

Aug. 19, 1969

KIYOSHI SANDOW ET AL

3,461,607

SMOKE AND HEAT VENT

Filed Aug. 11, 1967

3 Sheets-Sheet 1

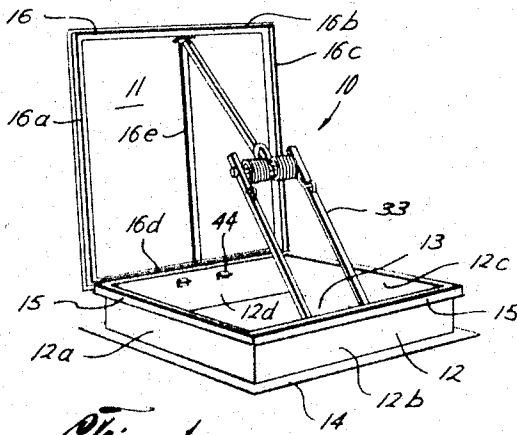


Fig. 1

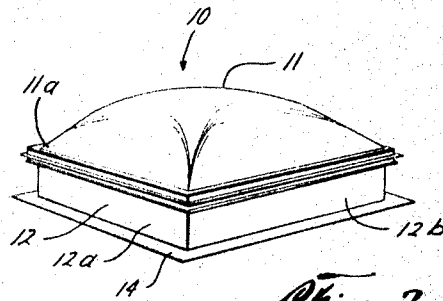


Fig. 2

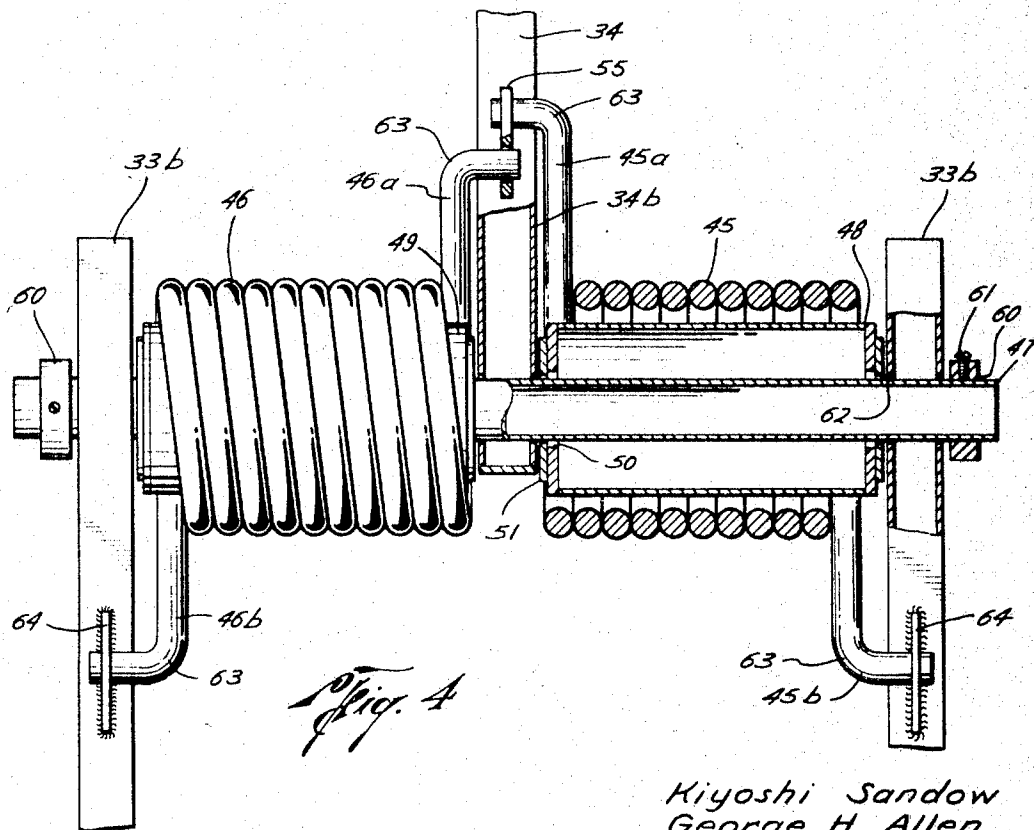


Fig. 4

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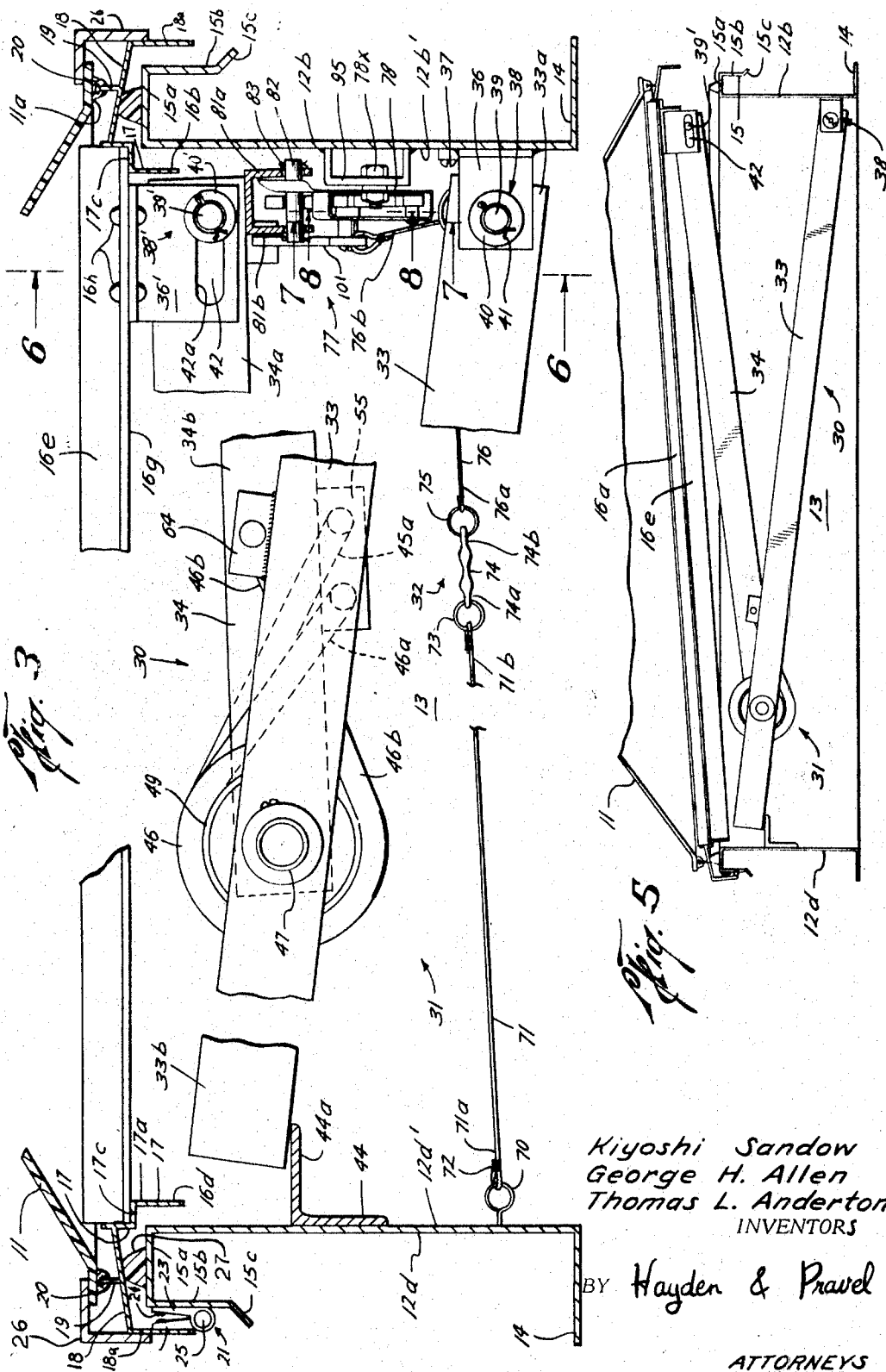
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3 Sheets-Sheet 2



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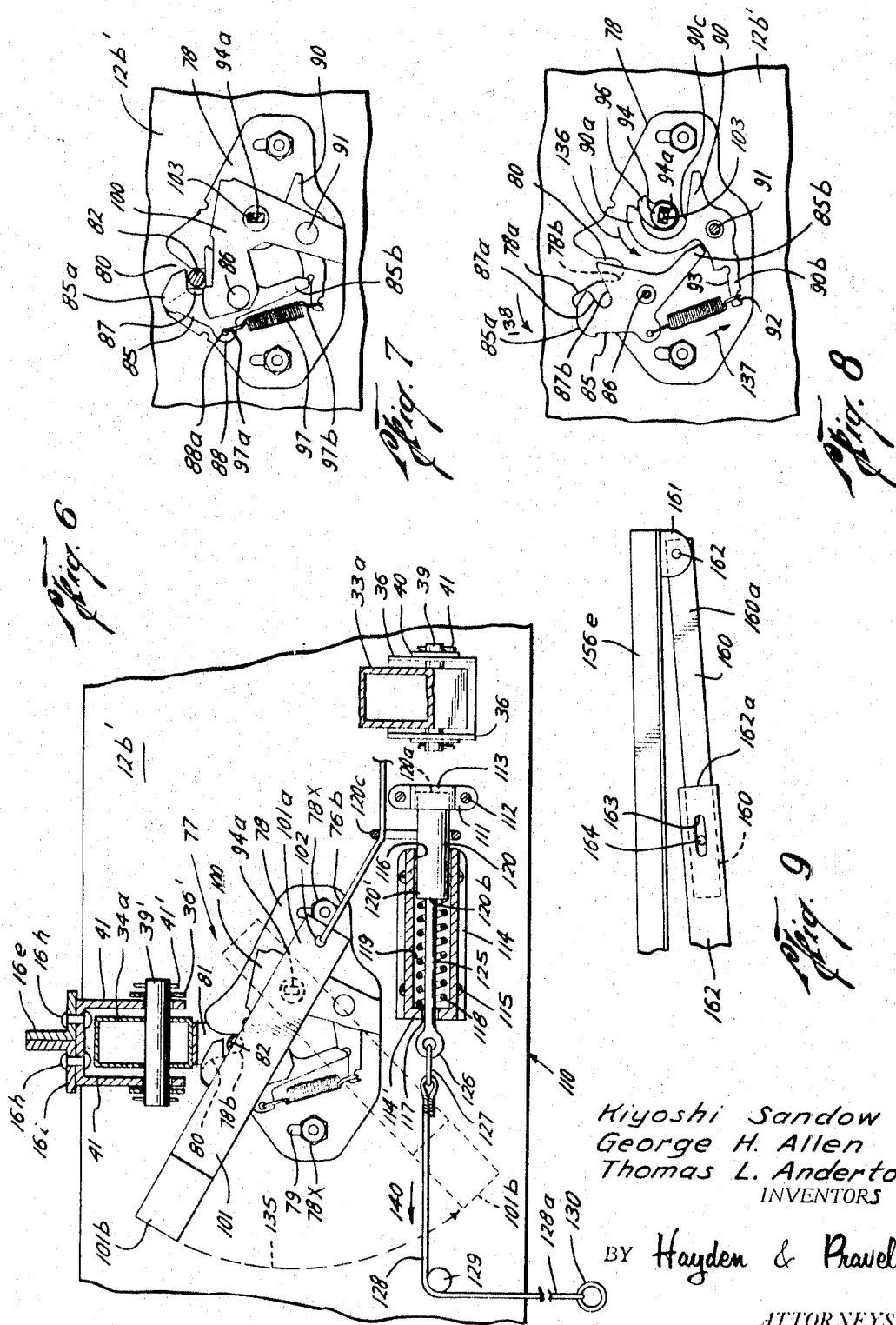
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SMOKE AND HEAT VENT

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3 Sheets-Sheet 3



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SMOKE AND HEAT VENT

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23 Claims

ABSTRACT OF THE DISCLOSURE

A vent including a frame and hinged cover for mounting with an opening in a building, house, or structure. The cover is pivoted about hinges to an open position when a fusible link is melted by heat or when a manual release means is actuated. A latch means for the cover is mounted opposite from the hinges and a means for opening the cover when the latch is released is disposed so as to exert a lifting force on the cover adjacent the latch means and opposite from the hinges to eliminate twisting or torque forces on the cover when latched or during lifting. The cover can be easily relatched by resetting the latch means and by then simply pushing the cover down to its closed position.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to a smoke and heat vent and more particularly to a new and improved smoke and heat vent.

Description of the prior art

There are many smoke and heat vents available in the marketplace today; however, such vents have many defects and disadvantages when compared with the present invention.

For example, the only known lifting means heretofore used for lifting the vent cover or lid have been mounted at the wall adjacent the hinged cover connection or on the side walls of the frame on which the lid is positioned. Although such lifting structures are satisfactory for small lightweight vent covers, they are inadequate and often incapable of lifting relatively large and heavier covers or lids. Further, such lifting structures are inadequate and often incapable of overcoming opposing natural forces, such as wind and snow. See, for example, United States Patent Nos. 3,036,406; 2,923,226; 3,017,721; 2,137,751; and 3,251,158.

Many prior smoke and heat vent devices have had some type of latching means or the like for holding the cover closed on the side of the frame opposite from the hinges. However, since lifting force exerted by the lifting means is not at the portion of the cover opposite from the hinges in such prior device, the lid has been subjected to damaging bending stresses which tended to distort and deform the lid.

The prior heat and smoke vents attached their cover lifting means to the side or hinged end frame sections. Thus, when the cover or lid is held in a closed position against the opening forces of springs and against the opening effect of wind pressure, the hinged end or side frame section is subjected to undue bending stresses. Attempts have been made to overcome this defect by adding "stress bars" or reinforcing struts of various kinds in an attempt to combat damage to the frame.

Typical of the prior art is Patent No. 3,251,158 which discloses a vent which is releasably latched by the use of a spring and a fusible link in a cable line to maintain tension in the cable for preventing release of the latch until

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the fusible link melts due to heat in the building. This type of latch means is easily and accidentally tripped and thus unwarranted opening of the smoke and heat vents has occurred from such things as wind uplift pressure and by cable lines being inadvertently flexed by incidental working apparatus in buildings, such as painters' ladders, heating cables, and the like. This causes possible storm damage to building and contents while open and entails the needless expense involved in closing and relatching the units especially when it must be done from inside the building, which relatching might have to be done from high scaffolds.

Summary of the invention

The present invention relates to a new and improved heat and smoke vent for use with an opening in a building, house or other type of structure including a fixed multisided frame having an opening therein and wherein the frame is positioned around the opening in the building, house or structure; a cover or lid pivotally mounted with the frame to enable the lid or cover to be moved from a closed position to an open position; means mounted with the frame and cover for moving the cover to its open position; and latch means for holding the lifting means to hold the cover in the closed position wherein release of the latch means enables said lifting means to lift the cover to its open position.

It is an object of the present invention to provide a new and improved heat and smoke vent.

Yet another object of the present invention is to provide a new and improved heat and smoke vent wherein a cover hingedly mounted with a frame is lifted at the edge of the cover opposite from the hinges.

Yet another object of the present invention is to provide a new and improved heat and smoke vent including a cover latch and means for imparting a lifting force to the cover at a point opposite from the hinge means for the cover whereby torque and bending stresses on the cover and fixed multisided frame are avoided.

Still yet another object of the present invention is to provide a new and improved heat and smoke vent including a frame and a cover hingedly mounted thereto, a lifting means for pivoting the cover to an opening position, a releasable latch means for holding the cover in a closed position and wherein the release of the latch means is independent of the force of the lifting means when in latch position so that a large lifting force may be provided for lifting relatively large vent covers and for overcoming naturally occurring large opposing forces while still requiring only a small amount of force to open the latch means.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the heat and smoke vent of the present invention illustrating a cover hingedly secured with a frame and rotated to an open position relative to the frame and a means for lifting the cover;

FIG. 2 is a perspective view of the heat and smoke vent of the present invention illustrating a cover or lid positioned on a frame in a closed position;

FIG. 3 is a partial view, partly in section, of the heat and smoke vent of the present invention illustrating a cover positioned in a closed position relative to a frame, means for lifting the cover and a latch means for holding the lifting means;

FIG. 4 is a view, partly in section, of the heat and smoke vent of the present invention illustrating a spring or actuating means axially mounted with an upper arm and a pair of lower arms;

FIG. 5 is a view, partly in section, of the heat and smoke vent of the present invention illustrating a cover being rotated relative to a frame by a lifting means;

FIG. 6 is a partial view, partly in section, of the heat and smoke vent of the present invention taken along line 6—6 of FIG. 3 illustrating a latch means for holding a lifting means and a manual release means of the present invention;

FIG. 7 is a partial view taken along line 7—7 of FIG. 3 illustrating the relationship of a latch element and a stop member and a spring relative to a plate member wherein the latch element is positioned to retain a pin mounted with an upper arm to retain the cover in a closed position;

FIG. 8 is a partial view taken along line 8—8 of FIG. 3 of the heat and smoke vent of the present invention and similar to FIG. 7 wherein the latch element and stop member have been rotated relative to each other to enable the latch element to release the pin mounted with the upper arm; and

FIG. 9 is a partial view of an alternative embodiment of the present invention illustrating a telescopic connection of an upper arm relative to a cover of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Attention is directed to FIGS. 1 and 2 wherein the heat and smoke vent of the present invention is generally designated by the numeral 10 and is illustrated as being positioned in its open position (FIG. 1) and its closed position (FIG. 2). A lid or cover 11 which is usually 4 feet by 4 feet but may be 4 feet by 8 feet or of even greater dimensions is positioned on a frame 12 for pivotal movement relative to the frame as will be brought out hereinafter. The frame 12 having an opening 13 is positioned around or immediately adjacent a corresponding opening (not shown) in a building, house, or other type of suitable structure (not shown).

The frame 12 of the heat and smoke vent 10 of the present invention includes sides 12a, latch end 12b and 12c, and hinged end 12d. Each of the side walls and ends includes transverse lips or edges 14 for securing the frame around the periphery or circumference of the opening in the structure. The side walls 12a, 12c, latch end 12b, and hinged end 12d each include an outstanding lip or edge (FIGS. 1 and 5) such as illustrated at 15. The outstanding lip extends outwardly from the upper surface of each of the respective side walls and includes an arm 15a and a depending arm 15b mounted therewith which is curved outwardly at its lower end to form the arm portion 15c.

A frame 16 mounted with the leading edges of the lid or cover 11 includes a plurality of side walls 16a, 16b, 16c, and 16d for supporting the lid or cover 11 on the frame 12 as illustrated in FIG. 2. The frame 16 for the cover 11 and the arm 15 of the frame 12 match evenly together to prevent rain and natural elements from damaging the inside of the structure. It should be noted that the cover or lid 11 is designed to be arcuately curved outwardly from the structure and the like but may be curved in any suitable manner as desired. It should also be noted that the cover or lid 11 is generally constructed of a suitable plastic or the like or any other suitable material, as desired, and may be transparent or other suitable desirable colors.

As illustrated in FIGS. 3 and 5, each of the sides 16a, 16b, 16c, and 16d includes a receiving bracket or shoulder bracket 17 which includes two parallel members 17a and 17b with a transverse member 17c mounted therebetween. The transverse member 17c is adapted to seat on the parallel arm or member 15a of each of the respective sides 12a, 12b, 12c and 12d and the member 17a extends downwardly inside the sides 12a, 12b, 12c, and 12d. Extending outwardly and downwardly from each of the parallel members 17b adjacent each of the sides 12a, 12c and ends 12b and 12d of the frame 12 is an attachment arm 18 including a depending member 18a. As illustrated

in FIGS. 3 and 5, extending upwardly from the attachment arms 18 is a transverse member 19 which serves as a seal to prevent entry of moisture into the opening 13. Each of the members 19 receives a cover or lid member 20 which is secured with an inner leading edge 11a of the lid or cover 11 to secure the lid or cover 11 with the attachment arms 18. Thus it should be apparent that the arm 18 engages the member or arm 15 to prevent entry of rain, wind, and the like into the opening 13. A sealing means 27 is secured with the upper surface of arm 15a and extends upwardly to sealingly engage the attachment arm 18 to insure the elimination of moisture in the opening 13. Further, a trim frame 27 is secured with the leading edge 11a of the cover 11 and extends downwardly adjacent the depending arm 18a to help eliminate the undesirable moisture and the like.

A hinge connection or hinge means 21 includes a pair of hinged plates 23 (only one of which is shown) mounted with the arm 18a and arm 15b of side 12d, respectively, as illustrated in FIG. 5 with any suitable means such as nuts and bolts 24. It is, of course, to be understood that the hinge means 21 includes the pin 25 around which the plates 22 and 23 of the hinge pivot as desired. It should also be apparent that the hinge means 21 enables the lid or cover 11 to be moved arcuately relative to the frame 12 about the hinge means 21.

As illustrated in FIGS. 3 and 5, a lifting means for rotating and limiting arcuate movement of the cover 11 relative to the frame 12 is generally designated at 30 and it includes a coil spring means or an actuation means 31.

The lifting means 30 for lifting the cover 11 preferably includes a pair of lower, spaced, parallel arms 33 and an arm 34 mounted between and above the arms 33. Each of the lower arms 33 is secured or mounted at one end 33a with the latch end 12b of the frame 12. A bracket 36 for each arm 33 is secured to the inner surface 12b' of the latch end 12b by welding, nut and bolt means 37, or any suitable securing means so that they extend outwardly from the inner surface 12b'. A cotter pin assembly designated at 38 includes a pin 39 which extends through openings (not shown) in the end 33a of each arm 33 and each bracket 36 to enable the ends 33a to be pivotally secured with the brackets 36. A conventional washer 40 and cotter pin 41 are preferably used for retaining the pin 39 with each bracket 36 and each end 33a of each arm 33.

As further illustrated in FIG. 3, the upper arm 34 includes an end 34a which is mounted or secured with a transverse rib 16e which extends from sides 16b to 16d of the frame 16 and which is mounted with member 17b and 17c of each of the sides. Mounted with the bottom surface 16g of the support rod 16e is a depending attachment element 36' which is preferably U-shaped and which is secured with the member 16e by rivets 16h or any other suitable means. The end 34a of the arm 34 and the attaching element 36' are pivotally secured with each other by a pivot pin assembly 38' which may be the same as or similar to the assembly 38 described hereinabove. The assembly 38' thus includes a pin 39' which preferably fits in a longitudinal slot 42 in each of the arms 41 and the end 34a of the upper arm 34 to form a lost-motion pivotal connection, the purpose of which will be described hereinafter.

As further illustrated in FIG. 3, an inner surface 12d' of the hinge end 12d receives a bracket 44 having an outwardly extending shelf 44a. The bracket 44 is secured with the inner surface 12d' by any suitable means such as welding. A pair of brackets 44 may be used if desired. The shelf 44a receives the ends 33b of the arms 33 for supporting at least some of the weight of the arms 33 to facilitate opening of the cover 11 as will be explained.

The actuation means 31 preferably includes a pair of oppositely coiled springs 45 and 46. The coiled springs 45 and 46 are mounted axially around cylindrical mem-

bers 48 and 49, respectively, disposed on the shaft 47 in FIG. 4. The cylindrical members 48 and 49 include openings 50 therein for longitudinally receiving the shaft 47. The end 34b has an opening 52 through which the shaft 47 extends to position such end 34b between the cylinders 48 and 49.

An inner end 46a of spring 46 and 45a of spring 45 extends outwardly and each is curved as at 63 to be secured with a receiving bracket 55 having openings (not shown) for receiving the ends 45a and 46a of the springs 45 and 46. The bracket 55 is secured by any suitable means such as welding to the arm 34 such that movement of the springs 45 and 46 will cause the arm 34 to move. It is to be understood that the pair of springs 45 and 46 may be replaced by a single spring, such as by joining the ends 45a and 46a.

As further illustrated in FIGS. 2, 3, and 5, a cylindrical retainer member 60 is mounted on each outer end of the shaft 47 and is securely mounted with the shaft 47 by the use of a tightening screw 61 which may be turned in a clockwise direction to engage the surface of the shaft 47 to retain the member 60 thereon. An opening 62 in each arm 33 receives the shaft 47 as illustrated in FIG. 2 with a retaining member 60 outside of each of the arms 33.

An end 46b of the spring 46 and an end 45b of the spring 45 extend outwardly and are curved at 63 to be received by a member 64 mounted with each of the lower arms 33. The member 64 is provided with an opening (not shown) for receiving the ends 46b and 45b, respectively, of the springs 45 and 46 and is secured with the arms 33 by any suitable means such as welding. Thus, the actuation means 31 is positioned in the opening 13 of the frame 12 and the ends 33a and 34a of the first and second means 33 and 34, respectively, are secured or mounted with the frame 12 and cover 11, respectively. It should also be understood that with the cover in the closed position as illustrated in FIG. 3, the coil springs 45 and 46 are coiled under compression to urge the spring ends 45a and 46a apart from the spring ends 45b and 46b, respectively.

The actuation means 31 and lifting means 30 may vary in size as desired since a stronger spring force and longer arms are needed to lift a larger cover or lid. Thus, the spring force may be several foot pounds for lifting a large cover or lid, and for overcoming the opposing natural forces such as wind or snow.

A latch means 77 holds the actuation means 31 in a coiled position to prevent the lifting means 30 from raising the cover 11 to the open position illustrated in FIG. 1. The latch means 77 is releasably held by the latch release means 32 illustrated in FIGS. 3, 6, 7, and 8. A ring retainer 70 or other suitable retaining means is preferably secured to the inner surface 12d' of the end 12d below the bracket 44. A first cable section 71 is secured at one end 71a to the member 70 and at its other end 71b with a fusible link 74 which may consist of lead or the like.

The fusible link 74 is connected to a second cable section 76 at its end 76a. Preferably, rings 73 and 75 are used to connect the fusible link 74 to the cable sections 71 and 76. The end 76b of the cable section 76 is connected with latch means 77. As will be understood, the fusible link 74 will melt when subjected to a predetermined amount of heat to disconnect the cables 71 and 76 from each other, for a purpose to be explained. The rings 73 and 75 may be secured to each other by a loose string or wire (not shown) which prevents undue searching and the like to rejoin the cable sections 71 and 76 after melting of the link 74.

The latch means 77 includes a plate member 78 which is secured to a bracket 94 (FIG. 3) mounted on the inner surface 12b' of the latch end 12b by fastening elements 78x positioned in a pair of slots 79. A slot 80 is formed in the upper surface of the plate member 78 by the sloped inclining side walls 78a of the plate member

78. A depending bracket 81 is secured to the lower surface of the upper arm 34 adjacent the end 34a thereof and includes parallel depending arms 81a and 81b which extend downwardly adjacent the slot 80 (FIG. 3). A pin 82 positioned below arm 34 is secured by cotter pins 83 or the like to retain the pin 82 in a transverse position relative to the arms 81a and 81b as illustrated in FIG. 3.

A latch element 85 is pivotally mounted on the plate member 78 by a screw and washer means 86. The latch element 85 includes an end 85a which is shaped as a gooseneck and on each side of which is formed a jaw slot 87 formed by an upper jaw 87a and lower jaw 87b and an outwardly extending portion 88 having an opening 88a therein. An opposite end 85b is maintained in a relationship with a pivoted stop 90 which is pivotally secured with the plate member 78 by a pin or screw 91.

As illustrated in FIG. 8, the pivoted stop 90 includes an end 90a with a curved portion defined by an inner surface 90c. Another end 90b is provided with a retaining portion 92 for a purpose to be brought out hereinafter and a notch 93 which receives the tapered end 85b of the latch element 85 as illustrated in FIG. 7 when the cover 11 is in a closed position relative to the frame 12 as will be explained hereinafter. A key tumbler 94 having a key slot 94a extends through and is rotatable relative to the plate 78. The key tumbler 94 includes a detent 96 which extends outwardly adjacent the curved and slotted portion 90c of the pivoted stop 90.

As illustrated in FIGS. 6, 7, and 8, a spring 97 is secured at one end 97a thereof through the opening 88a on the outwardly extending portion of the latch element 85 and at an opposite end 97b with the retaining portion 92 of the pivoted stop 90. Further, a cover plate 100 is mounted with the plate member 78 by extensions of the pivotal screws 86 and 91. The key tumbler 94 also extends through the cover plate 100.

A key 103 (FIG. 3) extends into the key slot 94a and its outer end is fixed to a release lever 101. The key 103 has the same rectangular cross-section as the key slot 94a so that when the lever 101 moves downwardly, the key tumbler 94 is rotated, as will be explained. The lever 101 has ends 101a and 101b. The end 101a receives the end 76b of the cable through an opening 102 therein. The other end 101b preferably has a weight to apply a predetermined turning or release force of the key 103 for turning the key tumbler 94 to release the latch 77 when the lever 101 moves downwardly by gravity, as will be explained.

A manual release means generally designated at 110 includes a bracket 111 having a curved portion 113 secured with the inner surface 12b' by a pair of bolts or screws 112. A spring and plunger container 114 is mounted with the inner surface 12b' by a plurality of screws or bolts 115 and includes openings 116 and 117 in each end thereof. A spring 118 is positioned in the opening 119 of the member 114 adjacent the opening 117 to abut an end 114' having the opening 117. A slidable bar 120 is positioned with one end 120a in the opening 113 and its opposite end 120b in the opening 119 of the member 114 by extending through the opening 116. The slidable bar 120 includes a shoulder 120' which contacts and abuts an end of the spring 118 opposite from the opening 117. A stem 125 extends outwardly from the shoulder 120' through the opening 117 of the member 114. A cable ring 120 surrounds a portion of the bar 120 between the ends 120a and 120b and the cable 76 adjacent the end 76b thereof.

An eyelet 126 is formed on the outer end of the stem 125 for receiving a manual release cable 128 which extends downwardly so that it can be reached from the floor or some other point remote from the vent 10. The cable 128 may be secured to the eyelet 126 by a ring 127 and may pass over a guide roller or pulley 129. A ring member 130 is provided at an end 128a of the cable 128 for facilitating the pulling of the cable. If desired, the cable 128 may be split to extend through the side 12b of the frame 12 to the exposed outer surface of the building,

house, or structure, while at the same time extending downwardly or alternatively may extend through the side 12b to the exposed outer surface of the structure.

In the operation of the vent 10 of this invention, the cover 11 is normally positioned in a closed position relative to the frame 12 as illustrated in FIG. 2. The vent cover 11 may be opened manually for ventilation of the building, if desired, by pulling on the manual release cable 128. When a fire or other source of heat occurs that is sufficient to melt the link 74, which generally comprises 25 pound test load, the cable sections 71 and 76 become disconnected one from the other. This in turn releases the lever 101 and the counterweight 101b moves downwardly in the direction of arrow 135 to the dotted line position of FIG. 6. When the lever 101 moves downwardly in the direction of the arrow 135, the key tumbler 94 is moved from the locked position illustrated in FIG. 7 to the released position illustrated in FIG. 8. The movement of the key tumbler 94 in the counterclockwise direction moves the detent 96 (FIG. 8) upwardly to engage the curved portion 90c of the pivoted stop 90. The engagement of the detent 96 with the curved wall of the slot 90c in the stop 90 causes the stop 90 to pivot or rotate in the direction of the arrow 136 (FIG. 8) which causes the end 90b of the stop 90 to move downwardly in the direction of the arrow 137 (FIG. 8).

The spring means 97 retains the tapered end 85b of the latch element 85 in the notch 93 of the stop 90 when the cover 11 is in the closed position. When the cover 11 is in the closed position, the pin 82 fits in the slot 80 in the plate member 78 and engages the jaws 87a and 87b of the jaw slot 87 of the latch element 85 to retain the cover 11 in its closed position (FIG. 7).

Such rotation of the detent 96 and the resultant rotation of the stop 90 overcomes the force of the spring means 97 to cause the end 85b of the latch element 85 to move or pivot toward the curved end 90a of the stop 90 and causes the outwardly extending portion 88 of the latch element 85 to move in the direction of the arrow 137. Such movement causes the gooseneck end 85a to move in the direction of the arrow 138 such that the upper jaw 87a of the jaw slot 87 is moved from a position transverse to the slot 80 in the plate member 78 to a position such that the jaw slot 87 is no longer positioned transverse to the slot 80. Such movement of the latch element 85 releases the pin 82 from the jaw slot 87 which also thereby releases the upper arm from the latch 77.

The fusible link 74 is generally constructed of a low pound test load, such as for instance 25 pound test, which prevents the latch means 77 from releasing the pin 82 and thus the arm 34. The spring or coil force of the actuation means 31 is independent of the smaller force or lower strength of the release means 32 and thus may be several foot pounds as needed to lift the lid and as explained hereinabove.

When the arm 34 is released, the ends 45a and 46a of the springs 45 and 46 force the upper arm member 34 upwardly while the lower arm members 33 continue to rest on the shelf 44a. This "lost" motion or movement is accomplished by the fact that the pins 39' must move the distance of the longitudinal slot 42 mounted with the member 16e before the pin 39' engages an end 42a of the longitudinal slot 42 to enable the pair of lower arms 33 to be lifted. This lost motion action enables the cover 11 to be initially lifted a short distance as illustrated in FIG. 5 by the upper arm 34 only without any appreciable upward motion of the lower arms 33. Such upward lifting action by the arm 34 enables the cover to gain momentum until the pin 39' reaches the end 42a of the slot 42 at which time the arms 33 are lifted by a continued uncoiling of the springs 45 and 46 until the cover is moved to its open position illustrated in FIG. 1. Of course, it is to be understood that the movement of the arms 33 and 34 is caused by the ends of the coil springs 45 and 46 being forced apart when the latch 77 is released automatically by a

melting of the fusible link 74 or manually by a release of the bar 120 from the bracket 111.

When the cover or lid 11 has almost reached the limit of its upward travel, the ends 45a and 46a and 45b and 46b of the springs 45 and 46 have been separated such that the spring is no longer under compression and such that the force required for further uncoiling of the springs 45 and 46 must be more than the force caused by the mass and acceleration of the lid or cover 11. Such additional force is provided by the force of the uplifted arms 33 and 34 which slowly overcomes the uncoiled transverse spring force to bring the moving cover 11 to a cushioned stop transverse to the frame 12.

When it is desired to close the cover 11, the fusible link 74 is first replaced if it has been melted, and the cable sections 71 and 76 are reconnected in the original position (FIG. 3) with the lever 101 in its raised position (solid line FIG. 6). The upward movement of the lever 101 moves the tumbler 94 clockwise to its original position (FIG. 7), but it is noted that the latch element 85 is still in the released position of FIG. 8. Then, the cover is pushed downwardly to the closed position to move the latch pin 82 to fit into the slot 80 of the plate member 78. The pin 82 will thus engage the lower jaw 87b of the jaw slot 87 and upon pressure being applied will overcome the spring means 97 to rotate the latch element 85 in the direction opposite from the arrow 138 which rotates the gooseneck 85a in the direction opposite from the arrow 138 to once again position the jaw slot 87 transverse to the slot 80 in the plate member 78 to latch the pin 82 therein. Such rotation also causes the end 85b to rotate toward the notch 93 so that the tapered end 85b is once again engaged in and retained by the notch 93.

As illustrated in FIG. 6 and as brought hereinabove, the manual release means 110 may be actuated from the inside of the building, house, or structure or from the outer exposed portion of the heat and smoke vent 10. To actuate the manual release means 110, the ring 130 is pulled such that the cable 128 is moved in the direction of the arrow 140. Such movement causes the end 120a of the bar 120 to move in the direction of the arrow 140 to release the end of the bar 120 from the bracket 113. Such movement in the direction of the arrow 140 must be sufficient to overcome the force of the spring means 118 which is used for retaining the bar 120 in the member 111. When the end 120a of the bar 120 is removed from the bracket 111, the tension maintained in the cable 76 by its connection with the ring 120c and bar 120 is released to enable the weight 101b to move downwardly in the direction of the arrow 135 for release of the pin 82 from the latch 77 so that the lifting means 31 can then lift the cover 11 upwardly as explained hereinabove. To reset the manual release means 110, the connecting ring 120c is mounted around the bar 120 while the bar 120 is held out of the bracket 111. When the downward pull on cable 128 is released, the spring 128 urges the end 120a of the bar 120 into the opening 113 in the bracket 111 to reset the release means 110.

As illustrated in FIG. 9, an alternative embodiment is included for the lost motion feature of the movement of the upper arm 34 relative to the pair of lower arms 33. In this embodiment, a cross member 156e is secured as explained hereinabove with respect to cross member 16e to the frame 16. An upper arm 160 similar to arm 34 is secured at one end 160a thereof with a depending bracket 161 by the use of pivotal pins 162. The upper arm 160 includes an extension 162 which is provided with an opening 162a in one end thereof to telescopically receive the arm 160. A pair of longitudinal slots 163 in the extension 162 and arm 160 is aligned and the pin 164 is inserted therethrough to secure the arm 160 and tension 162. Thus, the lost motion movement occurs in the longitudinal slot 163 as it does in the slot 42 (FIG. 3) when arm 160 is moved upwardly by the springs 45 and 46 which are mounted as illustrated in FIG. 4 with the ex-

tension 162 by the shaft 47. It is to be understood that lost motion devices such as illustrated may be eliminated if desired and pivotal arrangement, without the lost motion elements, used.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape, and materials as well as in the details of the illustrated construction may be made within the scope of the appended claims without departing from the spirit of the invention.

We claim:

1. A heat and smoke vent for use with a structure comprising:

- (a) a multisided frame having an opening therein, said opening in said frame communicating with the inside of the structure;
- (b) a cover positioned on the top of said frame;
- (c) hinge means secured with said cover and one end of said multisided frame to enable said cover to be pivoted from the position on the top of said frame to an open position;
- (d) lifting means pivotally connected with said frame and said cover only on the opposite end of the frame and cover from said hinge means for lifting said cover;
- (e) latch means for holding said lifting means to hold said cover in a closed position over said frame; and
- (f) release means secured with said latch means for releasing said latch means to release said cover to enable said lifting means to move said cover to its open position.

2. The structure as set forth in claim 1 wherein said latch means is mounted on the same end of said frame as is said lifting means to prevent time delay in lifting said cover when said latch is released by said release means which thereby prevents damage to said frame and said cover.

3. The structure as set forth in claim 1 wherein said lifting means includes:

- (a) a first means mounted at one end with said frame opposite from said hinge means, said other end of said means extending outwardly into said opening in said frame;
- (b) a second means mounted at one end with said cover opposite from said hinge means, said other end of said second means extending outwardly into said opening of said frame adjacent said first means;
- (c) an actuating means positioned in said opening of said frame; and
- (d) each of said ends of said first and second means extending outwardly into said opening in said frame being mounted with said actuating means.

4. The structure as set forth in claim 3 wherein said actuating means includes a coil means mounted adjacent each of said ends of said first and second means extending outwardly into said opening and wherein actuation of said coil means moves said second means at said end mounted with said cover a predetermined short distance relative to said first means and wherein said first means thereafter moves relative to said frame to move said cover to its open position.

5. The structure as set forth in claim 4 wherein just before said moving cover has reached its full open position said coil is no longer under compression and exerts a force transverse to said moving cover and wherein said first and second means slowly overcome the transverse force to cushion the stop of said cover as the limit of said first and second arms is reached.

6. The structure as set forth in claim 4 wherein said first means and said second means includes, respectively:

- (a) a pair of spaced parallel lower arms each of which is mounted at one end with said frame opposite from said hinge means and each of which extends outwardly at the other end into said opening in said frame to be mounted with said coil means; and

(b) an upper arm mounted at one end with said cover opposite from said hinge means, said upper arm extending outwardly at the other end into said opening to be mounted with said coil means.

7. The structure as set forth in claim 6 wherein said upper arm is positioned above and between said pair of spaced lower arms at the ends of each of said arms mounted with said cover and frame, respectively.

8. The structure as set forth in claim 7 including a pair of bracket shelves mounted with the same side of said frame as is said hinge means to receive one of each of the ends of said pair of spaced lower arms wherein one of each of said pair of lower arms rests on one of each of said rest members and said coil means and said upper arms rest with said lower arms when said cover is in a closed position.

9. The structure as set forth in claim 8 wherein actuation of said coil means imparts movement first to said upper arm to move said cover about said hinge means and wherein said lower arms move upwardly about said end of said arms mounted with said frame opposite from said hinge means after movement of said upper arms has begun to move said cover to its open position.

10. The structure as set forth in claim 9 including:

- (a) a bracket having a longitudinal slot therein mounted with said cover; and
- (b) pin assembly means secured with said upper arm and received by said longitudinal slot wherein actuation of said coil means causes said upper arm and cover to move upwardly about said coil means and wherein said pin assembly moves the longitudinal length of said slot to enable said upper arm to lift said cover upwardly before said lower arms are lifted from said bracket shelves by said coil means.

11. The structure as set forth in claim 1 wherein said release means includes:

- (a) a first cable section secured at one end with said frame retainer means;
- (b) a fusible link for receiving the other end of said first cable section, said link having the characteristic of melting from heat such as fire and the like;
- (c) a second cable section secured at one end with said link; and
- (d) a lever member having a weight at one end and receiving the other end of said second cable section.

12. The structure as set forth in claim 11 wherein said latch means includes:

- (a) means for securing said latch means to said frame opposite from said hinge means;
- (b) a plate member having an upwardly facing slot, said plate member being mounted with said means for securing;
- (c) a pivotal latch element having a jaw slot positioned transverse to said slot in said plate member when said cover is closed;
- (d) a releasable stop member for stopping movement of said latch element;
- (e) a key tumbler mounted with said plate member adjacent said stop member; and
- (f) a key mounted with said key tumbler and said lever wherein melting of said fusible link releases said lever and said weight moves said key and said key tumbler to release said stop member thereby pivoting said latch element to move said jaw slot from its transverse position to enable said lifting means to move said cover to its open position.

13. The structure as set forth in claim 12 wherein said means for lifting includes:

- (a) a first means mounted at one end with said frame opposite from said hinge means, said other end of said means extending outwardly into said opening in said frame;
- (b) a second means mounted at one end with said cover opposite from said hinge means, said other end

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- of said second means extending outwardly into said opening of said frame adjacent said first means;
(c) an actuating means positioned in said opening of said frame; and

- (d) each of said ends of said first and second means extending outwardly into said opening in said frame being mounted with said means for actuating.

14. The structure as set forth in claim 13 including:

- (a) a bracket secured with said first means; and
(b) a pin mounted with said bracket wherein said pin fits into said slot in said plate member and said transverse jaw slot when said cover is closed and wherein said pin is released from said transverse jaw slot when said latch element is pivoted to enable said cover to move to its open position.

15. The structure as set forth in claim 14 wherein said cover is closed by replacing said fusible link with said first and second cable section and rotating said lever to thereby rotate said key and key tumbler wherein said cover is moved to its closed position to enable said pin to engage said jaw slot to pivot said latch element wherein said jaw slot is positioned transverse to said slot in said plate member and wherein said stop member engages said latch element to prevent pivoting of said element of until melting of said cable.

16. The structure as set forth in claim 1 including a manual release means for releasing said latch means independently of said release means from the inside and outside of the structure.

17. A heat and smoke vent for use with a structure comprising:

- (a) a multisided frame having an opening therein, said opening in said frame communicating with the inside of the structure;
(b) a cover positioned on the top of said frame;
(c) hinge means secured with said cover and one end of said multisided frame to enable said cover to be pivoted from the position on the top of said frame to an open position;
(d) lifting means mounted with said frame and said cover;
(e) latch means for holding said lifting means to hold said cover in a closed position over said frame; and
(f) release means secured with said latch means for releasing said latch means to enable said lifting means to move said cover to its open position, said release means having a much smaller releasing force for releasing said latch means than the force imparted to said cover by said lifting means.

18. The structure as set forth in claim 17 wherein said release means includes:

- (a) a first cable section secured at one end with said frame retainer means;
(b) a fusible link for receiving the other end of said first cable section, said link having the characteristic of melting from heat such as fire and the like;
(c) a second cable section secured at one end with said link; and
(d) a lever member having a weight at one end and receiving the other end of said second cable section.

19. The structure as set forth in claim 18 wherein said latch means includes:

- (a) means for securing said latch means to said frame from said hinge means;

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- (b) a plate member having an upwardly facing slot, said plate member being mounted with said means for securing;

- (c) a pivotal latch element having a jaw slot positioned transverse to said slot in said plate member when said cover is closed;

- (d) a releasable stop member for stopping movement of said latch element;

- (e) a key tumbler mounted with said plate member adjacent said stop member; and

- (f) a key mounted with said key tumbler and said lever wherein melting of said fusible link releases said lever and said weight moves said key and said key tumbler to release said stop member thereby pivoting said latch element to move said jaw slot from its transverse position to enable said lifting means to move said cover to its open position.

20. The structure as set forth in claim 19 wherein said means for lifting includes:

- (a) an arm means mounted with said cover for moving said cover to its open position; and

- (b) an actuating means mounted with said arm means for enabling said arm means to move said cover to its open position.

21. The structure as set forth in claim 20 including a pin means mounted with said arm means wherein said pin fits into said slot in said plate member and said transverse jaw slot when said cover is closed and wherein said pin is released from said transverse jaw slot when said latch element is pivoted to enable said cover to move to its open position.

22. The structure as set forth in claim 21 wherein said cover is closed by replacing said fusible link with said first and second cable section and rotating said lever to thereby rotate said key and key tumbler wherein said cover is moved to its closed position to enable said pin to engage said jaw slot to pivot said latch element wherein said jaw slot is positioned transverse to said slot in said plate member and wherein said stop member engages said latch element to prevent pivoting of said element until melting of said cable.

23. The structure as set forth in claim 17 including a manual release means for releasing said latch means independently of said release means from the inside and outside of the structure.

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