

Aug. 12, 1941.

H. C. HUEGLIN

2,252,179

VENTILATOR

Filed April 13, 1939

3 Sheets-Sheet 1

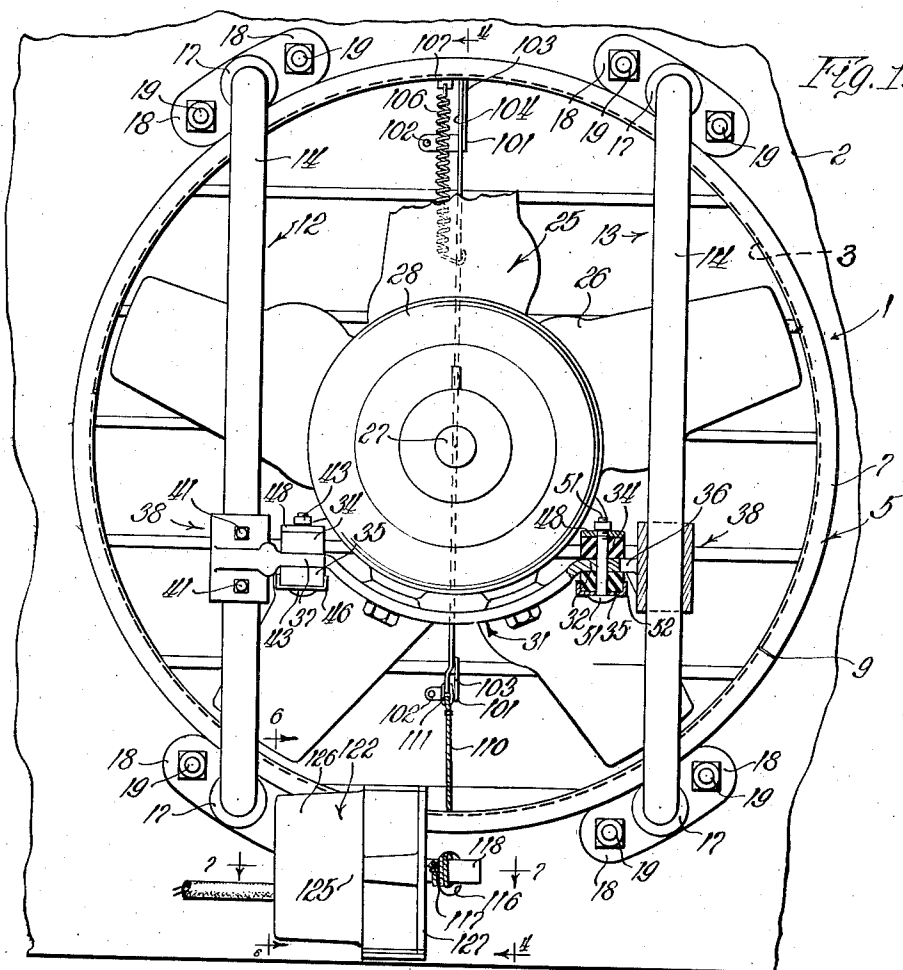


Fig. 1.

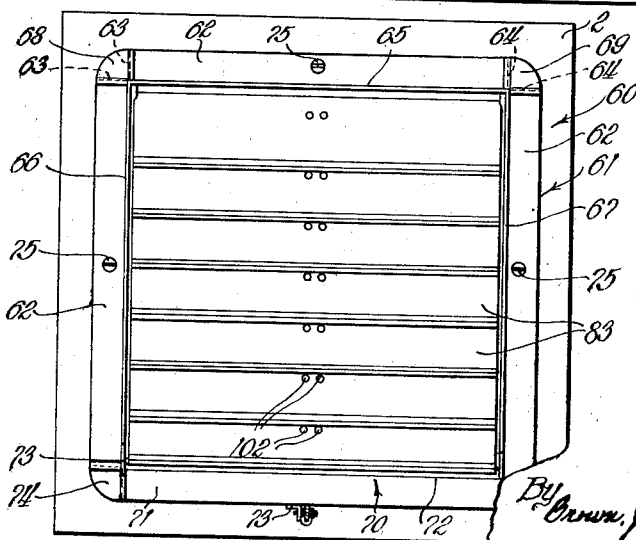


Fig. 2.

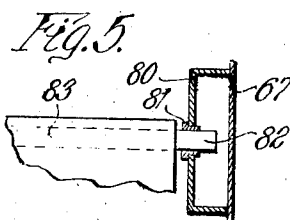


Fig. 5.

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3 Sheets-Sheet 2

Fig. 3.

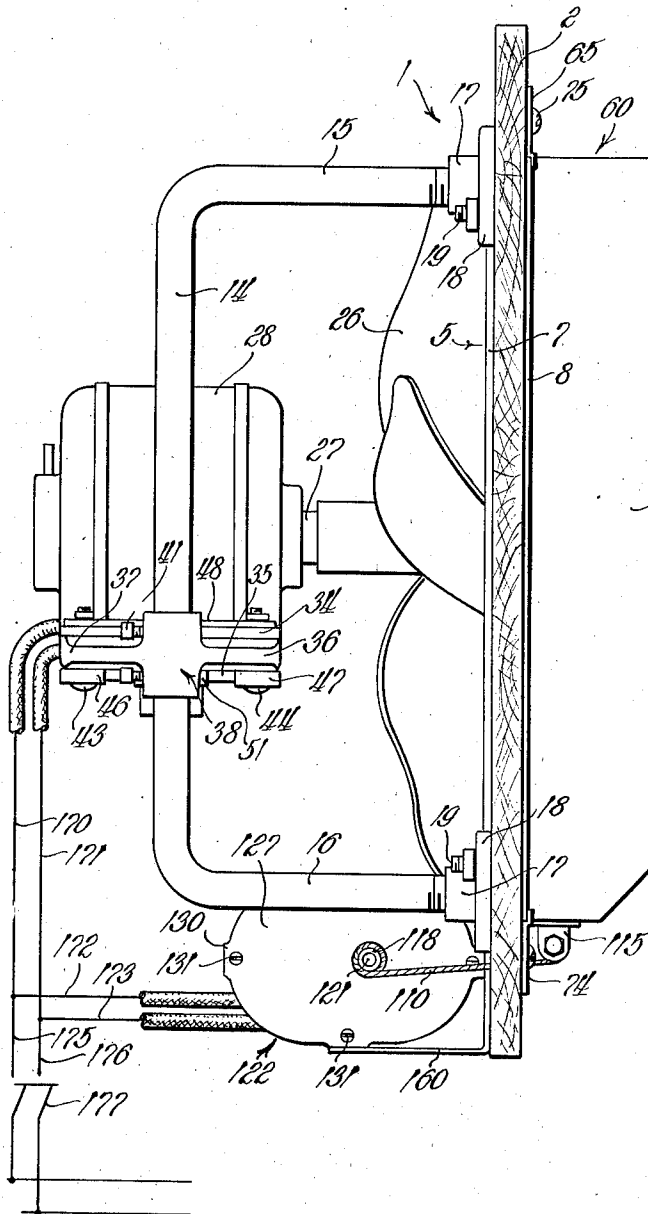
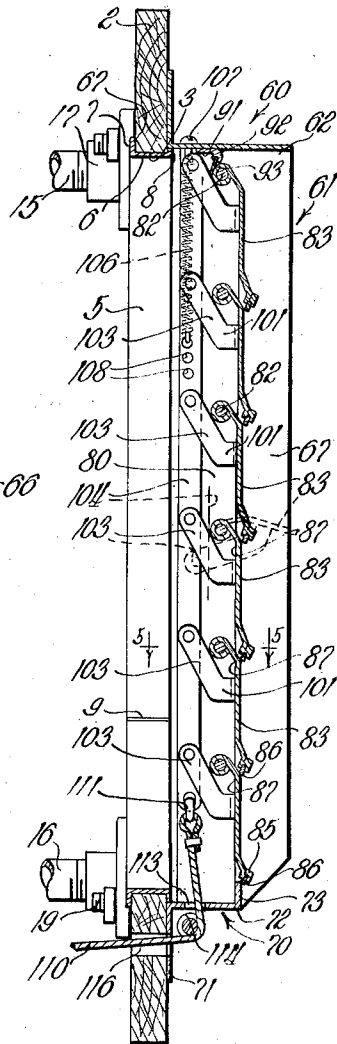


Fig. 4.



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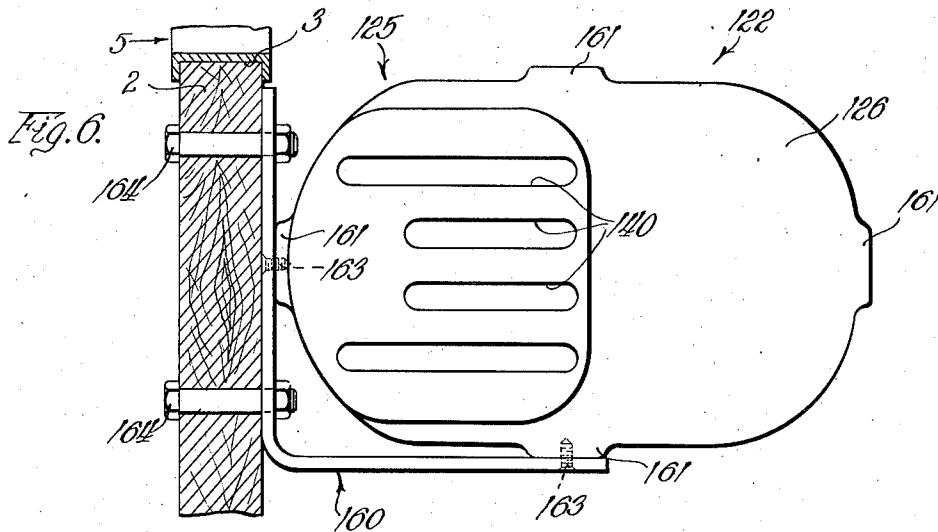
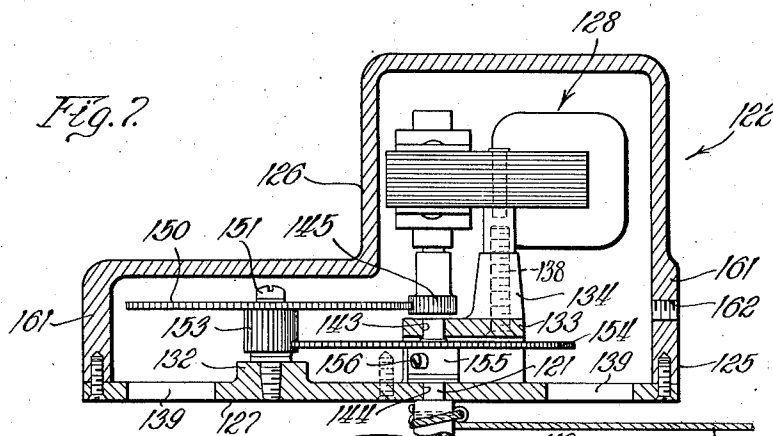
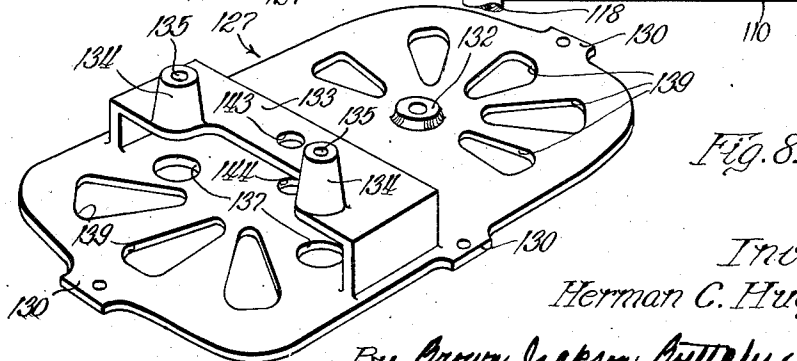
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,252,179

VENTILATOR

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Application April 13, 1939, Serial No. 267,535

10 Claims. (Cl. 98—116)

The present invention relates to ventilators, and more particularly to motor driven fans used to ventilate rooms in a building such as, for example, kitchens of homes, restaurants, and the like, by removing the air and forcing it out to atmosphere or some other point of discharge.

Ventilating fans of this type are well known and, generally speaking, they are supported upon a plate or other rigid member fastened to the wall of a building and the fan and driving motor therefor being mounted so as to force air out of the room into the atmosphere. Sometimes the ventilating fan is mounted on a panel so as to be supported in the upper part of a window. Since the opening through which the fan directs air leads to the outside, it is usual to provide some form of pivoted vanes or louvres and arrange them to open when the fan is in operation to provide for the exhaust of air from the room and to close when the fan is not in operation so as to eliminate drafts and cold air coming back into the room and to prevent the entrance of insects or the like.

In many instances the pivoted vanes or louvres have been of light construction and arranged for free swinging movement so that when the fan is turned on, the blast of air opens the vanes automatically and keeps them open until the fan is shut off. It has been found, however, that where the blast of air is relied upon to keep the vanes or louvres open, the total air discharge is reduced by something like 30%. In an effort to avoid the disadvantages of a construction of this nature, it has been proposed to provide mechanical means for opening and closing the vanes, with some sort of mechanical linkage associated therewith for turning on the fan and simultaneously opening the vanes, such as are shown in my two prior patents, 1,894,930, issued January 17, 1933, and 2,084,807, issued June 22, 1937. While, in general, ventilating fans of this type have proven successful, it would be an advantage to eliminate all mechanical interconnecting means while yet positively and firmly holding the louvres tightly closed until such time as the fan is turned on. Frequently, also, the ventilating fans are placed quite high, and where doors or switches, which form a part of the ventilating fan unit, have to be operated by hand, the necessary connections may be long and more or less unsightly or inconvenient.

With the above features in mind, the object and general nature of this invention is the provision of a ventilating fan in which the louvres are made of heavy gauge steel or other sturdy

material and are positively held tightly closed until the fan motor is turned on, whereupon the louvres will be opened by positive acting means of an electrical nature, connected either in series or parallel, as desired, but usually in parallel with the fan motor with both controlled by a single switch. Mechanical operating linkages may, in certain cases, require considerable force to operate, especially if the louvres are closed by a strong spring, and may be quite difficult or inconvenient to operate, particularly from a point remote from the ventilator unit. By the present invention, all mechanical operating connections between the motor switch and the apparatus for opening and closing the vanes are eliminated, and, instead, all control is effected by turning a switch which can be disposed wherever desired.

More specifically, it is a feature of this invention to provide a ventilating fan construction having rigid louvres controlled by an electrical unit in the nature of a stall motor positively connected with the louvres, the stall motor being mounted adjacent the fan and arranged to be energized simultaneously with the energization of the fan motor itself. An advantage of this arrangement is that merely turning a switch or otherwise directing a flow of current to the fan motor also automatically operates the stall motor which opens the louvres, and permits a practically unrestricted discharge of air there-through. It has been found that with such an arrangement a twenty inch fan will provide the effective capacity supplied by a twenty-four inch fan where the air blast was relied upon to hold the louvres open. Then when the fan motor is turned off, the stall motor is automatically de-energized and a relatively strong spring or other suitable means automatically returns the louvres to their closed position and holds them tightly closed and prevents them from chattering or rattling, which frequently occurred in prior devices where the louvres were of light material and more or less loosely mounted for free movement. The use of a stall motor in this connection is especially advantageous since it can be directly connected in parallel with the fan motor and can exert a sufficiently strong pull to open the vanes as soon as the fan motor is turned on, and the spring or other means against which the stall motor acts can also be made strong so that when the fan is not in operation the louvres are maintained tightly closed at all times.

Another feature of this invention is the mounting of the louvre controlling stall motor sufficiently close to the opening through which the

fan discharges air that the air moving toward the fan sweeps over the stall motor and keeps the same cool when it is in the operation of holding the louvres open.

A further feature of this invention is the provision of suitable reduction gearing for the stall motor with improved mounting and bearing means for the gearing which makes it especially adapted for use with a fan and louvre unit.

These and other objects and advantages of the present invention will be apparent to those skilled in the art after a consideration of the following detailed description of a proposed structural embodiment, taken in conjunction with the accompanying drawings illustrating the preferred form of the invention.

In the drawings:

Figure 1 is a rear view of a ventilating fan constructed according to the principles of the present invention;

Figure 2 is a view, taken on a reduced scale, of the outside of the fan unit shown in Figure 1, with the louvres closed;

Figure 3 is a side view of the unit shown in Figure 1;

Figure 4 is a sectional view taken generally along the line 4—4 of Figure 1, the fan and fan motor being omitted;

Figure 5 is a fragmentary section taken along the line 5—5 of Figure 4;

Figure 6 is a view taken along the line 6—6 of Figure 1, showing the stall motor casing;

Figure 7 is a sectional view, taken along the line 7—7 of Figure 1; and

Figure 8 is a perspective view of the base of the stall motor and support for the reduction gearing.

Referring now more particularly to Figures 1, 3 and 4, the reference numeral 1 indicates in its entirety a supporting frame for the unit and which comprises a panel 2, preferably formed of plywood, having a large central opening 3 therein. A channel ring 5 embraces the walls of the opening 3, and has a central section 6 with flanges 7 and 8 disposed at opposite sides of the panel 2. The channel ring 5 is split, as at 9 (Figures 1 and 4), to facilitate springing the ring 5 into place in the opening 3. The ring 5 protects the opening and prevents the panel from splitting or splintering in service. The supporting frame 1 also includes a pair of brackets 12 and 13 each consisting of a generally vertically disposed U-shaped pipe member 14 having ends 15 and 16 (Figure 3) extending generally horizontally toward the panel and threaded into sockets 17. Each of the sockets 17 has a pair of ears 18 which are apertured to receive bolts 19 by which the sockets, after being threaded onto the ends 15 and 16, are securely fastened to the panel 2 just outside the ring 5.

As best shown in Figure 1, the two pipe members 14 are disposed at spaced apart relation and receive therebetween a fan and motor unit indicated in its entirety by the reference numeral 25. The unit 25 includes a fan 26 supported on a shaft 27 which projects from an electric motor 28. The motor is secured to a saddle member 31. The member 31 is relatively narrow and has ends 32 disposed between a pair of cushioning strips 34 and 35. Also, the ends 32 of the member 31 are disposed in a horizontal position between spaced lugs 36 and 37 (Figure 3) which extend inwardly from a supporting sleeve 38, which is adjustably secured to the pipe members 14 by set screws 41 or the like. The lugs 36 and 37 are

apertured to receive bolts 43 and 44, the bolts also passing through the cushioning members 34 and 35. The lower ends of the bolts 43 and 44 pass through short channel members 46 and 47 (Figure 3) which embrace the associated lower cushioning member 35, the upper ends of the bolts passing through apertures in the strip 48 which overlies the cushioning member 34. A third bolt 51 passes through an intermediate channel member 52 (Figure 1) and upwardly through the cushioning members 34 and 35, the lug 32 on the motor supporting saddle 31, and a hole in the central portion of the upper strip 48.

The motor 28 is thus connected at each side to the associated supporting member 14, and since there is no metal-to-metal contact, the motor and fan operate silently and without vibration. The sleeves 38 may be adjusted vertically to dispose the fan axis coincidental with the center of the panel opening 3.

The fan 26, the motor 28 for driving the fan, and the supporting means for the motor and fan are disposed at one side of the panel 2. At the other side of the opening 3 is a louvre-supporting frame or casing indicated in its entirety by the reference numeral 60. The casing 60 includes an angle member 61 having its shorter flange 62 cut, as at 63 and 64, to permit the angle 61 to be bent at points to form the top and sides of the casing 60, the top being indicated at 65 and the sides at 66 and 67. At the points where the shorter flange 62 of the angle 60 is cut, small segments 68 and 69 are welded to the cut portions of the shorter flange, as best shown in Figure 2. The bottom of the casing 60 consists of an angle member 70 having its vertical flange 71 disposed in the plane of the vertical flanges of the top and sides 65, 66, and 67, the horizontal flange 72 of the angle 70 being bent upwardly, as at 73 (Figure 4). Segments 74 are welded to the adjacent flanges and materially contribute to the rigidity of the casing 60. The latter is secured to the panel 2 by a plurality of screws 75.

A narrow channel member 80 is secured to the inner surface of each of the flanges 66 and 67 and is apertured at a plurality of points to receive bushings 81 in which the pivots 82 of a plurality of louvres 83 are received. The pivots 82 and the louvres 83 are disposed horizontally, as best indicated in Figure 2. The louvres 83 preferably are made of heavy gauge steel or other sturdy stock, and are crimped, as at 85, to receive a strip of felt 86 whereby the lower edge of each louvre closes tightly against the upper portion of the next lower louvre. The lowermost louvre 83 closes against the upturned flange 73 on the angle 70, as best shown in Figure 4. The upper portion of each louvre is bent, as at 87, so as to dispose the pivot of each louvre in a plane inwardly of the general plane of the louvres when they are closed. A strip 91 is riveted or otherwise secured to the upper flange 65 and is bent downwardly, as at 92, and crimped to receive a felt strip 93. This strip lies against the portion of the upper louvre receiving the pivot 82 and thereby maintains a seal at this point which is tight at all times, both when the upper louvre is in closed position and when it is moved to open position.

A bracket 101 is fixed, as by rivets 102 or the like, to each louvre, and each bracket has an arm 103 which extends inwardly and upwardly, and a vertically disposed common operating member 104 is pivoted to the end of each of the arms 103. A strong spring 106 has its upper

end connected to an adjusting screw 107 and its lower end engaged in one of a plurality of holes 108 formed in the operating member 104, as best shown in Figure 4. The spring 106 acts through the common operating member 104 to hold all of the louvres tightly closed when the fan 26 is not in operation. In the closed position, the ends of the louvres lie against the edges of the vertical channels 80 and, also, the ends of the louvres 83 fit fairly snugly against the side flanges 66 and 67. Hence the casing 60, with its pivoted louvres, forms a vermin-proof and substantially air-tight closure when the louvres are shut. The spring 106 being strong and the louvres 83 being formed of steel or other suitable material and relatively rigid, it will be seen that there is little possibility of drafts and air currents finding their way through the closed louvres, and it is practically impossible for normal variations in air pressure to force the louvres open or cause them to rattle or chatter.

The louvres 83 are opened by means of a flexible element 110, such as a chain, cord, or cable, that is fixed by means of a connector 111 to the lower end of the common operating member 104. The element 110 extends downwardly through an opening 113 in the horizontal flange of the angle 70 and is trained around a sheave 114 which is pivoted on a bracket 115 carried by the angle 70. An opening 116 is formed in the lower portion of panel 2, and the corresponding portion of the vertical flange 71 and the element 110 passes through the opening 116 and has its end secured, as by a cotter key 117, to a cylindrical winding member 118. If desired, the latter may be in the form of a worm having a spiral groove. The member 118 is fixed to the shaft 121 of a stall motor unit, indicated in its entirety in Figures 1 and 3 by the reference numeral 122. The cotter key 117 to which the end of the element 110 is secured also serves as the means for fixing the member 118 to the shaft 121. The stall motor unit 122 is best shown in Figures 1, 3, 6, 7, and 8 and includes a casing 125 which consists of a cover 126 and a motor and gearing support or base 127. The latter is preferably formed of brass and the cover may be a casting of aluminum or other suitable material. The motor proper is indicated at 128 and is of conventional construction. The base 127 is formed with apertured lugs 130 which receives screws 131 that secure the base and cover together, and the base 127 is also provided with a tapped boss 132 and an integral transverse bridge 133 which carries two spaced lugs 134 having holes 135 drilled therein. The motor 128 is mounted on the lugs 134, as best shown in Figure 7, and the body of the base 127 has openings 137 which provide for the insertion of screws 138 (Figure 7) which secure the motor 128 in place. The base 127 has open sections 139 which provide for ventilation and reduce the weight of the base. The cover 126 also has openings 140 for the same purpose.

The bridge 133 and body of the base 127 are drilled, as at 143 and 144, to provide a bearing for the shaft 121. The latter is preferably steel, and since the base 127 is brass, no bushings for the shaft are necessary, nor is lubrication required. The openings 143 and 144 can be formed at one operation, thereby assuring proper alignment. The height of the lugs 134 is such that the driving pinion 145 (Figure 7) of the stall motor 128 is disposed just above the bridge 133 and in line with the shaft 121. A gear 150 is mounted

for rotation on a screw stud 151 threaded into the boss 132. The gear 150 is securely fixed to a brass pinion 153 journaled on the stud 151, and the pinion 153 meshes with a gear 154 disposed between the bridge 133 and the body of the base 127. The gear 154 carries a collar 155, and a set screw 156 securely fixes the collar and gear to the shaft 121.

The stall motor unit 122 is fixedly mounted in position on the frame 1 by means of an angle bracket 160. To this end the cover 126 carries bosses 161, two of which are apertured as at 162. Screws 163 pass through the holes 162 to fix the cover 126 to the bracket, and one or more bolts 164 fix the bracket 160 to the panel 2 below the opening 3 so as to dispose the winding member 118 in the plane of the operating link 104 and the flexible element 110 and in such a position that the element 110 winds uniformly on the member 118 when the stall motor 128 is energized. The unit 122 is mounted out of the path of movement of the fan 26 but close enough to the fan so that, in operation, the air moving toward the fan passes over the stall motor unit and keeps the same cool.

As will be understood, the unit 122 operates upon the stalled motor principle, wherein when the motor 128 is energized the shaft 121 is rotated through the reduction gearing, winding the element 110 on the member 118 and pulling down on the operating member 104 against the action of the spring 106, thereby opening the louvres 83. In opening the louvres, the member 104 moves downwardly until it strikes the hinged portions of the louvres (see dotted lines, Figure 4), thus serving as a stop for the louvres and the stall motor. The spring 106 is made strong enough to hold the louvres closed at all times when the fan is off, and the motor 128 of the unit 122 is designed to exert sufficient torque to overcome the spring 106 and hold the louvres open when the fan is turned on, the motor remaining in this position so long as it is energized. Upon de-energization, the spring 106 immediately exerts a pull on the operating member 104 and closes the louvres. Such units are designed to have a low current consumption.

The fan motor 28 receives current through a pair of leads 170 and 171, and the stall motor unit 128 receives current through a pair of leads 172 and 173. As best shown in Figure 3, the stall motor leads 172 and 173 are connected in parallel with the fan motor connections, and current is supplied to both sets of leads by conductors 175 and 176, and a switch 177 of any suitable construction. As will be clear from Figure 3, whenever the switch 177 is closed, the stall motor 128 is energized at the same time that the fan motor 28 is energized, resulting in the automatic opening of the louvres by the time the fan comes up to speed, the motor 128 positively holding the louvres open at all times that the fan operates. Opening the switch 177 simultaneously deenergizes the fan motor 28 and the stall motor 128, whereupon the fan is shut down and the relatively powerful spring 106 immediately closes the vanes or louvres 83 and holds them tightly closed. The conductors 175 and 176 are connected to any suitable source of current. If desired, the fan motor 28 and stall motor unit 122 may be arranged in series, instead of in parallel as shown.

It will be understood that my invention is not to be limited to the specific details shown and described above, but that, in fact, widely differ-

ent means may be employed in the practice of the broader aspects of my invention.

What I claim, therefore, and desire to secure by Letters Patent is:

1. A ventilator comprising a frame, a plurality of louvres pivoted to said frame, means for opening said louvres, a fan and an electric motor for driving the same carried by said frame for directing a blast of air through said louvres when open, spring means biasing said louvres for movement into their closed position, a stall motor electrically connected with said first electric motor, a drum carried by said stall motor, and a cable extending from said louver opening means to said drum whereby said louvres are opened against the action of said spring means whenever said stall motor is energized.

2. A ventilator comprising a fan, an electric motor for driving the fan, a plurality of louvres movable to open and closed positions in front of said fan, a stall motor mounted in the general path of movement of the air moving toward said fan, means for energizing said stall motor whenever the fan motor is energized, and drum and cable means connecting said stall motor to said louvres for opening the latter automatically whenever said fan is in operation, movement of the air past said stall motor serving to keep the latter cool.

3. A ventilator comprising a panel having an opening therethrough, a bracket fixed to said panel at one side of said opening, a fan and an electric motor for driving the same supported on said bracket, a plurality of pivoted louvres mounted on the panel at the other side thereof and biased for movement into closed position shutting off movement of air through said opening, common operating means for opening all of said louvres, a stall motor, a drum for said stall motor, a cable operatively connected to said drum and said common operating means for opening said louvres, and electrical connections whereby said stall motor is energized whenever said fan motor is in operation.

4. A ventilator comprising a panel having an opening, a flanged casing secured to said panel at one side of said opening, a plurality of horizontal louvres pivotally mounted in the side flanges of said casing, a bracket secured to each louver, a generally vertically disposed common operating member pivotally connected to each bracket, spring means anchored at one end to the upper flange of said casing and secured at its lower end to said common operating member for holding said louvres tightly closed, a pair of generally vertically disposed U-shaped brackets disposed at the other side of said panel and having their ends extending generally horizontally and secured to said panel, a fan and a motor for driving the same supported by said brackets in a position between the latter with the fan disposed generally within said panel opening, a second bracket fixed to said panel, a stall motor carried by said second bracket and having a winding member, said stall motor being disposed in the path of movement of the air moving toward said fan but below the latter, a sheave fixed to the lower flange of said louver casing, there being an opening in said flange and an opening in the panel below said fan opening, a flexible element trained over said sheave and connected at one end to said operating member and at the other end to said winding member, and means for energizing said stall motor whenever said fan motor is energized, whereby whenever the fan is operated

said louvres are automatically moved to their open position against the action of said biasing spring.

5. A ventilator comprising a panel having an opening therethrough, a pair of supporting brackets fixed to said panel in laterally spaced relation to the panel at one side of the opening therein, a fan unit mounted on said supporting brackets, a plurality of pivoted louvres mounted on the panel at the other side thereof and biased for movement into closed position shutting off movement of air through said opening, means for opening said louvres, a stall motor unit fixed to said panel at said one side thereof between said pair of brackets, there being a second opening through said panel below said first opening, a winding member driven by said stall motor, a flexible connector extending from said winding member through said second opening to said louver opening means, and electrical connections whereby said stall motor is energized whenever said fan motor is in operation.

6. A ventilator as defined in claim 5 wherein the louver opening means comprises a common operating member which is connected to the central part of said louvres and the stall motor unit is supported on a bracket disposed to one side of the plane of said common operating member, said winding member and said flexible connector both being disposed generally in the plane of said common operating member.

7. A ventilator comprising a panel having an opening therethrough, a pair of supporting brackets fixed to said panel in laterally spaced relation to the panel at one side of the opening therein, a fan unit mounted on said supporting brackets, a plurality of pivoted louvres mounted on the panel at the other side thereof and biased for movement into closed position shutting off movement of air through said opening, a third bracket fixed to said panel between said supporting brackets and below said panel opening, a stall motor unit including a casing having a cover fixed to said third bracket, a base carrying a stall motor, reduction gearing and a winding member driven from the motor by said reduction gearing, means securing the base to said motor, said stall motor bracket being fixed to said panel to dispose said winding member below the center of said louvres, a flexible member connected at one end to and adapted to be wound on said winding member, and means connecting the other end of said flexible member to all of said louvres for opening the latter.

8. A ventilator comprising a panel having an opening therethrough, a fan unit mounted on said panel at one side of said opening, a plurality of pivoted louvres mounted on the panel at the other side thereof, means acting against said louvres biasing them for movement into a closed position shutting off movement of air through said opening, common operating means connected to said louvres, a bracket fixed to said panel adjacent the plane of movement of said common operating means, a stall motor unit fixed to said bracket and including a base member disposed generally in a plane parallel to and adjacent the plane of movement of said common operating means and including an integral bridge section, the base and bridge section being bored to provide bearing portions, a shaft disposed in said bearing portions and carrying a winding member disposed in the plane of said operating means, and a stall motor and gear reduction means for driving said shaft, and a flexible connection be-

tween said common operating means and said winding member.

9. A ventilator comprising a frame, a plurality of louvres pivoted to said frame, means for opening said louvres, a fan, and an electric motor for driving the same carried by said frame for directing a blast of air through said louvres when open, a stall motor electrically connected to said first electric motor, a drum adapted to be driven by said stall motor and a cable extending from said louvre opening means to said drum whereby said louvres are opened whenever said stall motor is energized.

10. A ventilator comprising a support, louvre means movably mounted on said support, a fan, an electric motor for driving said fan to direct a blast of air through said louvre means when open, a stall motor electrically connected to remain energized substantially the entire time that

said fan motor is energized, speed reduction gearing driven by said stall motor, and drum-and-cable mechanism establishing a flexible motion transmitting relation between said reduction gearing and said louvre means, said drum-and-cable mechanism comprising a drum driven by said reduction gearing and a cable having one end arranged to wind upon said drum and having its other end operatively connected with said louvre means so as to move the latter to open position whenever said stall motor is energized, said cable winding through successive turns upon said drum in the operation of said mechanism whereby to afford additional speed reduction beyond said speed reduction gearing and also to provide a long range of operating movement for said louvre means within a relatively compact space.

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