March 23, 1954 M. E. LAUTNER 2,673,029

FAN STRUCTURE

Filed Sept. 15, 1951

Fig. 1.

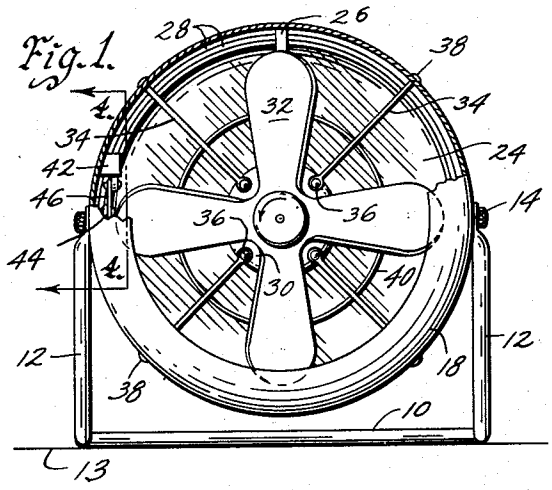


Fig. 2.

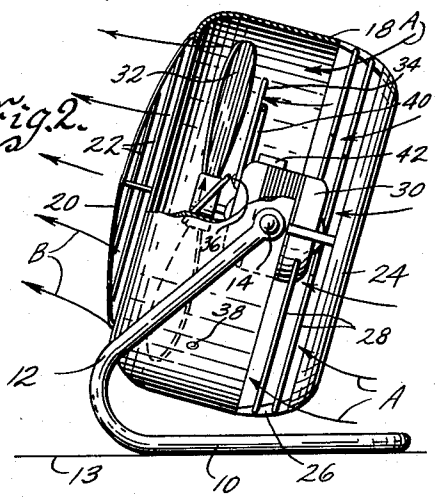


Fig. 3.

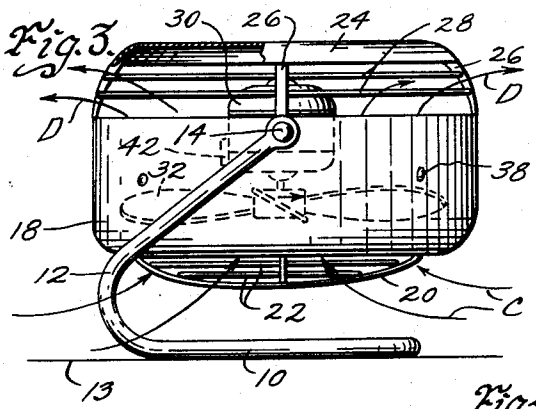


Fig. 4.

Fig. 5.

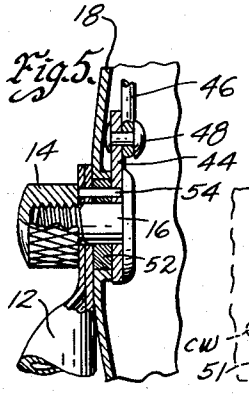
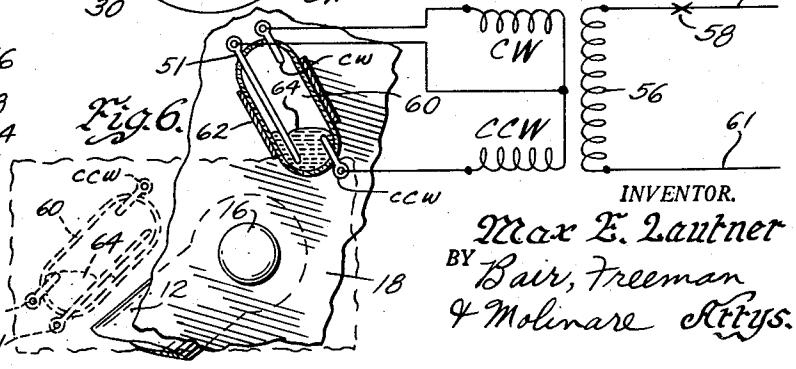


Fig. 6.



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FAN STRUCTURE

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Application September 15, 1951, Serial No. 246,746

11 Claims. (Cl. 230—259)

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This invention relates to a combination or dual purpose fan structure which can be used either as a directional blast type fan or a floor-type circulator.

One object of the invention is to provide a support, and a fan structure in which the motor and fan may be adjusted relative to said support for blowing air substantially horizontally or substantially vertically, a deflector plate being provided for deflecting the air radially in substantially horizontal directions in the latter position of the fan.

A fan of this character requires that the air be blown in one direction relative to the fan motor when the fan structure is adjusted to a position to serve as a directional blast type fan and in the opposite direction when it is adjusted to serve as a floor type circulator. An important object of the present invention, therefore, is to provide a means to electrically reverse the motor so that it will rotate clockwise or counter-clockwise as required.

A further object is to provide means to cause the electrical reversing to be accomplished automatically as a result of adjusting the motor for either directional blast operation or floor circulator operation.

More specifically, it is an object of the present invention to provide a reversing switch for the motor which is so linked with a shroud for the motor that when the shroud is adjusted for either type of air circulation, the switch will automatically be adjusted for forward or reverse rotation of the motor suitable to cause the fan to blow the air in the proper direction.

Still a further object is to provide the combination of a reversing switch and a motor that can be adjusted with its axis either vertical or horizonal, the motor being pivoted to a support and the switch being so connected with the motor and the support that it will electrically reverse the motor to cause rotation of the fan blades in the proper direction corresponding to the adjustment of the motor relative to the support.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my fan structure, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, wherein:

Figure 1 is a front elevation of a fan structure embodying my present invention and showing it adjusted for directional blast operation in a horizontal direction.

Figure 2 is a side elevation thereof showing the fan adjusted to a position for throwing the air in a slightly upward direction.

Figure 3 is a side elevation showing the fan structure adjusted to serve as a floor type circulator, the axis of the fan in this instance being vertical.

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Figure 4 is an enlarged sectional view of a portion of Figure 1 as taken on the line 4—4 thereof, and showing a reversing switch and the means for automatically operating the same, several positions of the switch being shown by dotted lines and the figure including an electrodiagram of the fan motor.

Figure 5 is a detail sectional view on the line 5—5 of Figure 4; and

Figure 6 is a view similar to Figure 4 showing a modified construction using a mercury type of switch.

On the accompanying drawing I have used the reference numerals 10 and 12 to indicate a support formed of tubular metal or the like. The portion 10 thereof is substantially U-shaped and is adapted to rest on a floor 13 or other supporting surface. The portions 12 are uprights or supporting posts for a substantially cylindrical shroud 18. As shown in detail in Figure 5, pivot bolts 16 are provided for connecting the shroud 18 to the posts 12, and lock nuts 14 are threaded on the pivot bolts. One of the pivot connections involves further details of construction as shown in Figure 5 which will be referred to later on in the present specification.

The shroud 18 is open at both ends and there is a wire guard structure for one end consisting of radial wires 20 and a pair of circular wires 22. This guard structure has been omitted from Figure 1 to show other details.

The other open end of the shroud 18 has supported in spaced relation thereto a deflector plate 24. The means of support consist of four posts 26 which leave an intervening space between the deflector plate and the shroud and this is provided with circular guard wires 28 as illustrated.

Within the shroud 18 a fan motor 30 is supported and a fan 32 is mounted thereon. The manner of support may consist of radial wires 34 secured at 36 to the motor 30 and at 38 to the shroud. These are reinforced by circular wires 40 and this arrangement, since the wires 30, 34 and 40 are made of metal, provides a somewhat resilient support for the motor that minimizes the transmission of vibrations from the motor to the shroud 18 and the support 10—12. The blades of the fan 32 are preferably designed for substantially equal efficiency when rotating in either direction.

A shroud, supporting arrangement therefor, and fan motor assembly of the character thus far described, is suitable for operation either as a directional blast-type circulator as shown in Figure 2 or as a floor-type circulator as shown in Figure 3 when the motor 30 is of electrically reversible character so that the fan blades 32 may be made to rotate in one direction or the

other for proper circulation of air in the two different positions of adjustment of the fan structure. By way of example, in Figure 2 arrows A indicate air flowing into one end of the shroud past the guard wires 28 and flowing out as indicated by arrows B through the guard structure 20—22. This is when the fan rotates counter-clockwise as in Figures 1 and 2.

On the other hand it is desirable that the fan rotate clockwise when the structure is adjusted as in Figure 3 so that air, as indicated by the arrows C, enters through the guard structure 20—22 and is deflected by the plate 24 to discharge in radially and substantially horizontal directions as indicated by the arrows D.

A reversing switch may be provided for this purpose and may be manually moved to one position or the other depending on the position to which the fan structure is adjusted, but it is desirable to have the switch operated automatically inasmuch as in the position of Figure 2 it is desirable only that the air be blown in the direction indicated by the arrows A and B while when the structure is adjusted as in Figure 3 it is desirable only that the direction of the air be reversed as indicated by the arrows C and D. Accordingly, I provide for automatic reversing of the switch.

By way of examples I show a switch 42 in Figure 4 and a mercury switch 62 in Figure 6. The switch 42 in Figure 4 is mounted on the shroud 18 as shown in Figure 1 and is operated by an arm 44 and a spring wire link 46. The arm 44 is fixed in relation to the support 10—12 as by means of a sleeve 52 shown in Figure 5 interposed between the post 12 and the arm 44, the three being connected against relative rotation as by a pin 54.

The arm 44 is thus in effect stationary as compared to the pivotally mounted shroud 18 and the motor 30 is pivotally movable with the shroud and relative to the support 10—12. The spring link 46 is then pivoted at 48 to the arm 44, the pivot 48, of course, being spaced from the pivot 16 for the shroud and its opposite end is pivoted at 50 to an operating ear 49 of the switch 42. This switch may be a slide-toggle type in which the operating arm 49 carries a bridging contact which bridges a common contact 51 and a counter-clockwise contact *ccw*, or the common contact 51 and a clockwise contact *cw*, in different positions of the switch relative to the support 10—12. The contacts *cw* and *ccw* are connected with one of the ends clockwise coils CW and counter-clockwise coils CCW of the motor 30 shown diagrammatically in Figure 4, while the common contact 51 is connected to the opposite ends of these coils.

The coils CW and CCW are shading coils; whereas the field coils of the motor 30 are illustrated at 56 and are in the main circuit, the supply wires being shown at 59 and 61. An on-off switch for the motor is shown at 58. The motor diagram shown is merely by way of illustration; whereas other reversing types of motors and switches may be substituted as desired, the main consideration being that the motor is capable of being electrically reversed and a reversing switch is provided therefor.

As to the operation of this switch, I have shown positions *a*, *b*, *c*, *d*, and *e* in Figure 4. The position *a* is the same as that shown in Figure 2, and the position *e* corresponds to that shown in Figure 3, the switch having moved through the positions *b*, *c* and *d* as the shroud 18 is pivoted from the position of Figure 2 to the position of Figure 3.

The position *b* corresponds to a horizontal-axis position of the fan as shown in Figure 1 and in this position the spring link 46 is being shortened between its pivot points 48 and 50. It is still further shortened in the position *c* and somewhere intermediate this position and position *d* the pivot 50 reaches its closest point relative to the pivot 48 after which the spring link 46 will expand as from the position illustrated at *f* to the position illustrated at *g* and in doing so will open the circuit of the counter-clockwise coils thus reversing the rotation of the motor in Figure 3 relative to the direction of rotation in Figures 1 and 2. In this manner I am able to automatically accomplish electrical reversing of the motor as a resultant of manually changing the fan structure from a position for blast-type circulation to one for floor-type circulation.

In Figure 6 I show a mercury switch 60 secured to the shroud 18 as by a clamp band 62 and containing the common contact 51, the clockwise contact *cw* and the counterclockwise contact *ccw* as in Figure 4. A comparable electric diagram is shown with clockwise and counter-clockwise coils and field coil 56.

With a mercury type of switch, a mechanical linkage connection as in the type of switch shown in Figure 4 is unnecessary. Instead the mercury switch is merely mounted on the shroud or at least in fixed position relative to the fan motor and at the proper angle for the mercury 64 therein to bridge the contacts 51 and *ccw* in the Figure 2 position of the fan structure, and bridge the contacts 51 and *cw* in the Figure 3 position as shown by dotted lines in Figure 6. In either case the motor is automatically electrically reversed at a position of the shroud intermediate its floor circulator position and its directional blast circulator position.

Some changes may be made in the construction and arrangement of the parts of my fan structure without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim as my invention:

1. A fan structure comprising a support, a motor pivotally mounted thereon for its shaft to extend substantially vertically or substantially horizontally, a fan on said shaft, a deflector plate arranged in a plane transverse to said shaft, said fan when rotating in one direction blowing air upwardly toward said deflector plate when said shaft is substantially vertical, and when rotating in the reverse direction blowing air away from said deflector plate, and a reversing switch operatively connected with said support and said motor to electrically reverse said motor when the motor is pivoted to said position with its shaft extending substantially horizontally.

2. A fan structure comprising a support, a motor pivotally mounted thereon, a fan on the shaft of said motor, a deflector plate, said fan when rotating in one direction blowing air toward said deflector plate when said motor is pivoted to one position, and when rotating in the reverse direction blowing air away from said deflector plate, and a reversing switch operatively connected with said support and said motor to electrically reverse said motor when the motor is pivoted to another position.

3. A fan structure comprising a support, a motor driven fan pivotally mounted thereon to blow air substantially vertically or substantially horizontally, a deflector plate spaced from said fan, said fan when rotating in one direction blowing air vertically toward said deflector plate, and when rotating in the reverse direction blowing air away from said deflector plate, and a reversing switch operatively connected with said support and said motor to electrically reverse said motor when said fan is pivoted to said position for blowing air horizontally.

4. In a fan structure of the character disclosed, a support, a tubular shroud pivotally mounted thereon for adjustment to positions with its tubular axis substantially vertical or substantially horizontal, a fan supported in said shroud and in fixed relation thereto, a deflector spaced from one end of said shroud for deflecting air from said fan in substantially radial horizontal directions when said shroud is adjusted to a position with its tubular axis substantially vertical and with said fan discharging air toward said deflector whereby said fan structure serves as a floor type circulator, and a reversing switch for said fan operatively connected with said shroud to reverse the rotation of said fan when said shroud is adjusted to a position with its tubular axis substantially horizontal whereupon said fan discharges air in the opposite direction relative to said shroud and said fan structure then serves as a directional blast type circulator.

5. In a fan structure, a support, a tubular shroud pivotally mounted thereon for adjustment to positions with its tubular axis substantially vertical or substantially horizontal, a fan in said shroud, a deflector spaced from one end of said shroud for deflecting air from said fan when said shroud is adjusted to a position with its tubular axis substantially vertical, said fan then discharging air toward said deflector, and a reversing switch for said fan operatively connected with said shroud to reverse said fan when said shroud is adjusted to a position with its tubular axis substantially horizontal.

6. A fan structure comprising a support, a motor pivotally mounted thereon for its shaft to extend substantially vertically or substantially horizontally, a fan on said shaft, a deflector plate arranged in a plane transverse to said shaft, said fan when rotating in one direction blowing air upwardly toward said deflector plate when said shaft is substantially vertical, and when rotating in the reverse direction blowing air away from said deflector plate, a reversing switch element for said motor to electrically reverse it, and an operating link element for said switch, one of said elements being connected to said motor and the other of said elements being connected to said support for moving said switch to its reverse position when said motor is moved from said position with its shaft extending substantially vertically to said position with its shaft extending substantially horizontally.

7. A fan structure comprising a support, a motor pivotally mounted thereon, a fan driven thereby, a deflector plate spaced from said fan, said fan when rotating in one direction blowing air upwardly toward said deflector plate when the axis of said fan is substantially vertical, and when rotating in the reverse direction blowing air away from said deflector plate, a reversing switch element for said motor to electrically reverse it, and an operating link element for said switch, one of said elements being connected to said motor and the other of said elements being connected to said support for moving said switch to its reverse position when said motor is moved from said position with the fan axis vertical to said position with the fan axis substantially horizontal.

8. A fan structure comprising a support, a motor pivotally mounted thereon for its shaft to extend substantially vertically or substantially horizontally, a fan on said shaft, a deflector plate arranged in a plane transverse to said shaft, said fan when rotating in one direction blowing air upwardly toward said deflector plate when said shaft is substantially vertical, and when rotating in the reverse direction blowing air away from said deflector plate, and a reversing switch carried by said motor and having a gravity actuated bridging element for forward and reverse contacts of said switch, said bridging element contacting the forward contacts thereof when said motor is adjusted with its shaft extending substantially vertically, and contacting said reverse contacts when said motor is adjusted to said position with its shaft extending substantially horizontally.

9. A fan structure comprising a support, a motor pivotally mounted thereon, a fan driven thereby, a deflector plate, said fan when rotating in one direction blowing air toward said deflector plate, and when rotating in the reverse direction blowing air away from said deflector plate, a reversing switch carried by said motor and having a gravity actuated bridging element for forward and reverse contacts of said switch, said bridging element contacting the forward contacts thereof when said motor is adjusted to one position with said fan structure serving as a floor-type circulator and contacting said reverse contacts when said motor is adjusted to another position with said fan structure serving as a blast-type circulator.

10. In a fan structure, a support, a tubular shroud pivotally mounted thereon for adjustment to positions with its tubular axis substantially vertical or substantially horizontal, a fan in said shroud, a deflector spaced from one end of said shroud for deflecting air from said fan when said shroud is adjusted to a position with its tubular axis substantially vertical, said fan then discharging air toward said deflector, a reversing switch for said fan, and operating means for said reversing switch operated by adjustment of said shroud to a position with its tubular axis substantially horizontal.

11. A fan structure comprising a support, a motor pivotally mounted thereon, a fan driven thereby, a deflector plate spaced from said fan, said fan when rotating in one direction blowing air upwardly toward said deflector plate when the axis of said fan is substantially vertical and when rotating in the reverse direction blowing air away from said deflector plate, a reversing switch for said motor to electrically reverse it, said motor being adjustable to a position for blowing air substantially horizontally and said reversing switch being operated by such adjustment to its motor reversing position.

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