United States Patent [19]

Rudine

[11] **3,826,183**

[45] **July 30, 1974**

[54] **MOTOR-POWERED SELF-OPENING AND CLOSING VENTILATORS**

[76] Inventor: **Kenneth M. Rudine,** 1307 Ashland, Houston, Tex. 77008

[22] Filed: **Jan. 2, 1973**

[21] Appl. No.: **320,102**

[52] **U.S. Cl.** ..... **98/116,** 137/533.27, 220/44 R

[51] **Int. Cl.** **F04d 25/14**

[58] **Field of Search** ..... 98/43 R, 116; 220/44 R; 137/533.17, 533.21, 533.27

[56] **References Cited**

UNITED STATES PATENTS

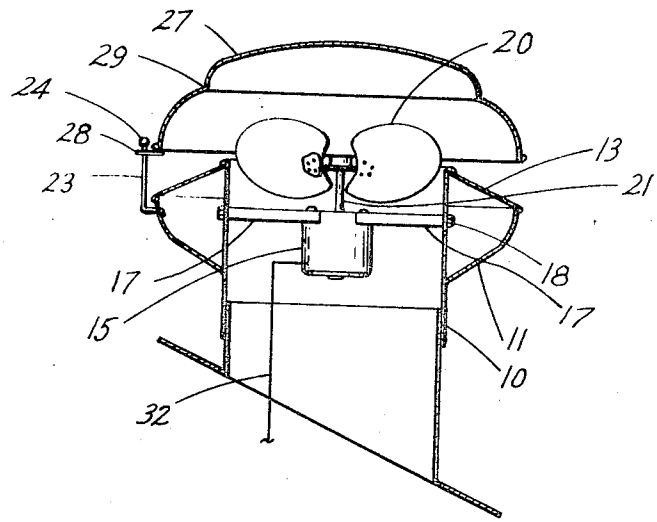
3,012,495	12/1961	Miller	98/116
3,324,784	6/1967	Lambie et al.	98/116 X
3,386,368	6/1968	Fielding	98/116 X
3,472,150	10/1969	Strawsine	98/116

Primary Examiner—Meyer Perlin
Assistant Examiner—Ronald C. Capossela
Attorney, Agent, or Firm—Carl B. Fox, Jr.

[57] **ABSTRACT**

Motor-powered ventilators having a domed top or lid which is opened by air pressure therebeneath when the ventilator is operating and which closes when the ventilator is not operating. The ventilators are of completely symmetrical form.

7 Claims, 3 Drawing Figures



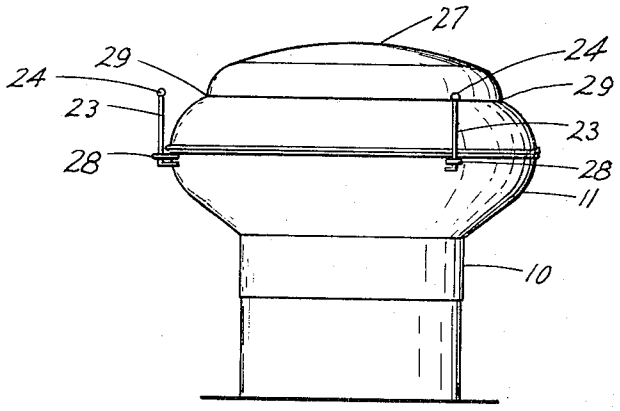


Fig. 1

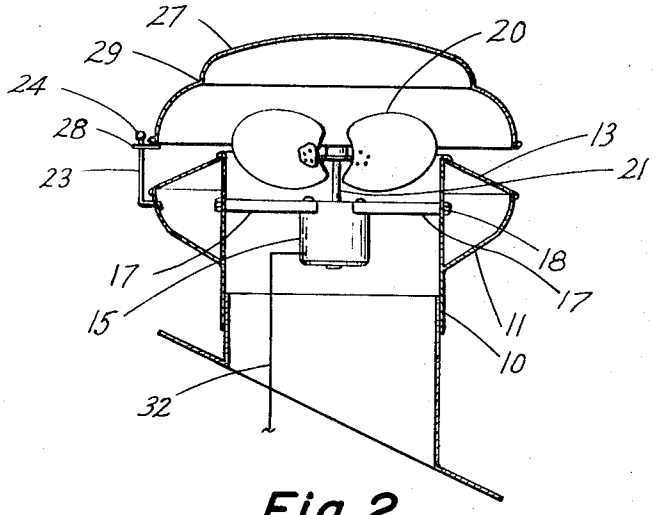


Fig. 2

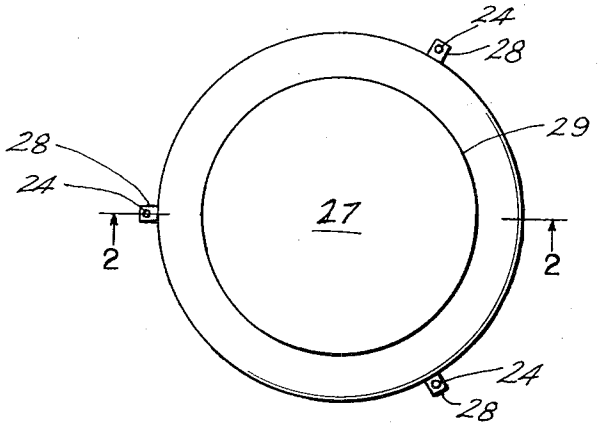


Fig. 3

MOTOR-POWERED SELF-OPENING AND CLOSING VENTILATORS

BACKGROUND AND SUMMARY OF THE INVENTION

A number of types of roof and ceiling ventilators are known in the art. Among these are rotary ventilators which rotate or spin in response to wind blowing thereacross and air flowing upwardly therethrough, and powered ventilators which usually have side air outlets more or less protected by their inwardly and downwardly sloped air outlet configurations. Other forms of ventilators are also available.

A common problem in connection with both rotary ventilators and common forms of powered ventilators is closing of the air passages through ventilators when they are not in use. Under most conditions, the rotary ventilators will not admit solid or liquid matter falling thereupon, but powered ventilators are not so well protected against entry of foreign materials thereinto. Another problem in connection with such ventilation equipment is, that when the owner desires to change from use of a rotary ventilator to a powered ventilator, a new roof connection assembly, or roof jack, must generally be installed, because the roof outlets of the two forms are not interchangeable. Rotary ventilators are nearly always mounted upon so-called roof jacks which for a pitched roof consists of an inclined plate from which a tube extends vertically upwardly at an angle to the plate. The plate forms a flashing for sealing with the roofing material. The ventilator has a lower cylindrical tube which fits over and is screwed to the tube of the roof jack. Powered ventilators generally are usually of rectangular or square configuration and a rectangular or square opening must be provided through the roof for their connection to the roof. The powered units are generally self-flashing, having an angular plate or flange therearound of the same angle as the roof.

According to the invention, powered self-opening and closing ventilators are provided. The lower part of the ventilator is in the form of an upright vertical cylindrical tube which may be connected to the conventional roof jack customarily used with rotary ventilators. Therefore, a change from use of a rotary ventilator to a powered ventilator entails only removing the rotary ventilator and installing the powered ventilator upon the same jack which is already in place. Of course, the ventilators disclosed herein may also be newly installed upon a customary roof jack installed for that purpose. Wiring for the electric drive motor for the ventilators herein disclosed must of course also be provided.

Unlike rotary ventilators, the ventilators according to the subject invention are self-opening and self-closing. Some forms of powered ventilators are self-opening and self-closing, but in not such a satisfactory manner as those afforded by this invention. Many persons provide auxiliary closure for ventilators during certain periods of the year. Plastic covers may be placed over rotary ventilators during the winter months, and similar plastic covers are available for most forms of powered ventilators. There are also disc closures for insertion into the roof jack tube for closing rotary ventilators. No such auxiliary closures are necessary in connection with the ventilators of this invention.

Other objects and advantages of the invention will appear from the following description of a preferred embodiment, reference during the description being made to the accompanying drawings.

BRIEF DESCRIPTIONS OF THE DRAWINGS

FIG. 1 is a side elevation of a ventilator of preferred form, in closed, non-operating condition.

FIG. 2 is a vertical cross section taken through the axis of the ventilator shown in FIG. 1, showing the ventilator in open, operating condition.

FIG. 3 is a top view of the ventilator shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the preferred embodiment of apparatus according to the invention which is shown in the drawings, a central vertically disposed tube or pipe **10** formed of sheet metal is adapted for connection at its lower end to the vertical tube or pipe of a conventional roof jack of the type used for installation of rotary ventilators. The ventilator may be connected to any other suitable tubular outlet of cylindrical form. An upwardly concave bowl-shaped element of thin-walled metal structure forming the lower body of the ventilator is indicated by reference numeral **11.** Bowl **11** has a central opening which is mechanically connected around tube **10** by expanding tube **10,** or connected by any other suitable form of connection. The opening through bowl **11** is connected at an intermediate point of the length of tube **10,** and an upwardly convergent annular plate element **13** is connected to extend between the upper end of tube **10** and the outer upper edge of bowl **11.**

An electric drive motor **15** is centrally supported within tube **10** by a plurality of radial arms **17** each connected at its outer end to tube **10** by a screw **18** and suitably connected to the outer surface of motor **15.** Three arms **17** are shown, but any number suitable for support of the motor may be used. A fan or blower blade **20** is mounted on shaft **21** of motor **15,** the blade being disposed at the upper end of tube **10.**

A plurality of L-shaped supports **23** are carried at or near the upper outer edge of bowl **11.** Three such supports **23** are indicated in the drawings, but any number suitable for the described purpose may be employed. The shorter legs of the L-shaped members **23** extend horizontally outwardly from bowl **11,** and the longer vertical legs extend upwardly thereof. An enlarged ball formation **24** or other form of stop is provided at the upper end of each support **23.**

The top or lid **27** of the ventilator is of downwardly concave dished form, and is symmetrical therearound. The same plurality of brackets or lugs **28** as the number of supports **23** is provided outwardly protruding from the lower outer edge of lid **27,** the brackets or lugs **28** being perforated to receive the supports loosely therethrough. The brackets **28** are slidable upwardly and downwardly of the supports **23,** as lid **27** moves upwardly or downwardly. Alternatively, the supports **23** may be on the lid, and the brackets on the bowl body.

Lid **27** has a horizontal inwardly upset bend line **29** continuously therearound, the lid being of curved shape above and below line **29.**

An electrical conduit **32** connected to a suitable source supplies electrical energy for operation of motor

15. Suitable switch apparatus is usually provided for turning motor 15 on and off.

In operation of the ventilator, when motor 15 is turned on and blade 20 is rotating, air is drawn upwardly through tube 10. The air pressure below and within lid 27 pushes the lid upwardly so that the brackets 28 are against stops 24 of elements 23. The inwardly upset line 29 around the lid serves to keep the lid centered. Air pressure from air flowing upwardly through the blower and diverted outwardly pushes against the lid above line 29 to center it. The air then is diverted downwardly and leaves the ventilator completely around its circumferance between the lower edge of lid 27 and plate 13. When motor 15 is turned off, the lid 27 settles down upon bowl 11, entirely closing the ventilator.

It will be clear that when the ventilator is not operating, it is completely closed against air flow therethrough. In addition, rain and dust and other material may not enter the ventilator when it is closed. Starting of motor 15 causes immediate automatic opening of the ventilator during operation thereof.

The ventilators may be of other horizontal cross sectional shapes than circular, such as square, rectangular, diamond, oval, or otherwise as selected. The dished or domed shapes of the lower bowl and the lid may be altered. For example, the ventilator could be made spherical, the bowl being in the form of a lower hemisphere and the lid being in the form of an upper hemisphere. Where line 29 is omitted, an interior irregularity such as a ring should be affixed around the interior of the lid so that upmoving air diverted outwardly against the lid will keep the lid centered and level.

The power used in keeping the lid elevated during operation is very small, and does not decrease the air output of the ventilators significantly. The air pressure beneath the lid acts upwardly against the entire undersurface of the lid, to lift it for operation. Winds blowing against the sides of the ventilator do not affect its operation. Air moving out of the ventilators prevent entrance of rain and dust during operation.

While a preferred embodiment of the invention has been shown in the drawings and described, many modifications thereof may be made by a person skilled in the art without departing from the spirit of the invention, and it is intended to protect by Letters Patent all forms of the invention falling within the scope of the following claims.

I claim:

1. Ventilator, comprising an upwardly concave lower body and a downwardly concave lid adapted to fit upon and to close the upper side of said lower body, said lid serving both as the top cover of said ventilator and as a damper to close said ventilator, one or the other of said body and lid having plural parallel peripherally disposed rod means extending therefrom each slidably received through a separate hole through the periphery of the other and permitting said lid to be moved levelly straight upward from said body to an open position centered above said body by sliding of said rod means through said holes responsive to air movement against the underside of said lid from said lower body, said rod means having end enlargements to retain said rod means in said holes, tubular air inlet means disposed upwardly centrally through said body, and means for impelling air upwardly through said air inlet means to impinge against the underside of said lid, the pressure of air entering through said air inlet means when said impelling means is operating moving said lid upward to open position, said lid moving down to closed position when by gravity when said impelling means is not operating.

2. The combination of claim 1, said air inlet means comprising tube means fixed vertically through an opening through the bottom of said body at its center and extending upwardly above said bottom of said body.

3. The combination of claim 2, said lid having protruding means extending around its interior spaced uniformly from its center, air entering through said air inlet means striking the underside of said lid centrally thereof and flowing outwardly in all directions across said protruding means to maintain said lid floating levelly above said body when said impelling means is operating.

4. The combination of claim 3, said body, inlet tube, lid and protruding means being circular and concentric.

5. The combination of claim 4, said inlet tube terminating upwardly above the upper edge of said body, said ventilator including upwardly conically convergent annular plate means connected between the upper end of said inlet tube and the upper edge of said body.

6. The combination of claim 5, said air impelling means comprising electric motor driven blower means disposed within said inlet tube means.

7. The combination of claim 6, the lower end of said inlet tube means being connectable to a roof jack of the type used to mount rotary ventilators whereby said ventilator may be installed on a said roof jack without modification thereof.

* * * * *