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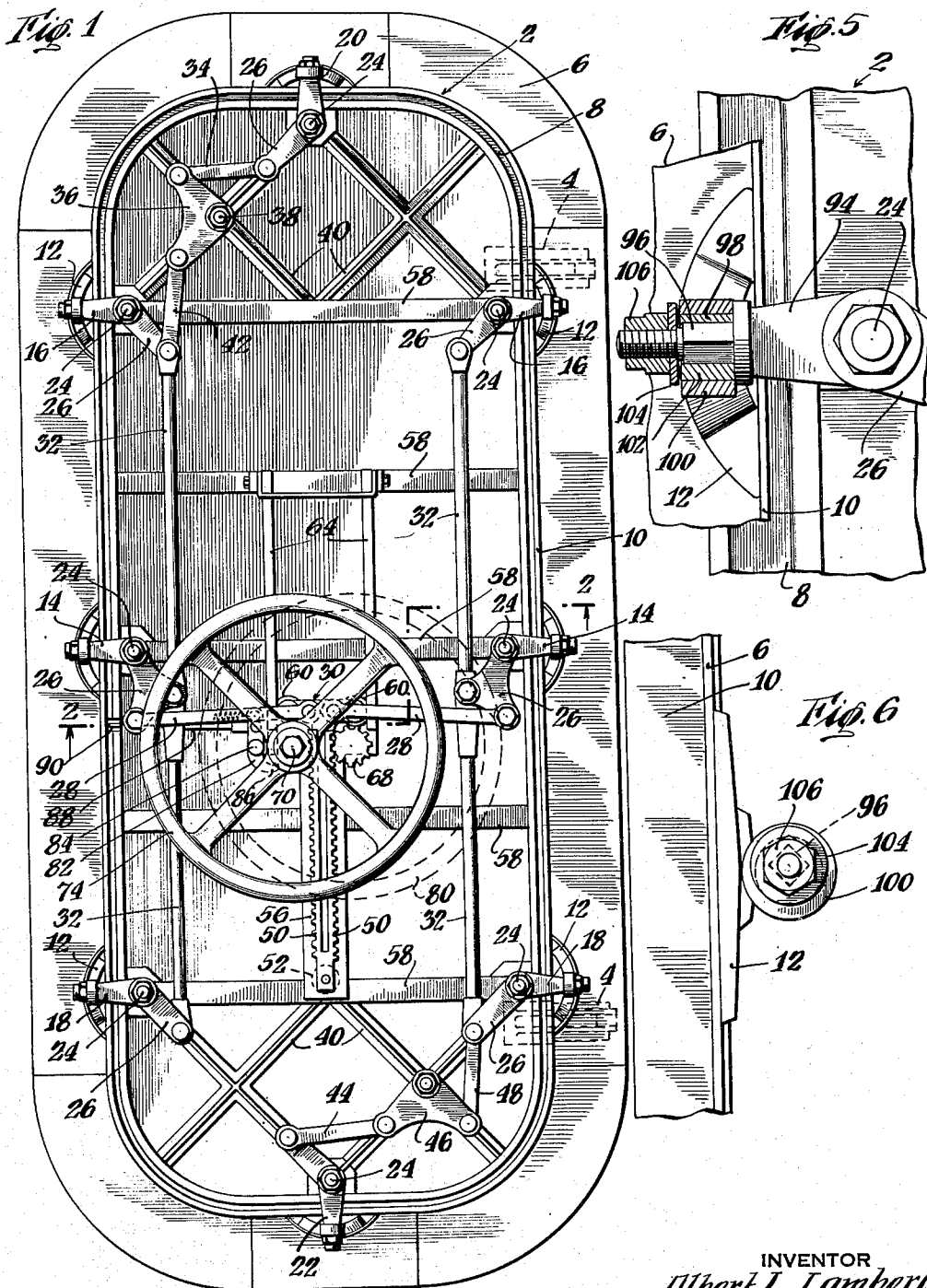
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2,209,060

QUICK ACTING DOOR

Filed Oct. 23, 1937

2 Sheets-Sheet 1



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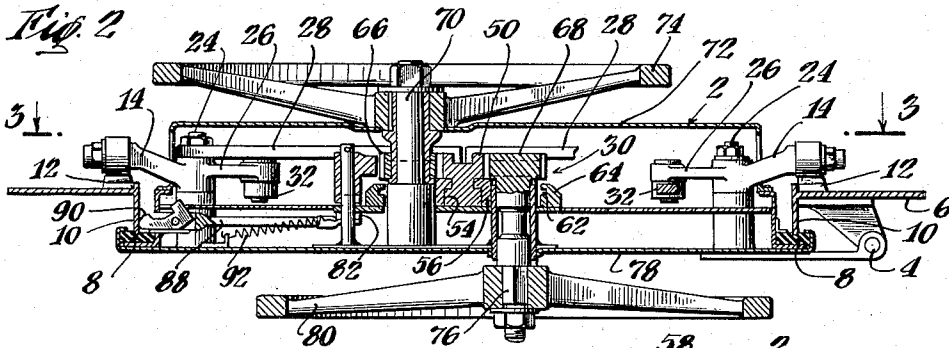
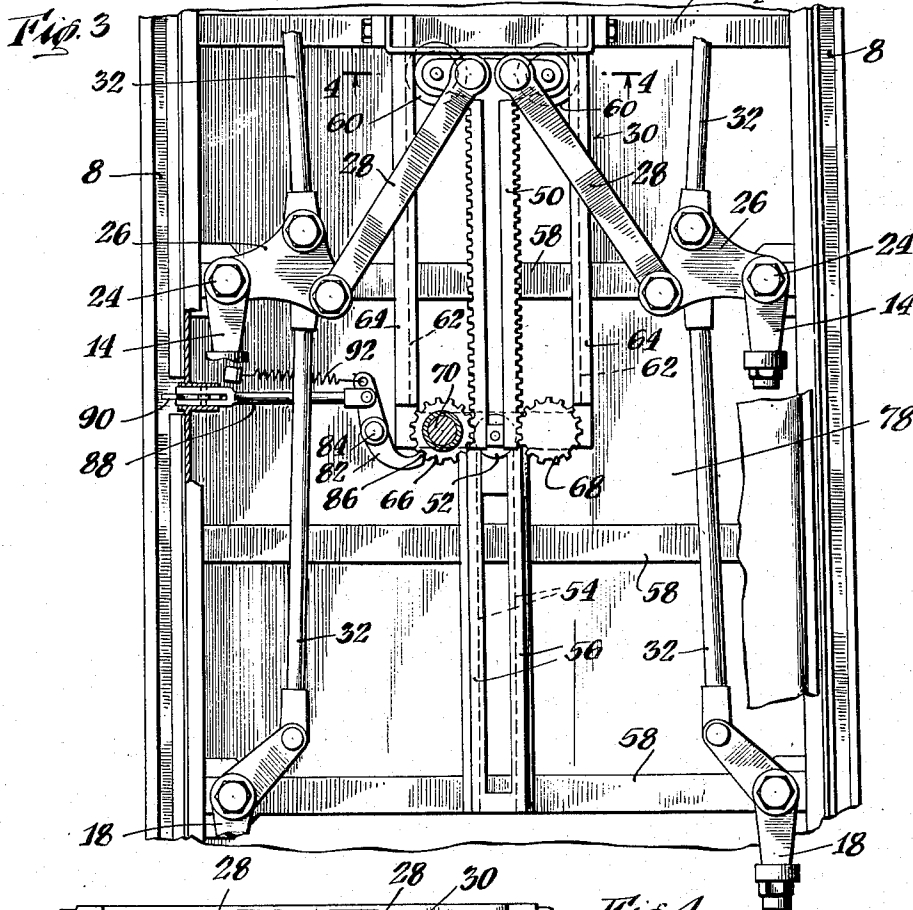
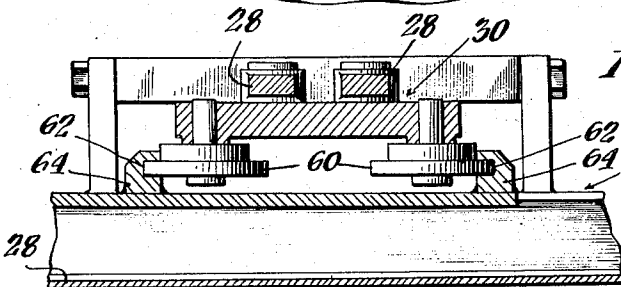
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QUICK ACTING DOOR

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2 Sheets-Sheet 2



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QUICK ACTING DOOR

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14 Claims. (Cl. 114—117)

This invention relates to ship doors, hatches and similar closures, and to fastening means therefor by which the closure may be urged toward a frame and into contact with a gasket for sealing an opening in the frame.

Constructions of this type have heretofore been provided with dogging members for urging the door or closure toward a frame, and in some instances a number of dogging members have been located at spaced points about the edges of the closure and opposite to hinges by which it is supported, in order to apply pressure to the closure at a number of points along the edges thereof. In such cases the dogging members employed are usually operated independently, with the result that pressure may be applied unequally to different parts of the closure tending to warp the closure and placing unequal strain on the dogging members and unequal pressure on different parts of the sealing gasket. The use of a plurality of dogging members, each of which is operated independently also causes considerable delay in releasing the door or hatch to open the same. Moreover, the dogging members used to retain ship doors and hatches tend to become loosened due to the vibrations set up by the ship propeller or shocks incident to gun fire. In such cases the door may open, or excessive strain may be placed upon those dogging members remaining in securing position.

In accordance with the present invention, these objections to construction of the prior art are overcome by providing dogging members with operating means therefor which when the door is in closed position tend continually to urge the dogging members into securing position and to prevent release thereof in response to vibration or shock.

In order to insure ready closing of the door or hatch, the invention also includes means for holding the dogging members in retracted position when the door is opened and for releasing the dogging members for movement into their locking position on closing of the door.

The invention further includes opposed or balanced means for actuating dogging members adjacent opposite edges of the door serving to apply substantially uniform pressure throughout the periphery of the door. The operating means of the present invention also allow flexing or distortion of the door when in use, without injury to the dog operating means.

One of the objects of the invention is to provide a ship door or hatch with means normally

tending to urge dogging members into their door securing position.

A further object of the invention is to provide a novel type of operating means for the dogging members on ship doors and the like which allow flexing of the door without injury to the operating means and insure uniform and balanced operation of the operating means and dogging members.

These and other objects and features of the invention will appear from the following description thereof, in which reference is made to the accompanying figures in the drawings, wherein:

Figure 1 is a view in elevation of a typical ship door and fastening means therefor embodying the present invention, with the inner cover plate of the door removed;

Figure 2 is an enlarged horizontal sectional view of a portion of the construction illustrated in Figure 1, taken on line 2—2 thereof;

Figure 3 is an elevation of a portion of the construction illustrated in Figure 1 with the parts shown in their closure releasing position, the view being partly in vertical section, as indicated by the line 3—3 of Fig. 2;

Figure 4 is a horizontal sectional view of a portion of the construction illustrated in Figure 3, taken on line 4—4 thereof;

Figure 5 is an enlarged detailed view, partly in section, illustrating one of the dogging members employed in the construction of Figure 1; and

Figure 6 is an end view of the dogging member illustrated in Figure 5, as seen from the left thereof.

In that form of the invention illustrated in the figures of the drawings, a ship door, indicated generally at 2, is pivotally supported by hinges 4 carried by a frame 6. The door is movable into position to engage and compress a gasket 8 carried by the door and extending about the marginal portion thereof in position to engage an abutment 10 on the frame to seal the door opening.

Dogging members carried by the door are movable into and out of engagement with cam blocks 12 located on the frame at suitable points about the circumference of the door. Any desired number of dogging members may be used, but, as shown, a central dogging member 14 is located adjacent each of the vertical edges of the door midway of the length thereof, upper dogging members 16 and lower dogging members 18 are spaced from the central dogging members along each vertical edge of the door and a top dogging member 20 is located adjacent the up-

per horizontal edge of the door while a bottom dogging member 22 is located adjacent the lower horizontal edge of the door. In this way the door is urged toward the door frame and into position to compress the gasket 8 at points located adjacent both the free and the hinged edges of the door and adjacent both the top and bottom thereof. The force applied in urging the door toward the frame thus is applied throughout the periphery of the door and the hinges are relieved of force which otherwise would be applied thereto on actuating dogging members adjacent the free edge of the door only.

The dogging members are connected to suitable operating means, in such a way that they are each given the same arcuate movement on actuating the operating means. In this way the camming action and the force applied to the door throughout the periphery thereof is substantially uniform. Each of the dogging members is movable about a pivot 24 and is provided with an operating arm 26 for moving the dogging member into and out of engagement with the cam block 12 associated therewith. The operating arms 26 of the dogging members 14 which are located centrally of the vertical edges of the door are connected by links 28 to suitable actuating means indicated generally at 30 and are also connected by links 32 to the operating arms 26 of the upper and lower dogging members 16 and 18. The top dogging member 20 is connected by a link 34 to a bell crank 36 mounted on a pivot 38 secured to reinforcing members 40 on the door. The bell crank 36 in turn is connected by a link 42 to the operating arm 26 of the upper dogging member 16 on one of the vertical edges of the door. The bottom dogging member 22 is similarly connected through link 44, bell crank 46 and link 48 to the lower dogging member 18 on the opposite side of the door. With this construction, operation of the actuating means 30, which serves to rotate the central dogging members 14 about their pivots into a retracted position also serves to move each of the dogging members 16, 18, 20 and 22 through a similar arc from the position illustrated in Figure 1, in which the door is secured against opening into the position illustrated in Figure 3, in which the door is released so that it may be opened.

The actuating means 30 to which links 28 are connected for operating the dogging members includes a rack 50 formed at its lower end with a member 52 slidable within grooves 54 in lower rails 56 mounted on reinforcing members 58 on the door. The upper end of the rack 50 is provided with spaced rollers 60 movable in grooves 62 in upper rails 64 which also are mounted on reinforcing members 58. The member 52 at the lower end of the rack 50 and the rollers 60 at the upper end thereof are formed to allow considerable play between them and the rails along which they move, and since the rails are independently supported by the transversely extending reinforcing member 58 on the door, any distortion of the door when subjected to severe pressure will not bend the rails so as to prevent free movement of the rack 50 in operating the door.

The links 28 extend in opposite directions from the rack 50 and since they are of equal length and in opposed relation their movement and the movement of the dogging members are similar and their reaction on the rack is balanced, insuring proper operation at all times.

The rack 50 is raised and lowered by pinions

66 and 68, which engage teeth on opposite sides of the rack 50. The pinion 66 is carried by a shaft 70 projecting through the cover plate 72 on one face of the door and provided with a hand wheel 74 for operating the actuating means. The pinion 68 is carried by a similar shaft 76 projecting through the cover plate 78 on the opposite face of the door and a hand wheel 80 is secured to shaft 76 to operate the actuating means. This construction serves to cause rotation of the hand wheel 74 in a counterclockwise direction, as seen in Figure 1, to raise the rack 50 and actuate the dogging members to retract the same, whereas clockwise rotation of the hand wheel 74 serves to lower the rack 50 and to move the dogging members into door-securing position. Similarly when facing the door from the opposite side thereof rotation of the hand wheel 80 in a counterclockwise direction (clockwise, as seen in Figure 1) serves to raise the rack 50 and release the door, whereas rotation of the hand wheel 80 in the opposite direction serves to lower the rack and move the dogging members into engagement with the cam blocks on the frame. It will thus be seen that similar, say counter-clockwise, operation, of the hand wheels 74 and 80 when facing the door on either side thereof serves to actuate the dogging members in a like manner to release the door for opening the same, whereas opposite, say clockwise, rotation of the hand wheel will serve to secure the door in closed position. An operator who is accustomed to opening the door by rotation of the hand wheel in one direction may therefore actuate the dogging members readily from either side of the door and without delay.

The construction illustrated normally tends to urge the dogging members into closed position by reason of the fact that the rack 50 is continuously urged downward by gravity and it therefore tends to cause the actuating means to move each of the dogging members into door retaining position. Vibration or shock due to the throbbing of a propeller or gun fire, therefore, tends to cause the door to be urged more tightly against the frame by which it is carried and to compress the gasket so as to insure sealing of the door opening at all times and under all conditions of use.

This gravity actuation of the dogging members also tends to move them to their locking position when the door is opened and if this were permitted, the door could not again be closed until the dogging members had been retracted to permit the door to enter the opening in the door frame. In order to avoid such gravity actuation of the dogging members when the door is opened, latch 82 is pivotally mounted at 84 on the door and is provided with a free end 86 for engaging the teeth of the pinion 66 by which the rack 50 is raised and lowered. The opposite end of the latch 82 is connected by a rod 88 to a trip member 90, positioned to engage the door frame on movement of the door into its closed position. A spring 92 normally urges the latch 82 into engagement with the teeth of the pinion 66, but the latch is retracted by inward movement of the trip member 90 and rod 88 against the action of the spring 92. In this way the pinion 66 and rack 50 are released for downward movement under gravity when the door is closed, whereas on opening the door the spring 92 urges the latch into engagement with the pinion 66 and prevents downward movement of the rack, thereby preventing movement of the dogging

members into their locking position when the closure is opened.

In view of the fact that the door may be warped or bent in use and the gasket may become compressed to a greater extent on one side of the door than the other, the dogging means preferably are formed in such a way that they may be changed selectively from time to time to urge the closure a greater or lesser distance toward the frame on predetermined arcuate movement thereof.

As illustrated in Figures 5 and 6, this may be accomplished by providing each of the dogging members with an arm 94 rotatably mounted on the pivot 24 and having a shank 96 which is polygonal in form and carries a bearing 98 having a similar polygonal opening therein for engaging the shank 96. A roller 100 is rotatably mounted on the bearing 98 and is selectively positioned with respect to the arm 94 of the dogging member by suitably positioning the bearing member 98, to locate the thickened portion 102 thereof toward or away from the cam block 12 over which the roller moves. The bearing 98 and roller 100 are held in place by means of a washer 104 and a nut 106, which is threaded onto the end of the shank 96 of the arm 94.

With this construction the position of the roller 100 carried by any one or more of the dogging members located about the periphery of the closure may be readily changed to compensate for any warping or bending of the door or for unequal deformation of the gasket so that the force with which the door is urged against the gasket to compress the same and seal the door opening upon predetermined arcuate movement of the dogging members may be maintained uniform.

The operation of the form of the invention illustrated will be apparent from the foregoing description thereof. The dogging members may be moved simultaneously and uniformly into door securing or door releasing position by similar operation of the operating means on opposite sides of the door. In the event the door is flexed or bowed inward under heavy pressure, the door actuating means and the guides therefor may move relative to one another without taking a permanent set, whereas if the door should warp or the gasket be compressed unevenly, the dogging members may be adjusted readily to compensate for such changes and to urge all parts of the door into engagement with the gasket by similar movements of the dogging members.

Moreover, when the door is in closed position the actuating means continuously tend to urge the dogging members toward their door securing position whereas when the door is opened the dogging members are held in their door releasing position. The construction of the mechanism is simple and its operation is rapid and effected by similar movements, so that delays and confusion in operating the same are avoided.

While the invention has been illustrated as applied to a ship door and a preferred form of operating means for the dogging members has been shown, it will be apparent that the invention is applicable to other types of closures and the actuating means employed may be suitably varied without departing from the spirit of the invention. It should therefore be understood that the form of the invention shown in the drawings and herein described is intended to be illustrative of the invention and is not intended to limit the scope thereof.

I claim:

1. In a closure structure comprising a frame

member, a closure member engageable with said frame member and means including cam surfaces secured to one of said members and coactive dogging members secured to the other of said members for securing said closure member to said frame member; the combination of means biased in one direction to movingly urge said dogging members into engagement with said cam surfaces to force said closure member toward said frame member, said dogging members and said biased means operating to urge said closure member tighter against the frame member in response to vibrations and other similar disturbances, means for moving said biased means in another direction to move said dogging members out of engagement with said cam surfaces to release said closure member, and means responsive to an opening movement of said closure member to prevent movement of said dogging members to closure retaining position.

2. In a closure structure comprising a frame, a closure engageable with said frame and means including cam surfaces and coactive dogging members for securing said closure to said frame; the combination of means including interconnecting mechanism arranged for movement by action of gravity to maintain a force adapted to urge said dogging members into engagement with said cam surfaces for securing said closure to said frame, manually operable means for moving said dogging members to closure releasing position, and means engageable with said mechanism to prevent movement thereof when said closure is moved away from said frame.

3. In a closure structure comprising a frame and a closure engageable therewith, said frame being provided with cam surfaces and said closure with dogging members adapted to engage said cam surfaces; the combination of mechanism carried by said closure including links operatively connected to said dogging members and means biased by action of gravity to urge said dogging members into engagement with said cam surfaces to force said closure toward said frame, means operatively connected to said mechanism for moving said dogging members to closure releasing position, and means associated with said mechanism and engageable with said frame to hold said dogging members in closure releasing position upon movement of said closure away from said frame and to release said mechanism for actuation of said dogging members upon movement of said closure toward said frame.

4. In a structure including a closure such as a ship door or hatch comprising a panel and stiffening members, a frame for said door, dogging members carried by said door and movable into and out of engagement with said frame to retain and release the door and links operatively connected to said dogging members; the combination of actuating means operatively connected to said links to move the dogging members simultaneously into and out of a door retaining position, including a rack having teeth on opposite sides thereof, guide means for said rack supported by said stiffening members, means on said rack cooperating with said guide means to guide said rack in its movements, pinions located on opposite sides of said rack and meshing the teeth thereon and operating members located on opposite sides of said door, one of which is connected to one of said pinions and the other of which is connected to another of said pinions whereby similar operating movements of either

of said operating members serve to impart similar movements to said dogging members.

5 In a structure including a frame and a closure therefor, said frame being provided with cam surfaces and said closure with a plurality of dogging members located at spaced points about the periphery thereof, said dogging members being pivotally mounted for movement into and out of engagement with said cam surfaces, operating arms connected to said dogging members and links connected to said operating arms; the combination of a vertically movable member connected to said links, said member being movable upwardly to move said dogging members out of engagement with said cam surfaces, and movable downwardly under the action of gravity to urge said dogging members into engagement with said cam surfaces.

20 6. In a structure including a frame and a closure therefor, said frame being provided with cam surfaces and said closure with a plurality of dogging members located at spaced points about the periphery thereof, said dogging members being pivotally mounted for movement into and out of engagement with said cam surfaces, operating arms connected to said dogging members and links connected to said operating arms; the combination of a vertically movable member connected to said links to simultaneously actuate said dogging members, manually operable means for raising said vertically movable member to move said dogging members out of engagement with said cam surfaces, and means for retaining said vertically movable member in raised position when the closure is open and to release said vertically movable member for movement downward under the action of gravity when the closure is moved to closed position.

40 7. In a structure including a frame and a closure therefor, said frame being provided with cam surfaces and said closure with a plurality of dogging members located at spaced points about the periphery thereof, said dogging members being pivotally mounted for movement into and out of engagement with said cam surfaces, operating elements connected to said dogging members, links connected to said operating elements, and common actuating means for simultaneously actuating said dogging members a like extent; said dogging members and the actuating means therefor being characterized by the fact that each dogging member includes a shank, a friction reducing roller carried by said shank and means for selectively varying the position of the axis of said roller with respect to the center line of said shank to urge different parts of said closure different distances toward said frame by a predetermined movement of said actuating means.

60 8. In a structure including a water-tight closure such as a ship door or hatch, a frame, hinged means for supporting the closure during movement toward and away from said frame and a gasket sealing the space between the closure and frame; the combination of means including pivotally movable dogging members serving to urge the closure toward the frame and to compress said gasket, each of said dogging members including a shank with a friction reducing roller thereon, common actuating means for moving said dogging members through arcuate paths of substantially equal extent to force said closure against said gasket, and means for adjustably supporting each roller on its shank whereby the distance said closure is urged toward the frame

by operation of said actuating means may be varied.

9. In a structure including a frame and a closure therefor, said frame being provided with cam surfaces, said closure being provided with a plurality of dogging members located at spaced points about the periphery thereof in position to be brought into engagement with said surfaces, said dogging members being mounted for movement into and out of engagement with said cam surfaces to retain and release said closure, and operating arms connected to said dogging members; the combination of actuating means operatively connected to said operating arms, said actuating means being movable in one direction to move said dogging members out of engagement with said cam surfaces, and movable in a second direction to urge said dogging members into engagement with said cam surfaces, said actuating means including an element adapted when the closure is in closed position to continually exert a force in said second direction so as to urge said dogging members along said cam surfaces to force said closure into tighter engagement with said frame when subjected to vibration or like disturbances, and means for moving said actuating means to release said closure.

10. In a structure including a frame and a closure therefor, said frame being provided with cam surfaces, said closure being provided with a plurality of dogging members located at spaced points about the periphery thereof in position to be brought into engagement with said surfaces, said dogging members being mounted for movement into and out of engagement with said cam surfaces to retain and release said closure, and operating arms connected to said dogging members; the combination of means for operatively interconnecting said arms including means adapted when the closure is in closed position to continually urge said dogging members into engagement with and along said cam surfaces whereby vibrations or the like tend to cause the closure to tighten against the frame, and means operatively connected to said interconnecting means for moving said dogging members to release said closure.

11. In a structure including a frame and a closure therefor, said closure comprising a marginal stiffening member and a panel secured thereto, a plurality of dogging members located at spaced points along said marginal member, for movement into and out of engagement with said frame to retain and release said closure, and operating arms connected to said dogging members; the combination of reinforcing members secured to said marginal member, means operatively connected to said operating arms for actuating said dogging members, and means mounted on said reinforcing members in spaced relation to said panel for supporting said actuating means so that when said door is subjected to pressure the panel may flex without distorting said actuating means.

12. In a structure including a frame and a closure therefor, said closure comprising a marginal stiffening member and a panel secured thereto, a plurality of dogging members located at spaced points along said marginal member, for movement into and out of engagement with said frame to retain and release said closure, and operating arms connected to said dogging members; the combination of reinforcing members secured to said marginal member, means supported by said reinforcing members independently of said

panel comprising a movable rack operatively connected to said operating arms for actuating said dogging members, means for guiding said rack including friction reducing rollers and manually actuable pinion means meshing the teeth of said rack.

13. In a ship door comprising a marginal stiffening member, a panel secured thereto and dogging members for securing said door to a frame; the combination of means for actuating said dogging members comprising a movable rack and guide means for said rack supported from said marginal stiffening member in spaced relation to said panel, whereby flexing movements of said panel do not distort said guide means.

14. In a structure including a frame and a closure therefor, said frame being provided with cam surfaces, said closure being provided with a plurality of dogging members located at spaced points about the periphery thereof in position to

be brought into engagement with said surfaces, said dogging members being mounted for movement into and out of engagement with said cam surfaces to retain and release said closure; the combination of means for operatively interconnecting said dogging members including a leverage mechanism having an element movable between upper and lower positions relative to said door, means operatively associated with said mechanism to effect movement of said element toward said upper position to retract said dogging members from engagement with said cam surfaces and toward said lower position to urge said dogging members along said cam surfaces, and the weight of said element being disposed to continually urge said dogging members into tighter engagement with said cam surfaces when the door is in closed position.

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