Feb. 2, 1960 M. WASSERMAN ET AL 2,923,226

FIRE VENTING ROOF STRUCTURE

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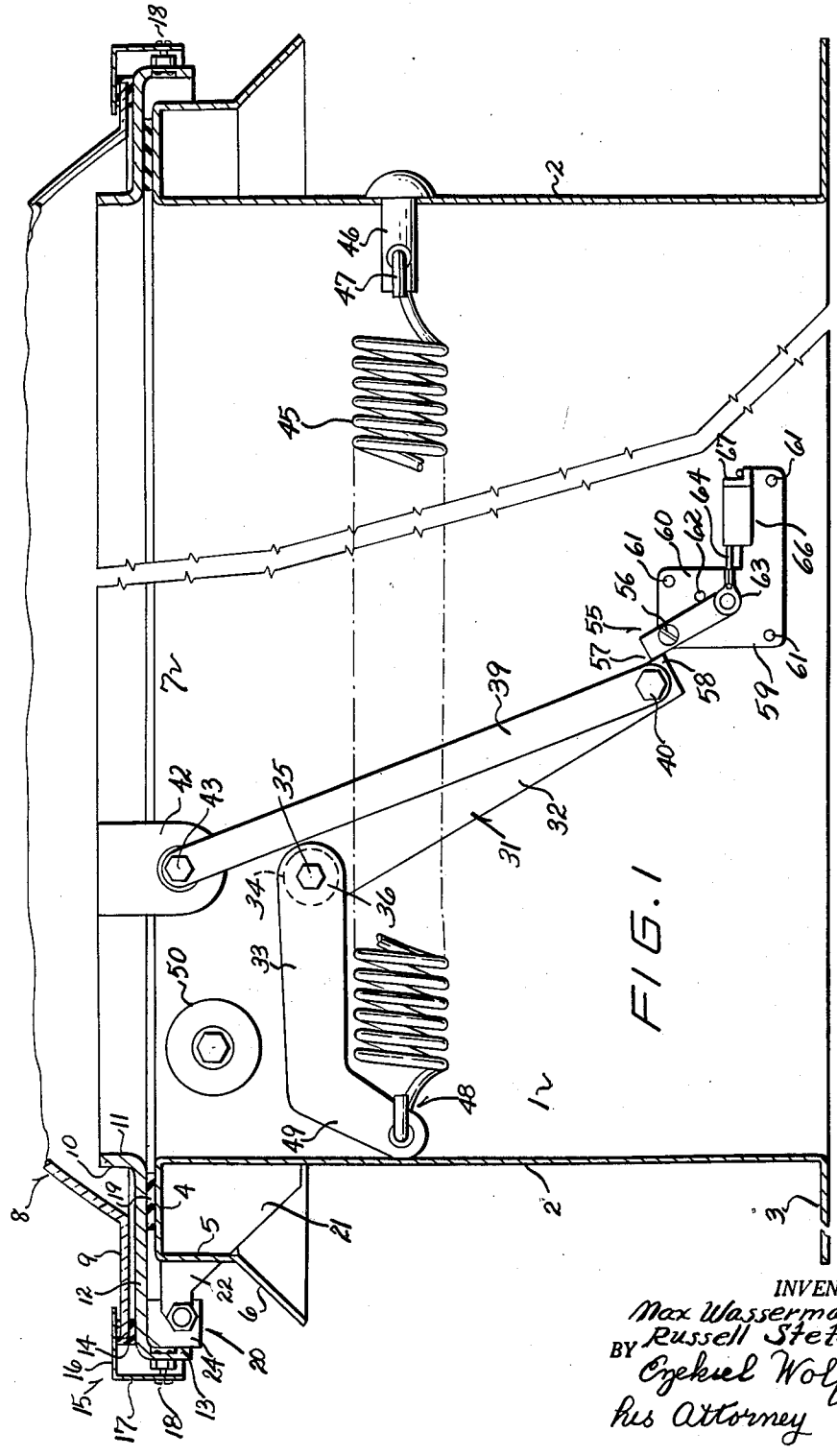


FIG. 1

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FIRE VENTING ROOF STRUCTURE

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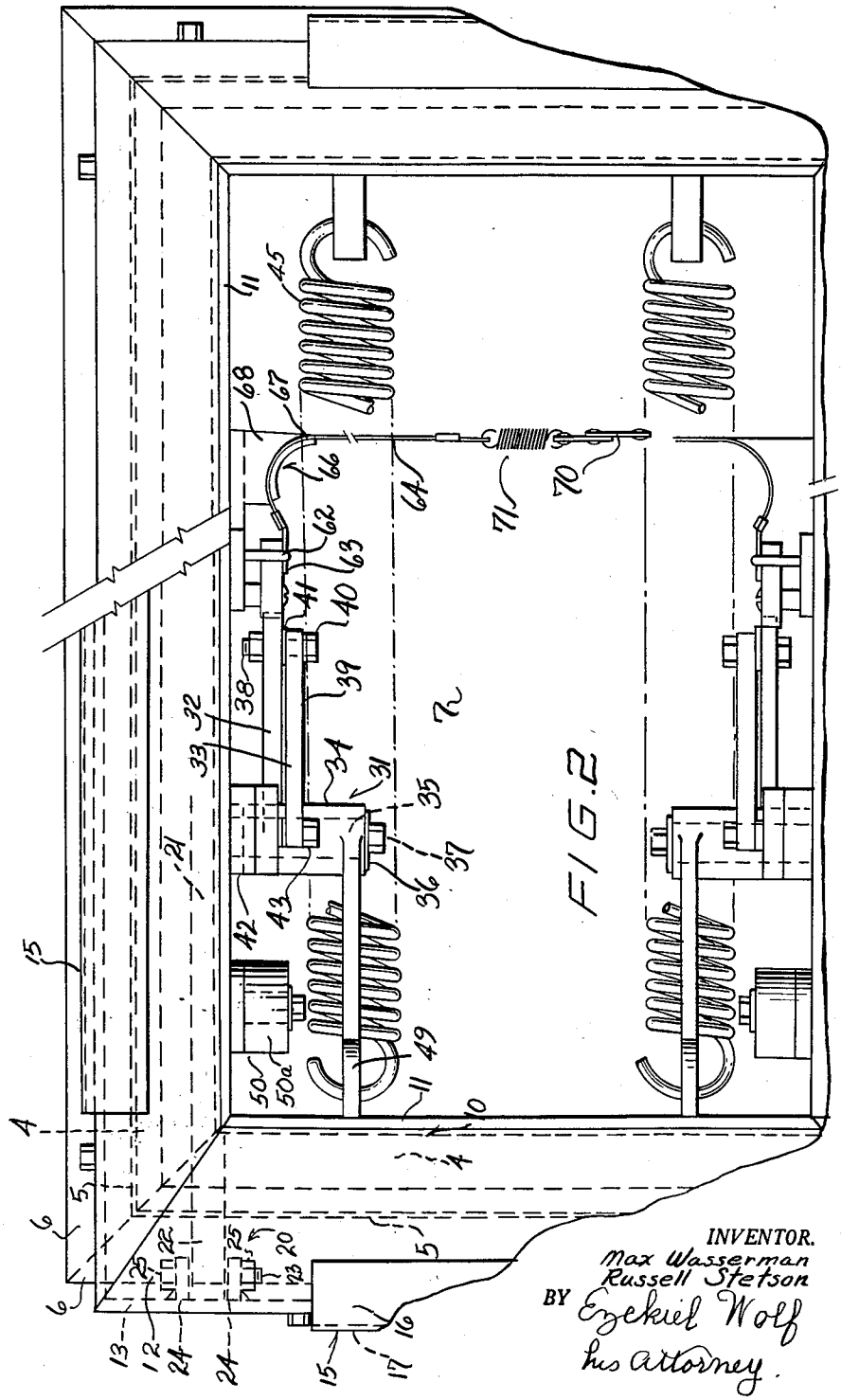


FIG. 2

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FIRE VENTING ROOF STRUCTURE

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Application December 29, 1955, Serial No. 556,377

4 Claims. (Cl. 98—86)

The present invention relates to an improved fire venting roof structure adapted to provide a fire vent opening in a roof when a fire occurs within the building structure, and in particular, to improvements in copending application Ser. No. 405,098 filed January 20, 1954 and now U.S. Letters Patent No. 2,827,003, issued March 18, 1958.

The present invention provides a well structure adapted to rest and be secured to a roof opening. Within this well structure is provided a pair of lever linkage systems, oppositely arranged and adapted to cooperatively open a hinged covering member when a fire within the building structure causes a fusible link incorporated into the structure to melt.

The present invention provides a positively operating device which is actuated by powerful springs. These springs are sufficiently powerful to overcome the weight of snow on the covering member or other restraining influences such as foreign materials which might collect about the hinges and impede the covering member from pivoting open.

A further advantage of the present invention is that it provides a cover member pivotally secured to the well and which is continuously maintained under an opening tension, provided by the spring-operated lever linkage system. This linkage system is maintained in a normally closed position by an improved lever arm freely pivotable to a release position upon the melting of a fusible link.

One more object of the present invention is to provide a dual lever linkage spring actuated opening system for raising the covering member with each spring actuated system, actuated simultaneously by the melting of a single fusible link.

The present invention also provides a structure in which a pair of opposite lever linkage systems are maintained in a normally closed tensioned position by a pair of lever arms interconnected by a cable having a fusible link formed therein. This cable is maintained under a constant and slight tension by a spring element which holds the lever arms in their selected closed positions. Upon melting of the fusible link, the lever arms are simultaneously released from their closed position, in turn, releasing both lever linkage systems to raise the cover or skylight covering element to an open fire venting position. The structure supporting the connecting cable and the lever arms maintaining the linkage systems in their normal closed position is designed particularly to avoid any binding and to permit and facilitate rapid easy opening of the dome upon melting of the fusible link. It is this particular feature which, it is believed, contributes substantially to the improved operation of the vent system for such a system must be able to withstand varying weather conditions and abuse for many years prior to operation.

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

Figure 1 is a side fragmentary cross-sectional elevation of the invention, and

Figure 2 is a fragmentary top plan view of the invention with the dome removed.

In the illustration of Figures 1 and 2, only one-half of the fire vent structure is disclosed. The opposite half of the fire vent structure is symmetrical with the half illustrated, and two lever linkage systems are thereby provided, with one of the systems formed on the opposite wall to the wall on which the lever linkage system illustrated in Figure 2 is positioned. Thus, in the invention, as illustrated, is provided a preferably rectangular well having side walls 1 and end walls 2. These side walls and end walls are connected at edges forming an enclosed casing or well and have at their lower ends outwardly extending bottom flanges 3 adapted to be secured to a roof. The upper edges of the walls are outwardly flared forming a top sill 4 extending all about the well. This top sill extends downwardly and angularly outwardly at 5 and 6, respectively, and form an outer peripheral apron structure. Positioned over the well opening 7 is a covering member formed preferably of a transparent or translucent plastic skylight dome 8 having an outwardly flared peripheral flange 9. This flange 9 fits over a covering frame 10 extending about the well structure. The covering frame 10 has an inner peripheral upwardly extending flange 7 forming an inner gutter member, a top covering outwardly extending flange 12, and an outer peripheral downwardly extending apron 13. The flange 9 is spaced from the flange 12 by a gasket 14 which also spaces the flange 12 from an outer retaining apron, generally designated 15. This outer retaining apron 15 may, if desired, extend all about the flange 9, but may, if desired, and as illustrated in Figure 2 extend only along a portion of the flange. This retaining apron 15 is provided with an upper inwardly extending flange 16 partially covering and spaced from the outwardly extending dome flange 9. The downwardly extending leg 17 is spaced from the downwardly extending flange 13 forming a passage between the two. This apron 15 secures the dome in position by clamping the flange 9 downwardly against the flange 12 and, in turn, is secured to the flange 12 by a series of screws 18. On the lower surface of the covering member 10 are positioned strips of gasket material 19 adapted to rest on the sill 4 when the dome structure is in its closed position. The entire dome assembly, including the dome and covering frame 10 is pivotally secured to the well structure by hinge structures generally designated 20. There is provided an opposite pair of these hinge structures 20, each comprising a supporting bar or plate 21 which is suitably and securely fixed to the upper, outer surface of the side wall 1. Each of these plates 21 projects rearwardly from the wall 1 through the flanges 5, providing an outer rear extension 22. This rear extension 22 is provided with a journal opening or hole through which a threaded shaft 23 extends and may freely rotate. This shaft 23 also passes through journal plates 24 rigidly and secured by suitable means to the inner surface of the covering member 10 close to the downwardly extending apron 13 in such a position that aligned holes in these plates 24 may be aligned with the journal opening in the plate 22 with the plate 22 positioned between this pair of plates 24. The shaft 23 extends through the plates 24 and 22 and is secured in position by suitable means, such as the bolts 25.

Within the well structure, there is provided a lever linkage system comprising the lever arm 31 which has a pair of angularly positioned ends 32 and 33 with the end 33 inwardly offset from the ends 32 by a connecting sleeve 34. This connecting sleeve 34 has an axial opening through which extends a rod 35. The sleeve 34 is free to rotate about this rod 35 and is secured to it by a suitable capping bolt means 36 and 37. The lower end of the leg 32 has a pin 38 pivotally projecting through it.

Also pivotally mounted on this pin 38 is a second lever arm 39 with the pin 38 projecting through the lower end of this lever arm 39. The pin 38 is secured in position by suitable bolt means 40 and for proper operation a gasket 41, spacing the lever arms 32 and 39, is provided. The upper end of the lever arm 39 is pivotally secured to a downwardly extending tongue 42 which is, in turn, secured to the inner surface of the flange 11 of the dome or covering structure. The lever arm 39 is pivotally secured by means of a pin and bolt arrangement 43. A substantial tension on the lever arms 31 and 39 is provided by the spring 45 which has one end secured to one end wall 2 by means of the bolt 46 engaging the bent end 47 of the spring 45. The other end 48 of this spring engages a downwardly extending lip or flange 49 formed integrally with the end 33 of the lever arm 31. This tension of the spring 45 is transmitted through the end 33 to the lever arm 39 to raise the dome to an open position. To limit the operation of this opening, a stop generally designated 50 is provided on the inner surface of the wall. This stop is adapted to engage the lever arm 31 limiting the opening motion of the dome to a desired position. If desired, a section 50*a* of the stop may be made of rubber or similar material to absorb the shock of lever arm 31 on contact.

The dome itself is maintained in a closed position and the lever linkage system comprising the lever arms 31, 39 and spring 45 is maintained in a closed and tensioned position by the engagement of the release lever 55. This release lever is pivoted near its upper end by a pin 56 and has its extreme upper rectangular end 57 adapted to engage when in a closed position the corner 58 of the lower end of the lever arm 31. Because of the lever arrangements illustrated, very little tension is required at corner 58 to prevent the lever linkage system from opening the dome. Thus, the release lever 55 need be maintained under very little tension to keep the dome in a selected closed position until the occurrence of a fire. This release lever is, therefore, pivotally secured by a pin 56 to the supporting plate 59 which also serves as a guide member for the release cable which initially permits the fire vent to operate. This supporting plate 59 has a base 60 with a plurality of rivet members 61 by which the plate 59 may be secured to the inner side of the wall 1.

Also provided on the inner surface of this base 60 is a restraining pin 62, positioned to limit the motion of the lever 55 so that its selected and proper position may be immediately obtained upon the setting of the fire venting system. At the lower end of the lever 55 is provided a pin and loop member 63 to which is secured a connecting cable 64. This cable 64 extends across the fire vent well to the opposite lever linkage system where it is connected to the corresponding release lever on the other side in an identical manner as herein shown.

Also formed as part of the member 59 is a cable guide section generally designated 66 which has an arcuate guide surface 67 connected to the face 60 by a connecting flange or web 68. The cable 64 extends about this arcuate guide 67 in such a manner that the cable end is aligned directly with the lower end of the lever 55 so as to prevent any fouling of the cable upon its release.

Centrally located within this cable is a fusible link 70 adapted to melt and part the cable at a selected temperature. To take up any slack and to maintain the lever 55 under a continued slight tension so that it will always engage the corner 58 of the lever arm 31, there is provided a spring member 71 interengaging the main portion of the cable and the fusible link. For balance, a pair of these spring members 71 may be provided, one on either side of the fusible link 70. Thus, there is provided in the present invention a venting system having a minimum of pivoting or moving parts and a positively actuated mechanism which will open the venting system immediately upon the severing of the cable 64 by the melting of the link 70.

Having now described our invention, we claim:

1. In a fire venting roof structure including continuous enclosing sidewalls forming a rectangular well opening in said structure, a covering member having outwardly flared peripheral flanges covering said opening, means pivotally mounting said cover at one sidewall, a pair of means for causing said covering member to open, positioned one on each of two opposite sidewalls, and means for restraining said last mentioned means from operation including in part a cable with a fusible link extending between said opposite sidewalls, cable guiding elements positioned one on each of said opposite sidewalls and adapted to guide and support said cables, each comprising a flat plate forming a base adapted to be secured to one of said opposite sidewalls, a fixed arcuate guide sector positioned in a plane normal to said base and providing a bearing surface for said cable, an interconnecting supporting web between said base and one edge of said sector in part forming a bearing surface for said cable, a pin supported on and extending normal to said base, a lever pivotally supported on said pin in alignment with one end of said guide sector and interconnected with the end of said cable and engaging said means for causing said covering member to open, whereby said covering member will open only in case of fire.

2. A device as set forth in claim 1 wherein said arcuate sector is 90° and extends in a plane substantially normal to said base.

3. A device as set forth in claim 2 having said pin positioned on a level above said sector with the lower end of said lever adapted to describe an arc substantially tangential to the plane of said sector.

4. A device as set forth in claim 3, wherein the ends of said arcuate sector are radial extensions with one normal and one parallel to said base.

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