F. J. PIKE & H. NEVILLE.

FLUID PRESSURE APPARATUS FOR OPERATING BULKHEAD AND OTHER DOORS.

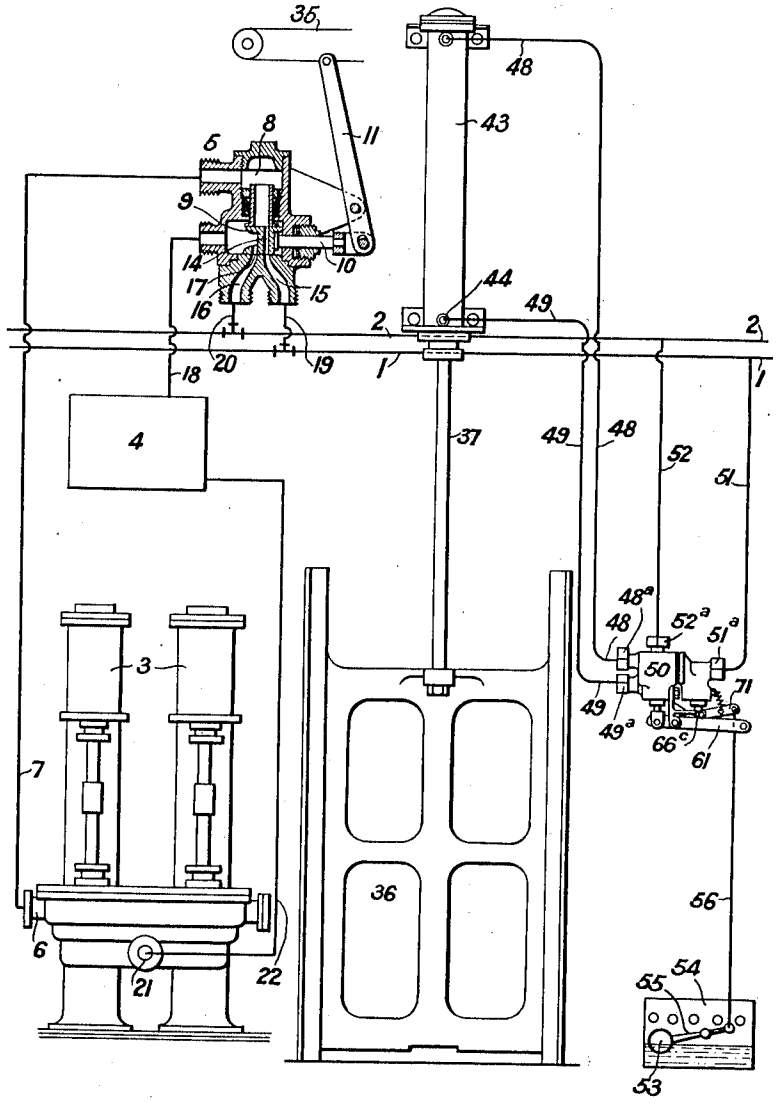
APPLICATION FILED MAY 17, 1912.

1,039,185.

Patented Sept. 24, 1912.

3 SHEETS—SHEET 1.

FIG. I.



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3 SHEETS—SHEET 2.

FIG. 2.

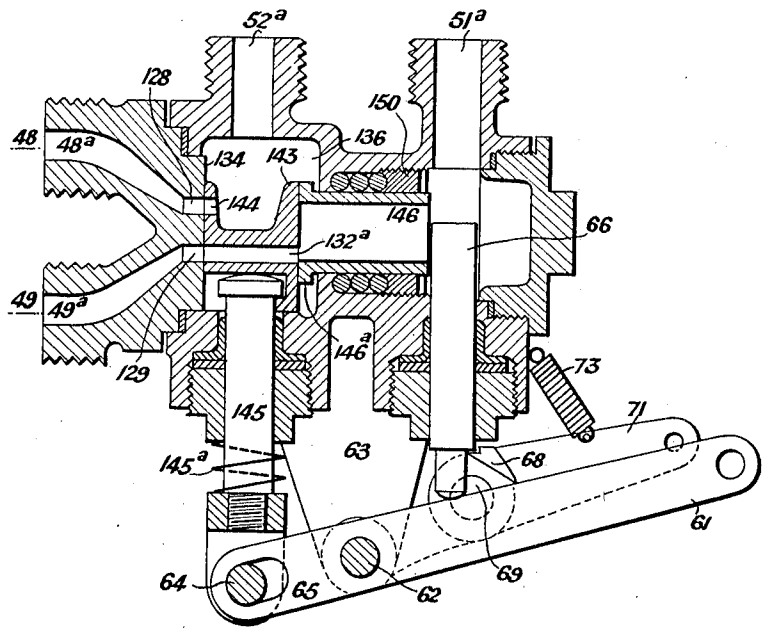
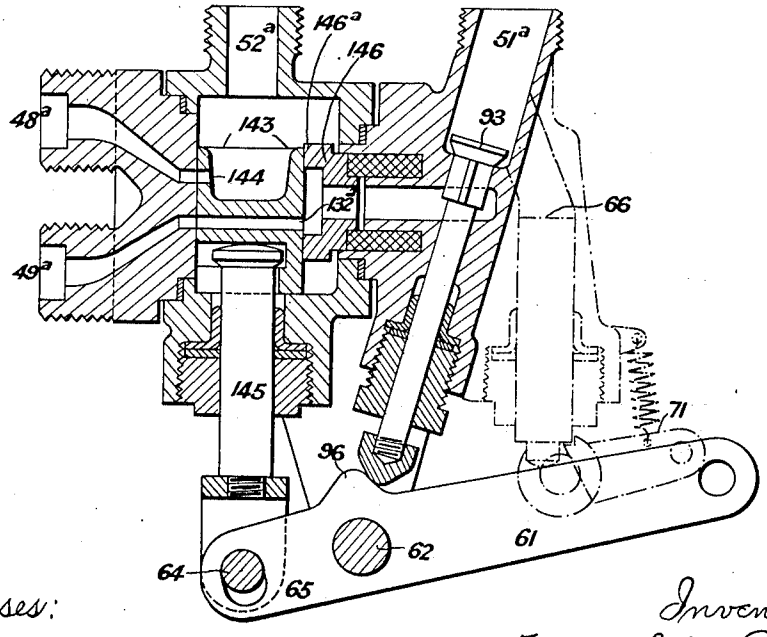


FIG. 2A.



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3 SHEETS—SHEET 3.

FIG. 3.

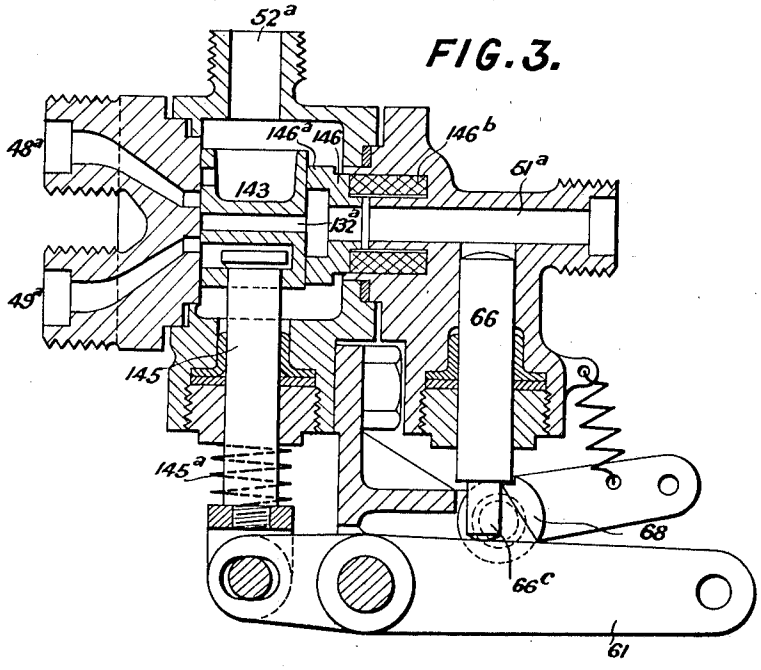
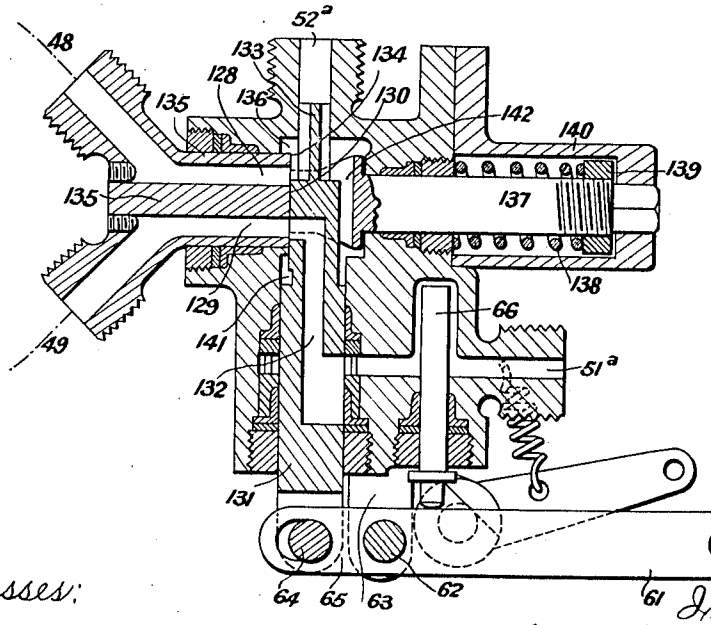


FIG. 4.



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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE APPARATUS FOR OPERATING BULKHEAD AND OTHER DOORS.

1,039,185. Specification of Letters Patent. Patented Sept. 24, 1912.

Application filed May 17, 1912. Serial No. 698,012.

To all whom it may concern:

Be it known that we, FREDERIC JOHN PIKE and HERBERT NEVILLE, subjects of the King of Great Britain, and residing, respectively, at 75 Cedars road, Beckenham, in the county of Kent, England, and 31 Elsinore road, Forest Hill, in the county of Kent, England, have invented new and useful Improvements in Fluid-Pressure Apparatus for Operating Bulkhead and other Doors, of which the following is a specification.

This invention relates to improvements in fluid pressure apparatus for operating bulkhead and other doors and more particularly in controlling valves for a reversible two-main system in which always one of the mains is a pressure main and the other an exhaust main and which mains are reversed for the purpose of simultaneously opening or closing a number of the doors from a central station which will hereinafter be referred to as "the bridge." In these systems various local control valve arrangements have been proposed, some of which comprised several valves belonging to each door and others of which comprised a single slide valve either ported, or of the piston type, for each door. In the former case, either double beat miter valves with grooved stems or lift valves have been employed, and usually there has been a manually controlled valve and a bilge float valve for each door, while in some cases these two valves have been arranged to govern the operation of a door-controlling valve. In such arrangements it has been possible to open the door by the manual control, when the closing main is under pressure, so as to allow of the escape of persons imprisoned behind the closed door, the valve having been returned to the position for closing the door as soon as the handle was released after the escape of the person, and it has been possible for the bilge-float control to close the door when the opening main is under pressure. In those arrangements in which each door control comprised a slide valve, it has been possible by the manual control to open the door when the closing main is under pressure, and to close the door not only by the bilge but also by the manual control when the opening main is under pressure, and in one instance in which a piston slide valve was employed, it was possible to move the valve to an intermediate position after a door had been moved to a partly closed position. The valve then remained in the intermediate position until the closing main was connected with the source of pressure, whereupon the valve was automatically moved by the fluid pressure in the closing main to allow the door to be completely closed by pressure fluid from the closing main. This valve also comprised a back pressure valve in the branch leading from the closing main to the valve casing, and normally this valve was prevented by the slide valve from seating itself. When however the slide valve was moved to an extreme position in the direction for closing the door during the normal condition of the mains, the back pressure valve was allowed to seat itself and thereafter prevented the opening of the door from the bridge.

In an arrangement of door controlling valve according to this invention, which valve may be adapted for use as a main reversing valve, the ports leading to the cylinder ends are controlled by a flat face slide valve which is balanced. The valve spindle may be subjected to the pressure of a spring or other load in order to return the valve to a normal position in which the door may be opened or closed from the bridge. Or the said spindle or the valve is subjected to fluid-pressure, whenever the closing main is put under pressure to return the valve to normal position so as to automatically open, or maintain, communication between the closing main and the closing end of the cylinder, a lever being provided for moving the slide valve by hand locally. With this latter arrangement when the closing main is open to exhaust, the slide valve may be left in an intermediate position so that the door may be closed or partially closed and maintained in the desired position against opening from the bridge. The valve may be maintained in the intermediate position, however, at any door by causing a spring to return the lever against a corresponding stop adapted to yield to local operation and also to the fluid pressure which is applied to the valve or valve spindle whenever the closing main is put under pressure. For example the spring may be arranged to hold the lever against a plunger which is normally projected to a limited extent by pressure in the opening main. If the closing main is under pressure and reversal of the

pressure conditions in the mains takes place, the pressure being restored to the opening main will move the plunger sufficiently for returning the valve to the mid-position.

If it be desired to close the door automatically by a bilge float the lever may be moved to reverse the slide by any suitable plunger device released by the rise of the bilge float.

Slide valves used in carrying out this invention may be of the type heretofore proposed for distributing hydraulic pressure to hydraulic machines and comprising a flat faced balanced slide valve provided with mechanical means constantly tending to press the valve toward its seat.

Figure 1 is a diagrammatic view of a hydraulic system for closing and opening bulkhead doors such system comprising improved door controlling valves constructed in accordance with this invention. Fig. 2 is a vertical section of an improved arrangement of door valve comprising a partially balanced slide valve for controlling communication between the two mains and the two ends of the door cylinder and including means operated by fluid pressure for automatically reversing the valve to close the door upon an abnormal rise of water in a compartment. Fig. 2[a] is a view similar to Fig. 2 but showing the application of a back pressure valve to the construction shown in Fig. 2. Fig. 3 is a similar view showing a slide valve similar to that seen in Fig. 2 returned by a spring to an intermediate position and against a yielding stop. Fig. 4 is a similar view in which the slide valve is arranged to control ports in a movable valve seating held in contact with the valve face by a spring.

Referring to Fig. 1, the opening main is indicated by 1, that is to say the main which, under normal conditions is subjected to pressure when it is desired to have all of the doors open or when it is desired to open all the doors simultaneously from a central station or the bridge of the vessel, and the closing main at 2, that is to say the main which under normal conditions is an exhaust main and is only subjected to pressure when it is desired to close all the doors simultaneously from the bridge. The connections of the mains 1 and 2, one with a source of pressure, here shown as pumps 3, and the other with an exhaust tank 4, may be reversed by means of a reversing valve device 5 hereinafter referred to as the main reversing or bridge valve. The bridge valve device 5, which may be of any suitable construction, is here shown as of the slide valve type. The suction inlet 21 of the pump is connected by a pipe 22 with the exhaust tank 4 and the delivery outlet 6 from the pump 3 is connected by a pipe 7 with the chest or chamber 8 for the slide valve 9, the operating rod 10 of which is controlled by a lever 11. The slide valve 9 is provided with a port 14 and controls two ports 15, 16 in the valve seating. In the position shown the port 15 communicates through the port 14 with the valve chamber 8 and therefore with the source of pressure. The port 16 is connected through the port 17 in the valve with the space which is connected by a pipe 18 with the exhaust tank 4. The port 15 is shown connected by a branch pipe 19 with the opening main 1, which is therefore under pressure, and the port 16 by a branch pipe 20 with the closing main 2 which is therefore the exhaust main. By reversing the valve the main 2 is put under pressure and the main 1 is connected with exhaust as will be readily understood. The lever 11 may be reversed in any convenient manner for instance by means of an endless wire or chain 35. The bulkhead door shown at 36 is of the vertically sliding type operated in a well known manner directly by a piston rod 37 of a cylinder 43. To close the door, pressure is admitted to the top of the cylinder, through a pipe 48 from the door valve device 50 and, to open the door, pressure is admitted to the bottom of the cylinder 43, through a pipe 49. The door valve device 50 is connected to the opening main 1 by a branch pipe 51 and to the closing main 2 by a branch 52. Means are provided for locally operating the door valve device 50 by hand and also automatically, so as to close the door, by means of the well-known device of a float 53 arranged in a protective tank 54 located at a suitable level in the bilge or in a compartment on one side of the door. As shown the float may for example be mounted on a lever 55 so that upon a rise of water in the tank a pull will be exerted on a wire 56 or the like which will hereinafter be referred to as the float connection.

The door valve device indicated at 50 is shown in Fig. 3. In this figure the connecting passage for the pipe 48 to the top or closing end of the door cylinder 43 is indicated by 48[a] and that for the pipe 49 leading to the bottom or opening end 44 of the cylinder 43 by the passage 49[a]. The connecting passage for the branch pipe 51 from the opening main 1 is shown at 51[a] and that for the branch pipe 52 from the closing main 2 is shown at 52[a].

In the improved construction of door valve shown in Fig. 2, two ports are provided in the valve seating 134, one port 128 being connected by pipe 48 to the closing end of the cylinder and the other port 129 being connected by pipe 49 with the opening end of said cylinder. The ports 128 and 129 are controlled by a double faced slide valve 143 provided with a through port 132[a] adapted to afford communication between

passage 51ª and either port 128 or port 129. Preferably the valve is further provided with a port 144 adapted to afford communication in the lower position of the valve between port 128 and the valve chamber 136 which is in free communication with passage 52ª, but it is obvious that the port 144 is not necessary and that the portion of the valve in which the port 144 is formed can be shortened so that the valve 143 uncovers the port 128 when in the position shown. The valve 143 is provided with a spindle 145 extending through suitable packing to the outside of the valve casing, and a double armed lever 61 is pivoted at 62 to a bracket 63 on the valve casing, the short arm 65 being connected to the spindle 145 by a pin 64 carried by the spindle moving in a slot in the arm 65. The lever 61 may be held in the normal position shown by a spring 145ª the valve casing itself acting as a stop for the valve. Communication between port 132ª and passage 51 is maintained in all positions of valve 143 by an exteriorly flanged tube 146 adapted to slide at right angles to the faces of the valve through suitable packing, and having the flange abutting on the rear face of the valve. This arrangement covers the rear face of the valve after the manner of a back pressure plate and limits the amount of pressure on the back of the valve whether fluid pressure be admitted through passage 51ª or 52ª. If desired, a spring (not shown) may be added to assist in holding the valve 143 upon the seating 134 and the tube 146 upon the valve 143, or an elastic packing may be employed around the tube 146 and between a flange on the tube and the plug 150 so as to tend to force the end flange 146ª of the said tube against the valve 143 and if desired a spring may also be employed with such packing.

With this arrangement and in the normal position of the valve the doors can be simultaneously opened or closed from the bridge at any time since there is free communication from main 1 by branch pipe 51, passage 51ª, tube 146, port 132ª, port 129 in the valve seating and pipe 49 to the opening end of the door cylinder and also free communication from main 2 by branch pipe 52, passage 52ª, valve chamber 136, port 144, port 128 and pipe 48 to the closing end of the door cylinder. To temporarily close the door locally, when opened from the bridge, the valve 143 is raised by depressing the longer arm of the lever 61 so that pressure is supplied from main 1 through 51ª, tube 146, port 132ª, port 128 and pipe 48 to the closing end of the door cylinder, while the opening end is free to exhaust through port 129, the valve chamber 136, and passage 52ª to main 2. On the release of the lever 61 the spring 145ª, if used, will return lever 61 and valve 143 to normal position thus again opening the door. When it is desired to open a door temporarily which has been closed from the bridge the operation of the lever and the connections will be the same, the flow of fluid however being reversed owing to the reversal of the mains, but since main 2 and connection 52ª now contain pressure fluid which is effective upon the area of spindle 145, the effective pressure returns the valve spindle and lever to normal position as soon as the lever 61 is released so that the door will again close.

When the door is opened from the bridge it can be automatically closed upon the rising of the bilge float due to an inrush of water. As shown in Fig. 1 the rising of the float 53 causes the lever 71 to be pulled down, and as seen in Fig. 2, this movement of the lever 71 releases the detent or cam device 68 formed on its hub from engagement with the ram 66 which is thereupon quickly depressed by the pressure fluid in the opening main and connection at 51ª. The descent of the ram 66 rocks the lever 61 with which the ram 66 engages and so reverses the valve 143 thereby bringing about the closing of the bulkhead door.

If it be desired to temporarily eliminate locally the opening from the bridge, so that a door may be maintained in a closed or partially closed position, the aforesaid spring 145ª for lever 61 may be omitted or detached because when main 1 is under pressure and the pressure fluid enters at 51ª the valve spindle 145, so far as fluid-pressure is concerned, is in equilibrium and the valve 143 will remain in an intermediate position closing both ports 128 and 129, provided the back of the valve is subjected to sufficient fluid pressure. Since, however, fluid-pressure returns the valve 143 to normal position when main 2 is under pressure and pressure fluid enters at 52ª, the fact that the valve had been left in an intermediate position would not prevent the door, if left partially closed, from being completely closed from the bridge simultaneously with all other doors in the system, as the valve 143 would be promptly returned to normal position when pressure fluid entered at 52ª. Said intermediate position may however be insured in the case of one or more doors as shown in Fig. 3 by causing the spring 145ª at any door to return the lever 61 against a corresponding stop adapted to yield to local operation of the lever and to fluid pressure when acting on the spindle 145. As shown said stop is constituted by suitably prolonging the projection 66ᶜ on the plunger 66 or by arranging for the plunger 66 to be arrested by the cam or detent 68 in the position shown so that the lever 61 comes against and is stopped by the projection 66ᶜ when the lever 61 and valve 143 are in the intermediate position shown. If the valve 143 has

been forced right down owing to the main 2 and connection 52a having been put under pressure, the restoration of pressure to the main 1 and connection 51a will cause the plunger 66 to return the valve 143 to the intermediate position. Thus the spring 145a is not essential to this arrangement. A non-return valve may be arranged either to prevent exhaust from the closing end of the door cylinder, or to prevent the admission of fluid-pressure into the opening end of said cylinder, so as to temporarily eliminate opening of the door from the bridge. For instance the said non-return valve 93 may be arranged as shown in Fig. 2a in the passage 51a but it may be in the passage 52a. This valve may be conveniently operated by a cam surface 96 which is movable with the lever 61 in such a manner that when for example the lever 61 is lowered from the position shown, the cam 96 opens the valve 93 so that it is possible for the pressure fluid in the opening main to effect the opening of the corresponding door if the latter has been wholly or partly closed. If it is desired by a local operator to leave a particular door in a closed or partly closed condition and to prevent any opening movement due to pressure in the opening main, the valve 143 is raised to close the door to the desired extent and the lever 61 is then raised again and left in the position shown in Fig. 2a, in which the valve 93 is seen closed by the pressure in the opening main.

In Figs. 2a and 3 the tubular part 146, 146a is shown reduced in length and formed with a shoulder abutting against an elastic packing 146b supported in a suitable recess in the casing.

As shown in Fig. 4 a valve face 130 may be formed on a spindle 131 which is provided with an internal port 132 adapted to afford communication between passage 51a and either of the two ports 128 or 129, leaving the other port 129 or 128, as the case may be, uncovered and in free communication with passage 52a. The spindle 131 is supported at both ends, the upper end being provided with a fluted extension 133 which is guided in the passage 52a. To insure a tight joint between valve face and seating 134 the latter is formed on a plunger 135 which extends at one end through suitable packing to the outside of the valve casing and terminates in two branched connections for the pipes 48 and 49 and extends at the other end into the valve chamber 136 where it terminates in a stem 137 extending through suitable packing to the outside of the valve casing. That portion of the plunger 135 which extends into the valve chamber 136 is provided with a transverse D-shaped, or otherwise suitably shaped slot 142 by which the flat valve seating 134 is formed and through which the correspondingly shaped portion of the valve spindle 131 passes. To hold the valve seating 134 against the flat valve face, a spring 138 is threaded over stem 137 and is placed under suitable compression between the casing and a nut 139 on the stem. The plunger 135 may be prevented from turning in any suitable manner, the spring 138 is shown surrounded by a casing 140 and the end of the stem 137 is squared and fits into a corresponding hole in the casing 140. The D-shaped portion of the spindle 131 upon which the valve face 130 is formed is of smaller dimensions than the lower portion of the spindle and immediately below the valve face 130 a transverse channel 141 is cut so as to permit of the passage of fluid (when the valve is in the upper position) through port 129 to or from passage 52a by way of clearance between the spindle 131 and the walls of slot 142 and between the plunger 135 and the walls of the valve chamber 136. The valve spindle 131 is operated by a double-armed lever 61 pivoted at 62 to a bracket 63 on the valve casing, the short arm 65 of which is connected to the spindle by a pin 64. The lever 61 may be held in the normal position shown against a stop constituted by the plunger 66 by a spring not shown. The pipes 48 and 49 are connected to the plunger 135 by suitable flexible couplings or telescopic joints (not shown).

The arrangements of door valves shown in Figs. 2, 2a, 3 and 4 without the plungers 66, and non-return valves 93, may also be employed as bridge or main reversing valves operated either by levers 61 or other suitable means as shown in Fig. 1. If the pump delivery pipe 7 were normally connected with 52a and 51a were connected to exhaust, one wire only would be necessary to operate the lever 61 from a distance owing to the unbalanced pressure load on the valve spindle.

We claim:

1. Reversing valve for hydraulic door-operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a casing, a flat slide face in said casing having a door-opening port and a door-closing port formed therein, a connection between said casing and the main which is normally a pressure main, a connection between said casing and the other main which is normally an exhaust main, a flat slide movable over said face and adapted to distribute pressure fluid and exhaust to and from said ports, and covering means for the rear face of said valve for reducing the area of the latter upon which pressure fluid is active substantially as set forth.

2. Reversing valve for hydraulic door-operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising

a casing, a flat slide face in said casing having a door-opening port and a door closing port formed therein, a connection between said casing and the main which is normally a pressure main, a connection between said casing and the other main which is normally an exhaust main, a flat slide movable over said face and adapted to distribute pressure fluid and exhaust to and from said ports, balancing means for said valve, and pressure means operating said balancing means and constantly pressing said valve to its seat, substantially as set forth.

3. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a casing, a flat slide face in said casing having a door opening port and a door closing port formed therein, a connection between said casing and the main which is normally a pressure main, a connection between said casing and the other main which is normally an exhaust main, this latter connection opening into said casing opposite one end of said face, a flat slide movable over said face and adapted to distribute pressure fluid and exhaust to and from said ports and to be pressed in one direction by pressure fluid when the latter is admitted to the normal exhaust main, and balancing means for said valve, substantially as set forth.

4. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a casing, a flat slide face in said casing having a door-opening port and a door closing port formed therein, a connection between said casing and the main which is normally a pressure main, a connection between said casing and the other main which is normally an exhaust main, a slide valve movable over said face and adapted to distribute pressure fluid to and from said ports, balancing means for said valve, a manual control operative upon said valve, and self-acting means constantly operative upon said valve in one direction, substantially as set forth.

5. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a casing, a flat slide face in said casing having a door opening port and a door closing port formed therein, a connection between said casing and the main which is normally a pressure main, a connection between said casing and the other main which is normally an exhaust main, a slide valve movable over said face and adapted to distribute pressure fluid to and from said ports, balancing means for said valve, a rod operatively connected to said valve and passing to the exterior of said casing, a gland in said casing for packing said rod, manually controlled means connected with said rod, and a spring constantly operative between said casing and an abutment on said rod, substantially as set forth.

6. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a casing, a flat slide face in said casing having a door opening port and a door closing port formed therein, a ported slide valve movable over said face and adapted to distribute pressure fluid to and from said ports, balancing means for said valve, a rod operatively connected with said valve and extending to the exterior of said casing, packing for said rod in its aperture in said casing, manually controlled means connected with said rod, a connection between said casing and the main which is normally a pressure main, said connection communicating with the port in said valve, and a connection between said casing and the other main which is normally an exhaust main this latter connection being arranged to open into the chamber in which said valve works so that pressure fluid arriving by such connection is effective upon said valve to the extent of the cross sectional area of said rod, substantially as set forth.

7. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a casing, a flat slide face in said casing having a door opening port and a door closing port formed therein, a connection between said casing and the main which is normally a pressure main, a connection between said casing and the other main which is normally an exhaust main, a flat slide movable over said face and adapted to distribute pressure fluid and exhaust to and from said ports, balancing means for reducing the area of the valve upon which pressure fluid is active, manually controlled means operatively connected with said valve, reversing means constantly tending to reverse said valve, a catch operative on said means to restrain the latter from reversing the valve, and a bilge float operatively connected with said catch, substantially as and for the purpose set forth.

8. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a casing, a flat slide face in said casing having a door-opening port and a door-closing port formed therein, a connection between said casing and the main which is normally a pressure main, a connection between said casing and the other main which is normally an exhaust main, a flat slide valve movable

over said face and adapted to distribute pressure fluid and exhaust to and from said ports, balancing means for reducing the area of the valve upon which fluid pressure is active, manually controlled means operatively connected with said valve, a ram normally subjected to pressure of fluid from the main normally under pressure and adapted to operate said valve in one direction, a catch normally restraining said ram from so operating, and a bilge float device operatively connected with said catch and adapted to release the latter upon the rising of said bilge float substantially as set forth.

9. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a casing, a flat slide face in said casing having a door opening port and a door closing port formed therein, a connection between said casing and the main which is normally a pressure main, a connection between said casing and the other main which is normally an exhaust main, a slide valve movable over said face and adapted to distribute pressure fluid and exhaust to and from said ports balancing mains for reducing the area of the valve upon which fluid pressure is active, a rod operatively connected with said valve and extending through an aperture in said casing, a gland in said aperture for packing said rod, manually controlled means operatively connected with said rod, and a yielding stop adapted normally to prevent said valve from returning to the position in which pressure fluid is admitted from the main which is normally under pressure to said door-opening port, but adapted to yield under the pressure put upon said valve when the normal conditions of the mains are reversed, substantially as set forth.

10. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a casing, a flat slide face in said casing having a door-opening port and a door-closing port formed therein, a connection between said casing and the main which is normally a pressure main, a connection between said casing and the other main which is normally an exhaust main, a flat slide valve movable over said face and adapted to distribute pressure fluid and exhaust to and from said ports, balancing means for reducing the area of the valve upon which fluid pressure is active, manually controlled means operatively connected with said valve, a ram normally subjected to pressure of fluid from the main which is normally under pressure and operatively connected with said valve, a catch engaging said ram and normally restraining it from operation in a position in which said ram stops said valve in an intermediate position, a bilge float device operatively connected with said catch and adapted to release the latter upon the rising of said bilge float and fluid pressure means adapted to move said valve from said intermediate position and operative whenever the normal exhaust main is placed under pressure substantially as set forth.

11. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a flat slide face, a through ported slide valve movable thereon, a ported flat faced cover operative against the rear face of said valve, means constantly pressing said cover against said valve and the latter against said seat, a rod coupled with said valve so as to permit of movement of the latter toward its seat and extending to the exterior of the casing, a gland in said casing for packing said rod, a connection between the casing and the normal pressure main said connection admitting fluid to said through ports, and a connection between the casing and the normal exhaust main said connection opening into the chamber in which said slide valve moves substantially as set forth.

12. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a flat slide face, a through ported slide valve movable thereon, a ported flat faced cover operative against the rear face of said valve, means constantly pressing said cover against said valve and the latter against said seat, a rod coupled with said valve so as to permit of movement of the latter toward its seat and extending to the exterior of the casing, a gland in said casing for packing said rod, a spring surrounding said rod and operative between an abutment on said rod and said casing in order to constantly tend to return said valve to one position, a connection between the casing and the normal pressure main said connection admitting fluid to said through ports, and a connection between the casing and the normal exhaust main, said connection opening into the chamber in which said slide valve moves, substantially as set forth.

13. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a flat slide face having a door-opening port and a door-closing port therein, a flat two faced ported slide valve movable over said face, a tubular body movable in a packed aperture in the valve chest, means operative to press said tubular part against said valve and said valve against said seat, a connection between the valve chest and the main

which is normally an exhaust main, and a connection between the exterior end of said tubular body and the main which is normally a pressure main, substantially as set forth.

14. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a flat slide face having a door-opening port and a door-closing port therein, a flat two faced ported slide valve movable over said face, a tubular body movable in a packed aperture in the valve chest, means operative to press said tubular part against said valve and said valve against said seat, a connection between the valve chest and the main which is normally an exhaust main, a ram chamber on the valve casing said chamber communicating with said tubular body and the main which is normally a pressure main, a ram in said chamber, a valve operating lever in the path of said ram, and a catch normally restraining said ram and adapted to be released by the rising of a bilge float device substantially as set forth.

15. Reversing valve for hydraulic door operating systems in which a pressure main and an exhaust main reversible from the bridge are employed, said valve comprising a flat slide face having a door-opening port and a door-closing port therein, a flat two faced ported slide valve movable over said face, a tubular body movable in a packed aperture in the valve chest, means operative to press said tubular part against said valve and said valve against said seat, a connection between the valve chest and the main which is normally an exhaust main, a fitting on the valve casing forming a connection between the main which is normally a pressure main and said tubular body, a self closing valve in said fitting adapted to be seated by the normal pressure in said main, a valve operating lever, a lost motion connection between said lever and said valve and a cam on said lever adapted to control said self-closing valve, substantially as set forth.

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