Oct. 23, 1962 M. D. MEARS ETAL 3,059,565

ANTI-BLAST CLOSURE DEVICE

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Fig. 1

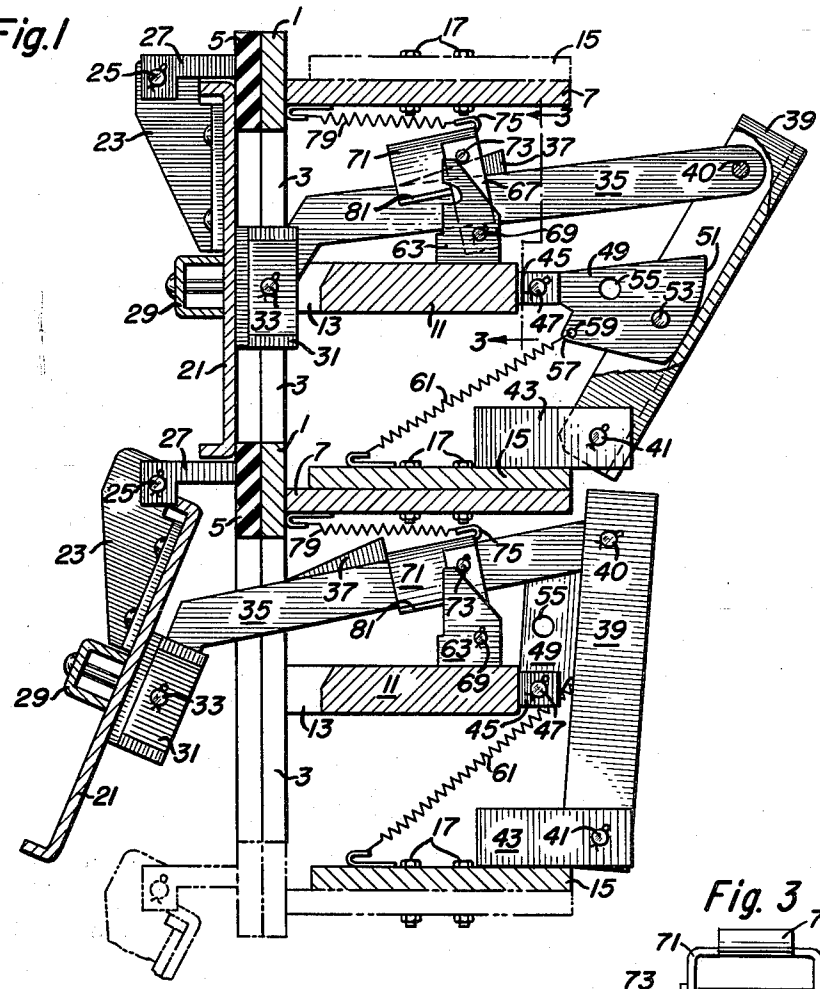


Fig. 2

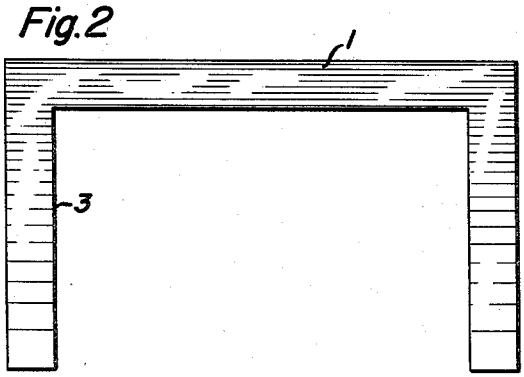
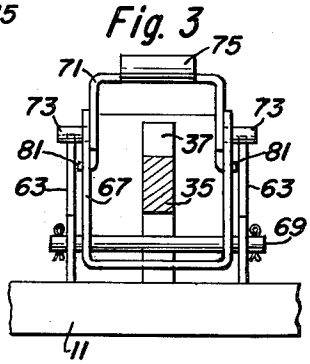


Fig. 3



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Fig. 4

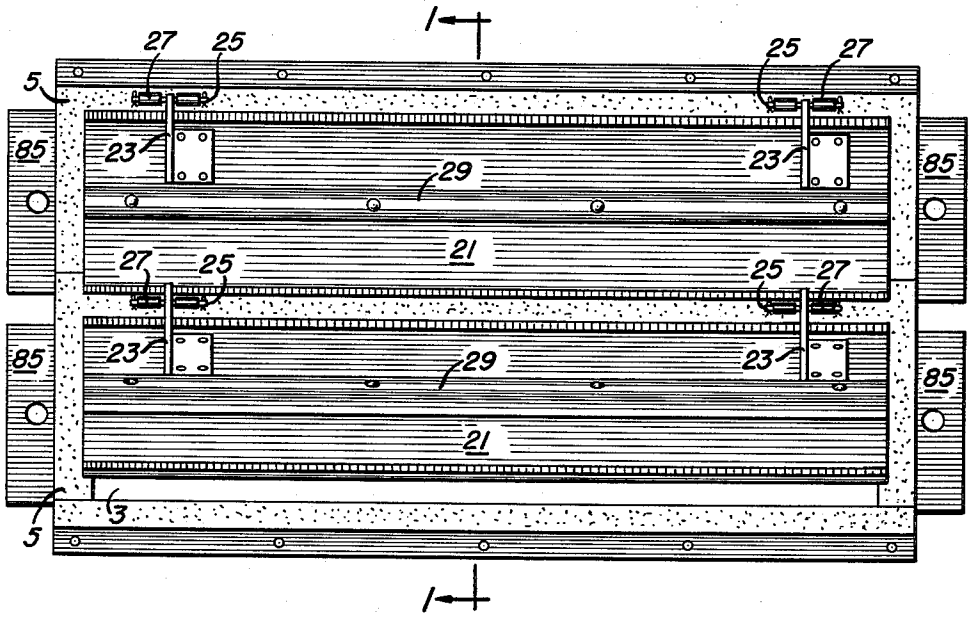
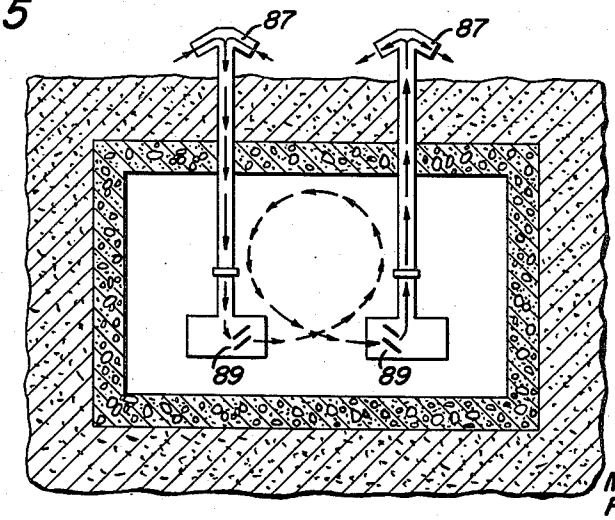


Fig. 5



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ANTI-BLAST CLOSURE DEVICE

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Filed Jan. 27, 1960, Ser. No. 5,080
2 Claims. (Cl. 98—119)
(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention herein described may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment to us of any royalty thereon.

This invention relates to a ventilation closure which is adapted to remain open under normal air flow but which will close under the positive pressure phase of a blast wave and remain closed during the ensuing rarefaction phase. It is intended for use in the ventilation systems of shelters as a protection to the filters, duct systems, shelter equipment and occupants.

The device is so constructed that it is operates satisfactorily under the conditions of an atomic blast, which may produce instantaneous reflected pressures on the closure of the order of several hundred pounds per square inch. Under these conditions its closing time is of the order of one or two milliseconds.

It is activated by the blast itself and requires no externally located signal device or auxiliary equipment.

The device is so constructed that any number of units can be combined to provide the desired capacity. It is readily accessible for repairs.

In the drawing, FIG. 1 is a section on line 1—1, FIG. 4. FIG. 2 is a front view of a front plate. FIG. 3 is a section on line 3—3 of FIG. 1 looking towards the left. FIG. 4 is a front elevation of a two-unit device involving our invention, the upper unit being shown closed and the lower being shown open. FIG. 5 is a diagrammatic view of a shelter ventilation system embodying our invention.

DESCRIPTION

Before fully describing our invention, which is constructed in such a manner that any number of units, as shown in the drawing, can be readily combined and assembled in parallel to accommodate higher flow rates, we would like it to be understood that for the purpose of simplification we will hereafter refer to and describe a single unit only.

The unit, ordinarily made of metal, embodies a front plate 1, which has a rectangular opening 3, surrounded by a rubber gasket 5, the latter being firmly cemented on the face of the front plate.

The top member 7 which is fastened to and extends at right angle to, the rear plane of the front plate 1, is sufficiently offset below the top edge of the latter to provide adequate space for member 15 of the build-on unit. The middle member 11, which is considerably shorter but much heavier than the top member 7, has a cutout 13, to permit the seating of the movable parts of the door. The middle member 11, fastened at each end, is centrally located and runs parallel with the top member 7.

Resting on the top member 7 of the next lower unit, is a lower member 15, which is of the same thickness as the member 7. It is located with its one edge vertically aligned with the rear edge of the member 7, while the opposite end, terminating short of abutment, creates a gap for welding purposes between it and the rear plane surface of the front plate 1. The member 15, also runs parallel with the top member 7. The unit, through this member 15, is generally fastened with bolts 17 on the top of member 7 of the next build-on unit, as shown by the phantom lines in FIG. 1 of the drawing.

In combining these units, since the member 7 of the next lower unit also serves as a bottom flange to complete the rectangular cell of the closure of the top unit, a supplemental similar closure structure is provided on the bottom unit.

The end members (not shown) are approximately of the same thickness as members 7 and are so sized and located on the end boundaries of the latter that the outer appearance of the unit resembles a rectangular box with flanged surfaces.

The door 21 of the unit, which is located on the face of the front plate 1, has on its front plane, firmly secured, a slotted hinge bracket 23. By this bracket 23, which is pivotally suspended and rotates on the hinge pin 25, door 21 hangs from the forked end of a bifurcated bracket 27, the opposite end of which is rigidly fastened on the face of the front plate 1.

Below the hinge bracket 23, centrally located, running longitudinally on the front plane of the door 21, and fastened thereto, is a reinforcing U-shaped stiffener 29, while on the rear plane of the door is fastened a bifurcated bracket 31, which pivotally engages, by means of pin 33, an arm 35. The arm 35 carries on its top edge an abutment 37 and extends rearwardly. It engages, at the upper end and inside of a narrow U-shaped channel link 39. At the joint, the arm and the link are penetrated by a pivot pin 40. Extending downwardly, the link 39 is pivotally engaged in a U-shaped bracket 43, having its closed end firmly secured to the lower member 15. At the opposite end, the legs of the U-shaped bracket 43 together with the lower end of the link 39 are penetrated by a pivot pin 41. The middle member 11 has fastened on it at its rear edge a bifurcated bracket 45, supporting on pin 47 pivotally movable cam lock 49.

Having its rear camming edge 51 located and making contact inside of the U-shaped channel of the link 39, the cam lock 49, which is made of a considerably thinner metal than the inside width of the member 39, is held in central position inside of the latter by a positioning pin 53. The pin, penetrating the cam lock 49 near the camming edge 51, is approximately of the same length as the inside width of the channel, and serves to prevent the wobbling of the cam when the latter's edge slides inside of the link 39.

The cam lock 49 has a hole 55 at its upper edge to permit the insertion of a suitable tool when disengagement of the cam lock from link 39 is desired. At the lower tail 57, is a hole 59 retaining tension spring 61 which at the opposite end is fastened to the lower member 15.

The middle member 11 has fastened on its top surface a bifurcated bracket 63, which is penetrated together with a U-shaped latch lever 67 by a pivot pin 69. In the upper half of FIG. 1, the bracket 63 is shown partially broken away to show how ears 81 abut the lever 67 so that spring latch 71 and latch lever 67 may swing as a unit about pivot pin 69.

The U-shaped latch lever 67, being pivotally secured at its lower closed end by the pin 69, engages at its upper end a spring latch 71. Having its integral pins 73 penetrating the legs of the latch lever 67, the spring latch 71 is pivotally connected near the upper edge of the lever.

At the top edge, the spring latch 71 has a hook 75, connected to the tension spring 79, the latter having its opposite end fastened at the front lower surface of member 7, while at the lower edge the spring latch 71 has limiting ears 81.

The unit or units are bolted through flanges 85 (FIG. 4) as a component of the ventilation system (FIG. 5 of the drawing) either at the top of the air intake column 87 or preferably inside of the shelter 89, as shown.

Operation

Referring to the lower portion of FIG. 1 showing the

device in its open position, the spring latch 71, pulled forward by spring 79 presses against the rear edge of abutment 37. Under ordinary wind pressure or a disturbance of similar intensity, movement of the door 21 inwardly is resisted by the engagement of ears 81 with lever 67 and by spring 79. Under the more violent force of a blast, the following action occurs.

During a positive blast phase, the air pressure which is exerted on the front plane of the suspended door 21, closes the door by pushing rearwardly the arm 35 which is in a somewhat inclined position.

Upon rearward advancement of the arm 35, the rear end of the abutment 37, which now begins to press and push rearwardly at the top front edge of the spring latch 71, stretches tension spring 79 and forces the spring latch to swing backward along with the latch lever 67 as a unit around the pivot pin 69 until the forward edge of the spring latch 71 rises above the abutment 37 thus disengaging same from the door mechanism and allowing the door to close unimpeded.

While the action just described is taking place, with the arm 35 moving rearwardly, the cam lock 49, which all this time is under constant tension of spring 61, rotates, bringing its camming edge 51 into contact with the inside of channel 39 and wedges itself against the inside bottom surface of the latter, locking and holding the door in the closed position.

To open the door of the unit, the operator inserts a suitable object in the hole 55, thereby lifting the cam lock 49. This action will disengage the cam lock from the channel 39 and release the door, which may then be opened by pushing channel 39 forward.

In moving forwardly and upwardly, the sloping forward face of abutment 37 slides freely under spring latch 71, so that the parts regain their first position.

In some situations, it might be desirable to have the device open automatically during the rarefaction phase

of the blast. By simply removing cam lock 49, this mode of operation can be attained.

Having fully described one particular form of our invention, it should be understood that we do not intend thereby to limit ourselves to the precise construction shown, but intend to include all modifications that fall within the spirit and scope of the invention as defined in the following claims.

We claim:

1. An anti-blast closure device comprising a front plate defining an opening and having a top member, a middle member, and a bottom member, said top, middle and bottom members being attached at right angles thereto, a door pivoted on said front plate at one side of said opening, a link spaced from said front plate, said link having a first end and a second end, said link being pivotally mounted at said first end in such a manner as to swing in a plane substantially perpendicular to said front plate, a rigid arm having an abutment joining, and pivotally connected to, said door and said second end of said link, a releasable spring latch engaging said abutment, a spring connected to said front plate and said latch and urging said latch and said arm toward said front plate, and a latch lever pivotally mounted on each end thereof to said spring latch and to said middle member for releasing said spring latch from said abutment when said door is moved a certain distance toward its closed position against the action of said spring.

2. An anti-blast closure device as defined in claim 1 and further comprising locking means operative when said door reaches its closed position to prevent it from reopening, said means comprising a pivoted cam lock with an arcuate camming edge positioned so as to engage said link and a spring urging said cam lock into constant engagement with said link, said cam lock being accessible for manual disengagement from said lock.

No references cited.