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2,530,160

DOOR SEAL

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Fig. 1.

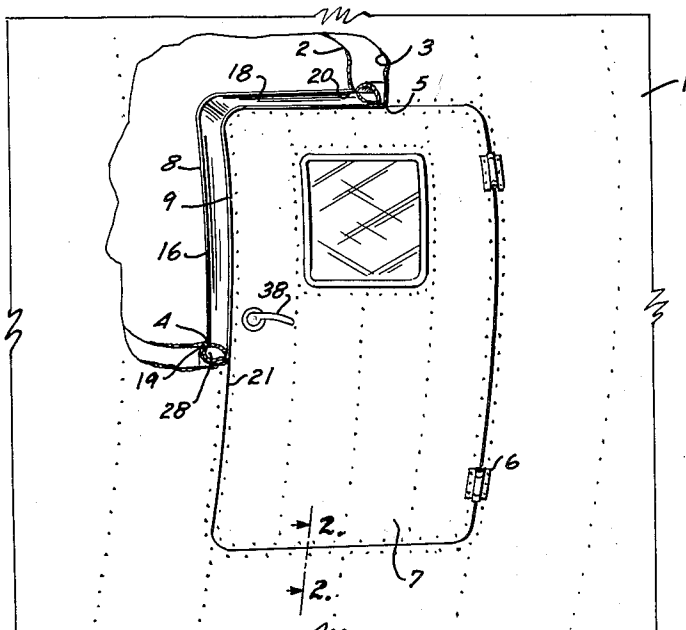


Fig. 2.

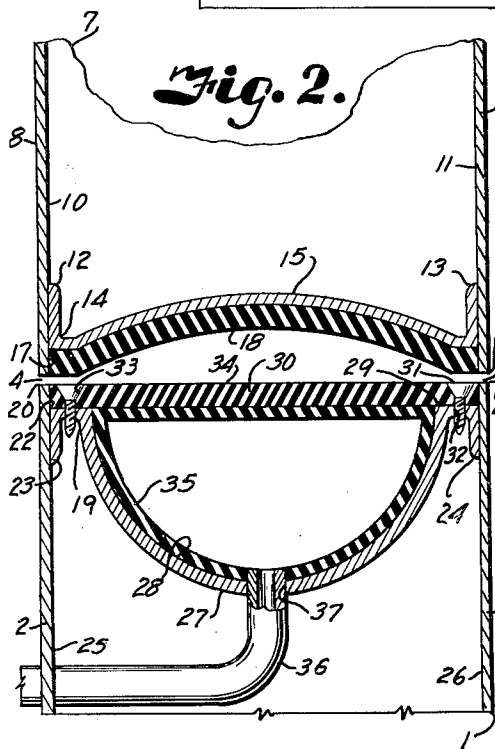
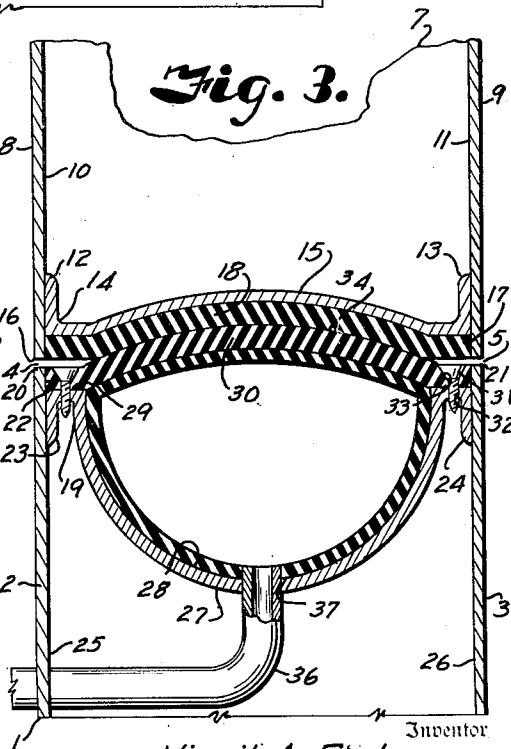


Fig. 3.



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DOOR SEAL

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2 Claims. (Cl. 20—69)

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This invention relates to door seals and more particularly to a device for completely sealing around doors and/or other closures for openings into chambers adapted to be pressurized.

The objects of the invention are to provide an expandible seal for doors and the like and adapted to be selectively engaged therewith to completely seal said door in the door opening; to provide a door casing with a pneumatic device for engaging in a recessed edge of a door for sealing same in the door opening; to provide a pneumatic door seal for pressurized chambers expandible into engagement with the door in response to air from the pressure system of the chamber; to provide a door seal adapted to break ice or the like from the door opening thereby facilitating easy and prompt opening of the door; to provide resilient facing on a door and door opening adapted to be moved into engagement for sealing the door in said opening; to provide flexible sealing members for protecting the pneumatic device; and to provide a door seal that is sturdy, efficient, and effective in all types of atmospheric conditions.

In accomplishing these and other objects of the present invention, I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a door in the wall of a pressure chamber, portions of the wall being broken away to illustrate a door seal embodying the features of the present invention.

Fig. 2 is a sectional view through the door and wall on the line 2—2, Fig. 1, the sealing members being disengaged.

Fig. 3 is a sectional view similar to Fig. 2, the sealing members being engaged for sealing the door in the opening.

Referring more in detail to the drawing:

1 designates a wall of an aeroplane, submarine or other chamber in which it is desirable to seal around door and like closures for wall openings to prevent air from passing to and from the chamber, whereby said chamber may be pressurized when desired. The wall may be of any suitable structure, the illustrated form consisting of spaced inside and outside panels 2 and 3 provided with aligned openings 4 and 5 respectively. Mounted on the wall, as by hinges 6, is a door 7 of suitable size and structure to substantially close the opening in the wall when said door is swung into alignment therewith.

The door preferably consists of spaced panels 8 and 9, slightly smaller than the openings 4 and

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5, to provide suitable clearance for swinging of the door. Secured to the inner faces 10 and 11 of the door panels 8 and 9, as by welding, are flanges 12 and 13 of a channel-like member 14 having a web 15 spaced from the edges 16 of the door panels, as at 17, to form a recess for a facing 18, suitably secured as by cementing to the web 15. The member 14 and the facing 18 extend completely around the edge of the door and are preferably concaved, forming a trough in said door edge for receiving a co-operating sealing member as later described. The facing 18 preferably is formed of medium hard rubber, and of one piece, however, more than one piece may be used by abutting the ends of said pieces whereby the edge of the door presents a substantially continuous surface toward the edges of the opening in the wall.

In the wall 1 a casing member 19 extends around the door opening and is spaced from the edges 20 and 21 of the panels 2 and 3 as at 22. The member 19 consists of flanges 23 and 24 suitably secured to the inner faces 25 and 26 of the panels 2 and 3 as by welding. Connecting the flanges 23 and 24 is a web 27, the mid portion of which is concaved to provide a substantially semi-circular groove 28 around the door opening, the side edges of the groove being spaced from the flanges 23 and 24, providing shoulders 29. A facing 30, preferably of medium hard rubber, is seated and secured to the shoulders 29 as by screws 31, the threaded shanks of which extend through countersunk openings 32 in the facing 30 and into threaded holes 33 in the web 27. The facing 30 preferably is of one piece, but may be formed in abutting sections and is of suitable thickness whereby when in normal condition permitting free opening of the door the outer surface 34 of the facing is substantially flush with the edges 20 and 21 of the panels 2 and 3, and said facing closes the groove 28 forming an expandible wall of said groove extending completely around the door opening. Suitable pressure may be applied to the groove to move the facing and in the illustrated form an expandible rubber tube 35 is preferably located in the groove 28 and extends around the door opening for exerting outward force on the facing 30 when air pressure is delivered to said tube through a suitable connection 36 which extends through an aperture 37 in the web 27 and is connected to a suitable air pressure supply (not shown), for example the air pressure system of the chamber.

In using a door seal constructed and assem-

bled as described, when there is no pressure in the tube 35 the facing 30 is substantially flush with the edges 20 and 21 of the wall panels as shown in Fig. 2 and the door may be swung freely on its hinges 6 to provide access to the chamber, a suitable latch indicated by the handle 38 being used to retain the door in closed position when desired. In order to insure an airtight closing of the door opening as when an aeroplane reaches high altitudes where it is necessary to pressurize the cabin, or in a submarine when submerging, the door is pulled flush and latched in the conventional manner and a valve or other suitable control (not shown) in the connection 36 operated to supply air pressure to the tube 35 for inflating same and applying pressure to the facing 30 to force said facing into sealing engagement with the door facing 18 as shown in Fig. 3. Forcing the facing 30 into the concave trough in the edge of the door forms an airtight seal around the door and also provides assistance for the door latch in insuring that the door will remain in sealed condition to withstand considerable pressure differential between the interior and exterior of the chamber. In cases of an aeroplane flying at high altitudes, ice may form on the surfaces and around the door seal. When it is desired to break the seal and any ice formation to open the door, the air pressure is released from the tube 35, deflating same and removing force from the facing 30, then under normal conditions the door could be opened by operating the door latch. If the door is frozen shut, additional air pressure is applied to the tube 35 and again released. This fluctuation of the air pressure will flex the facings 18 and 30 to quickly break any ice around the door seal.

While the expandible portion of the door seal is shown mounted in the wall 1, the arrangement of the sealing device may be reversed by placing the expandible portion in the door and forming the edge of the door opening in a trough, and similar results obtained.

It is believed obvious that I have provided a sturdy door seal, capable of selective operation to effect an absolutely tight door yet permit easy and prompt opening of the door in all kinds of weather conditions.

What I claim and desire to secure by Letters Patent is:

1. In a device of the character described, a wall of a chamber adapted to be pressurized, said wall being formed of spaced panels having aligned openings therein, means extending around the openings and connecting the panels to form a casing for the openings, said casing means having a recessed portion extending completely around said openings, a door hinged on the wall for movement into flush alignment with the openings, said door having a concaved portion extending around the peripheral edge, a resilient facing mounted on and extending around the concaved portion of the peripheral edge of the door, said facing conforming to the

shape of the peripheral edge of the door and forming a resilient lining therefor, a resilient flexible strip spanning the space between the panels and extending around the periphery of the openings therein and secured to the casing means adjacent the panels, and a pneumatic tube mounted in the casing recess behind the strip on said casing whereby inflation of the tube moves the mid portion of the strip between the wall panels into engagement with the resilient facing on the concave edge of the door compressing the engaging portions of the strip and facing for sealing and retaining the door in the openings.

2. In a closure for an opening in the wall of a chamber adapted to be pressurized, a frame in the wall surrounding the opening, a door mounted in said opening for movement into substantially closing relation thereto, the peripheral edges of said door being spaced from the edges of the opening, the peripheral portion of the door and the jamb portion of the frame having complementary opposed grooves extending completely around the edges thereof, the groove in the frame being of larger area than that of the door, a flexible and resilient facing of substantially uniform thickness extending around and secured to the peripheral edge of the door, said facing conforming to the contour of the groove in said door and forming a resilient lining therefor, a strip of flexible and resilient material spanning the groove of the frame and extending around the door opening, means securing the side edges of the strip to the frame adjacent the sides of the groove therein, the resiliency of the strip normally holding same in a straight line across the edges of the groove in the frame in spaced relation to the facing in the peripheral edge of the door, a pneumatic tube in the frame groove in engagement with the flexible strip, and means for selectively applying air pressure to the tube for expanding same to project the portion of the strip over said frame groove into the faced door groove and engagement with said facing compressing the engaged portions of the strip and facing for sealing and retaining the door in closed relation to the opening.

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