Aug. 25, 1959 W. SHEPHERD 2,900,892

VENTILATORS

Original Filed July 6, 1954 2 Sheets-Sheet 1

Fig. 1

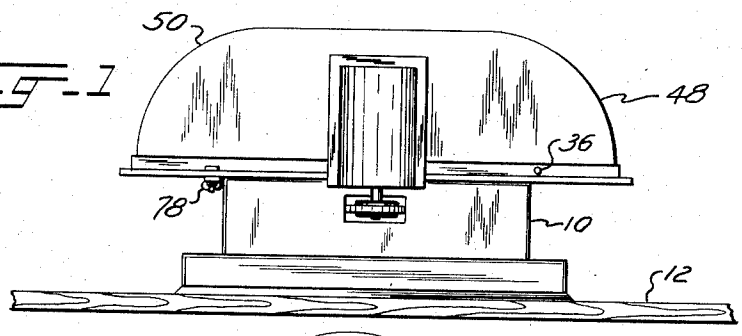


Fig. 2

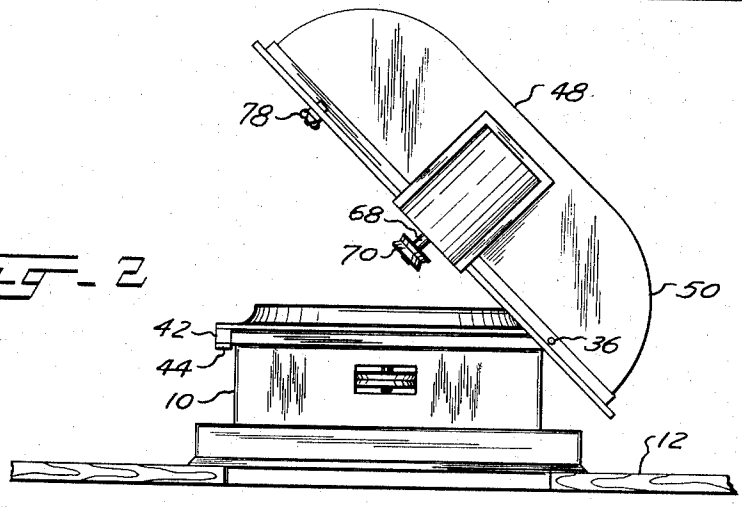
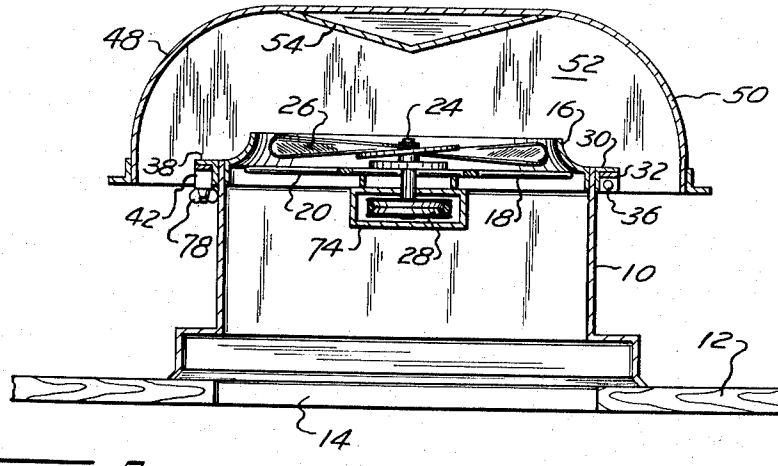


Fig. 3



INVENTOR

Wyley Shepherd

BY Robert J. Patch

ATTORNEY

Aug. 25, 1959 W. SHEPHERD 2,900,892

VENTILATORS

Original Filed July 6, 1954 2 Sheets-Sheet 2

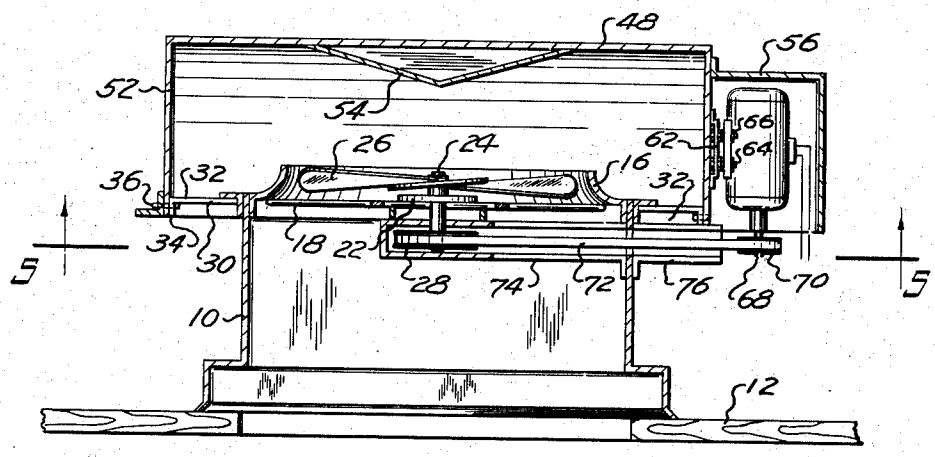


FIG. 4

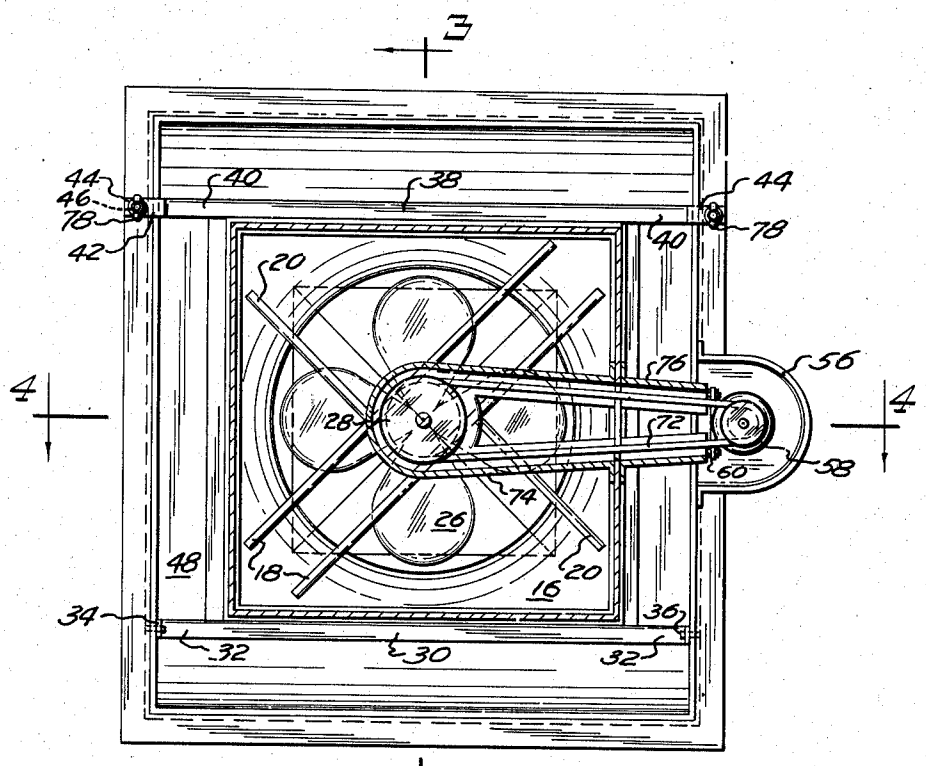


FIG. 5

INVENTOR

Wyley Shepherd

BY Robert Patm

ATTORNEY

United States Patent Office 2,900,892
Patented Aug. 25, 1959

2,900,892

VENTILATORS

Wyley Shepherd, Miami, Fla.

Original application July 6, 1954, Serial No. 441,236. Divided and this application November 4, 1955, Serial No. 544,931

6 Claims. (Cl. 98—43)

This invention relates to means for ventilating buildings, and more particularly to roof ventilators having a casing adapted to be secured to a roof as an upright outlet extension of an opening through the roof and having a ventilating fan in the casing.

Roof ventilators, as known heretofore, have suffered from the great disadvantage that they did not effectively shut out the elements during periods of use as well as during periods of idleness. In a high wind or a driving rainstorm, the roof ventilators known heretofore would often permit entry of rain water into the building to which they were attached, with resulting damage to the interior of the building. Alternatively, strong winds would often tear the roof ventilators of the prior art loose from their fastenings on the roof, or at the very least would blow back through the ventilator and force exhaust gases back into the building from which they were withdrawn.

In an effort to overcome the above disadvantages, a number of expedients have been tried. For example, it has been proposed to provide roof ventilators with various types of hoods or coverings for protective purposes. Thus, in U.S. Patent No. 2,332,552, issued October 26, 1943, to Belanger, an assembly of hood and shutters was provided which was designed to exclude the elements; however, this expedient nevertheless permitted the entry of driving rain into the casing past the shutters which were open in use. Moreover, this structure was subject to back draft when in use, was liable to be torn from its mounting in a strong wind, and did not afford easy access to the drive motor when assembled. In U.S. Patent No. 2,551,004, issued May 1, 1951, to Johnson, it was proposed that the hood be pivotally mounted; but this expedient was likewise unavailing, since the hood of Johnson did not exclude the elements when the ventilator was in use, nor did it afford easy access to the fan drive motor.

Although a number of other attempts were made to overcome the foregoing difficulties and disadvantages of the prior art roof ventilators, none, so far as I know, was entirely successful when carried into practice commercially on an industrial scale.

Accordingly, it is an object of my invention to provide a roof ventilator which will exclude the elements when the ventilator is in use as well as when it is not in use.

Another object of the invention is to provide a roof ventilator of which all the working parts are readily accessible from the roof side of the ventilator, thereby eliminating the awkwardness and hazard of using ladders or scaffolding to reach the working parts for repair and maintenance from within the building.

The invention also contemplates the provision of a roof ventilator in which the working parts are readily accessible without disassembly of any portion of the structure surrounding the working parts.

It is a further object of the invention to provide a roof ventilator in which back draft due to strong winds will be reduced to a minimum.

Still another object of the invention is the provision of

a roof ventilator which will not be susceptible of dislodgment from its fastenings in a strong wind.

A still further object of the invention is the provision of a roof ventilator adapted to serve either as an intake or an exhaust ventilator.

Yet another object of the invention is to provide a roof ventilator in which the air passageways are so arranged as to permit the movement of very great quantities of air without obstruction to its even flow.

It is also an object of my invention to provide a roof ventilator that is efficient in operation, that is easily installed, operated and repaired, and that is economical of manufacture and rugged and enduring in construction.

Other objects and advantages will become apparent by the following description taken in conjunction with the accompanying drawings in which:

Figure 1 is a side elevational view of a roof ventilator according to the invention, showing the hood in closed position, which is the operative position of the ventilator.

Figure 2 is a view similar to Figure 1, but showing the hood in open position, which is the inoperative position of the ventilator.

Figure 3 is an elevational cross sectional view of a ventilator according to my invention, taken on the line 3—3 of Figure 5.

Figure 4 is a view similar to Figure 3, but taken on the line 4—4 of Figure 5.

Figure 5 is a cross-sectional view of a ventilator according to the invention, taken from below on the line 5—5 of Figure 4, looking up.

Broadly stated, the present invention contemplates the provision of a roof ventilator having a casing adapted to be secured to a roof as an upright outlet extension of an opening through said roof and having a ventilating fan in the casing, and a hood over the casing to protect it from the elements. The hood may be mounted on the casing for pivotal movement about a substantially horizontal axis which may be disposed intermediate the horizontal length of the hood. The horizontal width and length of the hood may be substantially greater than the horizontal width and length of the casing; and the hood may be of downwardly concave shape so as to provide in effect a cap disposed over but spaced from the upper portion of the casing. The upper marginal portion of the casing may be disposed as high as or higher than the lower marginal portion of the hood to provide substantially complete protection from the elements. The hood may be provided interiorly with a downwardly projecting pyramidal deflector to facilitate the passage of air through the ventilator. The motor may be mounted on the outside of the casing and protected from the weather by the hood, or mounted on the outside of the hood and protected by a separate casing; but in either event, upward tilting movement of the hood will provide access to the motor, as well as to the other working parts.

Referring now to the drawings, Figure 1 shows in side elevation a first form of roof ventilator according to the invention, and comprising a trunk or casing **10** which may be of generally rectangular or circular shape, and which is adapted to be secured to the roof **12** as an upright outlet extension of an opening **14** through the roof, as best seen in Figure 3. The casing may be secured to the roof in any suitable manner, and flashing may be provided if desired to insure a weather-tight joint. A fan ring **16** is mounted in the upper portion of casing **10** as by welding, riveting, brazing, bolting, or the like, and is nicely rounded upwardly to a substantially circular throat opening, as shown in Figures 3 and 4. It will of course be understood that fan ring **16** may also be inverted from its illustrated position, and may take a variety of ring forms. Extending across the throat of

fan ring 16 is a pair of crossbars 18 attached at each end to the fan ring and braced intermediate their lengths by offset bracing struts 20 which are attached at one end to the fan ring and at the other end to their respective crossbar 18.

Mounted firmly on the crossbars 18 is a bearing member 22 in which fan shaft 24 is journaled for rotation about a vertical axis disposed between crossbars 18. At the upper end of fan shaft 24 are mounted a plurality of fan blades 26, so inclined that when fan shaft 24 turns in one direction, the air adjacent the blades 26 will be propelled in one direction, and when fan shaft 24 turns in the other direction, the air will be propelled by the blades 26 in the opposite direction. At the opposite or lower end of fan shaft 24 is mounted a fan pulley 28, for a purpose to be described hereinafter. It will of course be understood that the positions of the blades 26 and pulley 28 on shaft 24 may be reversed, so that the pulley is at the upper end of the shaft and the blades at the lower end.

Secured along the upper marginal portion of a side of casing 10 as by welding or riveting or the like is a substantially horizontal first hood support member 30, as seen from below in Figure 5. Member 30 extends laterally outwardly from the sides of casing 10, as shown by projection 32. In other words, the length of member 30 is substantially greater than the width of casing 10. Member 30 may be a bar or channel or other convenient structural form. The outer extremities of member 30 are provided with downturned ends 34 which carry substantially horizontally outwardly projecting pins 36, for a purpose to be described hereinafter.

At the opposite end of casing 10, adjacent an upper marginal portion thereof is a second hood support member 38, which also extends full width of casing 10, and extends laterally therebeyond substantially equal distances on either side thereof, as at projections 40. Projections 40 are provided with downturned ends 42 bearing at their lower extremities outwardly projecting horizontal ears 44 which are provided with holes 46 for a purpose to be described hereinafter. Thus, it will be seen that ears 44 provide in effect downwardly offset terminal portions of second hood support member 38.

Pivotally mounted on pins 36 is a hood 48 having rounded end portions 50 and vertical sides 52. Hood 48 thus is generally downwardly concave. It will also be observed that the horizontal length of hood 48 is substantially greater than the horizontal length of casing 10; and that the horizontal width of hood 48, as represented approximately by the length of members 30 and 38, is substantially greater than the horizontal width of casing 10. By virtue of the concavity and greater horizontal dimensions of the hood, it will be observed that the hood is at all points spaced a substantial distance from the casing, but that at the same time, the hood forms in effect a cap over and around the upper portion of the casing. It must also be noted that the lower marginal portion of hood 48 extends at least as low as the upper marginal portion of casing 10, as represented by the upper edge of the casing itself or by the upper edge of fan ring 16. Indeed, in Figures 3 and 4, it will be noted that the upper marginal portion of the casing 10 extends somewhat above the plane of the lower marginal portion of hood 48.

Depending from the upper interior surface of hood 48 substantially centrally thereof is a generally pyramidal deflector 54, which is made up of four equally inclined triangular pieces of sheet material of which the apices meet at the lowest point on the deflector to form the nadir of the pyramid. From the positioning of this inverted pyramid directly above the fan, it will be obvious that air passages are provided which provide for the flow of air on all sides of the casing 10, both on the inside and on the outside thereof. For example, it will be obvious that the path of air leaving a building through the ventilator of the invention will resemble the path of water in a fountain formed by directing a stream of water straight up. Similarly, the path of air flowing into a building through the ventilator will be the exact reverse. In other words, the novel shape and relationship of parts just described provides a smooth and even air flow over an unobstructed course.

Mounted on a vertical side 52 of hood 48 is a motor casing 56 having a flat top and a single curved side wall. Casing 56 is open at its bottom, but otherwise completely encloses fan motor 58 which may be a conventional electric motor having conventional wiring circuits and switches, not shown. Motor 58 is fastened to a motor mounting plate 60 which in turn is adjustably carried by base plate 62 mounted on vertical sides 52, by means of threaded bolts 64. Adjustment of motor mounting plate 60 toward and away from base plate 62, for a purpose to be described hereinafter, is afforded by adjusting nuts 66 which may be screwed up and down on threaded bolts 64. Motor 58 is vertically disposed and is provided with a downwardly depending drive shaft 68 having at its lower end drive pulley 70, for a purpose to be described hereinafter.

Interconnecting fan pulley 28 and drive pulley 70 is a fan drive belt 72, which may be a V-belt or other conventional form of drive belt. Mounted on the inside of casing 10 and enclosing fan pulley 28 and the portion of drive belt 72 which is inside the casing is a fan belt casing 74 which forms a first fan belt guard. This fan belt casing encloses the inner portion of the belt and the whole of the fan pulley substantially completely and protects them from dirt and extraneous matter or corrosive fumes which may be drawn into or expelled from the building. Mounted on the outside of the casing 10 and extending substantially between the casing and motor 58 is a second fan belt guard 76, which does not completely enclose the outer portion of the fan drive belt 72, but which is provided only with a top and sides. Guard 76 may desirably be formed from a single piece of sheet material simply by bending down the two side edges of the sheet which has previously been cut to tapered form in order to accommodate the convergence or divergence of the two runs of the drive belt occasioned by differential diameters of the fan pulley and the drive pulley. Thus, a second fan belt guard is provided which is effective to prevent or reduce damage to that portion of the drive belt which lies between casing 10 and hood 48.

The operation of the device of Figures 1 through 5 is as follows:

When it is desired to exhaust air or other gases from a building on which the ventilator is mounted, motor 58 is actuated so that drives haft 68 turns in a counterclockwise direction as seen in Figure 5. Fan blades 26 will then draw air up from the building and project it against deflector 54. Deflector 54 will distribute the air in all directions so that it will spread out horizontally from the axis of rotation of the fan in all directions. The air will then be deflected downwardly by sides 52 and end portion 50 of hood 48, and will pass into the outer air adjacent the sides of casing 10. Conversely, when it is desired to bring outside air into the building on which the ventilator is mounted, it is merely necessary to actuate the motor in the reverse direction, in which case blades 26 will draw air in through the reverse path. In either event, it is obvious that a smooth, fountain-like air flow is provided, which requires a minimum of power expenditure and enables the handling of the maximum quantities of air with the smallest possible ventilating unit. A primary feature of this fountain-like air flow is that air enters the ventilator from all sides thereof and passes out through the ventilator about all sides thereof. Thus, the stresses induced in the ventilator by the pressure of air passing therethrough are reduced to a minimum in the ventilator of the invention, since the air moving on all sides of the ventilator equalizes the pressures exerted

thereby and substantially balances the strain induced by the moving air in the ventilator.

It will also be observed that with the hood down in operative position, as shown in Figure 3, driving rain can not enter the ventilator unit even when the unit is in use. As is well known, raindrops blown by winds of hurricane force often travel substantially horizontally, with the result that they have no difficulty entering most louvred air vent structures. However, in the structure of the present invention, in which the lower marginal portion of the hook extends on all sides of the casing **10** at least as far down as the upper marginal portion of that casing, even raindrops traveling horizontally cannot find entry to casing **10**. By the same token, the profile of my novel ventilator is so reduced in elevational area and in height that strong winds have much less tendency to loosen it from its fastenings on the roof. Moreover, the circuitous air paths afforded by my novel construction greatly reduce backdraft through the ventilator when it is being used as an exhaust unit; and the desirable streamline shape enabled by the use of these circuitous routes further reduces wind resistance of the ventilator unit.

When it is desired to have access to the fan or motor for cleaning or repair, or when it is desired for any other reason to expose the working parts, the hood **48** is merely swung up, as shown in Figure 2. It will be observed that the hood pivots upwardly about its mounting pins **36**, which forms a horizontal pivotal axis disposed intermediate the horizontal length of the hood and transverse thereto. With the hood in raised position, the fan is readily accessible; and since the motor is carried with the hood in a downwardly open casing **56**, upward swinging movement of the hood renders motor **58** readily accessible without the inconvenience of working from below.

When it is desired to return the ventilator to operative condition, the hood is simply swung down again to its closed or forward position, in which its rests adjacent its swinging end but intermediate its horizontal length on horizontal ears **44**, which are downwardly offset as aforesaid so that when the hood is resting thereon, the lower marginal portion of the hood will be disposed in a plane substantially parallel to the plane of the roof. In other words, the downward offset levels the hood. Wing nuts **78** are adapted to register through holes **46** and corresponding holes in the lower marginal portion of the hood, in order to hold the hood in its lowered position. Needless to say, the wing nuts must be loosened before the hood can be swung upwardly and must be re-engaged in order to hold the hood in its lowered position. Instead of holes **46**, it will of course be apparent that wing nuts **78** could be pivotally mounted on hood **48** to swing into and out of outwardly opening slots in horizontal ears **44**.

When the ventilator is in operation, pulleys **28** and **70** are drivingly connected by belt **72**; and hence, when hood **48** is swung upward, it is obviously necessary to disengage the belt from one or another of the pulleys. To this end, I have mounted motor **58** in such a way that it will be movable inwardly or outwardly, toward or away from the fan. In order to effect this movement, adjusting nuts **66** are screwed inwardly or outwardly on threaded bolts **64**. For example, when it is desired to move motor **58** inwardly to release belt **72** from pulley **70**, the adjusting nuts **66** contacting the inner side of motor mounting plate **60** are screwed inwardly toward base plate **62**. Plate **60** may then be moved inwardly; and if desired, nuts **66** on the outer or motor side of plate **60** may also be screwed inwardly on bolts **64** to hold motor **58** in its inward or ineffective position during upward swinging of hood **48**. Conversely, when hood **48** is lowered and the ventilator is once more placed in operative arrangement, belt **72** will again be slipped over pulley **70** and the nuts **66** on either side of plate **60** screwed outwardly to tension belt **72** betwen pulleys **28** and **70** and maintain motor **58** in its operative or driving position.

This application is a division of my copending application Serial Number 441,236, filed July 6, 1954.

Although the present invention has been described in conjunction with preferred embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention, as those skilled in the art will readily understand. Such modifications and variations are considered to be within the purview and scope of the invention and appended claims.

I claim:

1. A roof ventilator comprising in combination a casing open at its top and bottom and adapted to be mounted on a roof over an opening therein, a fan mounted in said casing for rotation about a vertical axis, a downwardly concave hood mounted on and over said casing for pivotal movement about a substantially horizontal axis disposed more closely adjacent one side of the hood than the opposite side of the hood, said downwardly concave hood having a substantially vertical side, a fan motor mounted on the outer side of said substantially vertical side of said hood a substantial distance from said axis and on the same side of said axis as said opposite side of the hood, said motor having a downwardly extending vertical drive shaft, detachable means drivingly connecting said drive shaft and said fan, and a motor casing mounted on the outer side of said substantially vertical side of said hood and enclosing said motor but open at its bottom, whereby better access to said motor is afforded upon upward swinging of said hood about said horizontal axis, said motor and casing being disposed outside the air stream.

2. The invention of claim 1, in which said drivingly connecting means comprises a drive belt, and means for moving said motor toward and away from said fan, whereby said drive belt may be respectively disengaged from and re-engaged with said drive shaft before and after said upward swinging of said hood.

3. A roof ventilator comprising in combination a casing open at its top and bottom and adapted to be mounted on a roof over an opening therein, said casing having at least one side wall, a fan mounted in said casing for rotation about a vertical axis, a downwardly concave hood mounted on and over said casing for pivotal movement about a substantially horizontal axis disposed more closely adjacent one side of the hood than the opposite side of the hood, said downwardly concave hood having a substantially vertical side spaced outwardly from said side wall of said casing a substantial, horizontal distance, a fan motor mounted on the outer side of said substantially vertical side of said hood a substantial distance from said axis and on the same side of said axis as said opposite side of the hood, said motor having a downwardly extending vertical drive shaft, detachable means drivingly connecting said drive shaft and said fan, and a motor casing mounted on the outer side of said substantially vertical side of said hood and enclosing said motor but open at its bottom, whereby better access to said motor is afforded upon upward swinging of said hood about said horizontal axis, said motor and casing being disposed outside the air stream.

4. The invention of claim 3, in which said drivingly connecting means comprises a drive belt, and means for moving said motor toward and away from said fan, whereby said drive belt may be respectively disengaged from and re-engaged with said drive shaft before and after said upward swinging of said hood.

5. The invention of claim 4, in which said drive belt extends through an opening in said side of said casing.

6. The invention of claim 4, and a first drive belt guard mounted on the inner side of said side of said casing, and a second drive belt guard mounted on the outer side of said side of said casing and extending sub-

stantially between said side of said casing and said motor, said second guard forming in effect an outward extension of said first guard.

References Cited in the file of this patent

UNITED STATES PATENTS

577,581	Jacoby	Feb. 23, 1897
1,905,599	Nowitsky	Apr. 25, 1933
2,054,526	Sutcliffe	Sept. 15, 1936
2,157,609	Hopkins	May 9, 1939
2,198,420	Winton	Apr. 23, 1940
2,218,348	Boyer	Oct. 15, 1940
2,279,620	Hirschman	Apr. 14, 1942
2,332,552	Belanger	Oct. 26, 1943
2,335,508	Gustafsson et al.	Nov. 30, 1943
2,571,513	Ammerman	Oct. 16, 1951
2,666,378	Ammerman	Jan. 19, 1954
2,711,682	Drechsel	June 28, 1955