PATENT SPECIFICATION

693,920

Date of filing Complete Specification: June 13, 1951. No. 15411/50.

Application Date: June 20, 1950.

Complete Specification Published: July 8, 1953.

Index at acceptance:—**Class 110(i)**, D2i1.

COMPLETE SPECIFICATION.

Improvements in and relating to Electric Fans

We, THE GENERAL ELECTRIC COMPANY LIMITED, of Magnet House, Kingsway, London, W.C.2, a British Company, and THOMAS JOSEPH CURTIS, of The General Electric Company Limited, Engineering Works, Witton, Birmingham, a British Subject, 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:—

The present invention relates to electric fans having mechanism for causing the fan to oscillate during rotation so that the effect of the fan is felt over a wider area than would be possible if the axis of the fan were fixed.

It is an object of the present invention to provide mechanism for deriving oscillatory movement of the fan from the fan motor in which damage to the fan is avoided in the event of the fan coming into contact with a fixed or movable object during its oscillatory movement.

According to the present invention in an electric fan having mechanism for causing the axis of rotation of the fan blades to oscillate relatively to the base of the fan, said mechanism for oscillating the fan including a member which, when the fan is arranged for oscillation, is normally restrained from movement relatively to another member by frictional engagement therebetween, said frictional restraint is applied between a member secured to the base of the fan and a member which forms an abutment for the oscillating mechanism, the strength of such frictional engagement being sufficient to permit oscillation under normal operating conditions, but being insufficient to allow the oscillating mechanism to exert a force sufficient to overturn the fan if it meets an obstruction during operation, said oscillating mechanism being arranged to allow oscillation to continue, after angular displacement of the arc of oscillation by relative movement of the members subjected to the frictional restraint, in the event of the original arc of oscillation being obstructed.

The mechanism for oscillating the fan may conveniently be of the type in which an eccentric or equivalent means is driven through gearing from the shaft of the fan so that it rotates at a relatively slow speed. The eccentric or equivalent means is coupled by a link to a member which is normally fixed in relation to the base of the fan so as to provide an abutment or reaction point such that movement of the link caused by the operation of the eccentric or equivalent means causes the axis of rotation of the fan blades to oscillate relatively to the base of the fan. The member providing the abutment or reaction point for the link is connected to the base of the fan by frictional engagement which is normally sufficient to prevent movement between said member and said base so that the axis of the fan blades is caused to oscillate. Said frictional engagement is, however, arranged to be insufficiently strong to hold said member relatively to the base in the event of the fan meeting an obstruction during its oscillatory movement. If the fan meets such an obstruction, the member providing the reaction point is permitted to move relatively to the base of the fan when the frictional engagement is overcome.

It is to be understood that the base of the fan may include one or more joints or other mounting means permitting the axis of the fan to be displaced relatively to the base to permit the fan to be adjusted into any desired position or angular disposition in relation to the base of the fan.

One form of construction of electric fan in accordance with the present invention will

now be described by way of example with reference to the accompanying drawings, in which:—

Fig. 1 is a side elevation partly in section on a vertical plane passing through the axis of rotation of the fan blades;

Fig. 2 is a side elevational view at right angles to Fig. 1 but having a part of the housing of the fan motor removed; and

Fig. 3 is an exploded view to an enlarged scale showing details of the mechanism for causing the fan to oscillate.

Referring to the drawings; an electric fan comprises a casing formed in two parts 10 and 11 which together form a housing for an electric motor generally indicated at 12 and which has a double-ended shaft 13 one end of which extends through a bearing 14 carried by the casing part 10 and carries a spinner 15 on which are mounted fan blades such as 16. The fan blades 16 may be three in number. The spinner 15 is secured to the shaft 13 by means of a screw 17. The other end of the shaft 13 extends through a bearing 20 supported by a bracket 21 which forms a part of the frame surrounding the electric motor 12. The casing part 11 is held in position by a bolt 22 which engages a tapped hole provided for this purpose in an extension of the bracket 21. The end of the shaft 13 opposite to that which carries the spinner 15 is formed with a helical thread 23 which constitutes a worm for driving a worm wheel 24 at the upper end of a vertical spindle 25 carried by a lateral projection from the bracket 21 which is arranged to form an enclosure for the helical thread 23 and worm wheel 24. The lower end of the spindle 25 extends below the lateral extension of the bracket 21 and carries a gearwheel 26 which is in mesh with a larger gearwheel 27 mounted on a wheel 28 rotatable about a pivot 29 by which it is supported from the bracket 21. The wheel 28 carries a stud 30 forming a pivot attachment for one end of an oscillating link 31 which is maintained in position on the stud 30 by a cotter pin 32. Loose washers 33 are interposed between the link 31 and the wheel 28 and the cotter pin 32 in order to reduce friction therebetween. The stud 30 is arranged with its axis parallel to the axis of the pivot 29 but displaced therefrom so that when the shaft 13 of the fan is rotating, the stud 30 rotates about the pivot 29, the arrangement constituting an eccentric which causes the end of the oscillating link 31 to describe an oscillatory motion.

The fan is mounted on a stand comprising a base 40 having a flat lower surface for supporting the fan on a table or other horizontal surface. The base 40 may also be provided with one or more mounting holes so as to permit it to be secured to a wall or other mounting surface. The base may, if desired, include an electric switch and control means, such for example as a resistance element, for controlling the speed of the motor of the fan. The upper part 41 of the stand is provided with a knuckle joint, the two members 41 and 43 of which are pivoted together at 42. The member 43 of the knuckle joint terminates at its upper end in a spigot 44 about which the upper parts of the fan can oscillate. The mounting arrangements will be described in more detail hereafter. The lower end of the member 43 has several recesses (not shown) disposed in an arc about the axis of the pivot 42 and which can be engaged by a ball-catch 45. This enables the knuckle joint to be adjusted into any desired position of inclination of the axis of the fan shaft 13. The knuckle joint can be locked in position by a locking knob 46, the inner end of which is arranged to engage any one of a series of recesses opposed to the recesses provided in the member 43 for engagement by the ball-catch 45.

The housing of the fan is arranged to be rotatable for oscillatory movement about the axis of the spigot 44, a thrust bearing 50 being provided between the lower end of the casing part 10 and the knuckle joint member 43 to take the weight of the upper parts of the fan. A movable sleeve 51 is interposed between the casing part 10 and the spigot 44 and is slidable vertically under the control of a bolt 52 having an eccentric pin 53 extending from its end and engaging a recess in the sleeve 51. The bolt 52 has a spring loaded operating knob 54 by means of which it can be turned so as to raise or lower the sleeve 51 relatively to the casing part 10. A grub screw 55 is also disposed opposite to the bolt 52 and its end is arranged to project into a recess 56 in the sleeve 51 so as to limit the movement of the sleeve 51 relatively to the casing part 10. The sleeve 51 is free to rotate about the spigot 44. When moved downwardly by the bolt 52, the sleeve 51 bears on a friction member 57 which may be made of such material as cork, rubber or spring metal which when compressed secures the sleeve 51 to the knuckle joint member 43 so as to prevent movement of the sleeve 51 about the spigot 44. When the sleeve is locked in this way, the upper parts of the fan are fixed in relation to the spigot. If, however the sleeve 51 is moved upwardly by turning the bolt 52, upward thrust is transmitted through a thrust bearing 60 to a spring washer 61 which presses on a washer 66 below the plate 62 carrying a pin 63 to which one end of the oscillating link 31 is attached. In the absence of pressure through the spring washer 61 the plate 62 is free to rotate about a bearing

member 65 which is fixed to the spigot 44 by keyways and a bolt 64. In this condition, when the plate 62 is free to turn relatively to the spigot 44, the pin 63 offers no resistance to the oscillating link 31 so that the fan does not oscillate. When the sleeve 51 is moved upwardly, however, the pressure of the spring washer 61 causes the plate 62 frictionally to engage the bearing member 65 so as to hold it against rotation about the axis of the spigot 44. The pin 63 is then able to act as an abutment for the oscillating link 31 so that rotation of the wheel 28 through the gear-train from the shaft 13 of the electric motor causes an oscillatory movement to be imparted to the upper parts of the fan so that it oscillates about the axis of the spigot 44. The frictional engagement between the plate 62 and the bearing member 65 is sufficiently strong to prevent the plate 62 from being turned during normal oscillation of the fan, but in the event of oscillatory movement of the fan being prevented, for instance, if the fan meets an obstruction, slipping can occur between the plate 62 and the bearing member 65 thereby preventing damage to the fan. The plate 62 moves relatively to the bearing member 65 until the end of the oscillatory movement is reached. The plate is then held again by the frictional engagement so that the pin 63 can again constitute an abutment for the end of the oscillating link 31. This feature prevents damage to the fan in the event of its meeting an obstruction when arranged for oscillatory movement and the strength of the frictional engagement can be arranged to be such that the fan cannot over-turn itself if it meets such an obstruction.

The fan may be fitted with a guard (not shown) which is arranged to meet an obstuction before the fan blades touch it.

What we claim is:—

1. An electric fan having mechanism for causing the axis of rotation of the fan blades to oscillate relatively to the base of the fan, said mechanism for oscillating the fan including a member which, when the fan is arranged for oscillation, is normally restrained from movement relatively to another member by frictional engagement therebetween, wherein said frictional restraint is applied between a member secured to the base of the fan and a member which forms an abutment for the oscillating mechanism, the strength of such frictional engagement being sufficient to permit oscillation under normal operating conditions, but being insufficient to allow the oscillating mechanism to exert a force sufficient to overturn the fan if it meets an obstruction during operation, said oscillatory mechanism being arranged to allow oscillation to continue, after angular displacement of the arc of oscillation by relative movement of the members subjected to the frictional restraint, in the event of the original arc of oscillation being obstructed.

2. An electric fan according to Claim 1, wherein the oscillating mechanism comprises a gear train arranged to be driven from the blade carrying shaft of the electric motor and to drive an eccentric or equivalent means coupled by an oscillating link to the abutment frictionally secured to the base of the fan.

3. An electric fan according to Claim 1 or 2, including an element which is movable between two positions, in one of which it is arranged to apply the frictional restraint and in the other position is arranged to remove the frictional restraint so as to permit the fan to operate without oscillation.

4. An electric fan having an oscillating mechanism constructed and arranged to operate substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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

PROVISIONAL SPECIFICATION.

Improvements in and relating to Electric Fans

We, THE GENERAL ELECTRIC COMPANY LIMITED, of Magnet House, Kingsway, London, W.C.2., a British Company, and THOMAS JOSEPH CURTIS, of The General Electric Company Limited, Engineering Works, Witton, Birmingham, a British Subject, do hereby declare this invention to be described in the following statement:—

The present invention relates to electric fans having mechanism for causing the fan to oscillate during rotation so that the effect of the fan is felt over a wider area than would be possible if the axis of the fan were fixed.

It is an object of the present invention to provide mechanism for deriving oscillatory movement of the fan from the fan motor in which damage to the fan is avoided in the event of the fan coming into contact with a fixed or movable object during its oscillatory movement.

According to the present invention in an electric fan having mechanism for causing the axis of the fan to oscillate relatively to the base of the fan, the mechanism for oscillating the fan includes a member which

member 65 which is fixed to the spigot 44 by keyways and a bolt 64. In this condition, when the plate 62 is free to turn relatively to the spigot 44, the pin 63 offers no resistance to the oscillating link 31 so that the fan does not oscillate. When the sleeve 51 is moved upwardly, however, the pressure of the spring washer 61 causes the plate 62 frictionally to engage the bearing member 65 so as to hold it against rotation about the axis of the spigot 44. The pin 63 is then able to act as an abutment for the oscillating link 31 so that rotation of the wheel 28 through the gear-train from the shaft 13 of the electric motor causes an oscillatory movement to be imparted to the upper parts of the fan so that it oscillates about the axis of the spigot 44. The frictional engagement between the plate 62 and the bearing member 65 is sufficiently strong to prevent the plate 62 from being turned during normal oscillation of the fan, but in the event of oscillatory movement of the fan being prevented, for instance, if the fan meets an obstruction, slipping can occur between the plate 62 and the bearing member 65 thereby preventing damage to the fan. The plate 62 moves relatively to the bearing member 65 until the end of the oscillatory movement is reached. The plate is then held again by the frictional engagement so that the pin 63 can again constitute an abutment for the end of the oscillating link 31. This feature prevents damage to the fan in the event of its meeting an obstruction when arranged for oscillatory movement and the strength of the frictional engagement can be arranged to be such that the fan cannot over-turn itself if it meets such an obstruction.

The fan may be fitted with a guard (not shown) which is arranged to meet an obstuction before the fan blades touch it.

What we claim is:—

1. An electric fan having mechanism for causing the axis of rotation of the fan blades to oscillate relatively to the base of the fan, said mechanism for oscillating the fan including a member which, when the fan is arranged for oscillation, is normally restrained from movement relatively to another member by frictional engagement therebetween, wherein said frictional restraint is applied between a member secured to the base of the fan and a member which forms an abutment for the oscillating mechanism, the strength of such frictional engagement being sufficient to permit oscillation under normal operating conditions, but being insufficient to allow the oscillating mechanism to exert a force sufficient to overturn the fan if it meets an obstruction during operation, said oscillatory mechanism being arranged to allow oscillation to continue, after angular displacement of the arc of oscillation by relative movement of the members subjected to the frictional restraint, in the event of the original arc of oscillation being obstructed.

2. An electric fan according to Claim 1, wherein the oscillating mechanism comprises a gear train arranged to be driven from the blade carrying shaft of the electric motor and to drive an eccentric or equivalent means coupled by an oscillating link to the abutment frictionally secured to the base of the fan.

3. An electric fan according to Claim 1 or 2, including an element which is movable between two positions, in one of which it is arranged to apply the frictional restraint and in the other position is arranged to remove the frictional restraint so as to permit the fan to operate without oscillation.

4. An electric fan having an oscillating mechanism constructed and arranged to operate substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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The fan may be fitted with a guard (not shown) which is arranged to meet an obstuction before the fan blades touch it.

What we claim is:—

1. An electric fan having mechanism for causing the axis of rotation of the fan blades to oscillate relatively to the base of the fan, said mechanism for oscillating the fan including a member which, when the fan is arranged for oscillation, is normally restrained from movement relatively to another member by frictional engagement therebetween, wherein said frictional restraint is applied between a member secured to the base of the fan and a member which forms an abutment for the oscillating mechanism, the strength of such frictional engagement being sufficient to permit oscillation under normal operating conditions, but being insufficient to allow the oscillating mechanism to exert a force sufficient to overturn the fan if it meets an obstruction during operation, said oscillatory mechanism being arranged to allow oscillation to continue, after angular displacement of the arc of oscillation by relative movement of the members subjected to the frictional restraint, in the event of the original arc of oscillation being obstructed.

2. An electric fan according to Claim 1, wherein the oscillating mechanism comprises a gear train arranged to be driven from the blade carrying shaft of the electric motor and to drive an eccentric or equivalent means coupled by an oscillating link to the abutment frictionally secured to the base of the fan.

3. An electric fan according to Claim 1 or 2, including an element which is movable between two positions, in one of which it is arranged to apply the frictional restraint and in the other position is arranged to remove the frictional restraint so as to permit the fan to operate without oscillation.

4. An electric fan having an oscillating mechanism constructed and arranged to operate substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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It is an object of the present invention to provide mechanism for deriving oscillatory movement of the fan from the fan motor in which damage to the fan is avoided in the event of the fan coming into contact with a fixed or movable object during its oscillatory movement.

According to the present invention in an electric fan having mechanism for causing the axis of the fan to oscillate relatively to the base of the fan, the mechanism for oscillating the fan includes a member which

is normally restrained from movement relatively to another part by frictional engagement there-between, but which can move relatively to said other part if the frictional engagement is overcome as a result of the fan coming into contact with an obstruction during its oscillatory movement so that further oscillatory movement towards the obstruction is avoided.

The mechanism for oscillating the fan may conveniently be of the type in which a cam or equivalent means is driven through gearing from the shaft of the fan so that it rotates at a relatively slow speed. The cam or equivalent means is coupled by a link to a member which is normally fixed in relation to the base of the fan so as to provide a reaction point such that movement of the link caused by the operation of the cam or equivalent means causes the axis of the fan to oscillate relatively to the base of the fan. According to a feature of the present invention, a member providing the reaction point for the link is connected to the base of the fan by frictional engagement which is normally sufficient to prevent movement between said member and said base so that the axis of the fan is caused to oscillate. Said frictional engagement is, however, arranged to be insufficiently strong to hold said member relatively to the base in the event of the fan meeting an obstruction during its oscillatory movement. If the fan meets such an obstruction, the member providing the reaction point is permitted to move relatively to the base of the fan when the frictional engagement is overcome.

It is to be understood that the base of the fan may include one or more joints or other mounting means permitting the axis of the fan to be displaced relatively to the base to permit the fan to be adjusted into any desired position.

In one form of construction in accordance with the present invention an electric fan comprises a casing housing an electric motor, the shaft of which carries a plurality of fan blades. The fan blades may be constructed in accordance with co-pending Application No. 2869/50 (Serial No. 682094). The fan is mounted on a stand comprising a base plate having a flat surface or provided with feet for supporting the fan on a table or other horizontal surface. The base may also be provided with one or more mounting holes so as to permit the stand to be secured to a wall or other mounting surface. The stand may, if desired, include an electric switch and control means such, for example, as a resistance element for controlling the speed of the motor of the fan. The upper part of the stand is provided with a joint which may be in the form of a knuckle joint disposed, for example at right angles to the axis of the fan so as to permit the axis of the fan to be tilted. The other member of the knuckle joint terminates at its upper end with a spigot surrounded by a sleeve which is interposed between the spigot and the casing of the fan. Thrust and journal bearings are provided between the casing and the sleeve and the spigot to transmit the weight of the fan to said knuckle joint member. The sleeve is movable up and down relatively to the spigot. When moved downwardly the sleeve compresses a spring washer which is then arranged to secure the sleeve frictionally to the upper knuckle joint member. This position may be termed the "locked position". If, however, the sleeve is moved upwardly it compresses a second spring washer which lies between the upper end of the sleeve and a disc member carried by a pin and mounted so as to be rotatable relatively to the spigot, but not axially movable relatively thereto. The disc is secured in position on the pin by means of a spring clip such as a C-shaped clip. When the sleeve is moved into its uppermost position it compresses the second spring washer and secures the disc to the spigot by frictional engagement which is sufficiently strong to prevent the disc from being turned during normal oscillation of the fan during which the disc provides a reaction point for a link, the other end of which is connected to a cam or equivalent means driven through gearing from the shaft of the fan. The reaction point on the disc may be provided by a hinge pin extending through the link, while the other end of the link may be attached in a somewhat similar manner by means of a pin carried by the cam driven from the fan shaft.

The sleeve is movable up or down relatively to the spigot by means of a bolt provided at its end with an eccentric pin engaging a recess in the sleeve, and provided at its other end with an operating handle by means of which the bolt can be turned in its recess in the casing of the fan from a locked position in which the casing is secured to the upper knuckle joint member by the frictional engagement of the first spring washer or into an oscillating position in which the disc providing the reaction point for the link is frictionally secured to the spigot so as to prevent it from rotating relatively thereto. In the event of the fan during its oscillation meeting an obstruction which restricts or prevents the oscillatory movement, the frictional engagement between the disc and the spigot is insufficient to resist the thrust of the link, and the disc therefore moves relatively to the spigot until the end of the throw of the oscillatory movement is reached. The disc is then held by the frictional engagement in this new

position in which it provides a reaction point for the link causing the oscillatory movement of the fan. Thus the mechanism is self adjusting.

For the Applicants,
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Printed for Her Majesty's Stationery Office by Wickes & Andrews, Ltd., E.C.4. 39/244.—1953
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

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