No. 656,947. Patented Aug. 28, 1900.

W. B. COWLES.

APPARATUS FOR OPERATING BULKHEAD DOORS.

(Application filed June 23, 1899.)

(No Model.)

FIG. 1.

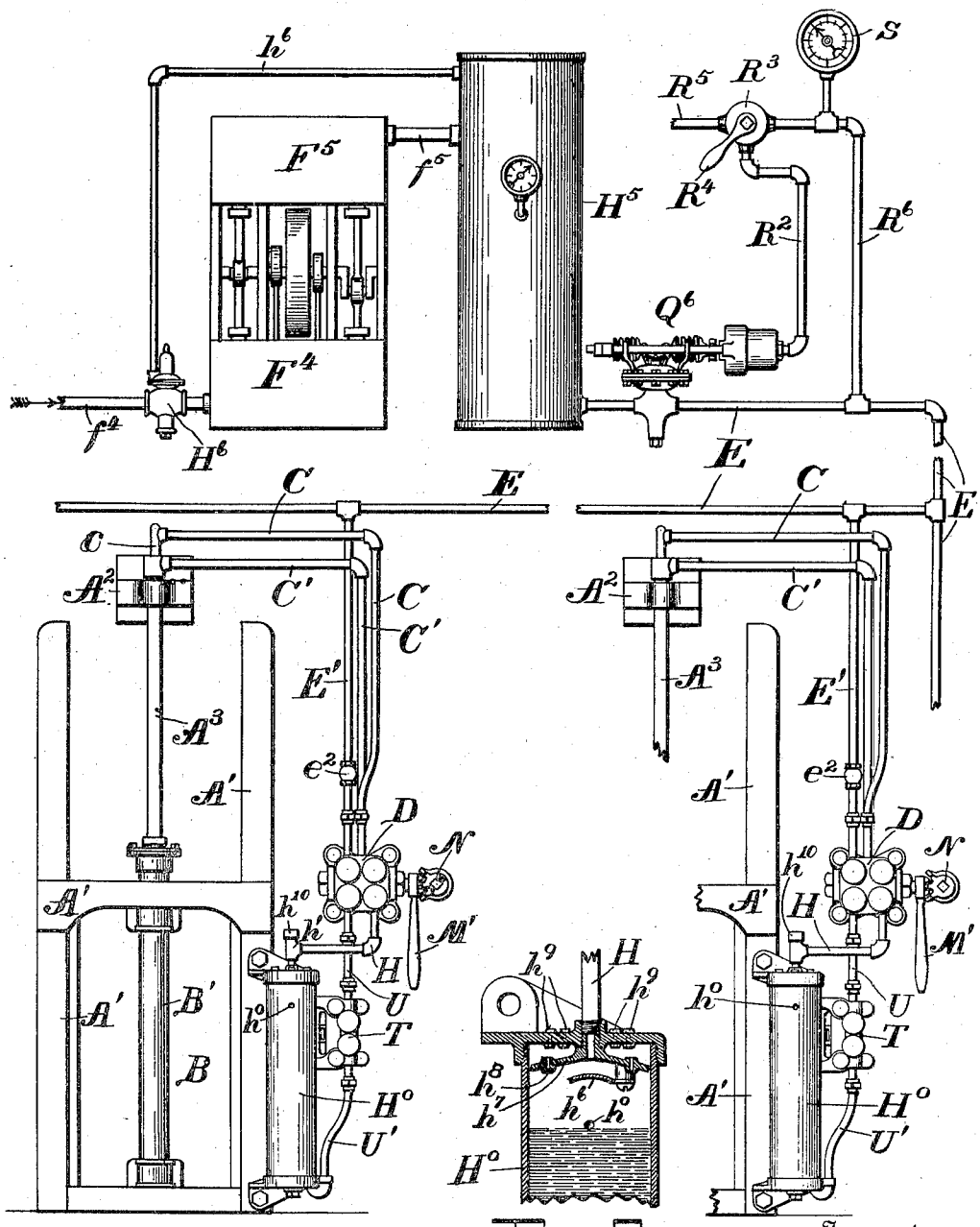


FIG. 2.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR OPERATING BULKHEAD-DOORS.

SPECIFICATION forming part of Letters Patent No. 656,947, dated August 28, 1900.

Application filed June 28, 1899. Serial No. 721,630. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BARNUM COWLES, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Apparatus for Operating Bulkhead-Doors or other Reciprocating Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in apparatus for opening and closing bulkhead-doors, hatches, ports, valves, gates, and other reciprocating devices, and while it is designed especially for use on shipboard it may be used advantageously in factories, theaters, large buildings, or any other place where such a system is necessary or desirable.

My present invention consists especially in certain improvements upon the system and apparatus shown in my United States Patents Nos. 564,474, 589,958, 605,399, and 608,838, granted to me July 21, 1896, September 14, 1897, June 7, 1898, and August 8, 1898, respectively, and more especially upon the matter shown in my Patent No. 631,698, issued August 27, 1899.

The said invention consists more especially in the application to the system shown in my former patents of details whereby the apparatus may be operated by compressed air, which is discharged after doing its work, and hence the necessity for the return system is obviated; and it also consists in combining a hand-operated hydraulic system with the pneumatic system herein described.

The system herein described is operated by compressed air from the central station or by liquid, by hand, at each door or other reciprocating device.

Referring to the drawings, Figure 1 represents diagrammatically the application of the improved system to operating two bulkhead-doors, and Fig. 2 represents a central vertical section through the upper part of one of the water-tanks used in connection with the hand apparatus for independently operating each door or other reciprocating device when desired.

A′ represents the frame-work of the door, which is secured to the bulkhead or deck. (Not shown.)

B represents the door, which carries rigidly attached thereto the cylinder B′, into which cylinder projects the hollow piston-rod A^3, secured to the bracket A^2, attached to the bulkhead, deck, or other rigid part of the structure. Through this hollow piston-rod A^3 projects the pipe *c* from the pipe C, and this pipe *c* opens into the lower end of the cylinder B′, while the pipe C′ opens into the annular spaces between the pipe *c* and the hollow piston-rod A^3 and supplies fluid-pressure to or permits the passage of fluid from the upper end of the cylinder B′. These two pipes C and C′ open into chambers in the valve-casing D, which is described in detail in my Patent No. 631,698, already referred to, which not being a part of my present invention will not be further described herein.

Fluid under pressure is supplied to the valve-casing D by means of branch pipe E′, leading from the fluid-pressure main E, which main is connected to the reservoir H^5, holding compressed air. Air is forced into this receiver H^5 under pressure by the apparatus shown diagrammatically to the left thereof, which includes a steam chest and cylinders F^4, supplied with steam or other fluid pressure from the pipe f^4 and operating air-pumps F^5, which deliver air under pressure through the pipe f^5 to the reservoir H^5. This reservoir is connected by the pipe E to the various reciprocating devices to be operated, as has already been described, and also by the pipe h^6 to the controlling-valve H^6, which valve is so arranged that when the pressure in the reservoir H^5 exceeds a predetermined limit the valve H^6 will close, automatically shutting off steam or fluid pressure from the pipe f^4 and steam-chest F^4, and thus serving as a safety device to prevent excessive pressure in the reservoir H^5. Any of the various well-known constructions for this purpose may be adopted.

The emergency system is operated by means of the handle R^4 and the valve R^3, which valve admits fluid-pressure from the pipe E and pipes R^6 and R^2 to the double-pressure-reducing valve Q^6, fully opening the same and allowing the emergency-pressure to flow into the pipe E, which operates the emergency mechanism at the several doors or other recipro-

cating devices, as has been fully described in the patent aforesaid. The construction and arrangement of the valve Q^6, by means of which the ordinary working pressure—say one hundred and fifty pounds—is normally admitted to the pipe E, while the emergency-pressure—say three hundred pounds—may be admitted to said pipe E when desired, is not a part of my present invention, but is well known in the art and will not be further described. By reversing the valve R^3 the compressed air in the pipe R^2 escapes through the escape-pipe R^5 into the atmosphere, and the double-pressure-reducing valve Q^6 sets itself again to pass the ordinary working pressure—say one hundred and fifty pounds.

N and M′ represent parts of the apparatus for operating by hand the valves in the casing D, as has been described in detail in my Patent No. 631,698, and form no part of my present invention.

It will be seen that when fluid under pressure is admitted to the pipe C and the lower end of the cylinder B the door will be forced down, while when fluid under pressure is admitted to the pipe C′ the door will be raised. In either case the fluid in the other end of the cylinder will return by the opposite pipe C′ or C, as the case may be, and this return fluid will be carried through the pipe H into the upper end of the water-tank H^0.

If the system be operated by compressed air, as has already been described, the air escaping from the escape end of the cylinder B′ will flow through the valve-casing D and pipe H and will enter the upper end of the tank H^0 above the scatter-plate h^6, escaping around the baffle-plate h^7 and through the holes h^8 therein and then through the holes h^9 in the muffle-head, covering the upper end of the tank H^0. The purpose of this arrangement of escape-air passages in the tank H^0 is to prevent the air from whistling as it escapes from the tank, and thus creating an unnecessary noise in escaping, and also to retain all liquid in the tank H^0.

In order to operate each door by hand, having previously filled the water-tank H^0 up to about the openings h^0, which are intended to prevent the tank from ever becoming entirely full of water and which water may be supplied through the pipe h', closed by the cap h^{10}, I pump this water by means of the hand-pump T through the pipes U′ and U to the valve-casing D, where it is delivered to one or the other of the pipes C or C′ by the hand mechanism M′ or N, as has already been described in detail in my Patent No. 631,698 aforesaid. This water then passes through the pipe C or C′ to the cylinder and moves the door in the desired direction. After one side of the cylinder B′ is full of water from the tank H^0 if pressure be brought either from water in the tank by hand on the other end of the cylinder or from fluid in the branch pipe E′ either for working each door singly or by the emergency-pressure the water will flow from the end of the cylinder not subjected to this pressure back through the opposite pipe C′ or C, as the case may be, into the valve-casing D and returning through the pipe H will go back into the tank H^0. This water will carry along some air with it, and to separate the two and prevent a sudden blast into the water in the tank H^0, I provide a baffle-plate h^6; but this arrangement of baffle-plates while preferable is not an essential feature of the invention and may be omitted, if desired.

During the operation of the device by means of the hand-pump the flow of liquid from the hand-pump up through the pipe E′ is prevented by means of a check-valve in the casing e^2, which opens downward and permits the flow of fluid-pressure from the pipe E′ downward into the valve-casing D, but shuts off the flow of water upward past this check-valve into the fluid-pressure main E.

The gage S indicates the pressure in the main E.

While this specification and drawings represent the invention as applied to bulkhead-doors, it will be understood that these were selected as the particular form of reciprocating device to which the invention is probably most applicable; but the same idea may be applied to closing doors in tunnels or drifts of mines, to closing hatches, elevator-wells, and passages in warehouses and the like, to closing air-passages in fireproof buildings, to simultaneously operating "fire-curtains" and opening all exits in theaters, and to a great variety of purposes where it is desired to supply a system for simultaneously closing a number of doors and yet permiting the separate opening and closing of each particular door without affecting the others in the system.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A fluid-pressure system for operating bulkhead-doors or other reciprocating devices, comprising a reservoir for compressed air, a fluid-pressure main leading therefrom, a double-pressure-reducing valve interposed between said reservoir and said main, a plurality of reciprocating devices all operated automatically by the pressure in said main at high pressures, and means controlled by hand for operating the several doors or other reciprocating devices separately by means of the said pressure, and a hand-pump and liquid-supply for operating each of said reciprocating devices independently of said compressed air, substantially as described.

2. A fluid-pressure system for operating bulkhead-doors or other reciprocating devices, comprising a reservoir for compressed air, means for automatically controlling the pressure of the air in said reservoir, a fluid-pressure main leading therefrom, a double-pressure-reducing valve interposed between said reservoir and said main, a plurality of

reciprocating devices all operated automatically by the pressure in said main at high pressures, and means controlled by hand for operating the several doors or other reciprocating devices separately by means of said pressure, and a hand-pump and a liquid-supply for operating each of said reciprocating devices independently of said compressed air, substantially as described.

3. A fluid-pressure system for operating bulkhead-doors, comprising a reservoir for compressed air, a fluid-pressure main leading therefrom, a double-pressure-reducing valve interposed between said reservoir and said main, a bulkhead-door operated automatically by the pressure in said main, and means controlled by hand for operating the door by means of said pressure, and a hand-pump and water-tank for operating said door independently of said compressed air, substantially as described.

4. A fluid-pressure system for operating bulkhead-doors, comprising a reservoir for compressed air, means for automatically controlling the pressure of the air in said reservoir, a fluid-pressure main leading therefrom, a double-pressure-reducing valve interposed between said reservoir and said main, a bulkhead-door operated automatically by the pressure in said main, means controlled by hand for operating the door by means of said pressure, and a hand-pump and water-tank for operating said door independently of said compressed air, substantially as described.

5. A fluid-pressure system for operating bulkhead-doors or other reciprocating devices, comprising a reservoir for compressed air, a fluid-pressure main leading therefrom, a double-pressure-reducing valve interposed between said reservoir and said main, and normally admitting reduced pressure to said main, with means operated by hand for opening said valve and suddenly increasing said pressure, a plurality of reciprocating devices all operated automatically by the pressure in said main at high pressures, and means controlled by hand for operating the several doors or other reciprocating devices separately at both pressures, and a hand-pump and liquid-supply for operating each of said reciprocating devices independently of said compressed air, substantially as described.

6. A fluid-pressure system for operating bulkhead-doors or other reciprocating devices, comprising a reservoir for compressed air, means for automatically controlling the pressure of the air in said reservoir, a fluid-pressure main leading therefrom, a double-pressure-reducing valve interposed between said reservoir and said main, with means operated by hand for opening said valve and suddenly increasing the said pressure, a plurality of reciprocating devices all operated automatically by the pressure in said main at high pressures, means controlled by hand for operating the several doors or other reciprocating devices separately at both pressures, and a hand-pump and a liquid-supply for operating each of said reciprocating devices independently of said compressed air, substantially as described.

7. An apparatus of the character described, comprising a pneumatic system operated either locally or at a distance, and a local hand-operated hydraulic system operating through the same mechanism but independently of said pneumatic system, substantially as described.

8. An apparatus of the character described, comprising a bulkhead-door and a cylinder and piston for operating the same, a pneumatic system for normally supplying pressure to said cylinder and a hand-operated hydraulic system for supplying pressure when said pneumatic system is not in operation, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM BARNUM COWLES.

Witnesses:
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M. J. RUDOLPH.