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COMBINATION SKYLIGHT AND FIRE VENT CONSTRUCTION

Filed Jan. 20, 1954

3 Sheets-Sheet 1

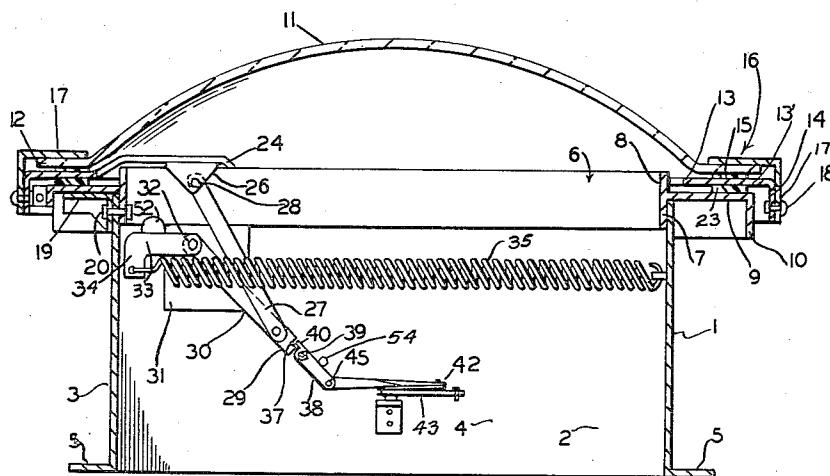


FIG 1

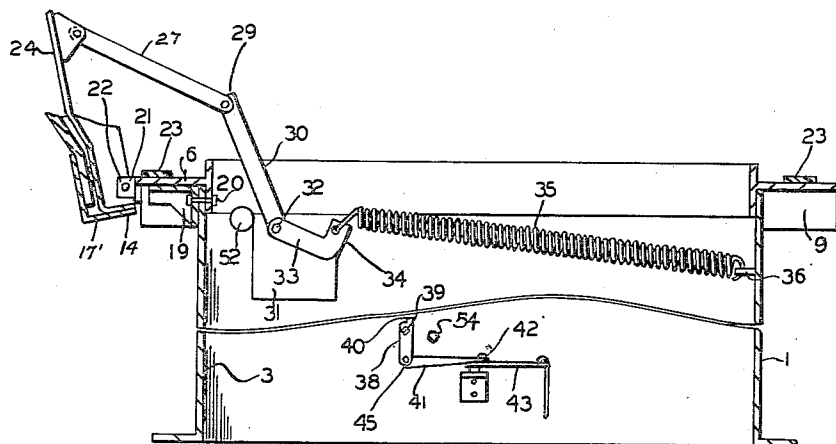


FIG 2

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3 Sheets-Sheet 2

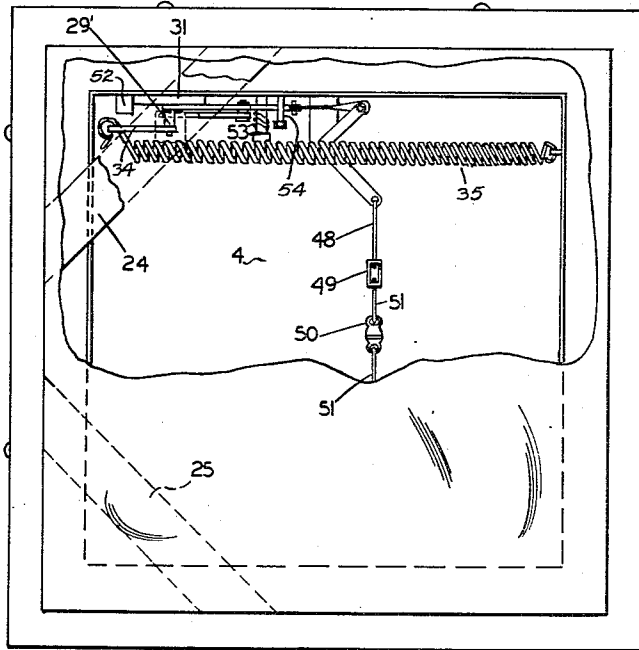


FIG. 3

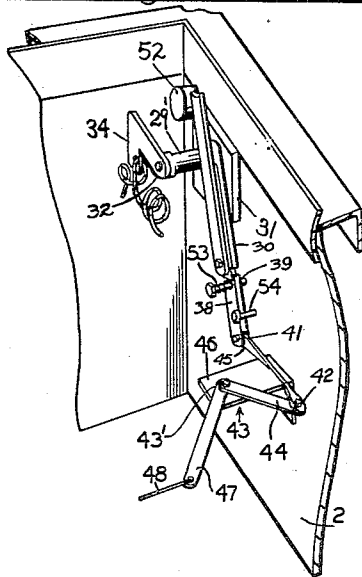


FIG. 4

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3 Sheets-Sheet 3

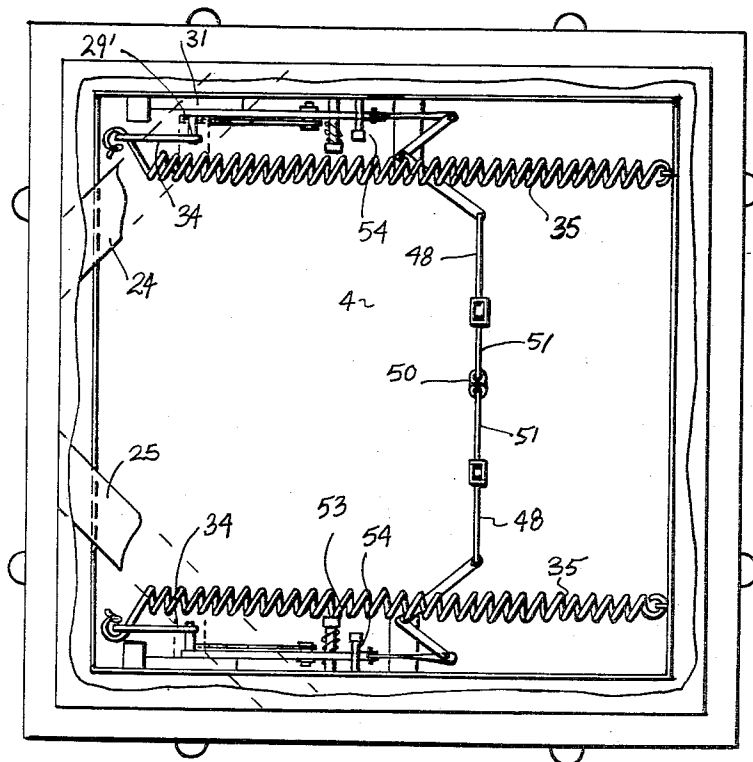


FIG. 5

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2,827,003

## COMBINATION SKYLIGHT AND FIRE VENT CONSTRUCTION

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13 Claims. (Cl. 108—16)

The present invention relates to a skylight construction in which the skylight covering is designed to act as a fire vent.

A major cause in the spread of fire through a building, particularly of very long buildings of one or two stories in height, is the lack of fire ventilation through the ceilings in the buildings. There have been sporadic attempts to solve this problem by providing skylight constructions wherein the skylight would be opened in the event of a fire. The solution of this problem by the development of a skylight construction has been unsatisfactory for a variety of reasons. One of the major difficulties in this construction is in providing a skylight construction which is normally watertight and locked in a closed position but which is certain to open with a positive action on the occurrence of a fire.

The present invention solves these problems by providing a skylight construction of a unitary design which may be readily installed in the field, without any requirement of assembly by the installer other than attaching the unit over the skylight opening.

In the present invention, a covering member formed with a clear plastic dome or bubble is positioned over side walls or curbings which form the well of the skylight. This covering member is hinged to one of the side walls in such a manner as to avoid any leak holes or other openings which may permit water from passing into the skylight well.

A further feature of this invention provides positive lock means which prevent the skylight from being opened from the outside by high winds or thieves, etc.

A still further object of this invention is to provide a mechanism for opening the dome and skylight covering when a fire occurs in which a fusible link is utilized, and in which the fusible link is positioned at a centrally located spot away from the walls so as not to be affected by heat conducted through the walls.

A further object of this invention is to provide a mechanism utilizing one or more powerful springs for positively opening the covering member, and a fusible link in which substantially no tension is translated from the spring to the link.

Another feature of this invention is to provide a skylight construction which will open automatically in the event of fire to act as a fire vent wherein the mechanism for operation of the invention is positioned in such a manner as to minimize the obstruction of light through the skylight.

A still further object of this invention is to provide a skylight having a mechanism for opening the skylight in the event of fire in which the mechanism is readily visible for inspection and in which the device may readily

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be tested and reset by a single individual without any damage to the unit other than the melting of the fusible link.

These and other objects and advantages of the present invention will be more clearly understood when considered in connection with a description of the accompanying drawings in which:

Figure 1 is a cross sectional elevation of the invention with the dome in a closed position;

Figure 2 is a fragmentary cross sectional elevation of the skylight with the dome in a partially open position;

Figure 3 is a top plan view with a portion of the covering member shown broken away;

Figure 4 is a fragmentary perspective view of the mechanism for opening the dome, and

Figure 5 is a top plan view of a portion of the covering member shown broken away.

Four side walls, 1, 2, 3 and a fourth not shown are joined at their side edges to form a skylight well 4 preferably rectangular in shape. The bottom edges of the side walls are provided with outwardly extending flanges 5 which may be provided with screw holes (not shown) for securing the unit over a skylight opening. A continuous covering frame generally designated 6 is welded or otherwise suitably secured all around the top edges of the side walls. This covering frame comprises an inner downwardly extending flange 7 which may be welded or screwed to the inside of the side walls, an upwardly extending flange 8 continuous with the downwardly extending flange 7 which forms a portion of the condensation gutter, an outwardly extending flange 9 and a downwardly extending flange or lip 10 at the outer peripheral edge of the outwardly extending flange 9.

Over the skylight well 4 is positioned the covering element partially formed of a clear or translucent plastic dome 11 which has at its peripheral edges an outwardly extending continuous and preferably horizontal flange 12. The dome 11 extends beyond the side walls with its peripheral flange 12 positioned over the outwardly extending flange 9 of the covering frame.

A supporting bracket 13' having a horizontal leg or plate 13 and with a downwardly extending apron or flange 14 formed at the outer edge of the horizontal plate or leg 13 extends all around the lower side of the horizontal flange 12 of the dome 11.

If desired, a gasket 15 may be provided between the flange 12 of the dome and the plate 13 of the supporting bracket. A continuous bracket 16 L-shaped in cross section, and having a plate or leg 17 extending over the flange 12 of the dome 11 and its other leg or plate 17' secured to the downwardly extending flange 14 by rivets 18 or other suitable means cooperates with the bracket 13' to secure the flange of the dome.

An angular L-shaped re-inforcing member 19 may be secured with one leg in face to face relation with the lower side of flange 9 and the other leg in face to face relation with the top of side wall 3 by a series of rivets 20. A pair of bolts 21 pass through the opposite downwardly extending flanges 14 of the sections of the supporting bracket 13' perpendicular to side wall 3 and are secured at their inner ends to supporting arms 22 which are riveted or welded or otherwise suitably secured to the outside of the downwardly extending flanges 10 at the corners of the covering frame near side wall 3. These bolts 21 serve as hinge supports for the covering element and permit the covering element to close over the well

and covering frame with the downwardly extending flanges 14 and 17' fitting the covering frame.

A series of gaskets 23 on the outwardly extending flanges 9 may be provided to cushion the covering element and to provide for drainage. These gaskets should have an opening between them at the corners of the unit to permit outward flow of condensation from the gutter. A pair of supporting arms 24 and 25 formed as continuations of the supporting bracket 13' and each extending angularly across one of the corners at which the covering element is hinged have the center section of each arm bent upwardly to provide clearance over the flange 8 of the covering frame 6. Connected to each of these supporting arms are spring operated lever systems which operate simultaneously to pivot open the dome in the event of fire. As these lever operated systems are identical and are positioned on opposite side walls, remarks made hereafter to one side will apply to the other.

Secured to the lower side of the arm 24 is a tongue 26 with an elongated lever arm 27 pivoted at one end 28 to the tongue 26. The other end of the lever arm 27 is pivoted to the lever arm 30 at a point just a little short of the end of section 29 of the lever arm 30. This lever arm 30 is formed of two sections 29 and 33 extending perpendicularly from opposite ends of a sleeve section 29' (Figure 3) with the sections 29 and 33 in an angular relation with one another and with the end of section 33 bent into a flange or lip section 34. The lever arm 30 is pivoted by a pin 32 secured to the side wall 2 over a reinforcing plate 31. A spring 35 is secured at one end through a hole in the lip 34 and at the other end to the side wall 1 by means of an eyelet 36 formed on the inside of the wall. This spring 35 should be sufficiently strong when acting with the other spring through their respective lever systems to open the cover elements outwardly despite other restraining factors, such as snow and ice. At the end of section 29 of the lever 30 beyond the point of pivot is a shoulder 37. A short lever arm 38 pivoted on a pin 39 is provided with a shoulder 40 at its upper end which is designed to engage the shoulder 37. The pin 39 on which the lever arm 38 is pivoted is sufficiently long to permit the arm 38 to be slid in and out of the same plane as is the lever arm 27. A spring 53 tensions the arm 38 normally into the same plane as the end 33 of lever arm 30. The lever arm 38 is hinged at 45 to a twisted lever arm 41 with the far end 42 of the lever arm 41 turned into a substantially horizontal plane. The end 42 of the lever arm 41 is in turn hinged to the leg 44 of the L-shaped lever arm 43. The lever arm 43 is in turn pivotally supported at the junction of its legs 44 and 47 by a pin 43' secured to a supporting plate 46 which in turn extends outwardly from the inner side of the side wall 2. Through a hole at the end of the leg 47 of the lever arm 43 is secured one end of a wire 48 with its other end formed into a loop over the one end of a fusible link 50. The other end of the link 50 is secured to a loop in the wire 51 which is in turn secured to a lever system on the other side wall similar to the one described above. Turn buckles 49 may be provided in the wires 48 and 51.

Projecting from the side wall is a stop 52 which extends far enough to engage the section 29 of the lever arm 30 as the dome opens (Figure 2), but does not extend far enough to engage the section 33 of the lever arm 30 due to the sleeve 29' between the sections 30 and 33. This stop 52 limits the opening of the dome to a desired position. A stop 54 secured to the side wall 2 is also provided to limit the motion of the lever arm 38 and prevent it from being pulled out of proper position.

In the operation of this device, when a fire occurs, the fusible link which may have any desired melting point as for example, 160° F., will melt; thus, separating the ends of wires 48 and 51 which were held under an extremely slight tension through the lever system. When

these wires are released, the lever arm 38 will pivot to a vertical position releasing the engagement of the shoulders 40 and 37. On this release, the lever arms 30 and 27 which were maintained under constant and substantial tension by the spring 35 are pivoted upwardly opening the covering of the skylight dome as far as the stop 52 will permit. These springs 35 should have sufficient strength not only to raise the covering element, but to also overcome any snow or ice which could otherwise retard the opening of the dome.

When the dome is to be reset, an individual may return the dome back to its original position from the inside of the well again tensioning the spring 35. The lever arm 38 may be moved inwardly against the tension of the spring 53 to permit the shoulder 37 to be pivoted below the shoulder 40 so that the two shoulders may be engaged. When in this position, the fusible link may be replaced and the skylight unit is again ready for re-use.

From the foregoing description, those skilled in the art will appreciate that the lever 38 enjoys a substantial mechanical advantage over the spring 35 with respect to the lever 30. In Figure 1 it will be noted that the spring 35 engages the lever arm 33 very close to the pivotal support 32 of the lever 30, while the lever 38 engages the lever arm 29 a considerable distance from the pivot point 32. Thus the lever 38 need exert a much smaller force upon the lever 30, than that exerted by the spring 35 to hold the lever 30 in the position shown in Figure 1. The mechanical advantage is further enhanced by virtue of the fact that the lever 38 is pivoted on the wall 2 of the well immediately adjacent the end of the lever 38 which engages the lever arm 29. Thus, the force exerted on the other end of the lever 38 need be only a small part of the force required to be exerted on the end of the lever arm 29 to hold the system in the position of Figure 1. As a result, there is very little tension exerted upon the fusible link 50, even though the tension of the cords 48 and 51 overcomes the considerable force exerted by the springs 35 upon the levers 30. It will be noted from the drawings that the leverage distance from the fulcrum point 32 (Figure 1) to the point at which spring 35 is connected to lip 34 is substantially not less than the leverage distance from fulcrum 32 to pivoting end 28.

Having now described my invention, I claim:

1. In a roof covering construction comprising a well and a cover pivotally supported on the top of said well, parallel lever systems pivotally mounted on opposite sides of the well and connected to the sides of the cover, biasing means secured to the lever systems and biasing the systems to pivot the cover to an open position on the well; means for securing the cover in a closed position on the well against the action of the biasing means comprising lever means mounted on each side of the well and engaging the lever systems at one end of said lever means, means forming a fulcrum for the lever means closer to said one end than the other thereby having a mechanical advantage at said end engaging the lever systems over the biasing means on the lever systems, means including a fusible link connected between each of the lever means and extending across the well holding the lever means in engagement with the lever systems barring failure of the fusible link.

2. In a roof covering construction comprising a well and a cover pivotally supported on the top of said well, parallel lever systems pivotally mounted on opposite sides of the well and each having one end connected to a side of the cover, springs connected to the other ends of the lever systems and biasing the lever systems to pivot the cover to an open position on the well; means for securing the cover in a closed position on the well against the action of the springs comprising a pair of levers pivotally supported on the sides of the well, and each having an end engaging one of the lever systems and each having means forming a fulcrum point closer to said end than

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the other thereby providing mechanical advantage at said end engaging the lever system over the springs connected to the lever systems, and means including a fusible link extending across the well and having its ends connected to the other ends of the levers for holding said levers in engagement with the lever systems barring failure of the fusible link.

3. A roof covering construction comprising sidewalls forming an enclosed well, a covering member positioned over said well, means hinging said covering member at one of said sidewalls, a lever system having a fulcrum and engaging said covering member for upwardly pivoting said covering member to an open position, spring biasing means engaging said lever system to move the covering member to an open position, means including a fusible link engaging said lever system preventing the lever system from opening the covering member under the bias of the spring means until failure of said link, said last mentioned means including a lever operatively engaging said lever system a leverage distance farther from said fulcrum than the leverage distance of said spring means from said fulcrum.

4. A roof covering construction comprising sidewalls forming an enclosed well, a covering member positioned over said well, means hinging said covering member at one of said sidewalls, a lever system having a fulcrum intermediate its ends pivotally secured to a sidewall with one end of the lever system pivotally connected to the covering member, said system adapted to pivot said covering member upwardly, spring means secured to the other end of the lever system biasing the lever system to open the covering member, and means including a fusible link engaging the lever system at a leverage distance from said fulcrum greater than the distance from said fulcrum to said spring means, preventing the lever system from operating under the bias of the spring, the last named means releasing the lever system on failure of the link.

5. A device as set forth in claim 4 wherein said spring means is connected to said leverage system at a leverage distance from the fulcrum of said leverage system substantially not less than the leverage distance from said fulcrum to the pivotal connection between said covering member and leverage system when said covering member is in a closed position.

6. A roof covering construction comprising sidewalls forming an enclosed well, a covering member positioned over said well, means hinging said covering member at one of said sidewalls, a lever system having a fulcrum intermediate its ends, said system pivotally connected at one end to said covering member for upwardly pivoting said member to open the well, spring means applying a biasing force to said system at the other end of said lever system to open the covering member, and means including a fusible link engagingly restraining the lever system at a leverage distance from said fulcrum greater than the leverage distance from said fulcrum to said spring means thereby preventing the lever system from operating under the bias of the spring, the last named means releasing the lever system on failure of the link.

7. A roof covering construction having continuous sidewall members about a well opening and a cover covering said opening, means for pivoting said cover outward for fire ventilation comprising means hingedly securing said cover at one edge to a sidewall member, a lever linkage system comprising a pair of lever arms pivotally interengaged at adjacent ends with one of said arms pivotally interengaged at its other end with said cover and with the other of said arms having an angle formed near its other end, means pivotally supporting said other arm to a sidewall at the vertex of said angle, a spring connected to the other end of said other arm at one end and at the other end to a sidewall tensioned to operate said lever linkage system to open the cover, locking means for securing in position said lever linkage system against the

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tension of said spring, including a lever pivotally supported adjacent one end on a wall member, said one end of the lever engaging said lever linkage system at said adjacent ends and having means providing a mechanical advantage at the other end of said lever over the spring, and means including a fusible link connected to the other end of the lever and holding the lever in engagement with the linkage system barring failure of said fusible link.

8. A device as set forth in claim 7 wherein said one end of said lever has a length shorter than the length of said other end of said arm.

9. A device as set forth in claim 7 wherein means including a spring normally maintaining said lever in a selected plane parallel to the sidewall on which it is pivotally supported, said lever adapted to be displaced from said plane whereby said lever is disengaged from said lever linkage system.

10. A device as set forth in claim 7 wherein a stop member projects from a sidewall and is positioned to engage said other arm when the cover is in an open position.

11. In a roof covering construction having a cover pivotally supported on the top of the well, parallel lever systems pivotally mounted on opposite sides of the well, each comprising a pair of lever arms pivotally interengaged at adjacent ends with one of said arms pivotally interengaged at its other end with said cover and with the other of said arms having an angle formed near its other end, means pivotally supporting said other arm to a sidewall at the vertex of said angle, a spring connected to the other end of said other arm at one end and at the other end to a sidewall tensioned to operate said lever linkage system to open the cover, locking means for securing in position said lever linkage system against the tension of said springs, including a pair of levers each pivotally supported adjacent one end on opposite wall members, said one end of the levers each engaging one of said lever linkage systems at said adjacent ends, having means providing a mechanical advantage at the other end of said lever over said springs and means including a fusible link extending across the well and having its ends connected to the other ends of said levers for holding the levers in engagement with the lever systems barring failure of the fusible link.

12. In a roof covering construction having continuous sidewall members about a well opening and a cover covering said opening, means for pivoting said cover outward for fire ventilation, comprising means hingedly securing said cover at one edge to a sidewall member, a lever linkage system connected at one end to said cover and pivotally supported adjacent its other end on one of the wall members, a spring connected between the other end of the lever linkage system and a wall member and tensioned to operate said lever linkage system to open the cover, locking means for securing in position said lever linkage system against the tension of said spring, including a lever pivotally supported adjacent one end on a wall member, said one end of the lever engaging the lever linkage system at a leverage distance further away from the pivotal support than the spring and having means providing a fulcrum point closer to said one end of the lever than the other thereby providing a mechanical advantage over the spring at said other end of the lever, and means including a fusible link connected to the other end of the lever and holding the lever in engagement with the linkage system barring failure of said fusible link.

13. A roof covering comprising sidewalls forming an enclosed well a covering member positioned over said well with its peripheral edges overhanging said sidewalls, means hinging said covering member at one of said sidewalls, lever means including a plurality of leverage arms secured to a sidewall and the cover member for upwardly pivoting said cover member, spring means connected to a leverage arm for actuating said lever means to lift the cover and open the well, another leverage arm having

a fulcrum point closer to one end than the other engaging said last mentioned arm at said one end and thereby having a mechanical leverage advantage at the other end over said last mentioned arm and spring means including a fusible link near the center of said well connected at said other end for holding said spring means ineffective until said link is melted.

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