

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) ELECTRIC FANS.

(71) We, KEMPTHORNE MISTRAL MANUFACTURING PROPRIETARY LIMITED, a Company incorporated under the laws of the State of Victoria, Commonwealth of Australia, of 320, St. Kilda Road, Melbourne, in the State of Victoria, Commonwealth of Australia, 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 in particular, although not exclusively, to fans of the desk or table type.

In order to increase the area of effectiveness of desk or table fans, it is presently necessary to employ a mechanism for mechanically moving the fan and motor assembly in an oscillatory or gyratory manner, the latter being most effective. Such mechanisms have several disadvantages; for example, the complexity of the mechanisms, existence of exposed moving parts, bulky guards and consequent cost. It is found to be most difficult to design a fan incorporating an oscillating or gyrating mechanism which nevertheless meets with the standards of appearance required today.

It is one object of the present invention to provide an electric fan which will deliver air in a substantially gyratory pattern (as defined below) by means of a simple mechanism which may be enclosed completely within a housing for the fan. In this specification, the term "gyratory pattern" is intended to indicate an air flow pattern which is substantially the same as that produced by a standard gyratory head fan only having substantially none of the rotary motion normally associated with the air flow from such fans.

Accordingly the invention provides a fan comprising a fan blade assembly, an electric motor for driving the fan blade assembly, [Price 25p]

means to render the air flow from the blade assembly wholly axial, and an air directing grille mounted in the path of the flow of air from the blade assembly and said means and driven by the motor to rotate at a speed less than the blade assembly speed, said grille including a plurality of louvres arranged parallel to and at different acute angles to the flow of air such that the air flow is directed by the grille in a substantially gyratory pattern (as hereinbefore defined).

Preferably the drive between the motor and grille includes a clutch mechanism which will permit disconnection of the drive if the grille is forceably restrained.

The clutch mechanism preferably includes means whereby the grille can be positively disengaged and engaged with the drive.

A preferred embodiment of the invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a front elevation of a desk fan embodying the invention.

Figure 2 is a sectional side elevation of the fan taken along line 2-2 of Figure 1, and

Figure 3 is a detailed sectional elevation taken in the direction of line 3-3 in Figure 2.

The fan shown in the drawings comprises a two-part moulded plastics casing 1 having an air inlet opening 2 at its rear face and an air outlet opening 3 at its front face. The casing is formed with an annular recess 4 surrounding the inlet opening 2 and this receives the base of a moulded plastics cage 5 which is held to the casing by screws 6. The cage 5 has a plurality of air intake openings 7 in its end wall and sides.

The casing 1 is also formed with a deeper annular recess 8 surrounding the outlet opening 3 and the two parts of the casing are completed by internal wall portions 9 extending inwardly of the casing 1 to meet at the middle of the casing. The wall portion 9 of the rear part of the casing 1 is

formed with nine circumferentially spaced slots 10 which receive the ends of nine equally spaced radial air straightening vanes 11 which are part of a moulded plastics unit including a central supporting hoop 12. The hoop has several circumferentially spaced portions 13 for receiving screws 14 engaging holes in radial supporting lugs 15 on the body of an electric fan motor M secured to and supported by the hoop 12.

The motor M has an output shaft extending from either end thereof and the end directed towards the inlet 2 supports a fan-blade assembly F. The other end of the output shaft is connected to a reduction gear box G enclosed within the motor body and having a coaxial output shaft O. The output shaft has a clutch ring 16 fixed for rotation therewith adjacent the motor M and supports a circular air directing grille 17 which is longitudinally slidable on and rotatable with respect to the shaft O.

The grille 17 has a central hub 18 mounted on the shaft O and a concentric peripheral rim 19 between which several of a plurality of parallel louvres 20 are connected, the remaining louvres extending chordally with respect to the rim 19. The louvres 20 are arranged in groups and are disposed parallel to and at different acute angles to the direction of air flow from the vanes 11. The grille is formed as an integral plastics moulding and is prevented from leaving the shaft by screw 21. The hub 18 is closed by a closure plate 18a held in the closed position by a compression spring as shown.

Applicant Company has found that a grille of the following construction is satisfactory: The central hub is about three inches in diameter and the rim is about thirteen inches in diameter. The louvres are arranged in three groups: a first group of six louvres positioned near one section of the rim and disposed at 0° to the direction of air flow; a second group of seven louvres disposed at 15° to the direction of air flow, and a third group of six louvres disposed at 30° to the direction of air flow, there being a slightly larger spacing between the groups than between adjacent louvres within the groups.

The grille 17 is selectively driven at the same speed as the output shaft O through clutch ring 16 by means of three leaf springs 22 secured to and extending rearwardly from the grille hub 18. Each spring 22 has an arcuate abutment 23 adjacent its free end which is such as to be capable of location in one of six axial notches or slots 22a (Figure 3) in an annular groove 24 in the clutch ring 16.

To operate the clutch and cause rotation of the grille 17, the hub 18 is located in the position shown in Figure 2 with the abut-

ments 23 of the clutch springs 22 engaged in the notches 22a of the groove 24 whereupon the interengagement between these parts causes the grille to rotate. The stiffness of the springs 22 and the depth of notches 22a are such that the clutch will slip if the grille is restrained by, say, a finger by said spring abutments riding out of said notches. When the grille is pushed inwardly from the position of Figure 2, the abutments 23 ride up over the adjacent end portion of the motor casing so that no drive is transmitted. The stiffness of springs 22 is such that the tendency of the shaft O to rotate the grille by friction between the shaft and hub 18 is resisted. By virtue of the above clutch arrangement, axial movement of the grille engages or disengages drive to the grille so this can be controlled as required.

In use the helical air flow from the fan blades F passes through the vanes 11 and is thereby rendered axial or "straightened". The air then passes through and is deflected by the grille louvres 20. If the grille 17 has been pulled into the drive position, the rotating grille will direct the air in a pattern substantially the same as that of a gyratory head fan. The only substantial difference in the air flow produced is that it is laminar rather than helical as in known gyratory head fans. This, of course, is an advantage rather than a disadvantage.

Using the particular louvre arrangement described above, the air flow pattern produced was mapped in a standard test and it was found that the area covered was of slightly larger diameter than that of an equivalent gyratory head fan.

If a continuous air stream is required in one area, the grille 17 is pushed in to disengage the clutch. It will be evident from the drawings that the hub 18 is shaped so as to be capable of being conveniently gripped.

The advantages of the above construction over known oscillatory or gyratory mechanisms will be readily apparent to persons skilled in the art. For example, the mechanism has no moving parts such as linkages and the like and it is completely enclosed in the fan casing for safety and pleasant appearance. The fan, whilst delivering air in a pattern substantially the same as a gyratory head fan, does not suffer from the disadvantage that the air flow in the pattern is helical.

It will be appreciated that modifications of the above embodiment may be readily effected. The fan blades may be replaced by a centrifugal fan member. The louvres in the grille may be disposed at different angles to those set out above according to the size of the fan. Furthermore, the output shaft O may be suitably formed so that the spring fingers 23 engage same directly.

WHAT WE CLAIM IS:—

1. A fan comprising a fan blade assembly, an electric motor for driving the fan blade assembly, means to render the air flow from the blade assembly wholly axial, and an air directing grille mounted in the path of the flow of air from the blade assembly and said means driven by the motor to rotate at a speed less than the blade assembly speed, said grille including a plurality of louvres arranged parallel to and at different acute angles to the flow of air such that the air flow is directed by the grille in a substantially gyratory pattern (as hereinbefore defined).
2. A fan as claimed in Claim 1, wherein the fan blade assembly is such as to deliver a helical air flow, said means including a plurality of fixed vanes including means for supporting the motor centrally within the array of fixed vanes, said fixed vanes extending radially of the axis of the motor and lying in planes extending longitudinally of the motor.
3. A fan as claimed in Claim 2, wherein said vanes are supported in slots in a casing surrounding the motor and fan blade assembly and having an air inlet and an air outlet, said grille being mounted at and covering said outlet.
4. A fan as claimed in any one of claims 1 to 3, further including a clutch mechanism which permits disconnection of the drive to the grille when the latter is forceably restrained, said clutch being capable of positive engagement and disengagement by axial movement of the grille.
5. A fan as claimed in claim 4, wherein said grille is mounted on an output shaft from a reduction gear box connected to said motor for axial and rotary movement relative to said output shaft, said clutch mechanism comprising at least one spring finger which is in frictional engagement with the output shaft or a member connected thereto in one axial position of the grille and is disengaged in another axial position of the grille.
6. A fan as claimed in claim 4 or 5, wherein the clutch mechanism is substantially as described with reference to Figure 2 of the accompanying drawings.
7. A fan as claimed in any one of the preceding claims, wherein said grille comprises a central cylindrical hub and a concentric rim between which said louvres are located, said louvres including three groups of parallel louvres, one group having louvres arranged parallel to the direction of air flow and the other two groups having louvres arranged at different acute angles to said direction, said acute angles and the number of louvres in each group being selected according to the size of the grille to achieve a substantially gyratory air pattern on rotation of the grille.
8. A fan as claimed in any one of the preceding claims, wherein said grille is constructed substantially as described with reference to Figures 1 and 2 of the accompanying drawings.
9. A fan as claimed in claim 2, wherein said vanes are constructed and arranged substantially as described with reference to Figure 2 of the accompanying drawings.
10. A fan substantially as described with reference to the accompanying drawings.

PAGE, WHITE & FARRER,

Chartered Patent Agents,

27, Chancery Lane,
London, W.C.2.

Agents for the Applicants.



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