

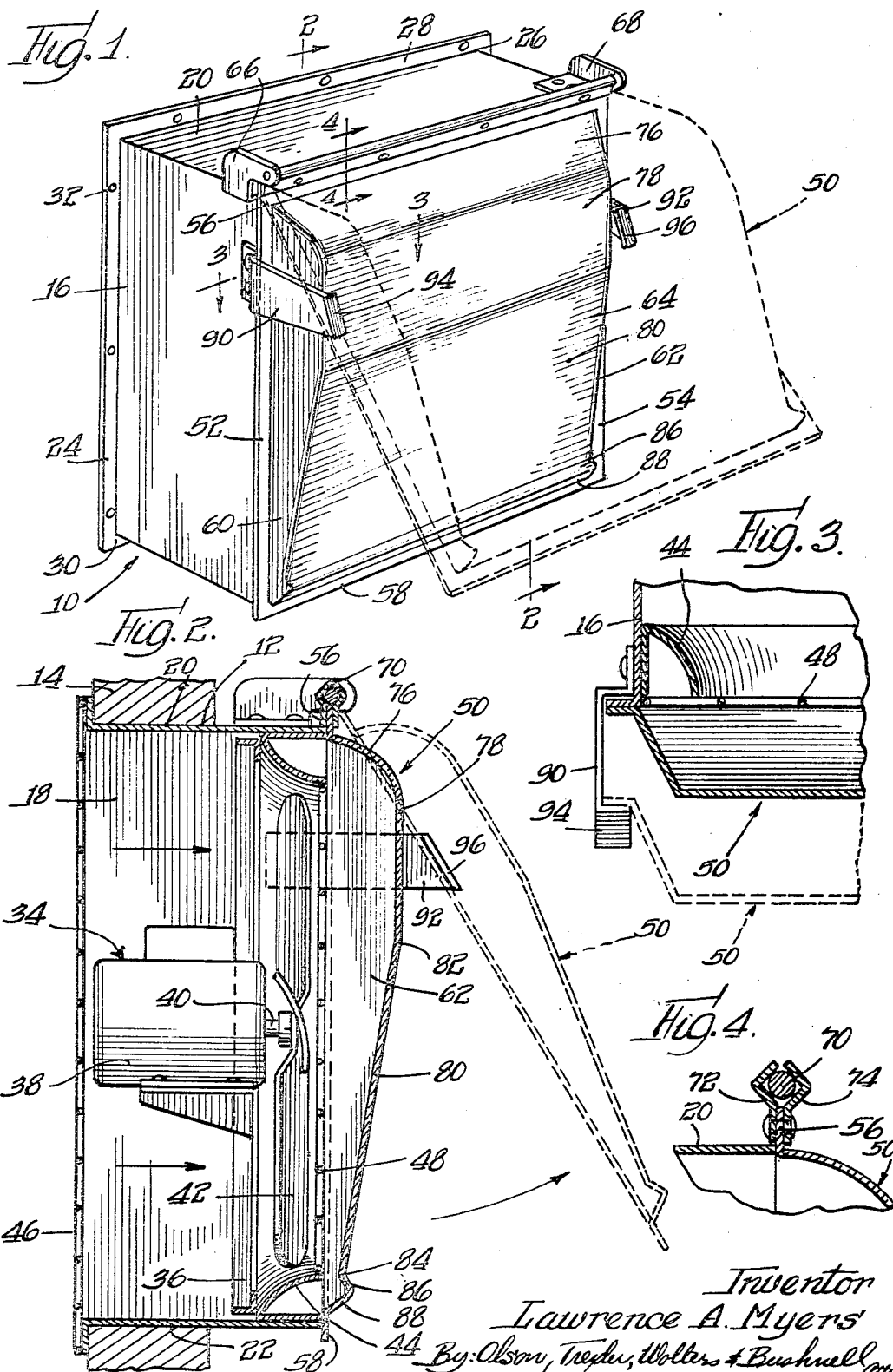
Nov. 25, 1969

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3,479,947

VENTILATOR UNIT

Filed Jan. 15, 1968



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VENTILATOR UNIT

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Filed Jan. 15, 1968, Ser. No. 697,913

Int. Cl. F04d 25/14; F24f 13/08

U.S. Cl. 98—116

7 Claims

ABSTRACT OF THE DISCLOSURE

There is disclosed a ventilator unit for mounting in a wall of a building such as a poultry house. The unit comprises a frame in which a fan is mounted and a combined closure and hood member swingably connected to the frame and adapted to be opened by air pressure when the fan is energized and constructed for minimizing the entry of rain and the like.

The present invention relates to a novel ventilator unit and more specifically to a novel unit particularly suitable to be mounted in an exterior wall of a building.

While ventilator units incorporating features of the present invention may be found suitable for a variety of installations, they are especially adapted for use in poultry or livestock houses. Ventilator units heretofore suggested for poultry houses and the like have usually included a fan and some means for minimizing the possibility of the entry of rain, snow and the like, particularly when the fan is not in operation. Such means have frequently included a plurality of shutters or louvers mounted for opening when the fan is started and/or a fixed hood mounted on and projecting outwardly and downwardly from the building sufficiently substantially to cover the fan opening. Such heretofore proposed structures are usually relatively complicated and expensive. In addition, such devices as louvers or shutters decrease the efficiency of the fan unduly and are difficult to clean and maintain.

It is an important object of the present invention to provide a novel ventilator unit having a fan and constructed so as to effectively preclude the entry of rain and the like without unnecessary interference with the operation of the fan and further constructed so as to facilitate easy maintenance and cleaning.

Another important object of the present invention is to provide a ventilator unit of the above described type which is of relatively economical construction.

A more specific object of the present invention is to provide a novel ventilator unit of the above described type having a fan mounted within a frame and including a closure member pivotally connected to the frame and constructed and arranged so as to open easily upon starting of the fan and so as to close effectively when the fan is stopped.

Other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings wherein:

FIG. 1 is a perspective view showing a ventilator unit incorporating the features of the present invention and further showing the closure member of the unit in broken lines in an open position;

FIG. 2 is a partial sectional view taken generally along line 2—2 in FIG. 1;

FIG. 3 is an enlarged fragmentary sectional view taken along line 3—3 in FIG. 1; and

FIG. 4 is an enlarged fragmentary sectional view taken along line 4—4 in FIG. 1.

Referring now more specifically to the drawings wherein like parts are designated by the same numerals throughout the various figures, a ventilator unit 10 incorporating features of the present invention is adapted to be mounted

in an opening 12 formed in a wall 14 of a building. As previously indicated, the unit may be installed in a variety of buildings and is particularly suitable for poultry and livestock houses.

The unit 10 comprises a frame or shell preferably of rectangular configuration having opposite pairs of sides 16—18 and 20—22. These sides may be formed from sheet metal or any other suitable material and are joined together so as to define a rectangular opening complementary to the opening 12 in the building wall. The sides terminate in marginal flanges 24, 26, 28 and 30. These flanges are adapted to overlie an interior surface of the building and are provided with apertures 32 through which nails or other suitable fastening devices may be driven.

A fan 34 is mounted within the opening defined by the frame on suitable support members or brackets 36 secured to the interior surfaces of the frame side walls. The fan may be of known construction and includes an electric motor 38 having an output shaft 40 on which a fan blade 42 is secured. The construction is such that when the fan is energized, air is pulled from the interior of the building and blown outwardly in the direction of the arrows shown in FIG. 2. Preferably, a circular cowling 44 is mounted within the frame around the fan blade for increasing the efficiency of the air flow.

In order to prevent inadvertent or accidental contact with the fan blades, a protective screen 46 is secured over the inner or inlet side of the frame. A similar screen or wire grid 48 is also preferably secured along the outer side of the frame and across the discharge opening defined by the cowling 44. These screens may be of known construction and preferably have a grid size which is small enough to prevent accidental engagement with the fan blade but large enough so as to facilitate cleaning. Furthermore, the wire size and grid openings of the screens are such that the screens do not form obstructions which significantly decrease the efficiency of the fan.

In accordance with an important feature of the present invention, the ventilator unit is provided with a closure member or a hood 50 adapted to extend over the outer side of the frame and close the discharge opening when the fan is not in use. The closure member or hood has side marginal portions or flanges 52, 54, 56 and 58 which are disposed in a common plane and are adapted simultaneously to abut edges of the frame or box sides 16, 18, 20 and 22 which are also disposed in a common plane as shown best in FIG. 2. Identical but oppositely disposed side portions 60 and 62 of the hood project outwardly and are inclined slightly inwardly from junctions with the marginal or side flanges 52 and 54 and merge with a broad central panel portion 64 of the hood which is formed as discussed in detail below. Preferably the hood is molded in one piece from a suitable plastic material, but it is understood that any desired fabricating means can be utilized.

Bracket members 66 and 68 are secured to the opposite ends of the top side 20 and support therebetween a hinge pin or rod 70. Complementary hinge members 72 and 74 are secured to the upper flange or marginal portion 56 of the hood. These hinge members embrace the hinge pin or rod 70 as shown best in FIGS. 2 and 4 for pivotally or swingably supporting the hood member. The arrangement is such that the axis of the hinge pin or rod 70 is in a plane containing the marginal flanges of the hood member and preferably slightly laterally outwardly from a plane containing the inwardly facing surfaces of these marginal portions. This arrangement aids in assuring proper sealing or closing engagement of the marginal portions with the outer edges of the frame or box.

The central panel 64 of the hood has a first or top section 76 extending laterally outwardly from the upper

marginal flange 56 a substantial distance. While the section 76 may be inclined downwardly slightly, to promote the runoff of rain water and the like when the hood is closed, it preferably extends primarily laterally outwardly for merging with a second generally vertical or upright section 78 at a junction which is at about the same level as the uppermost point of the fan cowling 44 and is spaced a substantial distance, at least several inches, outwardly from the fan.

The section 78 extends downwardly and merges with another section 80 at a junction 82 located slightly above the axis of the fan blade as shown best in FIG. 2. The section 80 is inclined inwardly from the junction 82 to a point or junction 84 close to the plane of the marginal flanges of the hood and relatively close to the lowermost point of the fan cowling 44. From the junction 84, the center panel has a section 86 which extends sharply outwardly for a short distance and merges with another section 88 which extends sharply inwardly and in turn merges with the bottom marginal flange 58. The location and arrangement of major portions of the hood substantially laterally outwardly of the plane containing the marginal flanges and the axis of the rod 70 locates the center of gravity of the hood at a point which is also spaced laterally outwardly from this plane. As a result, the hood is normally biased by gravity firmly against the edges of the frame or box for assuring proper closure of the fan opening.

When the fan is energized, the pressure provided by the air stream causes the hood to shift from the closed position shown in solid lines to the open position shown in broken lines. In this open position, it is seen upon referring to FIG. 2, that the upper sections 76 and 78 of the hood are spaced substantially laterally outwardly from the fan blade even though these sections are closest to the hinge because of the aforescribed manner in which the sections 76 are formed. The remaining sections 82, 86 and 88 of the hood are progressively spaced even greater distances from the fan opening as result of the inclined position of the hood. The total result is that the central panel portion of the hood is spaced sufficiently outwardly from the fan so as to avoid undue interference with the air stream in a manner which might cause a substantial decrease in the efficiency of the fan. By way of comparison, it has been found that presently available automatically operable louver or shutter structures reduce the efficiency of the fan by more than twice as much as the hood structure of the present invention.

Brackets 90 and 92 are secured to the opposite sides 16 and 18 toward but spaced beneath upper margins thereof. These brackets project forwardly or outwardly from the frame or fan box and carry stop elements or flanges 94 and 96 at outer ends thereof. These flanges may be separately or integrally formed and project inwardly respectively for engaging side marginal flanges 52 and 54 of the hood and thereby positively limiting outward movement of the hood as shown in broken lines in FIGS. 1, 2 and 3. In this manner, positive control is maintained over the hood so as to minimize any possibility of the hood being twisted and damaged by any wind blowing around the building. As previously indicated, the central panel portion of the hood is spaced outwardly from the fan in a manner for minimizing any adverse effect on the efficiency of the fan. At the same time, however, the gradual reverse inclination of the section 80 and the sharp inclination of the section 88 effectively increases the lifting action of the air stream against the inner side of the hood for positively and securely holding the hood against the stops 94 and 96. While the relative angle of the sections 80 and 88 may be varied within reasonable limits, one arrangement which has been found to be successful contemplates a 9° angle between the section 88 and the plane of the marginal flanges and a 60° angle between the section 88 and the marginal flanges. As previously indicated, the section 88 merges with an outwardly

inclined section 86. The V-shaped rib provided by these sections enhances the strength and rigidity of the lower free marginal portion of the hood.

While a preferred embodiment of the present invention has been shown and described herein, it is obvious that many structural details may be changed without departing from the spirit and scope of the appended claims.

The invention is claimed as follows:

1. A ventilator comprising frame means defining an opening through which an air stream is to be blown outwardly when the ventilator is in operation, a closure member traversing said opening, and means between said frame means and a first margin of said closure member pivotally mounting closure member for movement between a closed position and an open position, said closure member including a section adjacent said mounting means extending substantially outwardly from said opening and an additional section extending from said first mentioned section transversely of said opening for promoting movement of said closure member to said open position under the influence of said air stream upon operation of the ventilator and for minimizing any decrease in the efficiency of the flow of said air stream, said second section extending generally parallel to said opening to a line traversing a mid portion of the opening, said closure member including a third section extending from a junction at said line with said second section and inclined at a relatively small angle rearwardly with respect to said second section, and a fourth section adjacent a margin of said closure member opposite from said mounting means and inclined rearwardly at a relatively large angle with respect to said second section.

2. A ventilator comprising frame means defining an opening through which an air stream is to be blown outwardly when the ventilator is in operation, a closure member traversing said opening, and means between said frame means and a first margin of said closure member pivotally mounting closure member for movement between a closed position and an open position, said closure member including a section adjacent said mounting means extending substantially outwardly from said opening and an additional section extending from said first mentioned section transversely of said opening for promoting movement of said closure member to said open position under the influence of said air stream upon operation of the ventilator and for minimizing any decrease in the efficiency of the flow of said air stream, said closure member including peripherally substantially continuous marginal portions disposed substantially in a common plane and engageable with and around the periphery of said frame means when the closure member is in said closed position, said closure member further including opposite spaced apart side portions extending laterally outwardly from adjacent opposite marginal portions, said side portions and said last mentioned marginal portions extending transversely away from said mounting means, and said closure member comprising a central panel portion extending between and joining said side portions and including said first and second mentioned sections.

3. A ventilator, as defined in claim 2, wherein said second mentioned section is inclined reversely with respect to said first mentioned section.

4. A ventilator, as defined in claim 2, wherein said closure member includes another section adjacent a margin opposite from said mounting means and extending in a direction sharply reversed with respect to said first mentioned section.

5. A ventilator, as defined in claim 2, which includes stop means connected with opposite sides of said frame means and disposed outwardly therefrom for engaging said opposite marginal portions of said closure member when the closure member is in said open position and for preventing the closure member from moving outwardly beyond said open position.

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6. A hood for a ventilator of the type described comprising an upper marginal portion, a lower marginal portion, opposite side marginal portions joining said upper and lower marginal portions, all of said marginal portions being disposed substantially in a common plane, said upper marginal portion being adapted to be connected with hinge means for pivotally mounting the hood for movement from an upright closed position to an outwardly inclined open position, said hood including spaced apart opposite side portions projecting laterally outwardly from said opposite side marginal portions, and said hood including a central panel portion extending between said upper and lower marginal portions and joined to outer edges of said opposite side portions, said central panel portion including a first section extending laterally outwardly from said upper marginal portion and an additional section extending reversely of said first section and toward said lower marginal portion.

7. A hood, as defined in claim 6, wherein said additional section of said central panel portion extends from a line generally centrally positioned between said upper and lower marginal portions and at a relatively small angle with respect to the plane of said marginal portions, said central panel portion including another section ad-

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jacent said lower marginal portion and extending reversely with respect to said first section and at a relatively large angle with respect to said plane.

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U.S. Cl. X.R.

98—43; 230—132, 235