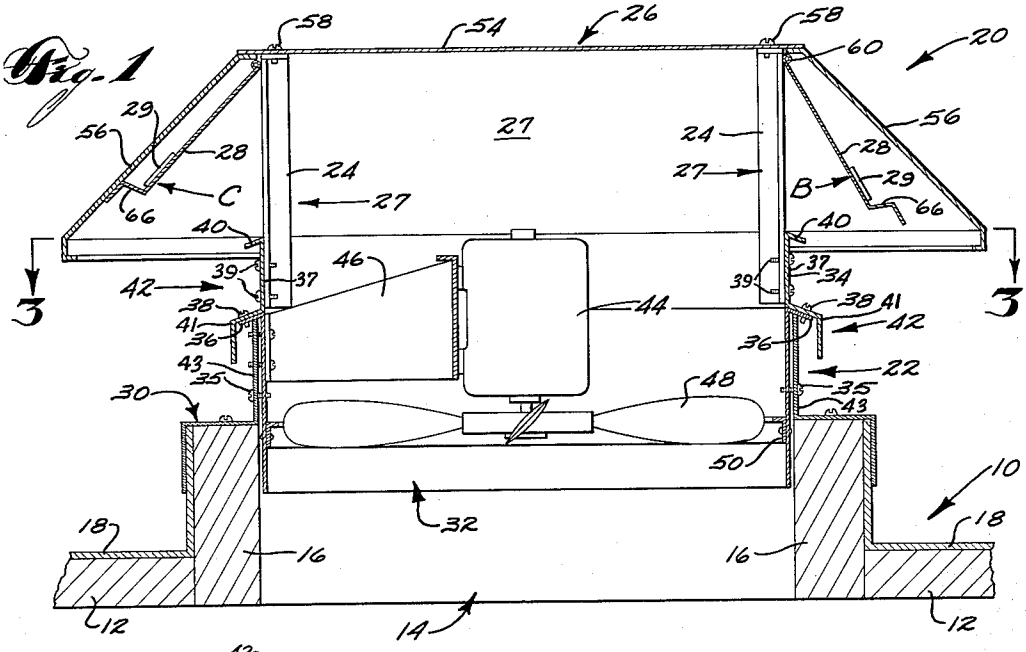
Oct. 19, 1965 J. O. HAZEN ETAL 3,212,425

FORCED FLOW VENTILATOR

Filed June 22, 1962

Fig. 1



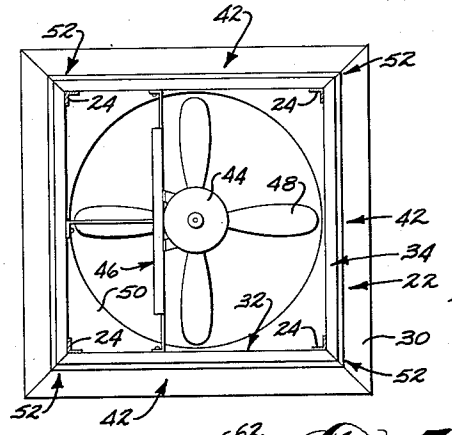


Fig. 3

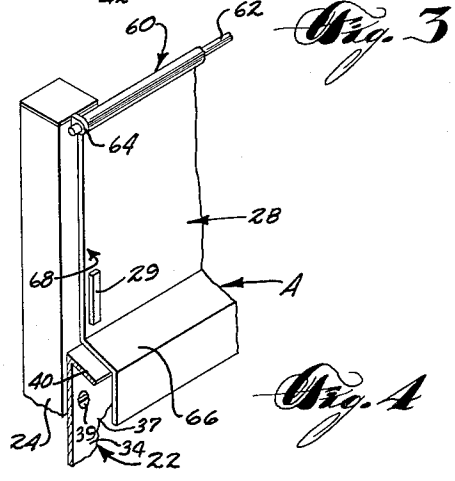


Fig. 4

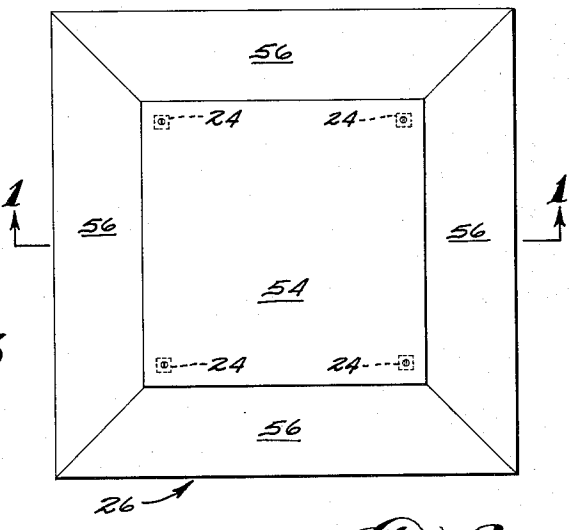


Fig. 2

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United States Patent Office 3,212,425 Patented Oct. 19, 1965

3,212,425

FORCED FLOW VENTILATOR

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Filed June 22, 1962, Ser. No. 204,575
6 Claims. (Cl. 98—43)

This invention relates to a forced flow ventilator and more particularly to a forced flow ventilator having freely pivotal dampers for sealing the ventilator gas passageways when the fan is not operating.

According to the present invention, a ventilator is provided having a ventilator stack which terminates in an external flange at its upper edge. The stack is adapted to surround a curb of a ventilator opening in a roof of a building. A cap member is maintained upwardly spaced from the stack by means of vertical support members. A fan and its associated drive means are mounted within the stack for withdrawing gases from the interior of the building.

In the present invention, the gases to be exhausted are drawn through the stack and are subsequently discharged horizontally through at least one gas passageway. The gas passageway is positioned between at least one adjacent pair of the vertical support members and above the external flange and below the cap member.

To seal the gas passageways when the fan is not operating, a substantially vertically disposed damper is provided which is substantially the same size as the gas passageway. The damper is positioned externally of the gas passageway and is pivotally secured along its upper edge to the adjacent pair of vertical support members. The damper has magnet means secured thereto, preferably on the external surface thereof, which are adapted to be attracted to portions of the ventilator structure surrounding the gas passageway. The magnet means have sufficient strength to hold the damper in sealing relation with the gas passageway only when the fan is not operating. When the fan is started, the built-up gas pressure within the ventilator forces the damper outwardly thereby permitting the exhaustion of the gases. The damper preferably is fabricated from lightweight, relatively thin gauge aluminum.

The damper also is provided with an outwardly extending flashing member along its bottom edge. The flashing member serves three functions. Namely, (a) it serves to seal the lower edge of the gas passageway when the damper is in a closed position by engaging the external flange; (b) it serves to maintain the damper spaced from the cap member so that the magnet means cannot be magnetically engaged thereon to hold the damper in an open position; and (c) it serves as a stiffening member for the damper.

With these remarks in mind, the principle objects of the present invention include:

To provide a forced flow ventilator having freely pivotal dampers which seal the gas passageways when the fan is not operating;

To provide a force flow ventilator having freely pivotal dampers including magnet means secured thereon whose strength is sufficient to hold the damper in sealing relation with the gas passageway only when the fan is not operating;

To provide a forced flow ventilator having freely pivotal dampers which pivot outwardly under the influence of the gases discharged from the stack;

To provide a forced flow ventilator which is relatively inexpensive to manufacture and install; and

To provide a force flow ventilator wherein only the cap member need be removed in order to service the fan and drive means.

These and other objects and advantages of the present invention will become apparent from the following detailed description by reference to the accompanying drawings in which:

FIGURE 1 is a cross-sectional view, taken along the line 1—1 of FIGURE 2, illustrating the interior structure of the present ventilator;

FIGURE 2 is a plan view, drawn on a smaller scale, of the ventilator of FIGURE 1 illustrating a cap member;

FIGURE 3 is a cross-sectional view, drawn on a smaller scale, taken along the line 3—3 of FIGURE 1, illustrating a stack of the present ventilator; and

FIGURE 4 is a fragmentary isometric view illustrating a freely pivotal damper and associated magnet means engaged with a vertical support member.

General

Referring to FIGURE 1, a generally horizontal roof of a buliding is indicated by the numeral **10**. The roof **10** is constructed of structural elements **12** which may include concrete, metal beams, lumber or similar materials of construction. An opening **14**, usually of rectangular configuration, is provided in the roof **10**. The opening **14** is surrounded by a curbing **16** which extends above the upper level of the roof **10**. A weather-proof coating or surface **18** is provided above the structural elements **12** to serve as a weather-proofing skin over the exposed surface of the building. The coating **18** may comprise tile, cement, bituminous materials, asbestos materials and the like.

The present force flow ventilator is indicated by the numeral **20** and generally comprises a stack **22**, vertical support members **24**, a cap member **26**, gas passageways **27**, and dampers **28** which have magnet means **29** secured thereto and which seal the gas passageways **27**.

Stack 22

Referring to FIGURES 1 and 3, the stack **22** is adapted to surround the curbing **16** of the opening **14** and comprises a curb adapter **30**, a fan housing **32** and a weathering skirt **34**. The curb adapter **30** rests on the curbing **16** and is secured thereto by any suitable means. The fan housing **32** extends downwardly through the curb adapter **30** and into the opening **14**. The fan housing **32** is secured to the curb adapter **30** preferably by means of bolts **35** and includes an outwardly extending flange **36** which rests on the upper edge of the curb adapter **30**. The weathering skirt **34** comprises a vertical portion **37** which is secured to the vertical supports **24** preferably by means of bolts **39**. The vertical portion **37** terminates along its upper edge in an external flange **40** and terminates along its lower edge in a generally L-shaped flange **41** having one leg thereof resting on and secured to the flange **36** preferably by means of bolts **38**.

Comparing FIGURES 1 and 3 it will be seen that the stack **22** is defined by a plurality of connected vertical side walls generally designated by the numeral **42** each of which comprises one of the weathering skirts **34**, one vertical leg of the fan housing **32** and a vertical wall **43** of the curb adapter **30**. In this instance the stack **22** has a square cross-section. It should be evident, however, that the stack **22** instead could have a hexagonal, octagonal or other polygon cross-section or even may have a circular cross-section since all of these cross-sections fall within the definition of a stack defined by a plurality of connected vertical side walls.

A drive means or electric motor **44** is mounted centrally in the fan housing **32** by means of a T-shaped motor support **46**. The motor **44** drives a fan **48** about a fixed vertical axis so that the gases are drawn from the interior of the building through the opening **14** and the stack **22**. A diaphragm **50**, secured within the fan housing **32** at

the level of the fan **48**, serves to increase the efficiency of the fan **48**.

Vertical support members 24

Each of the vertical support members **24** extend upwardly from a corner **52** of the stack **22** (see FIGURE 3) which in the specification and the claims will be termed a "juncture" of the adjacent ones of the vertical side walls **42**. Specifically the vertical support members **24** are secured at their lower ends to the weathering skirt **34** by means of the bolts **39** as described above and serve to support the cap member **26** in upwardly spaced relation with the stack **22**.

Cap member 26

Referring to FIGURES 1 and 2, the cap member **26** has a generally horizontal top **54** and a plurality of downwardly sloped connected side walls **56** which terminate at substantially the same level as the external flange **40** of the stack **22**. Comparing FIGURES 1 and 2, the cap member **26** is frusto-pyramidal in shape and has a square horizontal cross-section. It should be evident, however, that the cap member **26** instead could have a hexagonal, octagonal or other polygon cross-section or may even have a circular cross-section since all of these cross-sections may be described as a plurality of downwardly sloped connected side walls. Preferably the number of downwardly sloped connected side walls **56** of the cap member **26** is equal to the number of vertical connected side walls **42** of the stack **22**.

The cap member **26** is secured to the upper ends of the vertical support members **24** preferably by means of bolts **58**. Thus the cap member **26** may be readily removed when the motor **44** of the fan **48** requires servicing.

Gas passageways 27

Referring to FIGURES 1 and 3, each gas passageway **27** is disposed between one adjacent pair of the vertical support members **24** and above the external flange **40** and below the cap member **26**. Actually, the peripheral edge of each gas passageway **27** comprises the adjacent pair of vertical support members **24**, that portion of the external flange **40** and that portion of the inner surface of the cap member **24** which extend between the adjacent pair of vertical support members **24**. In the illustrated ventilator there are four gas passageways **27**.

Dampers 28

Referring to FIGURES 1 and 4, the dampers **28** are provided to seal the gas passageways **27** when the fan **48** is not operating. The dampers **28** are positioned externally of the gas passageway **27** and are freely pivoted along their upper edge **60** to the adjacent pair of vertical support members **24** by means of a rod **62** extending through an ear **64** secured to each of the support members **24**.

The dampers **28** preferably are fabricated from lightweight, relatively thin gauge aluminum and hence include an outwardly extending flashing member **66** which serves to stiffen the damper **28**. The outwardly extending flashing member **66** also serves the second function of sealing the lower portion of the gas passageway **27** by engaging the external flange **40** of the stack **22** as shown in FIGURE 4. The position, indicated by the letter A in FIGURE 4, is the normally closed position of the damper **28** when the fan **48** is not operating.

When the fan **48** is operating, the damper **28**, being lightweight, is forced outwardly to ride on the gas stream issuing from the gas passageway **27**, in the position indicated by the letter B in FIGURE 1.

Magnet means 29

Still referring to FIGURES 1 and 4, the dampers **28** have magnet means **29** secured thereto which are adapted to be attracted to portions of the ventilator structure surrounding the gas passageway **27**. As specifically illustrated, each magnet means **29** is secured to the external surface of the damper **28** adjacent a side **68** thereof which overlies one of the vertical support members **24**. The vertical support members **24** preferably comprise a magnetically susceptible material. The magnet means **29** preferably are positioned at the lower edge of the damper **28** adjacent to the flashing member **66** as shown in FIGURE 4.

The magnet means **29** should be of sufficient strength to maintain the damper **28** in sealing relation with the gas passageway **27** only when the fan **48** is not operating. When the fan is operating, sufficient gas pressure is built up within the ventilator **20** to overcome the magnetic attraction of the magnet means **29**. The damper **28** thus is released and floats in the general position indicated at B in FIGURE 1.

At the left hand side of FIGURE 1, the damper **28** is also illustrated in the extreme outward position indicated by the letter C. In this position, the flashing member **66** serves the third function of a spacer, i.e., it maintains the damper **28** spaced from the side wall **56** of the cap member **26**. Thus the magnet means **29** cannot magnetically engage the side wall **56** to hold the damper **28** in an open position.

From the foregoing detailed description it should be evident that the present invention provides a forced flow ventilator having freely pivotal dampers which seal the gas passageways when the fan is not operating; which pivot outwardly under the influence of the gas discharged from the stack; and which have magnet means secured thereon whose strength is sufficient to hold the dampers in sealing relation with the gas passageways only when the fan is not operating. The present invention further provides a forced flow ventilator which is relatively inexpensive to manufacture and install; and wherein only the cap member need be removed when the fan and drive means require servicing.

We claim:

1. A ventilator comprising in combination:
- a ventilator stack adapted to surround a curb of a ventilator opening in a roof of a building, said stack being defined by a plurality of connected vertical flat side walls, said stack terminating in an external flange at the upper edge thereof;
- a fan mounted within the said stack for rotation about a fixed vertical axis;
- drive means for rotating the said fan;
- a vertical support member extending upwardly from each juncture of adjacent ones of said vertical side walls;
- means for securing said support member to said adjacent ones of said vertical side walls;
- a cap member secured to the upper ends of said vertical support members and having a plurality of downwardly sloped connected side walls terminating at substantially the same level as said external flange and spaced therefrom;
- a gas passageway between at least one adjacent pair of said vertical support members and above the said external flange and below the said cap member;
- a damper disposed externally of the said gas passageway, said damper being substantially the same size as said gas passageway;
- hinge means mounted at the junction of said vertical support members and said cap member beneath the said downwardly sloped connecting side walls, said hinge means pivotally securing said damper at its upper edge; and
- an outwardly extending flashing member along the bottom edge of said damper, said flashing member being engaged with a portion of said external flange when the said fan is not operating.

2. The ventilator of claim **1** wherein the said ventilator stack has a square cross-section.

3. The ventilator of claim **1** wherein the said cap member has a frusto-pyramidal shape.

4. The ventilator of claim 1 including:
magnet means secured to the external surface of the said damper and adapted to be attracted to portions of the structure surrounding the said gas passageway;
said damper comprising a non-magnetic material;
said magnet means being so positioned and being of sufficient strength to hold the said damper in sealing relation with the said gas passageway only when the said fan is not operating.

5. The ventilator of claim 1 including:
magnet means secured along those sides of said damper which overlie the said adjacent pair of said vertical support members;
said damper comprising a non-magnetic material; and the said adjacent pair of vertical support members comprising magnetic susceptible material;
said magnet means being so positioned and being of sufficient strength to hold the said damper in sealing relation with the said gas passageway only when the said fan is not operating.

6. The ventilator of claim 1 wherein the said hinge means are mounted to the upper ends of the said vertical support members.

References Cited by the Examiner

UNITED STATES PATENTS

2,332,552	10/43	Belanger	98—43
2,711,682	6/55	Drechsel	98—116 X
2,739,521	3/56	Spear	98—116
2,812,703	11/57	Tobey	98—43
2,898,841	8/59	Knutson et al.	98—43
2,981,172	4/61	Kalman	98—116
3,064,548	11/62	Field	98—43

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