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C. B. CALDER.

WATER BALLAST CONTROLLING APPARATUS FOR VESSELS.

APPLICATION FILED AUG. 20, 1906.

Fig. 2.

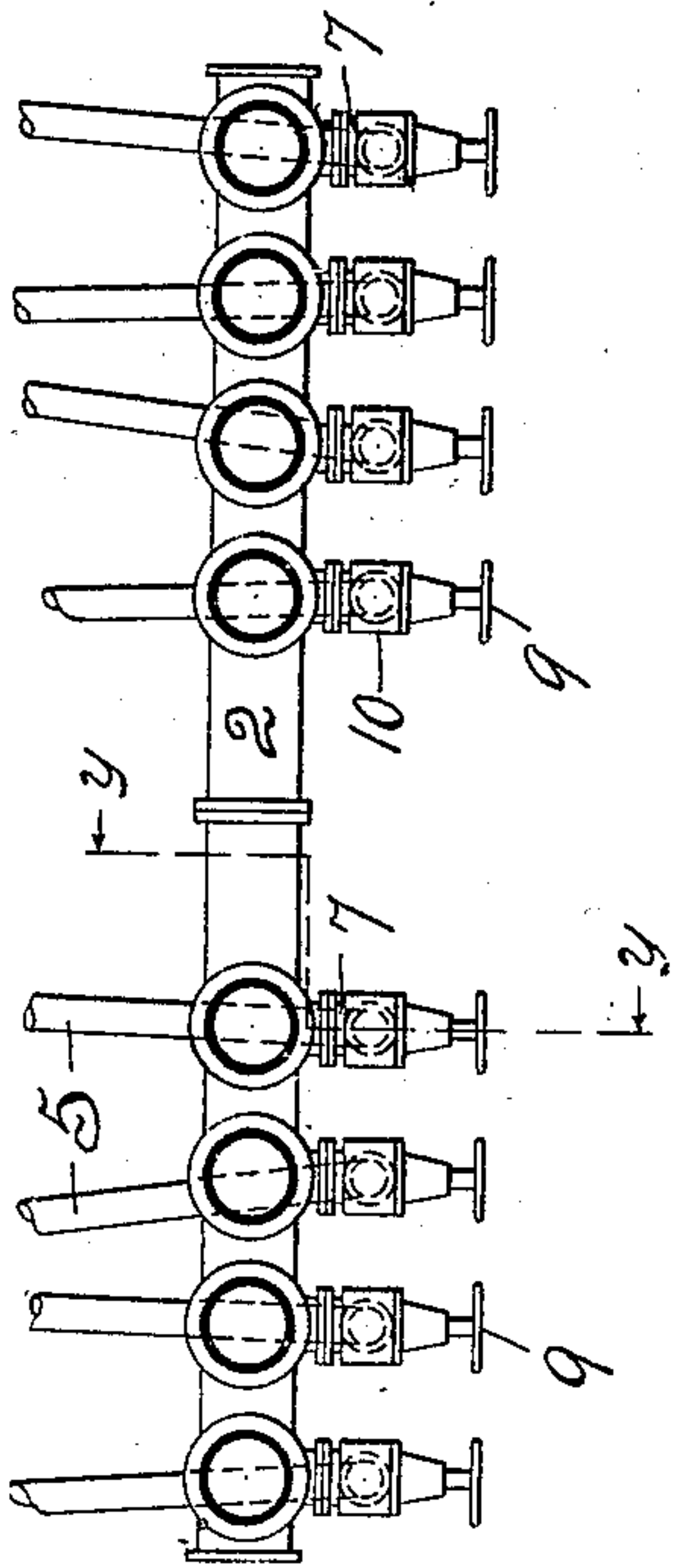


Fig. 1.

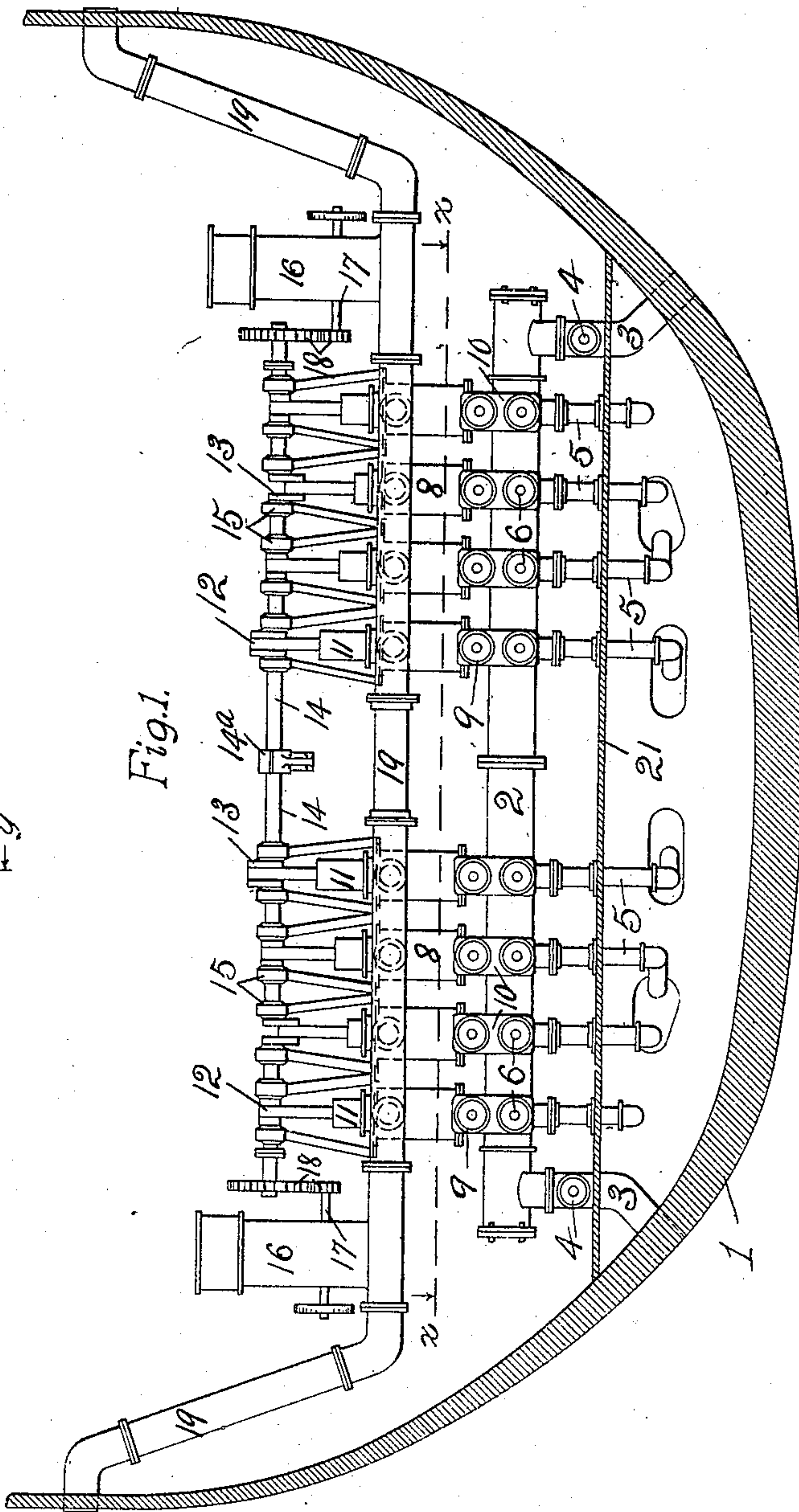
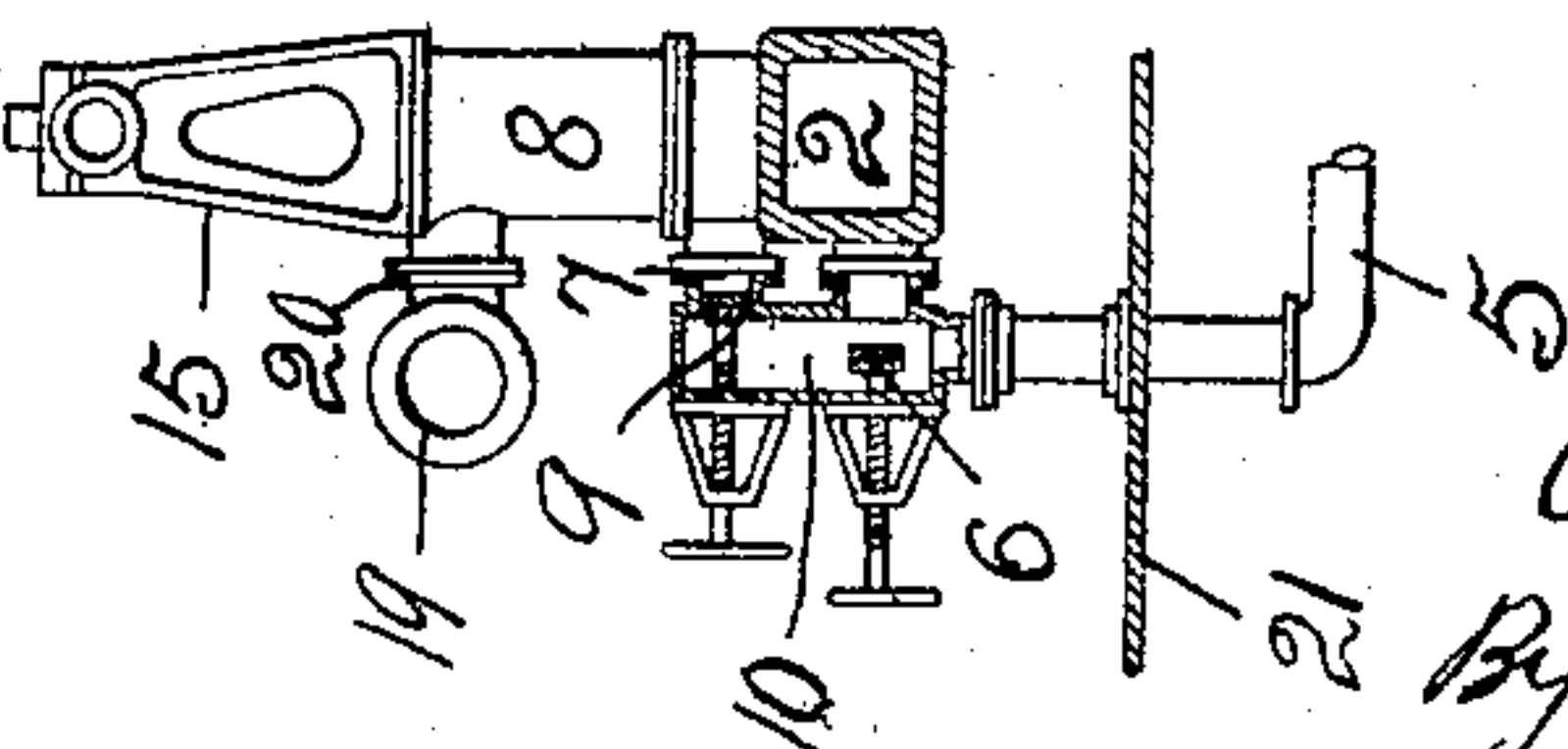


Fig. 3.



WITNESSES

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# UNITED STATES PATENT OFFICE.

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## WATER-BALLAST-CONTROLLING APPARATUS FOR VESSELS.

No. 842,856.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed August 20, 1906. Serial No. 331,256.

*To all whom it may concern:*

Be it known that I, CHARLES B. CALDER, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Water-Ballast-Controlling Apparatus for Vessels; 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to water-ballast systems for vessels, and more particularly to the means for filling and emptying the several water-compartments thereof.

The object of my invention is to provide an arrangement of valves, pumps, and piping whereby the several water-compartments of a vessel may be separately or simultaneously controlled, so that all the compartments may be filled or emptied together, or a part may be filled while the rest are being emptied, or each one may be filled or emptied separately.

The advantage of my invention will be obvious to those familiar with the systems now in use for controlling the water-ballast in large vessels, more especially freighters. One of the principal of these advantages is the facility and rapidity with which the ballast may be discharged from large freighters that are being loaded by modern hoisting machinery, it being a simple matter to control the discharge of the ballast with the load as it is deposited.

Another advantage is in raising a portion of the hull out of the water for repair work, which can be quickly accomplished through my invention by simultaneously discharging the water from the compartments near the portion to be raised and filling the compartments at the opposite end or side of the boat.

Other advantages will appear as the description proceeds.

While it is apparent that obvious modifications of my invention will occur to one skilled in the art, a preferred embodiment thereof is described in the following specification and illustrated in the accompanying drawings, in which—

Figure 1 is a partial cross-section of a boat equipped with my improved water-ballast

system with the operative parts thereof shown in rear elevation. Fig. 2 is a top sectional view of the operative mechanism, taken on the dotted line *x x* in Fig. 1; and Fig. 3 is a sectional end elevation thereof, taken on the dotted line *y y* in Fig. 2 and showing the associated pump.

Referring to the drawings, 1 designates the hull of a vessel, which contains the water-ballast pumping and regulating apparatus and the several water-compartments. (Not shown.) The pumping and regulating apparatus may be located at any convenient point, usually in the stern of the vessel, and the number and location of the water-compartments depends upon the size and character of the boat.

The pumping and controlling apparatus with which my present invention treats constitutes the manifold or header conduit 2, which communicates at either end with the sea below the low-water line of the vessel through the end pipes or conduits 3. This manifold and its end conduits may be of any suitable size, and the admission of water thereto from the sea is controlled by valves 4 in the end pipes or conduits 3.

Leading from the manifold or header 2 are a plurality of branch pipes 5, corresponding in number to the number of water-ballast compartments in the boat, and each communicating with a different one of such compartments. Each of these pipes has its communication with the header controlled by a valve 6, (best shown in Fig. 3,) which when opened permits water to flow freely from the header through the pipe into the associated compartment. Each pipe 5 also has communication at its header end, as at 7, with the base of the cylinder or barrel 8 of an ordinary lift and force pump, which is disposed above the header, and this communication is controlled by a valve 9, as shown in Fig. 3. The valves 6 and 9 are shown as being mounted within a common valve-chamber 10, which is adapted to have communication with either the header or pump-cylinder as one or the other of said valves is opened. A seating of the valve 6 and opening of the valve 9 closes communication with the header and opens communication between the pipe 5 and pump-cylinder, and vice versa, as it may be desired to empty or fill the associated water-compartment.

The plungers 11 of the several pumps con-



nect through connecting-rods 12 with the differentially-arranged crank-arms 13 of the common crank-shafts 14 14, which are mounted in bearing-standards 15 above the pump-cylinders and in parallelism with the manifold or header 2. Each crank-shaft 14 is driven by the motor or engine 16, located at the end thereof, the drive-shafts 17 of which connect with the shafts 14 through the medium of the meshing gears 18. A coupling 14<sup>a</sup> is provided between the shafts 14, so that both shafts may be operated by one engine or motor should it become desirable.

The overboard-discharge from the several pumps is effected through a common discharge pipe or conduit 19, which has proper communication with each cylinder through connections 20 and has its ends extending upwardly and terminating without the sides of the hull, preferably above the high-water line thereof. An important advantage of having the several pumps discharge into a common conduit is that the discharge of water from one pump will automatically prime all the others.

21 designates a floor or platform which is disposed beneath the header or manifold 2 and through which the pipes 5 extend. It is thus apparent that the manifold or header 2, being below the water-line of the hull, is normally maintained full of water, as the normal conditions of the sea cocks or valves 4 is open, so that an opening of the valve 6 of any or all of the pipes 5 will permit the water in the header to flow freely to the desired water compartment or compartments. When it is desired to empty any or all of the compartments of their ballast, the valves 6 associated with such compartments are closed and the valves 9 thereof opened, so that an operation of the pumps by starting the engines or motors 16 will effect an emptying of the compartment or compartments having open communication with the pump-cylinders and the water will be discharged overboard through the discharge-pipe 19.

It will be understood, of course, that the inlet and outlet openings of the pump-cylinder are controlled by the usual inwardly and outwardly opening valves. (Not shown.) It will also be understood that as many pumps and associated pipes 5 with their controlling-valves are employed as there are compartments in the vessel, so that each compartment may be filled or emptied independently of or in conjunction with the others or a part filled and a part emptied simultaneously, thus enabling the person in charge of the ballast apparatus to regulate or vary the filling or emptying of the ballast-compartments according as the loading or unloading of the vessel may require.

Having thus described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

1. In a vessel having a plurality of water-ballast compartments, a manifold in communication with the sea and communicating with each of said compartments through valve-controlled pipes, a pump associated with each of said pipes, and valves for opening and closing communication between said pumps and pipes.

2. In a vessel having a plurality of water-ballast compartments, a manifold in communication with the sea, a plurality of pumps corresponding in number to the number of compartments, a plurality of pipes each having communication with a compartment and with the manifold and one of said pumps, and an arrangement of valves associated with each pipe for controlling the filling and emptying of the compartments.

3. In a vessel having a plurality of water-ballast compartments, a manifold having its ends in valve-controlled communication with the sea, a conduit forming an overboard-discharge, a plurality of pumps associated with said conduit, a pipe communicating with each compartment and having valve-controlled communication both with the manifold and with the conduit through one of said pumps, substantially as described.

4. In a vessel having a plurality of water-ballast compartments, a header or manifold having its ends in communication with the sea, a plurality of pipes opening independent communication between the header and the several compartments, a valve in each pipe for controlling such communication, and a pump associated with each pipe whereby an operation of the pump will effect a discharge of the ballast from the associated compartment.

5. In a vessel having a plurality of water-ballast compartments, a header or manifold conduit having communication with the sea, pumping means associated with the header or manifold, a plurality of pipes communicating at one end with the compartments and having their other ends in valve-controlled communication both with the header and the pumping means, whereby the compartments may be all filled at once or at different times from the header or emptied together or at different times by the action of the pumping means.

6. In a vessel having a plurality of water-ballast compartments, a header or manifold conduit located beneath the water-line and in communication with the sea, a pump for each compartment, a pipe for each compartment having independent valve-controlled communication with the associated pump and the header whereby the compartments may be filled from the header and emptied by an operation of the pumps, and a common overboard-discharge for said pumps.

7. In a vessel having a plurality of water-  
ballast compartments, a header or manifold  
conduit having its ends in communication  
with the sea, a plurality of pumps operative  
5 in unison and each having communication  
with a different compartment, a plurality of  
pipes leading from the header to the several  
compartments, each being in valve-controlled  
communication with the header and in valve-  
10 controlled communication with a pump

whereby a part of said compartments can be  
filled and the others emptied simultaneously.

In testimony whereof I have hereunto  
signed my name to this specification in the  
presence of two subscribing witnesses.

CHARLES B. CALDER.

Witnesses:

A. D. BLACK,

H. V. SHEPHERD.