor 1 relative to the stator 2. The junction of the brackets and flange by the rivets is shrouded by a plastic cover 21.

The bearing brackets 14 and 15 extend from the flange 11 both over the top of, and

[*Price 4s. 6d.*]

underneath the motor, and these brackets carry at their ends remote from the flange 11 and adjacent to the shaft 3, bearings 22, 23 for the motor. The bearing 22 carried by the top bracket 14 is a simple sleeve bearing since it has to take only a journal load, while the bearing 23 carried by the bottom bracket 15 is a ball race bearing since it has to take both a journal load and a thrust load. The bearings 22, 23 are contained within housing 24, 25 carried by the brackets 14, 15, and both bearings are fitted with end caps 27, 28 respectively of a moulded synthetic material such as plastic which seal the housings 24, 25 from the ingress of foreign matter.

The rotor windings 29 are of the squirrel cage type and in this construction are diecast by forcing aluminium through slots in the laminae 9 in such a manner as to form an integral cast aluminium rotor.

The three projections 12 from the flange 11 have attached to each a fan blade 30, which may be either bolted or rivetted in position 31 according to the particular convenience of construction; in this case a nut and bolt are used.

The operation of the fan is generally similar to known types of ceiling fans, and when the current is switched on the rotor 1 revolves about the stator 2 causing a turbulence of air with the fan blades 30 attached to the said rotor. The difference of this construction of ceiling fan over existing fans, however, lies in that the bearing brackets 14, 15 do not themselves directly engage the rotor core but only the flange 11 associated with it and the air gap 20 between the rotor 1 and stator 2 is solely maintained by the engagement of the rivets 16 in the flange 11 and the brackets 14, 15.

It will be appreciated that the construction described above removes the necessity for a great amount of machining to be done on the component parts of the motor which are required with previous methods of construction of motors and electric ceiling fans. This means that the overall cost of the fan is substantially reduced without in any manner detracting from the efficiency of the fan.

In a modification of the construction described, a pull cord switch is incorporated in the fan together with means for regulating the speed of the fan. These means comprise two choke coils on the stator 2, and the shaft 3 is made hollow and is extended below the bottom bracket 15 to have a switch in a suitable housing and a pull cord extending from the housing. The leads from the switch pass up the hollow shaft 3 to the choke coils.

WHAT WE CLAIM IS:—

1. An electric fan comprising an external rotor and an internal stator, wherein a plate integral with the rotor and forming part of the rotor core, extends externally from the outer periphery of the rotor core to support accurately brackets carrying bearings between rotor and stator, the rotor being provided with fan blades.

2. An electric fan as claimed in Claim 1, wherein the plate is sandwiched between laminae of the rotor core.

3. An electric fan as claimed in Claim 1 or Claim 2, wherein the brackets enclose the rotor and stator.

4. An electric fan as claimed in Claim 3, wherein the junction of the brackets is shrouded by a cover.

5. An electric fan as claimed in any preceding claim, wherein the brackets are of pressed steel.

6. An electric fan substantially as hereinbefore described with reference to the accompanying drawing.

For the Applicants,
F. S. PEACHEY,
Chartered Patent Agent.

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