Dec. 9, 1969 W. F. REINKOESTER, JR 3,482,767

VENTILATOR

Filed May 28, 1968 2 Sheets-Sheet 1

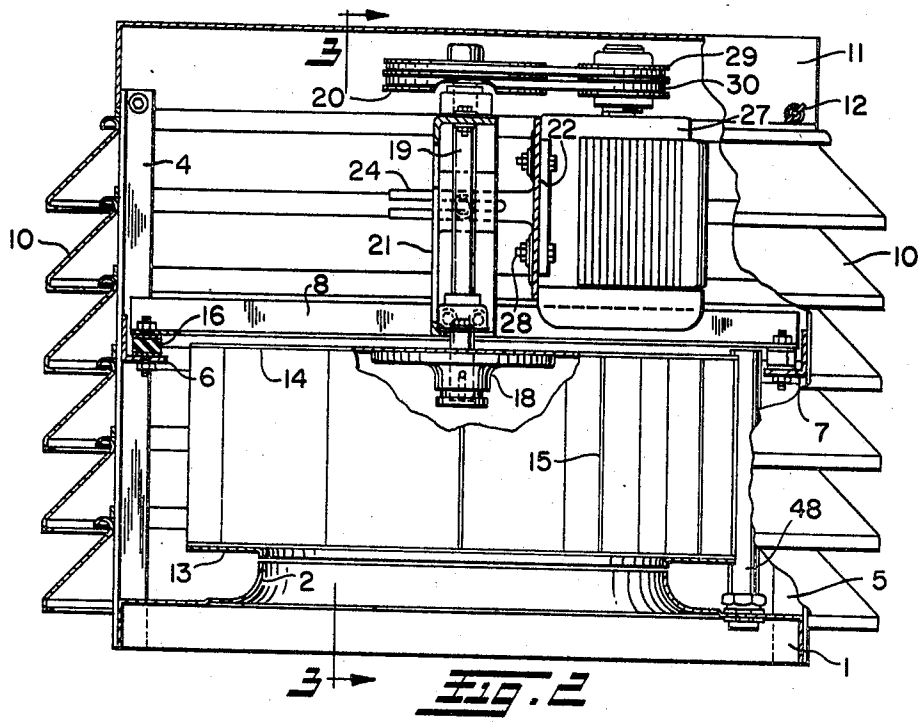


Fig. 2

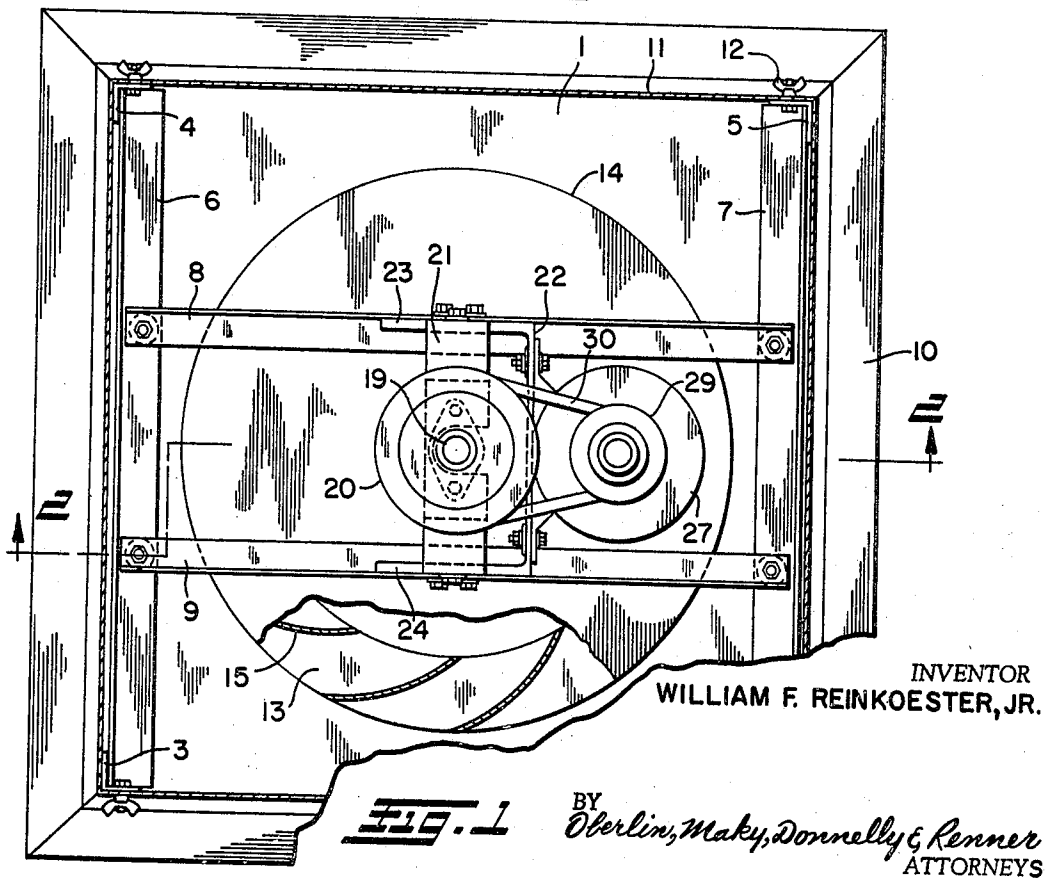


Fig. 1

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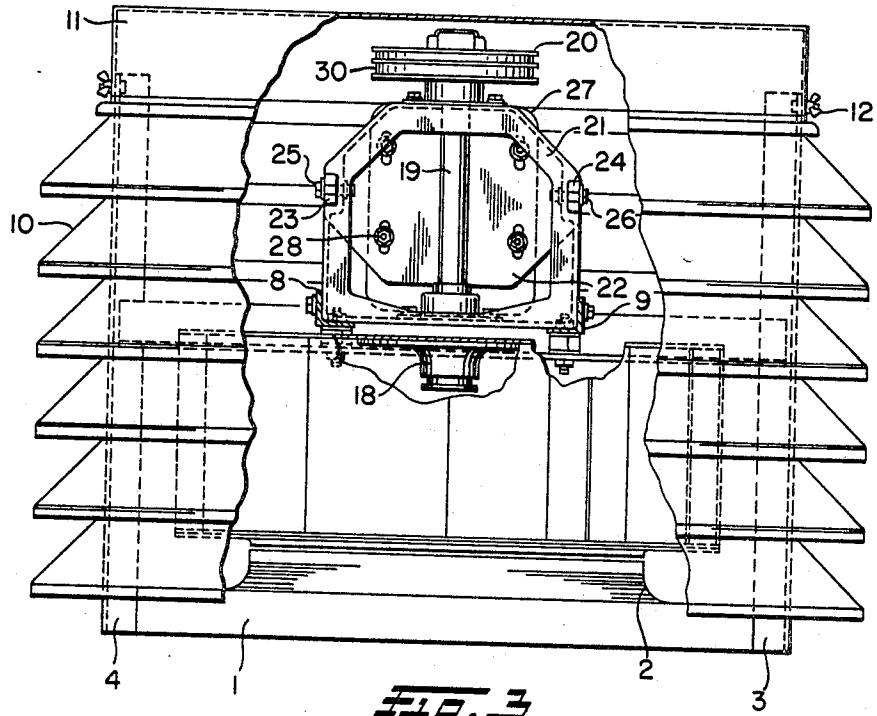


Fig. 3

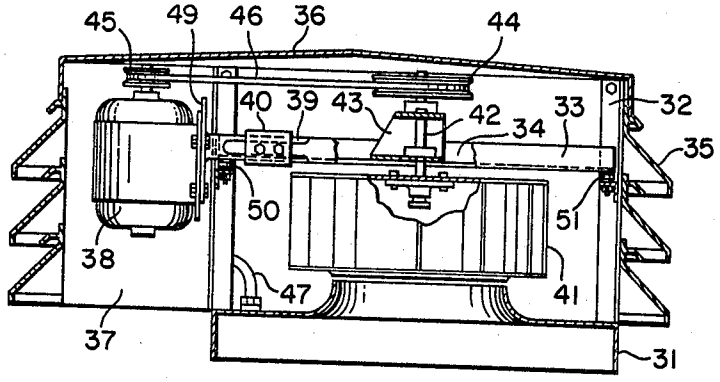


Fig. 4

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VENTILATOR

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U.S. Cl. 230—117 11 Claims

ABSTRACT OF THE DISCLOSURE

A roof ventilator having a fan or blower mounted for rotation about a vertical axis and belt-driven by an electric motor; such motor being provided with a cast light metal motor mount which in turn is carried on a pair of spaced rails supported at their ends by vibration isolators.

This invention relates as indicated, to ventilators and more particularly to ventilators provided with a fan or blower for expelling air from within a building. A ventilator of this general type, which has been found to be quite satisfactory, is shown and described in Cook Patent No. 3,313,228.

In ventilators of the type with which the present invention is concerned, a fan or blower is mounted for rotation about a vertical axis within an appropriate housing adapted to be itself mounted upon the roof of a building to be ventilated. An electric drive-motor is provided, also within such housing, and preferably above the fan or laterally thereof in order that it may be more accessible for attention if required. Such motor is mounted for lateral adjustment in order to maintain the drive belt for the fan under proper tension. The ventilator housing or casing is provided with lateral openings, preferably louvered, through which the air is expelled by operation of the fan, the air movement frequently also serving to cool the motor.

A common problem with all air-moving equipment, including ventilators of the general type described, is that of vibration and consequent objectionable noise resulting from operation of the motor and fan, the movement of the air itself, and the fact that the housing and certain other parts of the ventilators are ordinarily of sheet metal construction. While the motor should be readily adjustable, as above noted, it is also important that it be firmly and rigidly supported both to reduce vibration and also to insure that the drive belt is maintained under proper adjusted tension.

It is accordingly an important object of this invention to provide a roof ventilator in which the electric drive-motor is adjustably but firmly supported.

Another object is to provide such ventilator in which the motor mounting means is of a construction and material to minimize objectionable vibration and noise.

Other objects of the invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but certain of the various ways in which the principles of the invention may be employed.

In said annexed drawing:

FIG. 1 is a top plan view of a ventilator embodying the principles of this invention, with the upper portion of the cover cut away better to disclose the internal construction;

FIG. 2 is a vertical section taken through the ventilator of FIG. 1 approximately on the line 2—2 indicated thereon, with certain portions broken away better to disclose the consruction thereof;

FIG. 3 is an elevation of the ventilator of FIGS. 1 and 2 taken at right angles to FIG. 2 and having a portion of the outer louvered housing and cover broken away to disclose the end view of the motor mount therewithin; and

FIG. 4 is a vertical section through a generally similar form of roof ventilator in which the electrical drive-motor is, however, laterally offset within the housing.

Referring now more particularly to said drawing and especially to FIGS. 1–3 thereof, the embodiment of the invention there illustrated comprises a square sheet metal base **1** having a down-turned edge portion adapted to fit over a curb (not shown) extending upwardly from the roof of the building. Such base has an upwardly extending throat portion **2** which serves as a conduit for air drawn upwardly from the interior of the building. Vertical posts, such as angle member **3**, **4**, and **5**, are secured to the respective corners of base **1** as by welding, with horizontal angle members **6** and **7** welded to and interconnecting spaced pairs of such posts. A pair of spaced parallel rails **8** and **9** interconnect horizontal members **6** and **7** in a manner explained more in detail below, thereby to provide a frame to support both the external housing or casing and also to carry the fan and drive assembly.

In the preferred embodiments illustrated, such housing or casing comprises a series of extruded aluminum louvers **10** mounted on such corner posts and providing adequate exit openings for the air while at the same time excluding rain and snow from the structure. A removable sheet metal cover **11** fits over the upper ends of the corner posts and is retained in place by means of wing nuts such as **12**.

The blower proper occupies the space within such casing below rails **8** and **9** and comprises an aluminum mean airfoil wheel formed by a lower annular plate **13** having a central opening corresponding to throat **2** of base **1**, and an upper disc-shaped hub **14**, the arcuate vanes **15** being fitted and secured therebetween.

The ends of cross rails **8** and **9** are supported on horizontal members **6** and **7** respectively by means of vibration isolators such as **16**, these being commercially available rubber in shear isolators comprising spaced metal discs having an interposed rubber block bonded thereto, with threaded studs welded to the outer faces of such discs for attachment to the rails. A cast aluminum hub **18** is secured to the underside of blower disc **14** and is keyed to vertically upwardly extending drive shaft **19** which has drive pulley **20** keyed to its upper end. Such shaft **19** passes through bearings carried by upper and lower portions of a cast aluminum frame member **21** having a large window therein, such frame member being bolted to cross rails **8** and **9** and bridging the same centrally of the housing. A cast aluminum motor plate **22** is provided with a pair of integral horizontally extending fork arms **23** and **24** which embrace the respective sides of cast aluminum frame member **21**, fitting in grooves in the sides thereof (see FIGS. 1 and 3). Bolts **25** and **26** serve to lock such fork arms in desired adjusted position. It will be understood that instead of true forks these arms may be provided with elongated slots having closed ends.

Electric motor **27** is mounted on such plate **22** by means of four bolts such as **28** passing through short vertical slots in the plate, thereby affording a degree of vertical adjustment for the motor. Pulley **29**, driven by such motor, is connected to pulley **20** on the upper end of shaft **19** by means of drive belts **30**, whereby the blower is operated. Such belts, of course, are tensioned by proper adjustment of fork arms **23** and **24**.

Referring now more particularly to the embodiment of the invention illustrated in FIG. 4 of the drawing, such embodiment likewise comprises a square sheet metal base **31** provided with four uprights or corner posts such as **32** supporting a pair of horizontal rails **33** and **34** in the same manner as rails **8** and **9** of the FIG. 1 embodiment. A series of extruded aluminum louvers such as **35** are carried by such posts and a sheet metal cover **36** fits thereover. Such cover, however, is rectangular in shape and projects laterally of base **31** as shown to provide for a laterally offset motor compartment **37**. Electric drive-motor **38** is laterally adjustably mounted on rails **33** and **34** by means of cast aluminum forks such as **39** and bolted channel-shape extruded aluminum clamp members such as **40**.

Fan or blower **41** corresponding to that of FIG. 1 is carried by vertical shaft **42** journaled in bracket **43** supported by and bridging horizontal rails **33** and **34**. A pulley **44** is keyed to the upper end of shaft **42** and is driven from drive pulley **45** of motor **38** by means of belt **46**. Such belt is, of course, adapted to be properly tensioned through lateral adjustment of motor **38**. A protective tube **47** is provided for the electric cable (not shown) leading to motor **38**, thereby guarding such cable from fan **41**. A generally similar guard tube **48** is provided for the corresponding cable in the FIG. 2 embodiment of the invention. It will be noted that by offsetting the drive-motor laterally of the fan it is possible to achieve a considerably lower profile of the casing or housing, this frequently being preferred as a matter of appearance as well as affording less wind resistance. When moving contaminated air, a sheeet metal baffle or isolation plate may be interposed between the fan and motor, if desired.

The location of motor **38** laterally of the fan, as shown, affords a better wrap or arc of contact between belt **46** and pulleys **44** and **45**, particularly the latter. This serves to reduce slippage when the motor is started. Since rails **33** and **34** are widely spaced similarly to rails **8** and **9**, the high torque produced by the motor start-up does not appreciably distort the assembly, despite the wrench which such start-up produces. The motor plate **49** bearing the pair of fork arms **39** generally corresponding to arms **23** and **24** of FIGS. 1–3 will be of cast aluminum. By cantilevering the motor mount beyond the ends of rails **33** and **34** the motor and fan are supported on opposite sides of vibration isolators **50** in a generally balanced relationship. Any slight tendency of the motor to sag simply results in maintaining tension in drive belt **46**. While bracket **43** may be of heavy gauge sheet aluminum, a cast aluminum bracket is preferred not only for rigidity but also because of reduced vibration transmission and sound generation. The location of motor **38** closely adjacent vibration isolators **50** reduces the leverage and therefore the jerk imposed on them by abrupt start-up of the motor. The other pair of isolators **51** supporting the other ends of rails **33** and **34** carry less load.

I have found that by thus mounting the blower or fan in a relatively massive bracket or support of cast light metal such as aluminum or magnesium, which support is in turn carried on rails mounted on the vibration isolators **16**, a very substantial reduction is obtained in the objectionable vibration, noise and resonance which are otherwise frequently found in ventilating units of this general type. Furthermore, by mounting the motor itself on such rails by means of the same or separate cast aluminum or cast magnesium support, the motor vibration is likewise very substantially reduced. Ordinarily the entire assembly will be of aluminum, the posts, rails and louvers being of extruded aluminum, the blower and cover of sheet aluminum, and the blower and motor supports being of cast aluminum.

Other modes of applying the principles of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I, therefore, particularly point out and distinctly claim as my invention:

1. Ventilating apparatus comprising a frame, a sheet metal enclosure for said frame having air exit openings therein, a pair of laterally spaced horizontal rails carried by said frame within said enclosure, vibration isolators supporting said rails on said frame, a cast frame member of light metal bridging said rails thereabove and rigidly secured thereto, a vertically disposed drive shaft rotatably supported by said frame member between said rails, a fan mounted on the lower end portion of said shaft below said rails, a driven pulley secured to the upper end portion of said shaft, an electric motor within said enclosure for driving said pulley and fan, and means mounting said motor for adjustment toward and away from said driven pulley comprising a motor mounting member having a pair of parallel horizontally extending slotted arms, means carried by said rails for securing said arms in selected adjusted position, a drive pulley on said motor, and a belt operably connecting said pulleys.

2. The apparatus of claim **1**, wherein said motor is positioned above said fan with said slotted arms being directly adjustably secured to said cast frame member.

3. The apparatus of claim **2**, wherein said slotted arms are also of cast light metal.

4. The apparatus of claim **3**, wherein said slotted arms embrace said cast frame member and fit in horizontal grooves in the respective sides of the latter, said arms being integral with a cast plate of light metal to which said motor is mounted.

5. The apparatus of claim **4**, wherein said cast frame member has a large window therethrough and said drive shaft is supported by the upper and lower portions of said frame member bridging said rails.

6. The apparatus of claim **4**, wherein said enclosure is formed with horizontal extruded aluminum side louvers and an impervious top cover.

7. The apparatus of claim **1**, wherein said motor is positioned laterally of said fan, with said slotted arms being adjustably secured to said rails for lateral adjustment in a direction parallel to said rails.

8. Ventilating apparatus comprising a frame, an enclosure for said frame having laterally disposed air exit openings therein, a pair of laterally spaced horizontal rails carried by said frame within said enclosure, vibration isolators supporting said rails on said frame, a frame member bridging said rails generally centrally of said enclosure, a vertically disposed shaft rotatably supported by said frame member between said rails, a fan mounted on the lower end portion of said shaft below said rails, a driven pulley secured to the upper end portion of said shaft above said rails, an electric motor within said enclosure for driving said pulley and fan, a drive pulley on said motor, a belt operably connecting said pulleys, and means mounting said motor for adjustment toward and away from said driven pulley comprising a cast light metal plate to which said motor is secured, a pair of parallel spaced horizontal slotted arms integral with said plate, and means carried by said rails rigidly engaging said slotted arms to secure the latter in selected adjusted position.

9. The apparatus of claim **8**, wherein said motor is positioned laterally of said fan beyond the ends of said rails, and said slotted arms are parallel to and respectively engage said rails for longitudinal adjustment relative thereto.

10. The apparatus of claim **9**, wherein said motor is positioned closely adjacent said vibration isolators supporting the adjacent ends of said rails.

11. Ventilating apparatus comprising a frame, an enclosure for said frame having laterally disposed air exit openings therein, a pair of laterally spaced parallel horizontal rails carried by said frame within said enclosure, vibration isolators supporting said rails on said frame, a fan support member bridging said rails and carried thereby generally centrally of said enclosure, a verti-

cally disposed drive shaft rotatably supported by said fan support member between said rails, a fan mounted on the lower end portion of said shaft below said rails, a driven pulley secured to the upper end portion of said shaft above said rails, an electric motor within said enclosure for driving said pulley and fan, a drive pulley on said motor, a belt operably connecting said pulleys, and means mounting said motor for adjustment toward and away from said driven pulley comprising a cast light metal support element to which said motor is secured, a pair of parallel spaced horizontal arms integral with said support element and extending therefrom, such spacing of said arms being similar to that of said rails and said arms extending parallel to said rails, and means

carried by said rails rigidly engaging said arms to secure the latter in selected adjusted position.

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98—43; 230—235