Dec. 13, 1960 F. U. HILL 2,963,956

ROOF VENTILATOR

Filed May 10, 1957 2 Sheets-Sheet 1

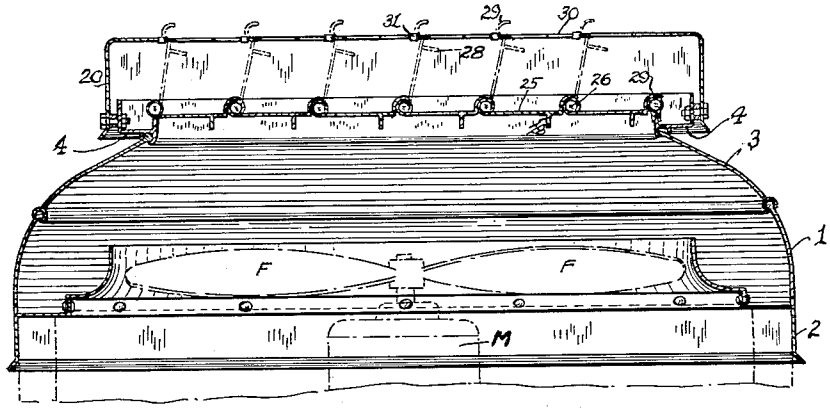


FIG. 2

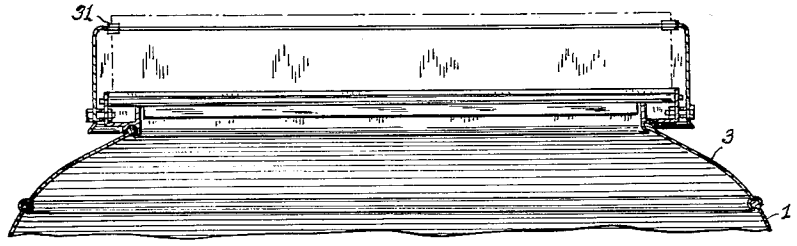


FIG. 3

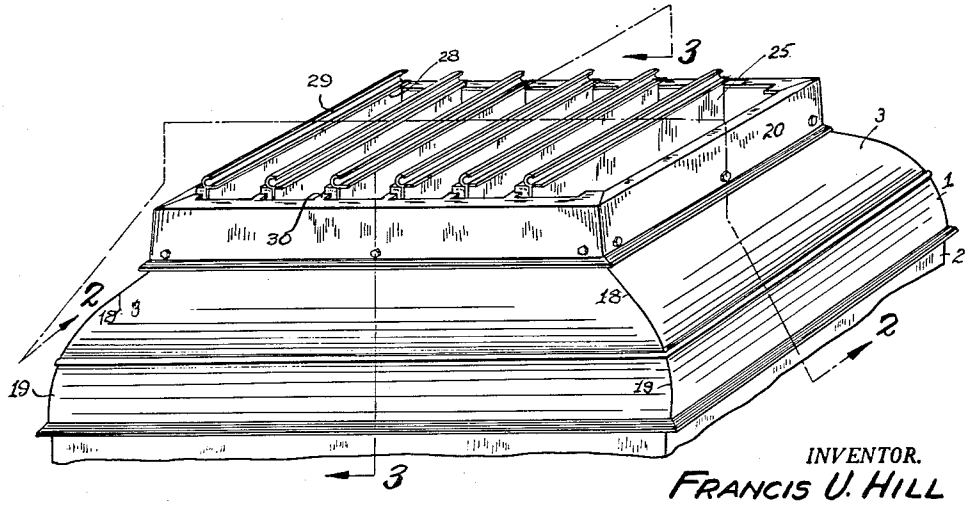


FIG. 1

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ROOF VENTILATOR

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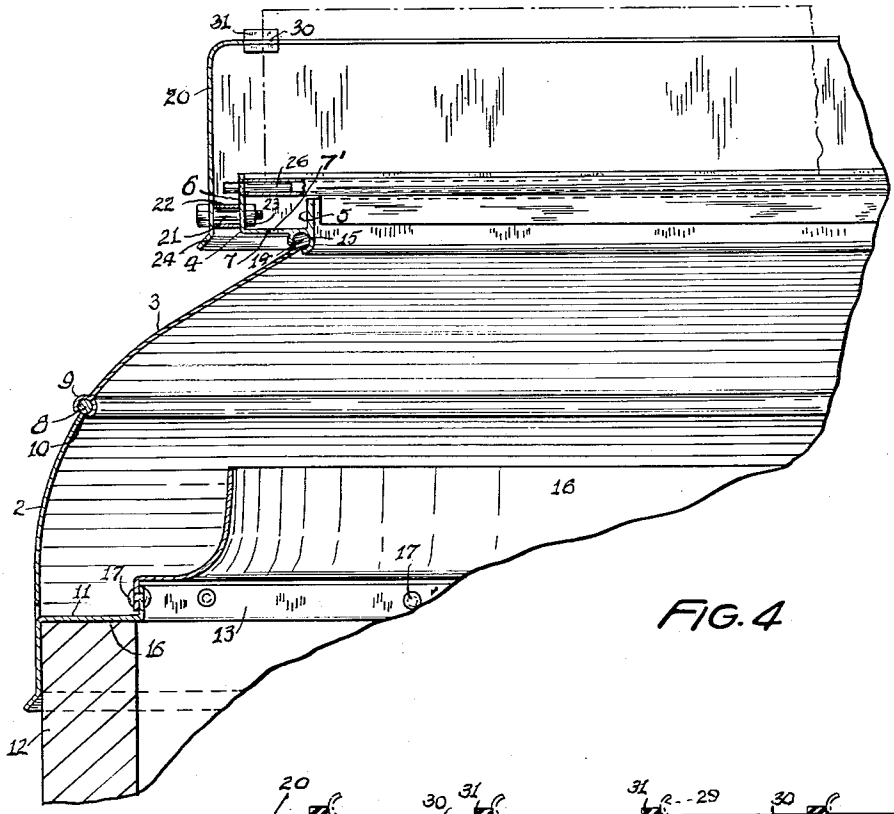


FIG. 4

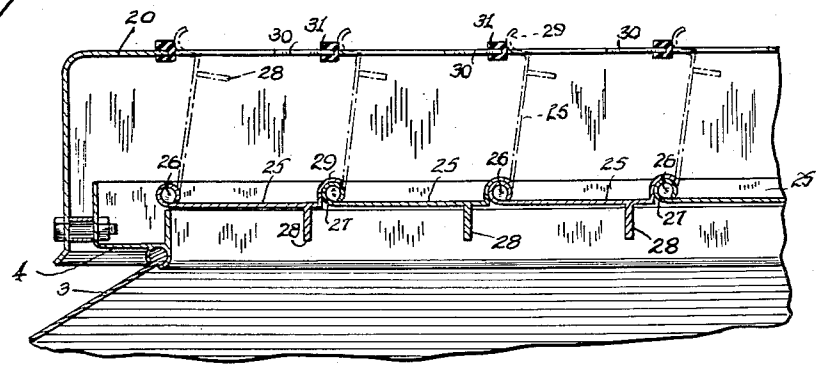


FIG. 5

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ROOF VENTILATOR

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7 Claims. (Cl. 98—116)

This invention relates to roof ventilators and more particularly to roof ventilators for industrial use although the invention is equally well adapted to use in homes and smaller buildings.

It is an important object of this invention to construct a roof ventilator which is sturdy, easy to assemble and which is adapted to low cost modern manufacturing methods.

A further object consists in providing a roof ventilator which is made up of component extruded parts or sections which may readily and easily be assembled on the site of installation.

Another object of the invention is the provision of multiple louver-type dampers in a roof ventilator as contrasted to the conventional large type dampers, thereby not only reducing the size of the equipment, but reducing the amount of resistance to flow through the ventilator. By eliminating large and heavy dampers and by the provision of multiple louver-type dampers, such as this invention contemplates, the opening and closing of the multiple dampers is rendered easy and quiet and damper failure and expensive repairs are reduced to a minimum, if not entirely eliminated.

Another important object of this invention is to employ metal extrusions in constructing the ventilator which may readily and easily be assembled together, thus eliminating all riveted sheet metal joints and permanently assuring the owner of leak-proof performance, at the same time providing great sturdiness and rigidity in the structure.

A still further object of this invention is to so construct a roof ventilator and particularly one of large capacity which will eliminate the employment of heavy equipment, such as truck cranes, for hoisting the ventilators to a building roof and therefore to make it possible to assemble the complete ventilator on the roof site of installation.

A still further object of the invention is to provide roof ventilators having high efficiency and quietness of operation yet which, even in the large industrial sizes, will be light as compared to conventional ventilators now in use of comparable size thereby eliminating heavy duty structural supports in the roofs on which the ventilator is to be installed.

Another object of this invention is the elimination of maintenance such as painting and particularly where such ventilators are located in inaccessible locations. In this connection, I prefer to employ a metal or alloy capable of being worked by modern extrusion processes such as, for instance, aluminum. The use of aluminum or similar metals and alloys having corrosion resistance qualities permits the ventilators to have an attractive permanent metallic surface.

Other objects and advantages of this invention will become more apparent as the following description of an embodiment thereof progresses, reference being made to the accompanying drawing in which like reference characters are employed to designate like parts throughout the same.

In the drawings:

Figure 1 is a perspective view of a ventilator embodying my invention shown completely assembled and ready to be placed in service on a roof;

Figure 2 is a section taken on line 2—2 of Figure 1;

Figure 3 is a section taken on line 3—3 of Figure 1;

Figure 4 is an enlarged fragmentary section of one corner section of a ventilator embodying the present inventions; and

Figure 5 is an enlarged sectional fragment through dampers and the damper housing assembly taken on line 2—2 of Figure 1.

Conventional roof ventilators and particularly those in industrial use are relatively large in dimension, are heavy and usually, for that reason, require additional heavy duty roof reinforcement or support. Such ventilators when shipped to the site of installation usually have to be hoisted by a truck crane to the roof of the building and the roof site of installation since such ventilators usually are prefabricated and assembled at the factory and shipped ready for installation. Conventional roof ventilators usually are manufactured by bolting, riveting or welding body sections together at the factory for shipment to the point of installation. Such conventional ventilators have given rise to maintenance problems and high costs and when they have to be installed in inaccessible places, such maintenance and repairs become an even greater problem.

By my invention, I have eliminated these difficulties and have provided a roof ventilator which is comparatively small in size and weight but of higher efficiency than a conventional ventilator of the same venting capacity, the smaller size and decreased height of the ventilator made possible by my invention eliminating the unattractiveness of conventional type ventilators which extend above the roof a considerable distance and are unsightly.

My invention also contemplates the use of multiple louver-type dampers characterized by their ability to operate easily and quietly in use and to offer a minimum resistance to fluid flow through the ventilator.

I will now proceed to describe an embodiment of the invention disclosed herein. The body of the ventilator 1 comprises three primary extruded parts including a lower or base section 2 terminating at its bottom in a curb engaging portion, an upper complementary extruded section 3 interlocked with the lower base section 2 and extending upwardly from the base section 2 for interlocking engagement with a supporting frame 4 which acts as a gutter to conduct drainage away from the body, and comprises the spaced substantially parallel upright walls 5 and 6 and a bottom wall 7 having a drain opening 7' connecting the walls 5 and 6 and forming each of the peripheral sides of the suporting frame 4.

It will be noted that each of the respective sections or units 2, 3 and 4 are interconnected or removably interlocked for easy assembly at the site of installation. This is accomplished by forming the adjacent portions of the lower and upper respective members 2, 3 and 4 with cooperating complementary means whereby these respective parts may be removably interlocked and supported one upon the other. For instance, as shown in the embodiment illustrated in the drawings, the upper peripheral end of the wall 2 is formed with a bead or rounded portion which is indicated at 8 while the adjacent lower portion of the section 3 which is supported on the section 2 is provided with a substantially circular channel 9 open at its bottom end as at 10 for receiving the bead 8 in axial telescopic relation for releasably interlocking these parts together.

The lower portion of the lower body section 2 is pro-

vided with an inwardly projecting supporting flange **11** at a point above the lower extremity of the section **2** whereby the entire assembly may be supported on a roof curbing such as indicated at **12**. The inner extremity of the flange **11** is upturned as at **13**. When each of the several respective sections **2** and **3** are assembled in interlocked relation, as shown more particularly in Figs. 2 and 4, they form a ventilator body of sturdy construction forming a housing through which gases may be vented from the interior of the building through an opening communicating with the base of the ventilator.

The louver supporting frame, indicated generally at **4**, is adapted to be supported upon the upper ventilator sections **3** and is connected thereto in interlocked relation in a manner similar to that already described in connection with sections **2** and **3**, that is, the upper peripheral portion of each of the housing members **3** is formed to provide a rounded bead **14** having interlocking engagement within the downwardly opening channel **15** formed in the base of the louver supporting frame **4**.

A fan ring **16** is carried and supported by the upwardly projecting flanges **13** of the lower section **2** and when these lower sections are assembled together, the fan ring may be riveted thereto or otherwise secured, as at **17**. The fan ring surrounds the rotating blades of a fan indicated at F which is driven by the motor M and directs the upwardly venting gases upwardly into the top of the ventilator toward the louvers carried by the supporting frame **4**. The motor M is, of course, supported within the curbing by conventional means (not shown) and when running functions to draw exhaust gases or other gaseous fluids upwardly from the building through the opening in the roof communicating with the ventilator and through the fan ring and thence upwardly to be impinged against the louvers carried by the louver supporting frame **4**, as will be more thoroughly described hereinafter.

When each of the assembled sectional side and end units are respectively assembled together to form the ventilator body **1**, their adjacent meeting edges, such as indicated at **18** and **19**, may be permanently assembled together to form a rigid body structure by welding the same along the meeting edges of the respective adjacent sections.

An inverted frame **20** is carried by the supporting frame **4** and is secured to and supported by the upwardly extending walls **6** and in spaced relation thereto by means of the bolts **21**, the spacing sleeve **22** and the nuts **23**. The lower peripheral edge of the inverted frame **20** is flanged downwardly as at **24** to communicate the outside atmosphere through the bottom open end of the inverted frame **20** and thence upwardly through the frame **20** and out through the openings in the top thereof. This arrangement also provides means for releasing pressures such as down drafts which may occur under certain atmospheric conditions.

In further carrying out my invention, the damper or louver frame **4** is provided with a plurality of spaced louvers **25** pivotally supported in spaced relation by opposite walls or flanges **6** on pins **26** carried by these walls and projecting inwardly thereof to receive the tubular ends of the louvers **25** in telescopic relation. The respective pins **26** project in axial alignment from opposite walls **6** and carry the opposite ends of the respective louvers whereby these louvers are free to swing or oscillate about the axes of the pins **26** in use.

Each louver, as shown in detail in Fig. 5, comprises a vane **25** lying transversely of the damper frame and formed along one transverse edge into a loop **27** for receiving the supporting pins **26**. The other transverse end of each vane **25** is formed with a portion lying in a plane intersecting the vane **25** and comprising a depending portion **28** and an upwardly projecting cup-shaped portion **29** adapted to overlie the adjacent looped end **27** of the next adjacent louver **25** when the louvers are in down position, as indicated in Fig. 5. The depending portions **28** of each louver in the position shown in Fig. 5 constitute fins projecting downwardly into the up flowing exhaust gases or fumes passing through the ventilator while the cup-shaped forward portions **29** of each louver nest upon and are supported on the looped portions **27** of the next succeeding louver to maintain the louvers in horizontal position when there is no updraft passing through the ventilator.

Each of the louvers is freely swingable about its axis and when an updraft passes through the ventilator the fins **28** serve to act as a sort of pocket to provide means whereby an efficient lifting action may be imparted to the louvers under an updraft pressure, thereby raising the louvers from their horizontal position to a maximum position shown in broken lines in Fig. 2. The inverted frame **20** is provided with a series of spaced strips or stops **30** extending in planes substantially parallel to the planes of the axes of the louvers and spaced above the same in a position whereby they will act as means to limit the upward movement of the louvers under draft operating conditions. Each of these strips or stops is provided at each end with a rubber cushioning member **31**, as indicated in Figs. 2 and 3. These resilient cushioning members are engaged by the cup-shaped portions **29** along the forward edges of each of the louvers when the louvers are in the position shown in Fig. 2 and being of relatively soft resilient material, such as rubber or sponge rubber or similar materials having similar characteristics, serve to eliminate noisy operation which of course would occur should the louvers be thrust upon the bare metal strips **30**. Since the louvers are each freely movable on their axes and since each louver is provided with a fin **28**, their response to an updraft, whether the same be of relatively low or even higher pressure, will be instant and they will operate in a noiseless manner.

The fan F, of course, will provide a forced updraft through the ventilator and will further enhance the operation of the louvers in response to such updraft, the gases and fumes passing upwardly through the ventilator and out between the up-raised louvers and through the frame **19** and to the atmosphere.

From the above, it will be seen that by my invention I have provided an effective roof ventilator for industrial and even domestic use, if desired, which is not only light but due to its extreme simplicity of construction and the simplicity of its assembly on the site of installation, is extremely economical to manufacture and install and, of course, is highly efficient in use. Furthermore, this construction enables a roof ventilator to be made at a lower overall height than is customary in conventional factory assembled roof ventilators with which I am familiar. Furthermore, this invention eliminates the necessity of employing heavy equipment to erect the roof ventilator at the site of operation since the same may be supplied in knockdown form and assembled at the site of use on the roof. Also the invention contemplates a novel type of construction whereby the several principal units comprising the roof ventilator may be interlocked and assembled as a complete roof ventilator at the site of use.

Various changes may be made in the details of construction and arrangement of parts of the invention without departing from the spirit thereof or the scope of the appended claims.

I claim:

1. In a roof ventilator construction, a substantially hollow ventilator body comprising a plurality of complementary superimposed and interlocked body sections including a base and a louver supporting section, said interlocking body sections each comprising extruded side and end members for assembly together to form a hollow rectangular section, the side and end members of each of said body sections respectively being formed along their respective adjacent marginal edges with complementary, interlocking and telescoping portions, the respective side and

end members of each body section being assembled together in end-to-end abutting relation and secured together by welding along their abutting end edges, a plurality of louvers pivotally supported in said louver supporting section and disposed to close the outlet opening of the ventilator body under the action of gravitational force but movable in response to an updraft in said ventilator body to open the outlet to the outside atmosphere through said frame, and a fan mounted in the base section for creating an updraft in the ventilator body to thereby actuate said louvers against gravitational force.

2. In a roof ventilator construction, a substantially hollow ventilator body comprising a plurality of complementary superimposed body sections interlocked marginally including a base and a louver supporting section, said interlocking body sections each comprising extruded side and end members for assembly together to form a hollow rectangular section, the side and end members of each of said body sections respectively being formed along their respective adjacent marginal edges with complementary interlocking and telescoping portions, the respective side and end members of each body section being assembled together in end-to-end abutting relation and secured together by welding along their abutting end edges, a plurality of louvers pivotally supported in said louver supporting section and disposed to close the outlet opening of the ventilator body under the action of gravitational force but movable in response to an updraft in said ventilator body to open the outlet to the outside atmosphere through said frame, and a fan mounted in the base section for creating an updraft in the ventilator body to thereby actuate said louvers against gravitational force, said louver carrying section including a drain catcher comprising a pair of spaced apart substantially upright continuous peripheral walls and a continuous horizontally disposed peripheral wall connecting said upright walls throughout their extent, said horizontally disposed wall having a drain opening therein, the innermost upright peripheral wall constituting a fluid outlet opening communicating with the interior of the ventilator body, the outer peripheral upright wall constituting a support for an open frame, a substantially open frame spaced outwardly from and supported on said outer upright wall, said open frame communicating at its top and bottom with the outside atmosphere, and means carried by said outer peripheral wall and connected to said open frame to support the frame on and in spaced relation peripherally thereto.

3. In a roof ventilator construction, a substantially hollow ventilator body comprising a plurality of complementary superimposed interlocking body sections including a base, an intermediate section, and a louver supporting section, said louver supporting section having a pair of spaced apart substantially upright marginal walls encompassing said section, a bottom wall connecting said upright walls throughout the extent of said walls, the innermost upright wall of said pair constituting a fluid outlet opening communicating with the interior of the ventilator body and the outside atmosphere, the outer upright wall constituting a support for an open frame member, an open frame member being supported on said outer upright wall and spaced peripherally therefrom and having communication with the outside atmosphere at its top and bottom, means carried by said outer upright wall and connected to the open frame member to support said frame member on and in spaced relation peripherally thereto, a plurality of louvers pivotally mounted for individual movement in the louver section to close said fluid outlet opening under the action of gravitational force, but movable in response to an updraft in said ventilator body to open the outlet to the outside atmosphere through said frame, said louvers each comprising a flat body having one longitudinal edge portion formed to receive supporting pins, louver supporting pins, said supporting pins being mounted on opposite sides of said supporting section, said louvers having a forward portion overlying and supported on the rear portion of the next successive louver when said louvers are in closed position, said frame having a stop in the path of the updraft driven, respective louvers when they are open to limit the swing thereof to substantially full open position under the influence of an updraft, while permitting said louvers to float on an updraft from closed position to substantially full open position.

4. In a roof ventilator construction, a substantially hollow ventilator body comprising a plurality of complementary superimposed interlocking body sections including a base, an intermediate section, and a louver supporting section, said louver supporting section having a pair of spaced apart substantially upright marginal walls encompassing said section, a bottom wall connecting said upright walls throughout the extent of said walls, the innermost upright wall of said pair constituting a fluid outlet opening communicating with the interior of the ventilator body and the outside atmosphere, the outer upright wall constituting a support for an open frame member, an open frame member being supported on said outer upright wall and spaced peripherally therefrom and having communication with the outside atmosphere at its top and bottom, means carried by said outer upright wall and connected to the open frame member to support said frame member on and in spaced relation peripherally thereto, a plurality of louvers pivotally mounted for individual movement in the louver section to close said fluid outlet opening under the action of gravitational force, but movable in response to an updraft in said ventilator body to open the outlet to the outside atmosphere through said frame, said louvers each comprising a flat body having one longitudinal edge portion formed to receive supporting pins, louver supporting pins, said supporting pins being mounted on opposite sides of said supporting section, said louvers having a forward portion overlying and supported on the rear portion of the next successive louver when said louvers are in closed position, said frame having a stop in the path of the respective louvers when they are open to limit the swing thereof to substantially full open position under the influence of an updraft, said louvers each having a lifting fin depending from the forward portion of the louver and into the path of the updraft in the outlet opening when the louvers are in closed position, to be acted upon by the updraft in such manner as to assist in swinging the louvers toward open position.

5. In a roof ventilator construction, a substantially hollow ventilator body having an outlet at its top and open at its bottom for connection with a roof opening over which it is fitted, said body comprising a plurality of complementary superimposed interlocking body sections including a base, an intermediate section and a louver supporting section, a plurality of louvers pivotally mounted in said louver supporting section and disposed to close said opening under the action of gravitational force but movable in response to an updraft in said ventilator body to open said outlet to the outside atmosphere through said body, said interlocking body sections each comprising extruded side and end members for assembly together to form a hollow rectangular section, the side and end members of said intermediate body section respectively having a marginal channel formed along one marginal edge, and a marginal bead formed along the opposite marginal edge, said respective side and end members of the base and louver supporting sections each being formed respectively along their adjacent longitudinal edges for endwise telescopic assembly with the respective side and end members of the intermediate section and to have a telescopic interlocking engagement with the said marginal channels and beads thereof, the adjacent vertical edges of the adjacent assembled end and side members being welded together along their edges to provide a rigid body structure.

6. In a roof ventilator construction, a substantially hollow ventilator body comprising a plurality of comple-

mentary superimposed interlocking body sections including a base and a louver supporting section, said interlocking body sections each comprising extruded side and end members for assembly together to form a hollow rectangular section, the corresponding side and end members of said body sections respectively being formed along their respective adjacent longitudinal edges with complementary endwise telescoping and interlocking portions, the respective side and end members of each body section being permanently secured together along their abutting end edges.

7. In a roof ventilator construction, a substantially hollow, vertically disposed ventilator body, a louver carrying frame on said body adjacent its outlet end, said louver carrying frame including a drain catcher comprising a pair of substantially parallel spaced apart upright peripheral walls and a horizontally disposed peripheral wall connecting said upright walls throughout their extent at their lower portions, said horizontally disposed wall having a drain opening therein, the innermost upright peripheral wall defining a fluid outlet opening communicating with the interior of the ventilator body, the outer peripheral upright wall constituting a support for a second frame, a second frame spaced outwardly of and supported on said outer upright wall, said second

frame being open at its top and bottom for communication with the outside atmosphere, means securing the second frame on and in spaced relation to said outer upright wall, a plurality of louvers pivotally mounted in said louver carrying frame and disposed to close said fluid outlet opening under the action of gravitational force but swingable in response to an updraft in said ventilator body to open the fluid outlet to the outside atmosphere through said frames.

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