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RETAINING MEANS FOR THE DAMPERS OF VENTILATORS

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Fig. 1

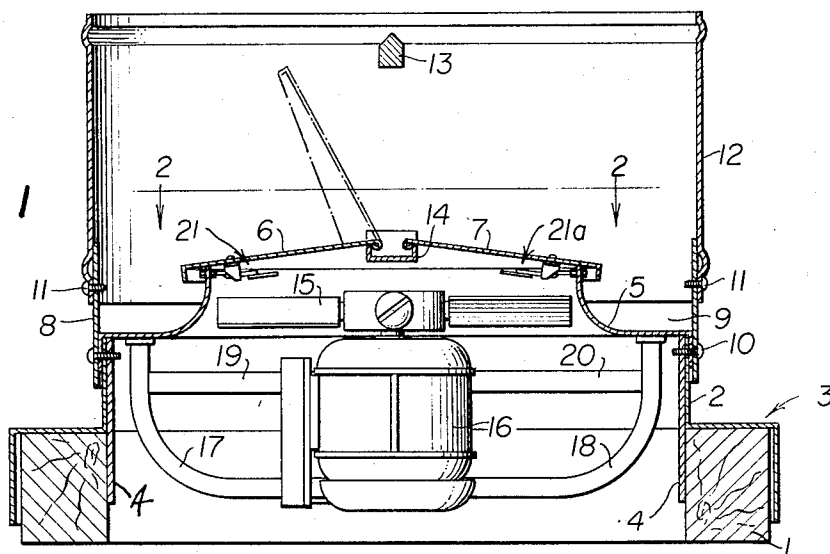
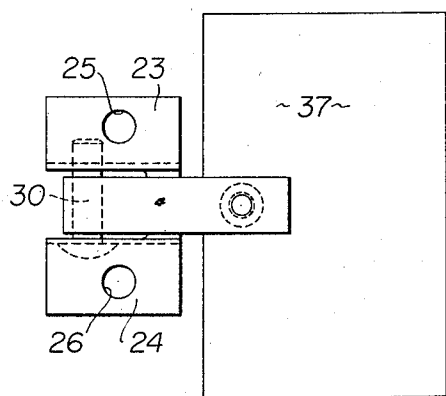


Fig. 3

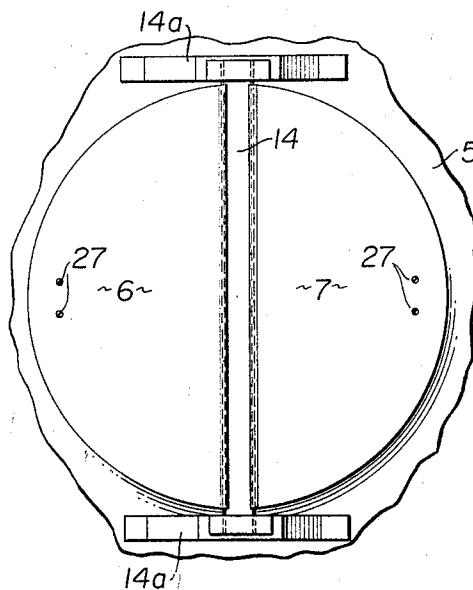


Fig. 2

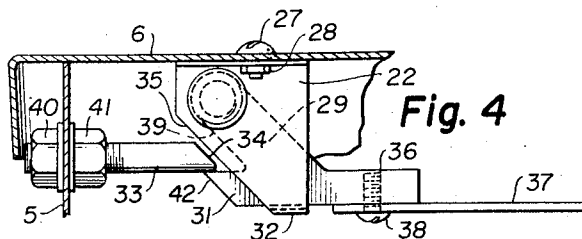


Fig. 4

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RETAINING MEANS FOR THE DAMPERS OF VENTILATORS

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5 Claims. (Cl. 98—116)

The present invention relates to ventilators provided with air moving means and more particularly to retaining means for preventing intermittent opening and closing the dampers of the ventilator when the air moving means is at rest.

Ventilators as now constructed are usually provided with air-moving means, such as a motor-driven fan, for expelling hot air or air which is contaminated with smoke, dust, fumes, or odors, from the interior of buildings or from rooms or offices therein when the fan is energized and with one or more dampers to prevent the entrance of rain, snow, or other weather elements, into the room or building when the fan is at rest. Such dampers are sufficiently light in weight so that they may be opened by the pressure of air when the fan of the ventilator is being driven but have sufficient weight to close by gravity when the fan of the ventilator is deenergized. When such ventilators are installed on a building or on the wall of a room of such buildings, air pressure in excess of atmospheric pressure frequently builds up in the room or building which opens the damper a small amount and when the pressure of the air within the room or building is released, the damper returns by gravity to its closed position. This intermittent opening and closing of the damper of the ventilator when the fan is at rest not only causes wear upon the damper but the noise incident thereto is annoying to the occupants of the room or building in which the ventilator is installed.

It is the aim of the present invention to provide means for retaining the damper of a ventilator in closed position against the pressure of air which builds up within a room or building on which the ventilator is installed when the air-moving means of the ventilator is at rest but which is releasable by the pressure of air within the ventilator when the air moving means is energized. In accordance with my invention, the retaining means includes an abutment which is adjustable so that the damper will be maintained in its closed position until a predetermined air pressure is developed within the ventilator.

It is therefore an object of the present invention to provide retaining means for maintaining the damper of a ventilator in its closed position until sufficient air pressure is built up within the ventilator by air moving means, such as a motor-driven fan, to open the damper against the force of the retaining means.

Another object of the invention is to provide means including an adjustable abutment which may be set in different positions for maintaining the damper of a ventilator in its closed position against pressure which builds up in a room or building on which the ventilator is installed but which permits the damper to open when the pressure developed within the ventilator exceeds an amount depending upon the position at which the abutment is set.

My invention will be better understood by reference to the accompanying drawings in which:

Fig. 1 is a cross sectional view of a ventilator provided

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with a pair of dampers and showing retaining means for each of the dampers;

Fig. 2 is a plan view of the dampers taken on a plane passing through the line 2—2 of Fig. 1, looking in the direction of the arrows and showing parts of the ventilator broken away;

Fig. 3 is an enlarged plan view of my damper retaining means; and

Fig. 4 is an enlarged side elevational view of the damper retaining means.

While the damper retaining means of the present invention may be applied to a damper or to the dampers of ventilators of any desired type, such as wall or roof ventilators provided with one or more dampers which close by gravity and which are opened in response to the pressure of air developed by an air moving means, such as a motor driven fan, as illustrated in the drawing, a roof type ventilator is shown which may be applied to a wall or shaft 1 surrounding an opening in the roof of a building. As shown, the ventilator includes a wall 2 having an angularly-shaped bottom portion 3 which engages the upper and outer faces of wall 1 and a plurality of strips 4 which engage the inner face of wall 1 and the upper portion of wall 2, and which together with wall 2 form a support for a venturi-shaped wall 5 which extends inwardly toward the axis of the ventilator and is then flared outwardly relative to wall 1 to form a seat for a pair of dampers 6 and 7. As shown, the lower portion of the venturi-shaped wall 5 and strips 8 extending upwardly relative to wall 1, are secured to wall 2 and strips 4 by suitable means, such as bolts 10, and secured to strips 8 in a like manner, such as by bolts 11, in an annular protecting wall 12 across which extends a bar 13 which limits the movement of the dampers when they are in their extreme open positions.

While the damper or dampers may be of any desired type which close by gravity, as illustrated two dampers are provided which are pivotally connected to a bar 14 which extends across wall 5 and is supported at its opposite ends by brackets 14a which in turn are secured to and extend upwardly from wall 5, and arranged within the chamber formed by the venturi-shaped wall 5 and wall 2 is an air moving means, such as a fan 15, which is connected to the shaft of a motor 16 which motor may be supported in place in any desired manner, such as by means of bars 17 and 18 secured to wall 5 and reinforcing bars 19 and 20.

In the normal operation of ventilators of this type, when the motor is energized, it rotates the fan and air pressure is developed which forces dampers 6 and 7 to their open position and when the motor is deenergized and the fan is at rest, the dampers close by gravity. It is well known, however, that when motor 16 is deenergized and fan 15 is at rest, the dampers are frequently partly opened by air pressure developed in the room or building on which the ventilator is installed which is in excess of the air pressure on the outside of the building and when the air pressure upon the ventilator is released, the dampers close by gravity.

According to my invention, means are provided for retaining the damper of a ventilator in its closed position until the air-moving means is energized at which time the pressure of air within the ventilator which is developed by the rotation of the air-moving means will be sufficient to open the damper of the ventilator against the force of the retaining means and when the air-moving means is deenergized, the damper will close by gravity and will again be retained in place by the retaining means until motor 16 which drives fan 15 is again energized. The retaining means of the present invention therefore eliminates the annoyance caused by the intermittent opening and closing of the damper by air pressure which

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builds up within the ventilator when the air moving means is at rest.

The means for retaining the dampers in their closed position when fan 15 is at rest are designated by the numerals 21 and 21a in Fig. 1 of the drawings and one of the retaining means is shown more particularly in Figs. 3 and 4 of the drawing and since the retaining means for each damper is a duplicate of the retaining means for the other damper, only one retaining means will be specifically described, and it will of course be understood that when the ventilator is closed by a single damper, only one retaining means will be required.

As shown in Figs. 3 and 4, the retaining means includes a substantially U-shaped member 22 which may be secured to the damper in proximity to wall 5 in any desired manner, such as by bolts or by welding. As shown, the U-shaped member is provided with outwardly extending apertured flanges 23 and 24 and a bolt 27 is inserted through an aperture in the damper and the aperture in one of the flanges and a second bolt is inserted through a second aperture in the damper and the aperture in the other flange, and each of the bolts is secured in place by a nut 28 as shown in Fig. 4 of the drawings.

The U-shaped member 22 serves as a support for a keeper 29, the upper portion of which as shown in Fig. 4 is provided with a transverse opening and a pin or bolt 30 extends through aligned opening in the upper portion of the legs of the U-shaped member 22 and the transverse opening in the keeper. As illustrated in the drawings, the openings in the legs of the U-shaped member are arranged in proximity to the outer edge of the legs relative to the axis of the ventilator. The pin or bolt 30 extends through the apertures in the legs of the U-shaped member 22 with a press fit so that the pin 30 will not rotate relative to the legs of the U-shaped member. The transverse opening in the keeper, however, is sufficiently large so that the keeper may be easily pivoted on pin 30.

For retaining the damper in its closed position against the pressure of air which builds up in a room or building in which the ventilator is installed when the fan is deenergized, the keeper is provided at its lower portion with an arm 31 which extends outwardly relative to the axis of the ventilator and the bottom face of which is arranged in close proximity to the web 32 of the U-shaped member when the damper is in closed position and the upper face of which is arranged substantially in vertical alignment with pin 30 and engages the lower portion of an abutment, such as a bolt 33, when the damper is in closed position. Bolt 33 is adjustably secured to the upper portion of wall 5 in alignment with the keeper 29 and is provided with a face 34 which is inclined inwardly toward the axis of the ventilator at an angle of approximately 35° to 50° relative to the axis of bolt 33. As shown it is inclined at an angle of approximately 45° relative to the axis of bolt 33.

Keeper 29 is also provided with an arm 36 which extends inwardly toward the axis of the ventilator to which a weight 37 is connected by suitable means, such as a bolt 38, for urging the upper face of arm 31 in engagement with abutment 33. Weight 37 which is arranged between the fan 15 and the damper 6 as shown in Fig. 1 of the drawings is in the form of a comparatively large flat plate and when fan 15 is energized, the force of the air against weight 37 rotates the keeper 29 in a counterclockwise direction upon pin 30 to release the upper face of arm 31 from abutment 33 and damper 6 is then moved by the force of air generated by fan 15 in the usual manner to its open position as shown in dotted lines in Fig. 1.

To enable the retaining means to assume its original position when fan 15 is deenergized, arm 31 of keeper 29 is provided with a face 42 which is inclined inwardly toward the axis of the ventilator at substantially the same degree of inclination as the face 34 of bolt 33 and as the

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damper 6 moves toward its closed position by gravity, the lower face of arm 31 engages the web 32 of the U-shaped member 22 and the inclined face 42 of arm 31 slides over the inclined face 34 of bolt 33 and when the damper 6 engages the seat provided by wall 5, the weight 37 forces the upper face of arm 31 of keeper 29 into engagement with the lower portion of bolt 33 and the damper is again retained in its closed position until motor 16 is again energized to rotate fan 15.

What is claimed is:

1. A vertically axised ventilator including a ventilator shaft and a damper which closes the shaft by gravity, a stationery wall providing a seat for the lower face of said damper when the damper is in its closed position, air moving means arranged below said damper to move air against said damper, means for retaining said damper in its closed position against the force of air pressure which builds up within said ventilator which is in excess of the air pressure upon the upper face of said damper when the air moving means has been manually deenergized, said means including a support secured to said damper and extending downwardly therefrom, a keeper pivotally mounted in said support and being provided with an arm which extends outwardly and an arm which extends inwardly relative to the axis of the ventilator, abutting means supported by said wall, and a comparatively large flat plate secured to the inwardly extending arm of said keeper which is arranged between the damper and the air moving means and in a plane which extends substantially perpendicular to the axis of the ventilator, said plate having sufficient weight to urge the outwardly extending arm of the keeper into locking engagement with the lower portion of said abutting means and being movable upwardly by the dynamic pressure of moving air when the air moving means is manually energized to move the outwardly extending arm of said keeper out of locking engagement with said abutting means to permit said damper to open.

2. A vertically axised ventilator including a ventilator shaft and a damper which closes the shaft by gravity, a wall providing a seat for the lower face of said damper when the damper is in its closed position, air moving means arranged below said damper to move air against said damper, means for retaining said damper in its closed position against the pressure of air which builds up within the ventilator in excess of the air pressure upon the upper face of said damper when the air moving means has been manually deenergized, said retaining means including a substantially U-shaped support having a flat web, which support is secured to and extends downwardly from said damper, a keeper pivotally mounted in said support and having a pair of arms, one of which extends outwardly and the other of which extends inwardly relative to the axis of the ventilator, said outwardly extending arm having a free end portion which is inclined downwardly and inwardly toward the axis of the ventilator, abutting means supported by said wall and having a free end portion arranged within the ventilator, the face of which is inclined downwardly and inwardly relative to the axis of the ventilator, a flat plate secured to the inwardly extending arm of said keeper which plate is arranged between the damper and the air moving means in a plane which extends substantially perpendicular to the axis of the ventilator, said plate having sufficient weight to force the outwardly extending arm of the keeper into locking engagement with the lower portion of said abutting means when the air moving means is manually deenergized, and the dynamic air pressure upon said plate when the air moving means is manually energized being sufficient to move said plate and keeper to a position in which the outwardly extending arm of the keeper is moved out of locking engagement with said abutting means to permit said damper to open, said keeper having a lower face which engages the web of the U-shaped support and the inclined face of its outwardly

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extending arm being caused by the weight of the damper to move downwardly over and past the inclined face of said abutting means when the air moving means is manually deenergized and the damper moves to its closed position by gravity at which time the weight of said plate again becomes effective in forcing the outwardly extending arm of said keeper into locking engagement with the lower portion of said abutting means.

3. A vertically axised ventilator including a ventilator shaft and a damper which closes the shaft by gravity, a stationary wall providing a seat for the lower face of said damper when the damper is in closed position, air moving means arranged below said damper to move air against said damper, means for retaining said damper in its closed position against the force of air pressure which builds up within the ventilator which is in excess of the air pressure upon the upper face of said damper when said air moving means has been manually deenergized, said retaining means including a support secured to said damper and extending downwardly therefrom, a keeper pivotally mounted in said support, an abutment supported by said wall, and means for maintaining a portion of said keeper in locking engagement with the lower portion of said abutment when the air moving means is manually deenergized including a comparatively large flat plate secured to a second portion of said keeper which plate is arranged between the damper and the air moving means and extends in a plane which is substantially perpendicular to the axis of the ventilator, said plate being movable upwardly by the dynamic pressure of moving air when the air moving means is manually energized to move said keeper out of locking engagement with said abutment to release said retaining means.

4. A vertically axised ventilator including a ventilator shaft and a damper which closes the shaft by gravity, a stationary wall providing a seat for the lower face of said damper when the damper is in its closed position, air moving means arranged below said damper to move air against said damper, means for retaining said damper in closed position when air pressure is built up in said ventilator which is above the pressure on the upper face of said damper and the air moving means has been manually deenergized, said retaining means including a support secured to said damper and extending downwardly therefrom, abutting means supported by said wall, a keeper pivotally mounted in said support, said keeper being provided with an arm extending outwardly and an arm extending inwardly relative to the axis of the ventilator, and a plate secured to the inwardly extending arm of said keeper for urging the upper face of said outwardly extending arm into locking engagement with the lower portion of said abutting means,

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said plate being arranged between said damper and air moving means and extending in a plane which is substantially perpendicular to the axis of the ventilator and being movable upwardly by the dynamic pressure of moving air when the air moving means is manually energized to move said outwardly extending arm out of locking engagement with said abutting means to permit said damper to open, and said abutting means being adjustable inwardly and outwardly relative to the axis of the ventilator to vary the area of the abutting means which is engaged by said outwardly extending arm to thereby vary the amount of dynamic air pressure required to release said retaining means.

5. A vertically axised ventilator including a ventilator shaft and a damper which closes the shaft by gravity, a stationary wall providing a seat for the lower face of the damper when the damper is in its closed position, air moving means arranged downwardly from said damper to move air against said damper, means for retaining said damper in its closed position against air pressure on the lower face of the damper when the air moving means has been manually deenergized, said means including a support secured to and having vertically disposed parallel legs extending downwardly from the damper, a pivot pin extending between said legs, a keeper having an upper portion pivotally mounted on said pivot pin, a portion extending inwardly toward the axis of the ventilator, and an arm extending outwardly relative to the axis of the ventilator which arm has an upper face which is arranged below and in substantially vertical alignment with said pivot pin, a plate secured to the inwardly extending portion of said keeper, said plate being disposed between said damper and said air moving means and extending in a plane which is substantially perpendicular to the axis of the ventilator, an abutment supported by said wall and the outwardly extending arm of said keeper being maintained in locking engagement with the lower portion of said abutment by the weight of said plate to retain the damper in place when the air moving means is manually deenergized, and said plate being movable upwardly by the dynamic pressure of moving air to move said arm out of locking engagement with said abutment when the air moving means is manually energized to permit said damper to open.

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