No. 662,330. Patented Nov. 20, 1900.

G. B. WILLCOX.

MEANS FOR CONTROLLING WATER BALLAST IN SHIPS.

(Application filed Mar. 27, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

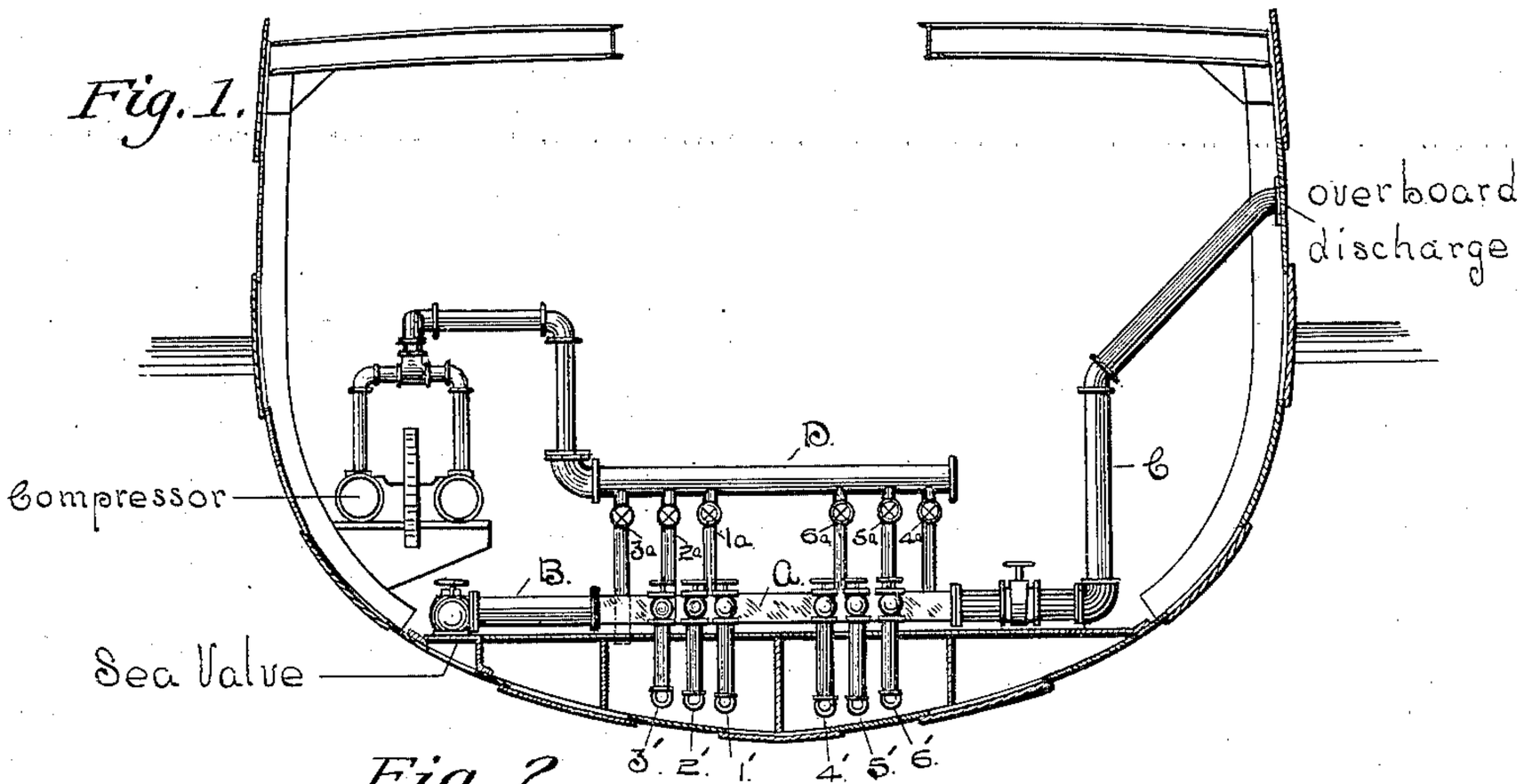
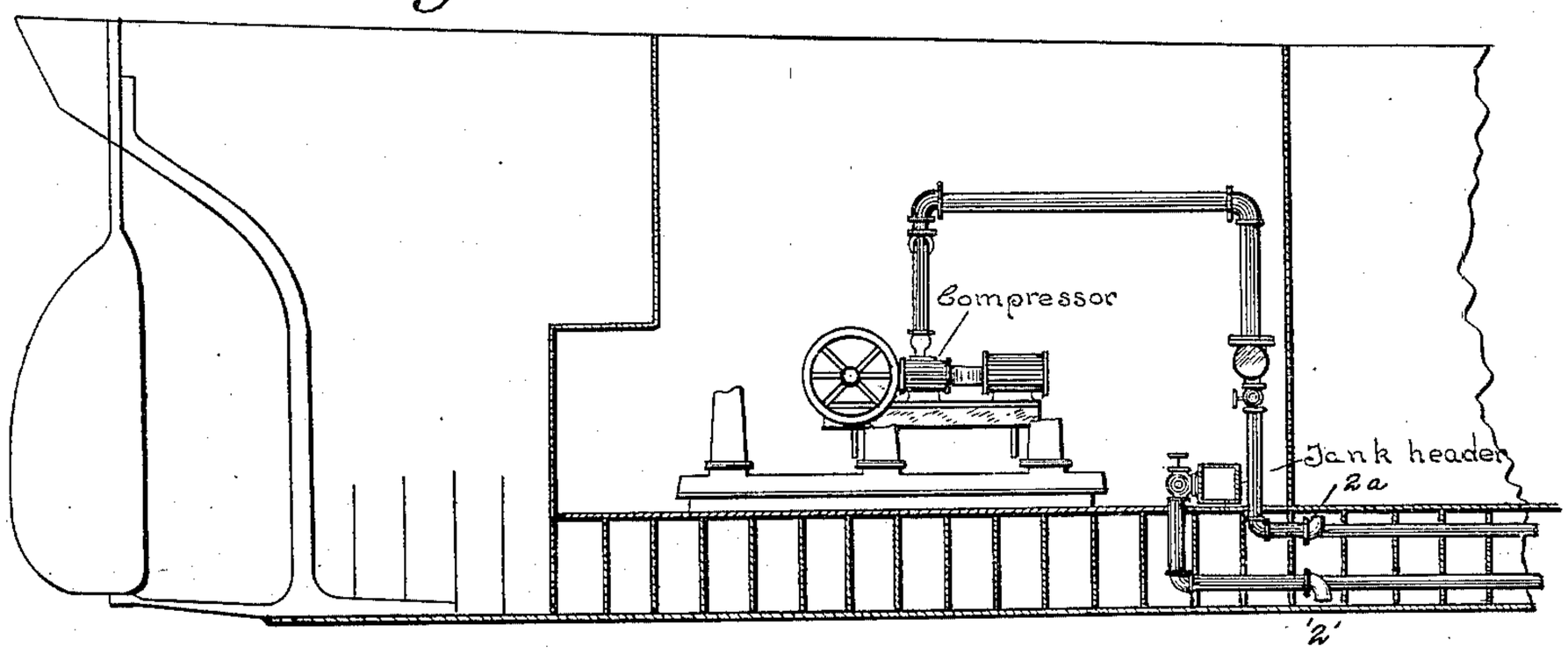


Fig. 2.



WITNESSES:
William Stephens
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INVENTOR.

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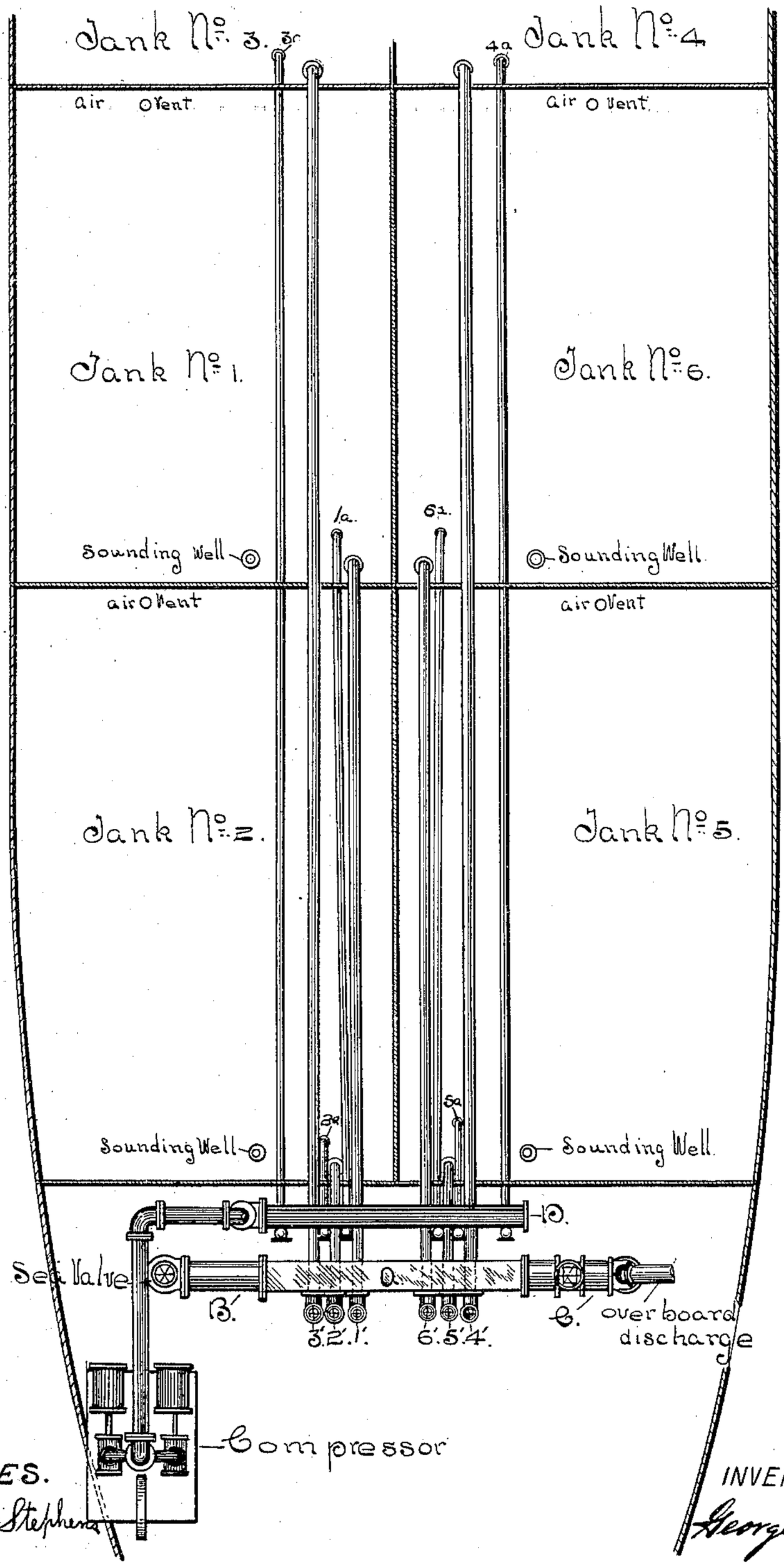

Fig. 3.

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UNITED STATES PATENT OFFICE.

GEORGE B. WILLCOX, OF BAY CITY, MICHIGAN.

MEANS FOR CONTROLLING WATER BALLAST IN SHIPS.

SPECIFICATION forming part of Letters Patent No. 662,330, dated November 20, 1900.

Application filed March 27, 1900. Serial No. 10,411. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. WILLCOX, a citizen of the United States, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Means for Controlling Water Ballast in Ships; 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 improved means for handling and controlling the water ballast of steamships and other vessels; and the improvement consists in the means and devices by which the objects of my invention are attained. These objects are, first, to provide means whereby the contents of one ballast-tank can be easily and quickly transferred to another tank without pumping overboard and without passing the water through a ballast-pump when trimming ship, and, second, to dispense partly or entirely with the heavy water-ballast pumps heretofore required on shipboard and to employ means that will operate smoother, with greater economy, and at higher speed, handling air instead of water, thus permitting the use of a smaller and lighter machine, giving higher velocity of flow through the pipes, and consequently smaller pipes that weigh less and occupy less space than water-pipes of equal capacity.

A further object is to provide means for regulating the admission of air to the tanks in any combination desired, thereby permitting the contents of any tank to be discharged overboard or to be transferred to any other tank at will.

It has been common heretofore in merchant vessels to connect each of the several water-ballast tanks to a common manifold or "tank-header." Each tank is provided with a shut-off valve and the header is connected to the sea-valves for flooding the tanks and to the ballast-pump suction for emptying them.

In some ships a modified arrangement that consists in a two-part header is used. Half the ballast-tanks of the vessel communicate with each part, and between the lengths of the header a gate-valve is usually inserted, so as to separate the two parts when desired. Each part of the header is connected to its individual sea-valve. With this latter arrangement two ballast-pumps are needed, one for each section of the header.

By the common arrangement first above described any tank may be filled independently of the others, and later after closing the sea-valve one or more tanks may be pumped out. The second arrangement has the additional advantage of permitting the tanks connected to one section of the header to be pumped out while those connected to the other section of the header are being filled; but to accomplish this it is necessary to pump the contents of one tank overboard while filling the other through the sea-valve with harbor water that is in many cases foul and injurious to the tanks or else to provide an elaborate and costly series of water-pipes connecting the different tanks. This plan, moreover, requires the presence of two ballast-pumps and a great amount of large pipe, all of which is very heavy and occupies valuable space in a crowded part of the vessel.

When a vessel is taking or discharging cargo at ore, grain, or coal chutes, it is frequently necessary to trim ship quickly by shifting the water ballast, and it is important to be able to fill some of the tanks on one side of the ship while simultaneously emptying those on the other side. The simplest way to accomplish this is to shift the water from one tank around through the header into another tank without pumping overboard, an operation that cannot be performed while the pressure in both tanks remains equal, which is the case when the entire header is subjected to the suction of the ballast-pump. Thus in order to shift ballast with the two-part header and ballast-pump arrangement above described the contents of one tank must be pumped overboard while the other tank is being filled through the sea-valve. The power required to elevate the tankful of water overboard is considerable, since the tanks usually contain from one hundred to five hundred tons of water each, and the steam consumption of the slow-speed ballast-pump is large, being from one hundred to

two hundred pounds weight of steam per horse-power per hour.

To obviate the difficulties and inconvenience of the old systems of ballast-handling, I have devised the system and means described in this specification and illustrated in the drawings forming a part thereof.

Throughout the several views of the drawings similar letters and characters of reference designate corresponding parts and devices.

Figure 1 is a transverse section of a vessel, showing my invention applied to the water-ballast system. Fig. 2 is a part longitudinal view of the same. Fig. 3 is a plan view.

A is a tank-header of any usual or suitable form, connected by its pipes 1′ 2′ 3′ 4′ 5′ 6′ to the respective ballast compartments of the vessel, and by pipes B and C to the sea-valve and overboard discharge, respectively. The pipes 1′ to 6′ are fitted with valves, and any tank may be filled by opening its valve and allowing water to flow in through the sea-valve. As previously described, a ballast-pump located in the line of the discharge-pipe C has heretofore been employed to empty the tanks.

In applying my invention I dispense with the ballast-pump and connect each ballast-tank to a manifold D or other suitable device by air-pipes 1^a 2^a 3^a 4^a 5^a 6^a, &c. The manifold is connected to an air-compressor located in any convenient part of the vessel. The pipes 1^a to 6^a, &c., are provided with suitable valves.

To empty any tank—as, for instance, No. 1—the valve in pipe 1′ is opened and air under pressure is admitted to the tank through the pipe 1^a, thus displacing the water in the tank and forcing it overboard through the discharge-pipe C.

To shift the ballast—*i. e.*, to empty a tank, as No. 1, and discharge its contents into any other tank, as No. 6—the valves in pipes No. 1′ and 6′ are opened and air is forced into the tank 1 through the air-pipe 1^a, thus displacing the water in tank No. 1 and causing it to flow around through the header A and pipe 6′ into tank No. 6. It is evident that by properly manipulating the valves of the air and water pipes any part of the contents of one tank may be distributed to the other tanks as desired, thus quickly and easily trimming ship without pumping water overboard.

To permit the egress of free air from the tank while it is being filled with water, any suitable form of air-valve or air-vent may be employed, and to prevent loss of compressed air through the air-vent while the tank is being emptied a suitable means for closing the air-vent is provided. A sounding-well for determining the depth of water in the tank is provided, as in all ships fitted with water ballast.

The details of construction of the air-vent and sounding-well are not shown in the drawings for the reason that suitable constructions for such purposes are well known and the spirit of my invention would still be preserved if any of the usual or approved forms of air-vents and sounding-wells were employed in connection with it.

By the means above described I am enabled to handle a large amount of water ballast rapidly and conveniently without pulsation in the flow of water, to shift the ballast from one compartment of the vessel to another without pumping overboard and without being obliged to make up the deficiency thus caused by taking in harbor water when in port, as is the case when ballast-pumps are used.

The location of the compressor is not confined to the line of the discharge-pipe, as all ballast-pumps are, but it may be placed in any convenient position. With this system the ballast-water is not passed through the pumping-mechanism, and the danger of blocking valves by material floating in the ballast-tanks is entirely eliminated.

When the compressor is not in service for handling ballast, it may be utilized for operating repair-tools, pneumatic drills, chipping and calking tools and the like and for many other purposes for which air-compressors are commonly applied.

What I claim is—

1. In combination with a ship's water-ballast system that comprises a plurality of ballast-compartments communicating by valve-controlled conduits with a chamber or header, the means whereby water ballast may be regulated and shifted; that is to say: compressed-air conduits communicating with the respective ballast-compartments; a source of compressed air for forcing air through said conduits into the compartments to be emptied; and means for controlling the admission and distribution of compressed air to the compartments.

2. In combination with a ship's water-ballast system consisting of a plurality of ballast-tanks communicating with a common header, the means whereby water ballast may be shifted from one tank to another, comprising a plurality of compressed-air conduits adapted to discharge compressed air into the respective tanks; an air-compressor for forcing air through said conduits into said tanks, and valves for controlling the admission of compressed air to the compartments substantially as described.

3. The combination with water-ballast tanks having a common header and separate flow-regulating valves; of compressed-air conduits communicating with the several tanks; a common header or manifold for the several conduits; a source of compressed air for forcing air into said manifold and conduits; and

means, as valves in said conduits, for controlling the distribution of compressed air to said tanks, substantially as described.

4. In a tank system comprising ballast tanks or compartments communicating respectively with a tank-header; means for shifting and controlling the contents of said compartments, that consists in displacing the contents of a compartment by compressed air, thereby causing the water to flow around through the tank-header into another ballast-compartment, substantially as described.

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

GEORGE B. WILLCOX.

Witnesses:

WILLIAM STEPHENS,

J. W. MCMATH.