

[72] Inventor **Albert R. Krannich**
Akron, Ohio
[21] Appl. No. **30,839**
[22] Filed **Apr. 22, 1970**
[45] Patented **Aug. 3, 1971**
[73] Assignee **The Burt Manufacturing Company**
Akron, Ohio

[56] **References Cited**
UNITED STATES PATENTS
2,884,847 5/1959 Otto 98/86
3,323,438 6/1967 Korff 98/42
3,337,991 8/1967 Adams 98/86 X

Primary Examiner—Edward J. Michael
Attorney—Oldham & Oldham

[54] **EMERGENCY VENTING DEVICE**
10 Claims, 5 Drawing Figs.

[52] U.S. Cl. 98/86,
252/1
[51] Int. Cl. F23I 17/62
[50] Field of Search 98/42, 86;
252/1

ABSTRACT: An automatic relief-type ventilator for a building with dampers or covers movable to and from open and closed positions and damper-operating mechanism including a damper lift arm with a support means pivotally engaging each lift arm intermediate the ends thereof, latch means operatively engaging an end of each lift arm to latch the dampers in closed position, and fusible restraining means associated with the latch mechanism to release the same for automatic damper-opening action under predetermined heat conditions.

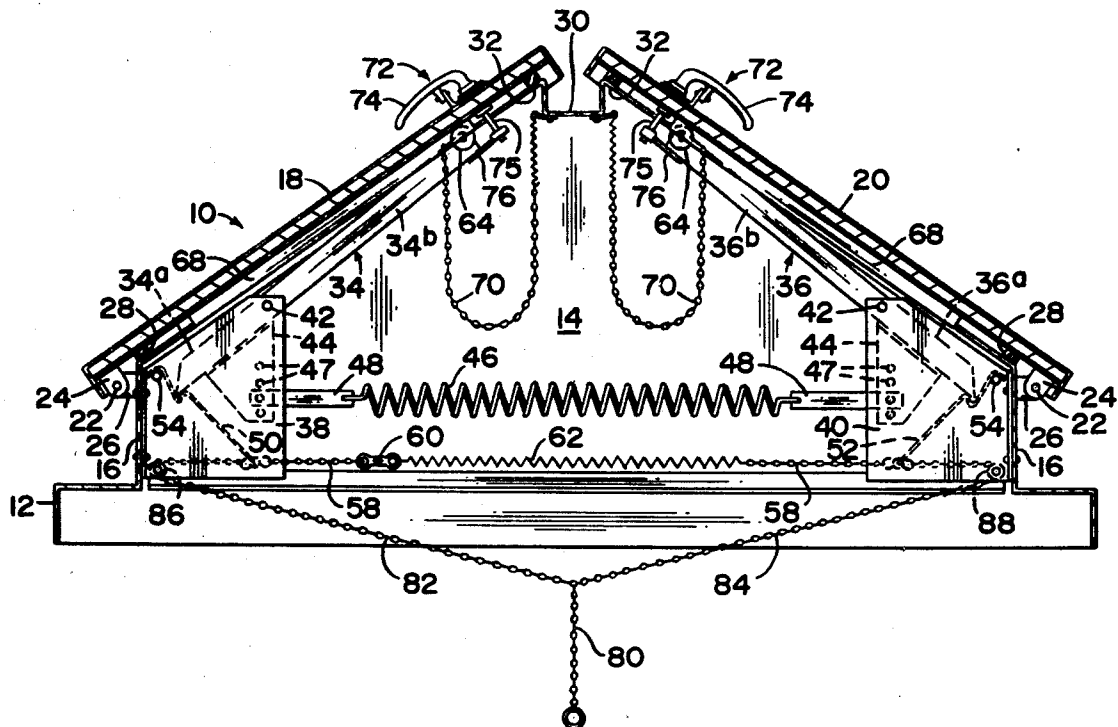


FIG. 3

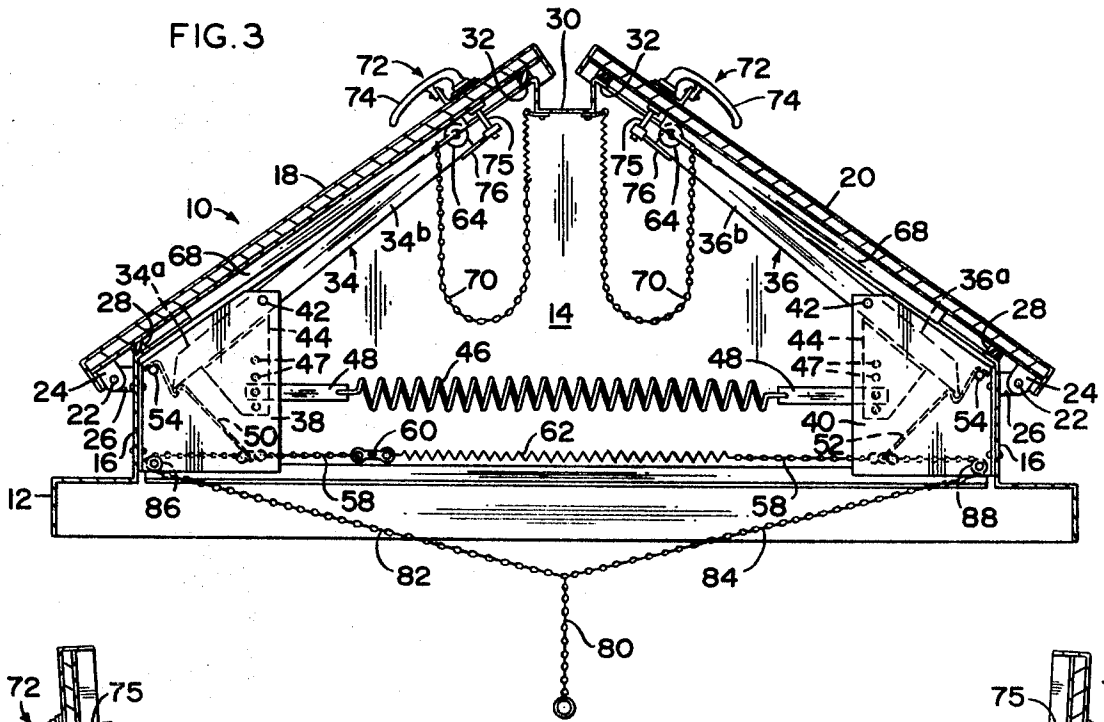
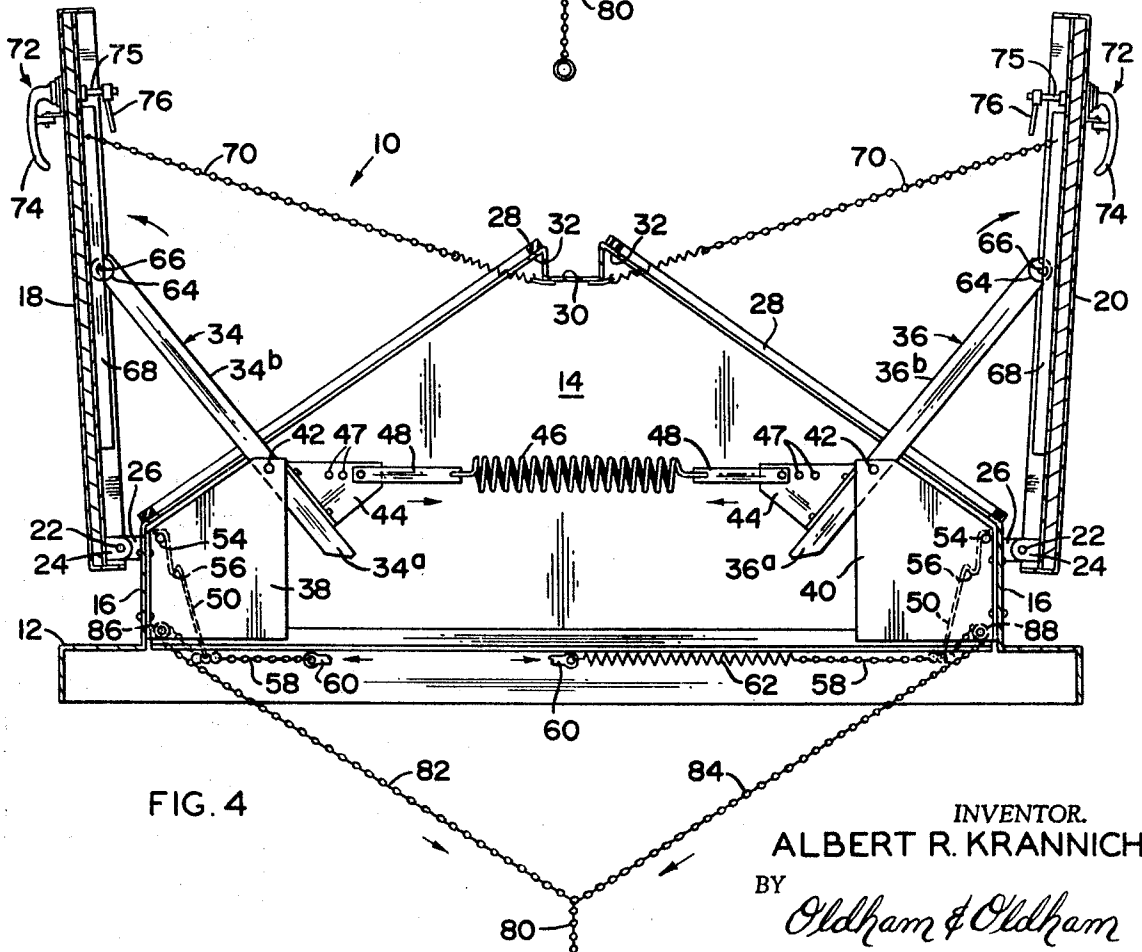


FIG. 4



INVENTOR.
ALBERT R. KRANNICH
BY *Oldham & Oldham*
ATTORNEYS.

EMERGENCY VENTING DEVICE

The present invention relates to roof ventilators and particularly to an improved automatically functioning venting device adapted to provide emergency relief of heat, smoke or explosive forces from within the building in which the ventilator is positioned.

Heretofore there have been many different types of ventilator constructions provided and used in buildings of various types. However, the venting of buildings is particularly important under fire or smoke conditions. Certain previous constructions have been suggested to provide emergency venting devices for a building and these devices are represented by U.S. Pats. Nos. 2,940,377; 3,323,438 and 3,182,581 as showing typical prior art units.

All of such previous units, in my opinion, have been relatively complex to build, or they have been relatively costly, or they have been subject to other disadvantages so that improvements in this field are desired.

The general object of the present invention is to provide a novel and improved positive acting emergency roof ventilator construction adapted to provide relief for excessive heat created within the building, or explosive forces generated within the building.

Another object of the invention is to provide a novel and improved roof ventilating device wherein the device will readily automatically open and vent the building under certain predetermined operating conditions.

Another object of the invention is to provide a damper lock means arrangement for engaging an upper portion of a damper in a roof ventilator of the automatic opening type wherein the lock means does not interfere with operation of the automatic opening portion of the damper mechanism.

A further object of the invention is to provide an emergency venting device for a building which device is made up of a relatively uncomplicated construction, and wherein a sturdy, dependable venting unit is provided for emergency, automatic use under predetermined operating conditions within a building.

The foregoing and other objects and advantages of the invention will be made more apparent as the specification proceeds.

Reference now is made to the accompanying drawings, wherein:

FIG. 1 is an end elevation of an emergency vent device embodying the principles of the invention;

FIG. 2 is a reduced scale side elevation of the vent device of FIG. 1;

FIG. 3 is a fragmentary enlarged vertical section taken on line 3-3 of FIG. 2 with the device shown in its closed condition;

FIG. 4 is a fragmentary vertical section, like FIG. 3, but showing the device in its open position; and

FIG. 5 is a fragmentary enlarged view, partially diagrammatic, of the automatically releasable locking means portion of the apparatus of the invention.

When referring to corresponding members shown in the drawings and referred to in the specification, corresponding numerals are used to facilitate comparison therebetween.

INVENTIVE SUBJECT MATTER

The present invention, as one embodiment thereof, relates to an automatic relief-type ventilator with a pair of dampers being operatively positioned on a base or frame mechanism, and damper-operating mechanism including a damper lift arm with a support axle engaging the lift arm intermediate the ends thereof, damper-opening means being operatively engaged with the lift arms, and restraining means operatively secured between lower portions of the lift arms and including releasable latch means for each lift arm engaging the lower sections of the lift arms, but to be released upon a predetermined heat condition set up within the building.

Reference now should be made to the details of the construction shown in the accompanying drawings, and an automatic relief-type ventilator is indicated as a whole by the numeral 10. This ventilator 10 is constructed and arranged to open portions thereof automatically under predetermined heat or pressure conditions set up within the building with which the ventilator means 10 is used.

The ventilator means 10 includes a base 12 adapted to engage an opening in the roof of a building, for example, and which base has frame means associated therewith and particularly including generally triangularly shaped ends 14 suitably secured to the base, which frame means also include elongate narrow side panels or sections 16 extending the length of the base 12, secured thereto, and extending vertically upwardly therefrom. A pair of dampers or cover panels 18 and 20 are shown operatively engaging and partly positioned on the ends 14 to extend upwardly and inwardly of the ventilator means 10 when in their closed positions. These dampers or cover panels 18 and 20 are pivotally mounted, as by rivets or pins 22 engaging respective brackets 24 and 26 secured to the lower edges of the dampers and portions of the frame means, respectively. Such cover panels can be of any desired construction and may, for example, have resilient sealing gaskets 28 secured to edge flanges on the frame means to operatively engage the dampers when closed. In addition, a substantially U-shaped section 30 is secured to and extends between the upper portions of the ends 14 to complete closure of the opening provided in the building and complete the frame means or top portion of the ventilator means 10. The dampers 18 and 20 seal against edge portions of this center section at diverging flanges 32 provided thereon. Normally the dampers or cover panels 18 and 20 are elongate, rectangular units.

As a feature of the invention, a special or improved lift arm means and associated controls are provided in the ventilator means 10 of the invention. These lift arm assemblies and associated means include individual lift arms 34 and 36 individually engaging with the dampers 18 and 20, respectively, and with the lift arms 36 being pivotally secured to support plates or brackets 38 and 40 operatively secured to the base 12 or side panels 16, the lift arms 34 and 36 being pivotally secured to the plates 38 and 40 as by axles, rivets or pins 42. FIGS. 3 and 4 of the drawings clearly show that the pins or rivets 42 engage the lift arms 34 and 36 intermediate the ends thereof to provide upper and lower sections 34a and 34b, and 36a and 36b, respectively, in the lift arms. The lift arms are shown as having extension plates 44 secured to the lower sections 34a and 36a thereof, and these extension plates 44 extend inwardly of the ventilator means toward each other and have a suitable lift mechanism, preferably a coil spring 46 secured to and extending between the extension plates as by use of connector links 48. The coil spring 46 is of such size and is so tensioned in the closed position of the ventilator means as in FIG. 3, that under proper operative conditions, as hereinafter explained, the coil spring 46 will rapidly draw the dampers 18 and 20 to the open positions shown in FIG. 4. The coil spring 46 may engage any of several holes 47 in the plates 44 for adjustment of its lifting moment.

In order to secure the dampers in closed position, a latch mechanism is preferably associated with the lower sections or portions of each of the lift arms 34 and 36, and such latching means include a pair of latch plates 50 and 52 individually associated with the lift arms 34 and 36, respectively. These latch plates are pivotally positioned on the support plates 38 and 40 or means associated therewith as by support shafts or rods 54 to which the latch plates are individually secured, as by welding, whereby the latch plates are positioned pivotally in the ventilator means. Each latch plate has a latching shoulder 56 provided therein intermediate the ends thereof, and with the latch plates each normally being positioned to extend downwardly and inwardly of the ventilator means and with the shoulders 56 each facing inwardly of the apparatus. Under closed conditions, the lower ends of each of the lift arm sections 34a and 36a is individually seated against a latch

shoulder 56, as shown in FIG. 5. These latch shoulders normally are provided at a suitable inclination to the vertical so that only a line contact is provided between a shoulder surface and the associated portion of the lift arm that engages the shoulder. So as to retain the latch plates 50 and 52 in latching positions, a suitable control means, such as a chain 58 having a heat-fusible link 60 of conventional construction and a tension spring 62 connected thereto or provided therein, normally extends between the latch plates 50 and 52 under tension to draw such latch plates inwardly towards each other. The chain 58 can engage with the latch plates 50 and 52 in any known manner.

The latching means of the invention is designed so as to be automatically releasable under predetermined operating conditions. Thus, when a fire would occur within the building on which the ventilator means 10 is positioned and when the heat has reached a predetermined temperature and fuses the link 60, it will release the chain 58 whereby the inwardly directed restraining forces on the latch plates 50 and 52 are released. As indicated in FIG. 5, there is a continual release moment exerted upon the latch plates as exemplified by the downwardly directed force line *ac* that is urging each of the latch plates about the support pivot or pin 54 thereof and thus the force *ac* has a moment arm *ab* tending to move the latch plates to release positions at all times. Hence, upon the release of the chain 58, the latching means will automatically disengage and permit the coil spring 46 to swing the dampers 18 and 20 rapidly up to their open positions as in FIG. 4.

Forces exerted on the lift arms 34 and 36 are transmitted to the dampers as by a plurality of rollers or discs 64 carried on a shaft 66 secured to the upper end or sections 34*b* and 36*b* of each lift arm. These rollers or discs 64 preferably have an operable means associated therewith and a channel 68 is secured to the inner surface of each of the dampers to extend transversely thereof parallel to the lift arms whereby the rollers or discs 64 will roll along the channel 68 to transmit lifting forces to the dampers.

Preferably some suitable safety means, such as chains 70, are secured between the upper ends of the channels 68 or dampers and the center section 30 of the ventilator means, or frame to prevent any excessive opening movement of the dampers.

As yet another feature of the ventilator means of the invention, suitable lock means 72 are provided for securing the dampers in closed positions. Such lock means include handles 74 which have shafts 75 rotatably carried on the individual dampers and which include lock bars 76 that provide the only connection between the lock means and the individual dampers. These lock bars 76 are positioned as cantilevers on the shafts 75 and are adapted to engage under the upper ends of the upper sections 34*b* and 36*b* of the lift arms to restrain opening movement of the dampers under normal operating conditions. However, should an explosive force be set up within the building, then the lock bars 76 are predetermined of a size, composition and construction that they will distort or bend to release the individual dampers under such predetermined pressure conditions and permit the dampers to be blown up to open positions even though the lift arms 34*b* and 36*b* still are restrained in their latched, inoperative positions.

Yet another advantage of the ventilator means 10 of the invention is that the dampers can be manually opened, if desired. Thus, the drawings show that a pull chain 80 can extend downwardly from the ventilator means and have upper diverging sections 82 and 84 that pass around suitable rollers or guides 86 and 88 and connect to the latch plates 50 and 52. Hence, a downwardly directed force exerted on the chain 80 will exert an outwardly directed force against or on the latch plates 50 and 52 and stretch the spring 62 further whereby the latching means will be released even though the link 60 has not been fused, and then the spring 46 will move the dampers to their opened positions of FIG. 4. Naturally the dampers can be readily reclosed at any time as desired by merely manually pushing the individual dampers or cover panels to a closed

position and turning the handles 74 to lock position. If the lock bars 76 have been damaged, or bent, in opening the dampers, then to close the dampers, new lock bars 76 should be placed in the apparatus, or else the previous lock bars must be straightened or otherwise returned to operative condition.

It also should be noted that the lock means 72 and lock bars 76 thereof engage only the upper ends of the lift arms and usually are in light pressure engagement therewith. When fire and heat conditions are created in the building, the initial lifting movement of the lift arms 34 and 36 is such that these members are moved through an arc so as to slide them out of engagement with the individual lock bars or arms 76 on the dampers 18 and 20 as upward movement thereof is provided whereby the dampers can be swung readily to their open positions and be released from the lock means.

By the lift arm construction and latch means of the invention, a relatively small restraining force applied to the latch means may control a relatively great opening force continually applied to the dampers 18 and 20. The restraining force is applied to the latch plate 50 in the direction indicated by the arrow *e* while the release moment is clockwise as indicated by the arrow *d*.

The springs 46 and 62 normally are stressed appreciably below their strength limits to function properly under elevated temperature conditions.

The apparatus of the invention is relatively uncomplicated but yet it is of sturdy construction and provides a positive acting "fire warden"-type of a ventilator unit which also will provide effective release from explosive forces generated within the building with which the damper is used. Of course, the base 12 and the frame means with the ends 14 thereon may be of such shape as to position the cover panels horizontally or substantially so when in their closed positions, if desired. The panels will still function automatically in the manners described. Hence, the objects of the invention are believed to be achieved.

While one complete embodiment of the invention has been disclosed herein, it will be appreciated that modification of this particular embodiment of the invention may be resorted to without departing from the scope of the invention.

What I claim is:

1. A building ventilator comprising

a base and frame means for engaging a building and operably covering an opening therein,

a pair of cover panels pivotally and operatively engaging said base along a pair of opposed margins thereof and having operative closed positions inclined upwardly and inwardly towards each other to engage portions of said frame means,

a lift arm for each of said cover panels operably and pivotally secured intermediate its ends to said base to form upper and lower sections on said lift arms, each lift arm having an upper end operably engaging the inner surface of a said cover panel,

a lift means operably secured between said lift arm lower sections, and

restraining means operably secured between said lift arm lower sections and including a releasable latch means for each lift arm engaging the lower section of a said lift arm.

2. A building ventilator as in claim 1 where said restraining means includes a heat-fusible release link and said latch means automatically releases said lift arms when said release link fuses.

3. A building ventilator as in claim 1 where lock means secure said cover panels to said lift arms and include a cantilevered lock bar forming the sole lock connection therebetween whereby on an explosive gas impact with said cover panels, said lock bars can deform and release said cover panels.

4. A building ventilator as in claim 2 where said latch means includes a latch arm having a shoulder therein, said latch arms of each said latch means being inclined downwardly and inwardly towards each other when operative, said latch arm

5

shoulder engaging a said lift arm to place a release moment on said latch arm.

5. A building ventilator as in claim 1 where each of said cover panels has a guide channel extending from edge to edge thereof parallel to a said lift arm, and roller means are carried by each of said lift arms at the upper ends thereof to engage said channels.

6. A building ventilator as in claim 1 where said restraining means includes a tensioned coil spring, and a manual release member engages said latch means to enable them to be released by a force exerted on said release member and transmitted to said coil spring to increase the tension therein.

7. In an automatic relief-type ventilator with dampers and damper-operating mechanism, a damper lift arm with a support axle interposed between ends of the lift arm and pivotally engaging the same.

8. In an automatic relief-type ventilator as in claim 7 and in-

6

cluding a latching assembly operatively engaging a lower end of the lifting arm.

9. In an automatic relief-type ventilator as in claim 7 and including a lock handle means engaging an upper end of the lift arm only, and not interfering with automatic operation of the damper.

10. A building ventilator as in claim 1 where said lift means includes a coil spring to move said cover panels to open positions, said latch means includes a latch arm having a shoulder therein, said latch arms of each said latch means being inclined downwardly and inwardly towards each other, said latch arm shoulder engaging the end of said lower section of said lift arm to place a release moment on said latch arm whereby an automatic cover-panel-opening action can be obtained.

20

25

30

35

40

45

50

55

60

65

70

75