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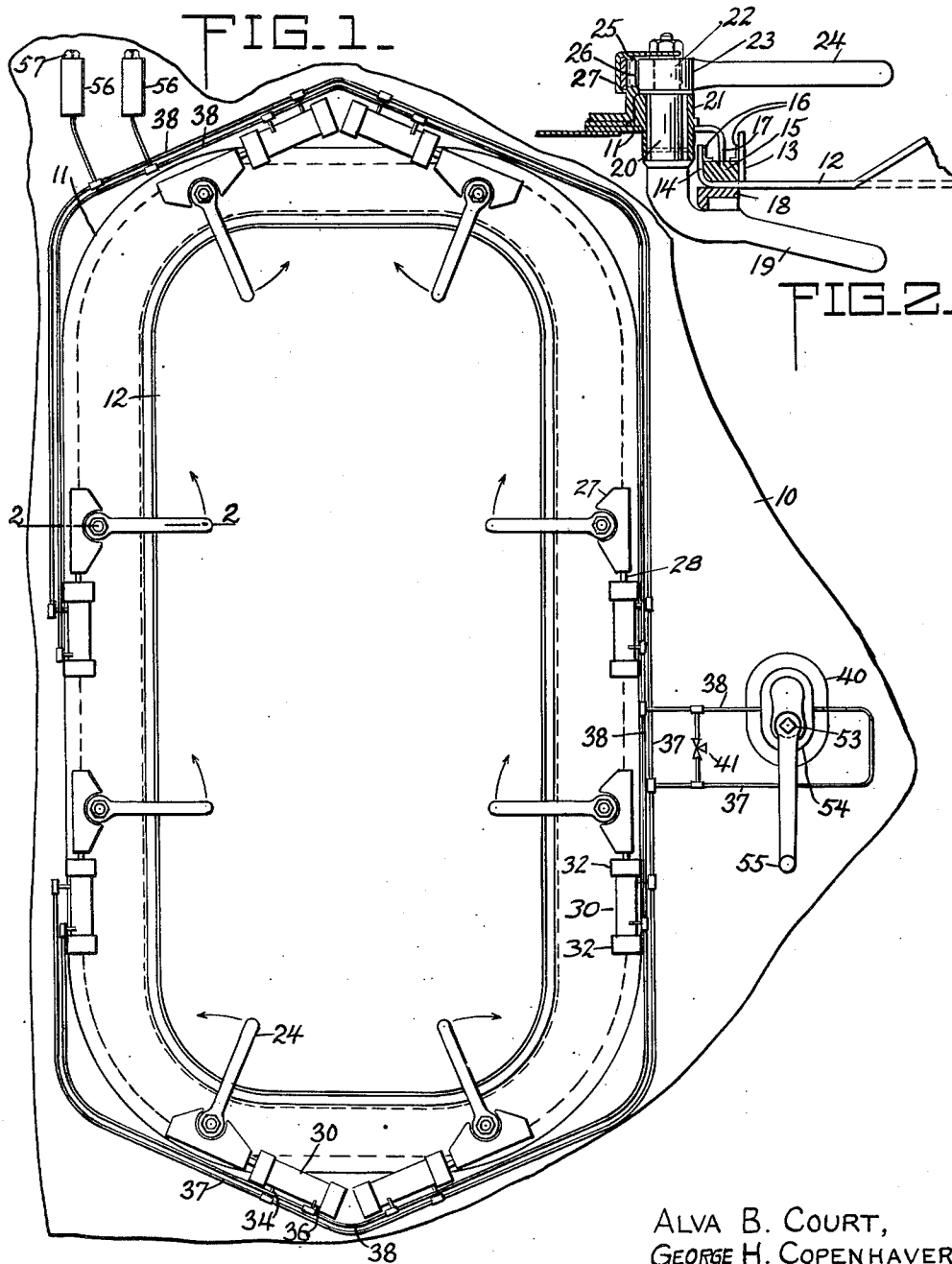
A. B. COURT ET AL

2,179,495

DOOR AND HATCH CLOSURE

Filed Dec. 29, 1938

4 Sheets-Sheet 1



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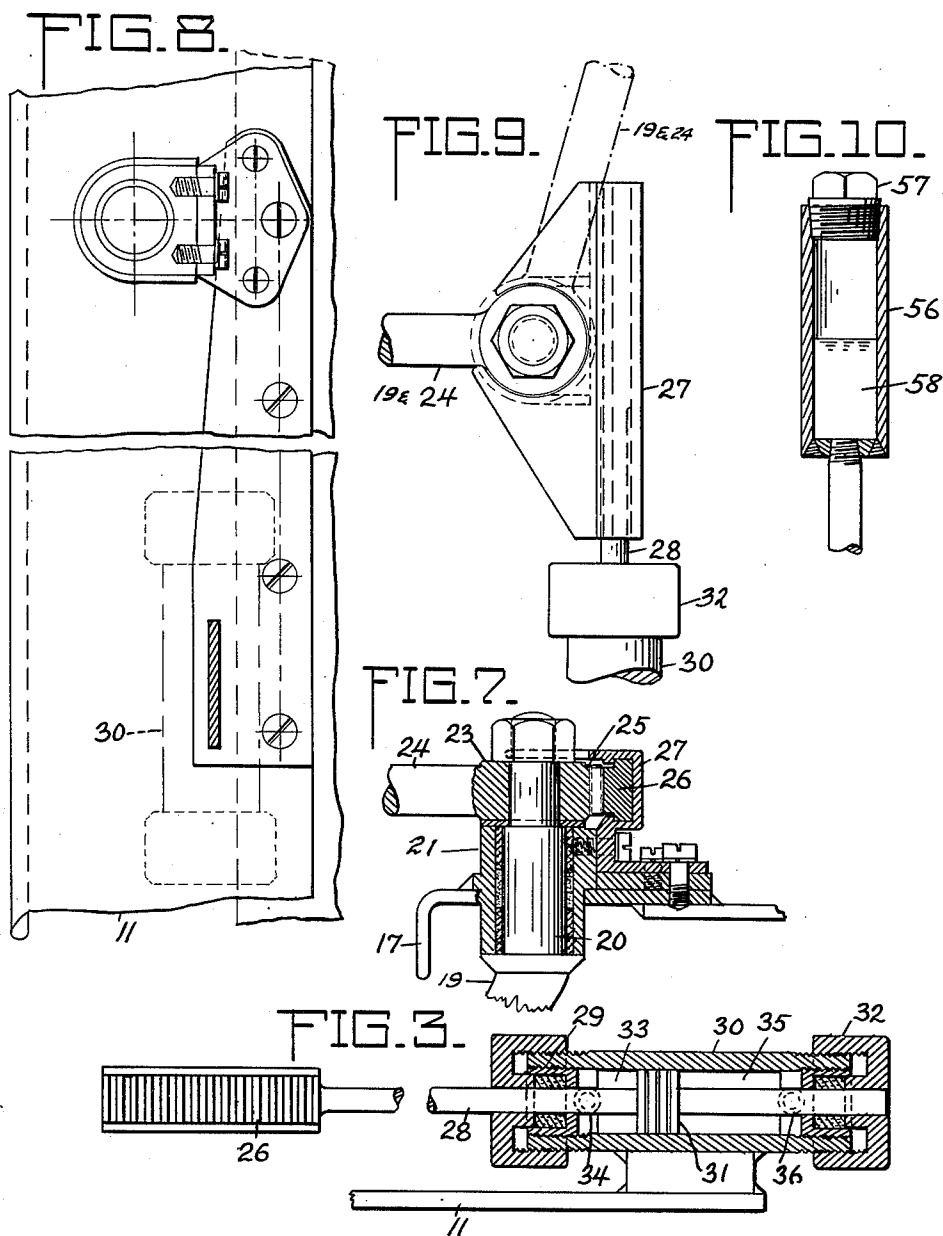
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4 Sheets-Sheet 2



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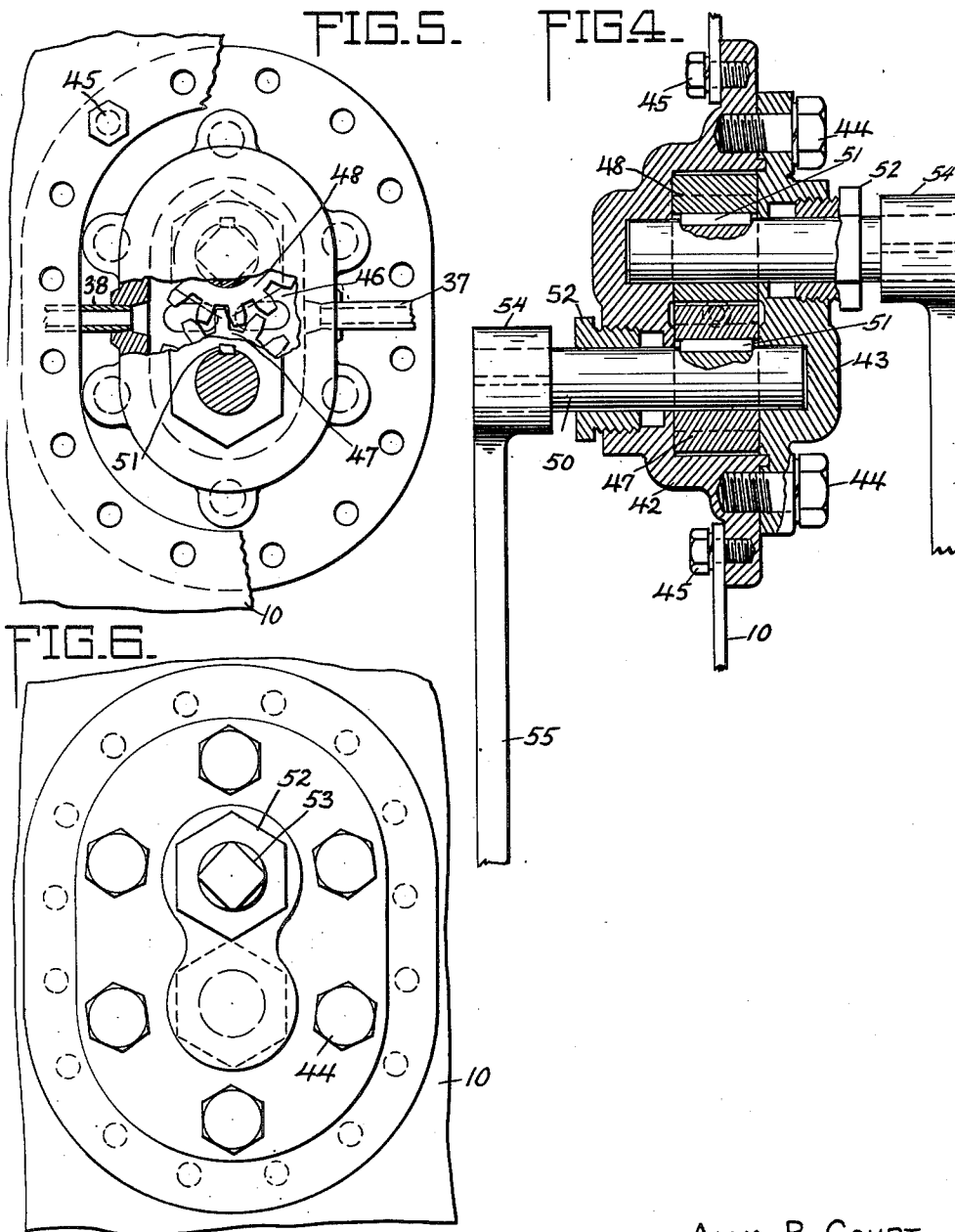
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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

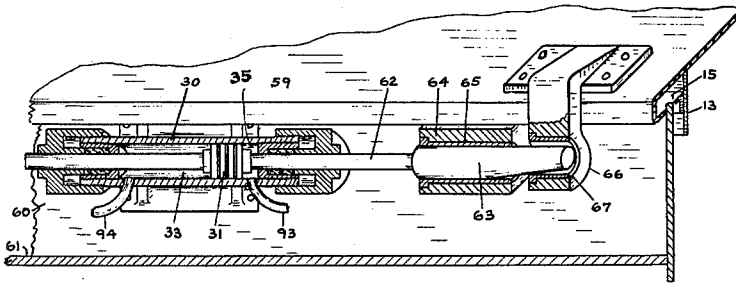


FIG. 11

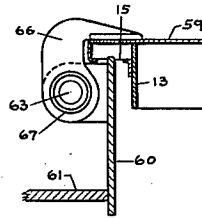


FIG. 12

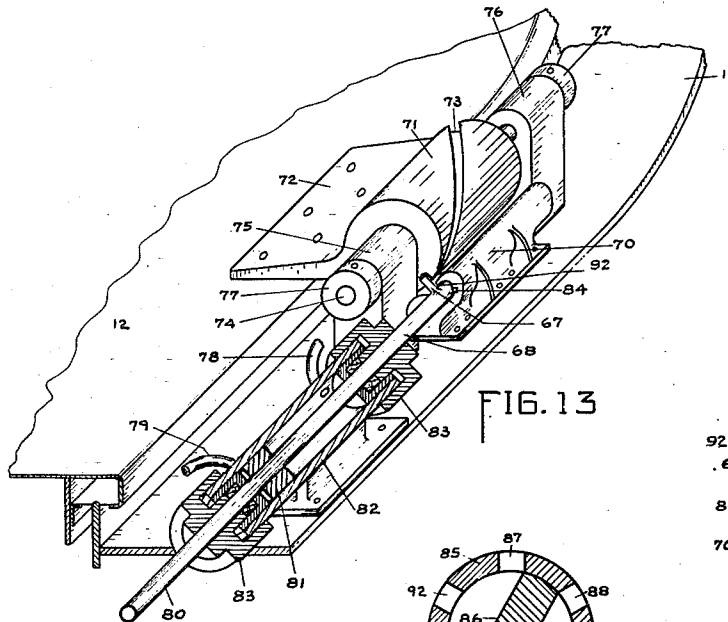


FIG. 13

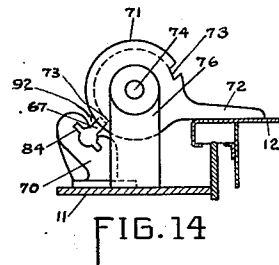


FIG. 14

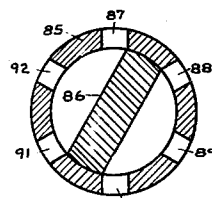


FIG. 15

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DOOR AND HATCH CLOSURE

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2 Claims. (Cl. 114—116)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This invention relates to a door or hatch closure, and has for an object to provide an improved door or hatch closure especially intended for use on fluid-tight doors and hatches such as are used in ships and submarines.

A further object of this invention is to provide a door or hatch closure which is hydraulically operated and serves to apply uniform pressure about the entire edge of the door or hatch and hold it in fluid-tight position.

A further object of this invention is to provide a door or hatch closure including dogging means which is uniform and self-adjusting about the entire periphery of the door or hatch.

A further object of this invention is to provide a door or hatch closure wherein each dog has an auxiliary hand control.

A further object of this invention is to provide a door or hatch closure wherein substantially the entire weight of the closure and the hydraulic operating mechanism is carried by the bulkhead or deck and not by the door or hatch, thus reducing the weight to be handled in opening or closing the door or hatch.

A further object of this invention is to provide a gear pump that is extremely compact in size for providing the hydraulic pressure for operating the dogs of the door or hatch closure of this invention to either cover releasing or closing position.

A further object of this invention is to provide a compact pressure producing pump which may be mounted in the plane of a bulkhead wall or deck and operated in an identical manner from either side thereof.

A further object of this invention is to provide a hydraulically operated means of rotating a door or hatch from the open to the closed position and vice versa.

With the foregoing and other objects in view, the invention consists in the construction, combination and arrangement of parts hereinafter described and illustrated in the drawings, in which,

Fig. 1 is an elevational view of a fragment of a bulkhead having a door to which the door closure of this invention has been applied.

Fig. 2 is a sectional view on line 2—2 of Fig. 1.

Fig. 3 is a partly sectional view of the dog operating cylinder and the dog rack for the rotary type of dogging means.

Fig. 4 is a partly sectional view through the gear pump of this invention.

Fig. 5 is a partly broken away elevational view of the gear pump from the left side of Fig. 4.

Fig. 6 is a full elevational view of the gear pump from the right side of Fig. 4.

Fig. 7 is a partly sectional view of the rotary type dog operating mechanism on a larger scale than in Fig. 2.

Fig. 8 shows the door frame and cylinder support.

Fig. 9 is an enlarged fragmentary view of the dog and operating cylinder.

Fig. 10 is a sectional view of the fluid expansion cylinder.

Fig. 11 is a fragmentary view of the reciprocating type of dogging mechanism as applied to a hatch or door cover.

Fig. 12 is a partly sectional end view of Fig. 11.

Fig. 13 is a partly broken away diagonal view of the door or hatch closing mechanism as applied to the hinge of the door or hatch.

Fig. 14 is a partly sectional end view of Fig. 13 looking from the upper right hand end downward towards the left; and

Fig. 15 is a diagrammatic sectional view of a six-ported valve for use in applying hydraulic pressure selectively to the door or hatch closing and dogging mechanisms.

There is shown at 10 a bulkhead of the type in common use in ships and submarines having a door frame 11, to which is hinged a door 12 in any conventional manner. The door 12 is provided along its periphery with a stiffening bar 13 cooperating with a flanged edge 14 of the door for holding a packing member 15 therein by suitable securing beads 16. Between the beads 16 the packing member is exposed for contact with a knife-edge 17 on the door frame 11, so that when the door 12 is urged against the door frame 11 a water-tight connection is obtained between the packing member 15 and the door frame knife-edge 17.

In order to urge this door 12 into such water-tight position, an arc-shaped wedge 18 mounted on door 12 is provided for engagement with a projection on dog handle 19, which handle 19 is provided with a stem 20 journaled through a bearing 21 extending through the door frame 11. The stem 20 is provided with a reduced neck 22, non-circular in shape, to receive a complementary shaped hub 23 of a handle 24 keyed thereon, the handle 24 being located on the opposite side of the bulkhead from the handle 19, so that operation of either handle 24 or handle 19 will cause the projection on handle 19 to engage or disengage wedge 18. The hub 23 of handle 24 is provided with a tooth gear sector 25 which, in turn, meshes with a rack 26 slidable within a

trackway 27, whereby linear movement of rack 26 provides rotative movement of gear sector 25 to rotate the reduced neck 23, stem 20, and thus operate dog handle 19.

5 The rack 26 has a connecting rod 28 extending therefrom through a packing gland 29 and into a cylinder 30, through piston 31, and terminating within or beyond a second packing gland 32, thereby obtaining equal effective area on both
10 sides of the piston. The cylinder 30 is provided with a cylinder chamber 33 on one side of the piston 31 connected to a conduit 34, and with a cylinder chamber 35 on the other side thereof connected to a conduit 36. As is obvious, causing
15 a pressure to flow through one of the conduits into its cylinder chamber on one side of piston 31 and permitting it to flow out of the cylinder chamber on the other side of the piston through
20 the other conduit will move the piston in one direction, and with it simultaneously move the rack 26 to operate the dog handle 19 to engage wedge 18 and thereby urge door 12 into water-tight contact with knife-edge 17 of frame 11.

Conduit 34 is connected by a T-joint to a pressure line 37 and the other conduit 36 is similarly
25 connected to another pressure line 38. The pressure lines 37 and 38 are each connected to opposite sides of a pressure pump 40, mounted through the bulkhead 10. A by-pass valve 41 connects the line 37 to the line 38 so that the pump
30 may be by-passed if desired to permit manual operation or adjustment of the dog handles 19 and 24.

As will be apparent from Fig. 1, as many dogs,
35 handles and operating cylinders may be provided as desirable, each one individually joined to both lines 37 and 38, so that all of the dogs will be simultaneously operated to either door closing or door releasing position when pressure is applied
40 through one or the other of the pressure lines 37 and 38 by means of the pump 40. The pump 40, as shown in Figs. 4, 5, and 6, includes a housing 42 and a cover plate 43 secured thereto by bolts 44, the pump itself being secured in position by
45 bolts 45.

Within the pump 40 in a chamber 46 formed by the housing 42 and the plate 43 there are provided a pair of meshed gears 47 and 48, the chamber 46 being of such a size that the gears 47 and
50 48 substantially fill the ends thereof.

The pressure lines 37 and 38 enter into the chamber 46 through the opposite sides thereof along a line extending substantially through the intermeshed teeth of the gears 47 and 48. Each
55 gear 47 and 48 is provided with a shaft 50 keyed therein as at 51, and extending through a packing gland 52 and ending in a squared end 53 for receiving a complementary shaped hub 54 of a crank handle 55. These shafts 50 each extend
60 from opposite sides of the pump 40, whereby one crank handle 55 is on one side of bulkhead 10 and the other crank handle is on the opposite side of bulkhead 10.

As a result thereof, a person operating either
65 crank handle in a clockwise direction will cause fluid 58 to be pumped from pressure line 37 through the pump and pressure line 38 to move the dog handles 19 to door closing position. Operating either crank handle 55 in the opposite or
70 counter-clockwise direction will pump the fluid 58 from line 38 through line 37 and move the dog handles to door releasing position. Each pressure line 37 and 38 may be provided with an expansion cylinder 56 connected thereto, partly
75 filled with the pressure fluid 58 and partly with

air or gas under pressure held therein by a plug 57.

In operation, the door may be closed or released from either side of the bulkhead by a suitable operation of either crank handle 55. By using the by-pass 41 the dogs and their handles may
5 be released for individual operation, if desired, or the handles when so released may be adjusted, if necessary, relative to each other so that all of the dogs may be operated simultaneously by operation
10 of the gear pump 40 and its operating crank handles 55, thus insuring a water-tight closing operation of the door from either side thereof, at the same time making it easy to release the door from such water-tight closed position for opening
15 in the usual manner.

There is shown at 59 in Figs. 11 and 12 a hatch cover of the type in common use in ships generally similar to the door construction shown in Fig. 2. Angular stiffener 13 is associated with the edge
20 of the cover 59 to retain the gasket 15 for engagement with the knife-edge of the hatch coaming 60 to form a tight joint.

A cylinder 30 having oil chambers 33 and 35, and piston 31, similar to that shown in Fig. 3, is shown in Fig. 11 mounted on the hatch coaming 60 in combination with piston rod 62. Rod 62 is connected to or integral with dog pin 63 so that the reciprocating motion of the piston under the influence of the operation of the pump, or of the selective introduction of fluid under pressure as will be described later, will cause reciprocation of dog pin 63 in bearing 64, which is mounted on the hatch coaming 60, the reciprocation causing pin 63 to engage or disengage dog lug 66,
35 mounted on the hatch cover 59.

As will be seen in Fig. 11, the under side of dog pin 63 is tapered to produce a wedging action as it enters dog lug 66 and the dog pin is held against non-axial displacement by the length of the bearing provided by the bushing 65 in bearing 64. The bushing 67 is provided in lug 66 to reduce friction and to permit ready replacement in event of wear.

There is shown in Fig. 13 and Fig. 14, a cylinder 82 having piston 81 and end bearing glands 83 generally similar to the cylinder shown in Fig. 3. Cylinder 82 is mounted on the door frame 11 in such a position that the reciprocation of its piston causes the door to open or close by means of the connected piston rod 68, which rod is connected to traveling lug 67, said
50 lug having extensions 84 which move reciprocally in housing 70. Lug 67 moves in housing slot 92 and engages curved groove 73 in hinge member 71. The housing 70 with the cylinder 82 and the fixed hinge members 75 and 76 being mounted on the door frame 11, and the rotating hinge member 71 having pin extensions 74 held in proper axial position by collars 77 being mounted
60 on the door cover 12 by palm 72, any axial movement of the piston 81 will cause a corresponding rotation of the door 12 either to open or to close with respect to the door frame 11, the action of lug 67 in groove 73 being that of a closed cam.
65

As will be seen in Fig. 15, a valve of the type shown having a housing 85 and rotary plug or baffle member 86 can be connected in a hydraulic pressure system so that pressure can be applied selectively to any two pipes and simultaneously
70 and automatically open two other ports to the relief or receiving tank.

Valve housing 85 may have port 87 connected to a relief valve or receiving tank into which the oil not under operating pressure is exhaust-
75

ed, port 88 may be connected through pipe 79 to cylinder 82, port 89 may be connected to pipe 93 or pipe 34, port 90 may be connected through a pipe not shown to a source of oil pressure such as a tank or pump, port 91 may be connected through pipe 78 to cylinder 82, and port 92 through pipe 94 or pipe 36 to cylinder 30.

With this arrangement, if plug 86 is centered on an axis between ports 87 and 88, as shown in Fig. 15, the oil pressure will be applied to pistons 31 of Fig. 11 or of Fig. 3 in a manner to release the dogs, and to piston 31 in a manner to swing the door or hatch open. If plug 86 is centered on an axis between ports 88 and 89, the oil will flow through port 91 and pipe 78, moving piston 31 downward in Fig. 13, causing the door or hatch to close, exhaust taking place through pipe 79 and ports 88 and 87; meanwhile the pressure exerted through port 89 and through pipe 93 or pipe 34 will keep the dogs on the door or hatch in the freed position. With plug 86 centered between ports 89 and 90, the oil pressure through ports 90 and 91 will keep the door or hatch closed, while the oil flow through port 92 and pipe 94 or pipe 36 will cause the dogs to be set, exhaust taking place through pipe 93 or pipe 34, and through ports 89 and 87.

In the specification and claims the term "door" covers both a door through a bulkhead or a hatch or other closure member through a deck, and, likewise the term "bulkhead" covers not only a vertical bulkhead but any other member such as a deck in which an openable closure member may be placed.

Other modifications and changes in the proportions and arrangements of the parts may be made by those skilled in the art without departing from the nature of the invention, within the scope of what is hereinafter claimed.

The invention described herein may be manufactured and/or used by or for the Government of the United States of America for govern-

mental purposes without the payment of any royalties thereon or therefor.

Having thus set forth and disclosed the nature of this invention, what is claimed is:

1. For use in holding a water-tight bulkhead door in locked position or for releasing the door from locked position from either side of the bulkhead, a plurality of hydraulically actuated door-holding or door-releasing dogs mounted on the bulkhead, a pair of hydraulic pressure lines connected to each of the hydraulically actuated dogs, and means for applying pressure to either one of the hydraulic pressure lines and releasing it from the other of the hydraulic lines to actuate said dogs simultaneously, said pressure-applying means comprising a pressure pump mounted in the bulkhead for actuation from either side thereof.

2. For use in holding a water-tight bulkhead door in locked position or for releasing the door from locked position from either side of the bulkhead, a plurality of hydraulically actuated door-holding or door-releasing dogs mounted on the bulkhead, a pair of hydraulic pressure lines connected to each of the hydraulically actuated dogs, means for applying pressure to either one of the hydraulic pressure lines and releasing it from the other of the hydraulic lines to actuate said dogs simultaneously, said pressure-applying means comprising a pressure pump mounted in the bulkhead for actuation from either side thereof, said pressure pump being a gear pump including a pair of gears, each gear having a shaft keyed thereto, one shaft extending to one side of the bulkhead and the other shaft extending to the other side of the bulkhead, and handle means mounted on each shaft, whereby said dogs may be actuated by operation of the gear pump handle on either side of the bulkhead.

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