No. 689,741. Patented Dec. 24, 1901.

A. McDOUGALL.

VESSEL FOR TRANSPORTING GRANULAR SUBSTANCES.

(Application filed Sept. 10, 1901.)

(No Model.)

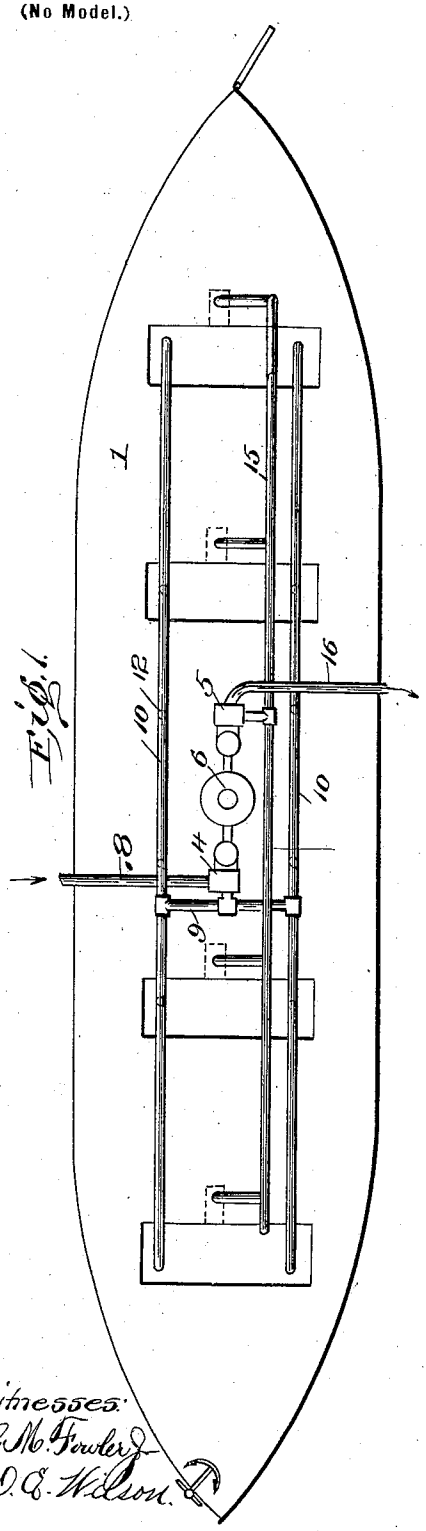


Fig. 1.

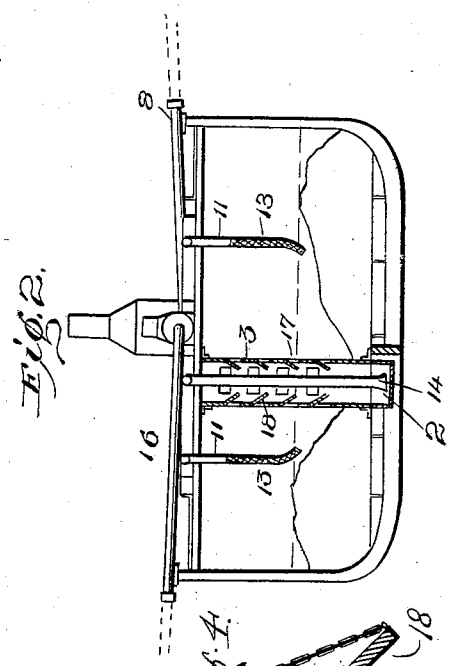


Fig. 2.

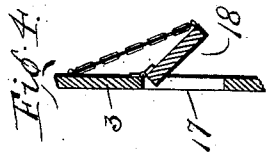


Fig. 4.

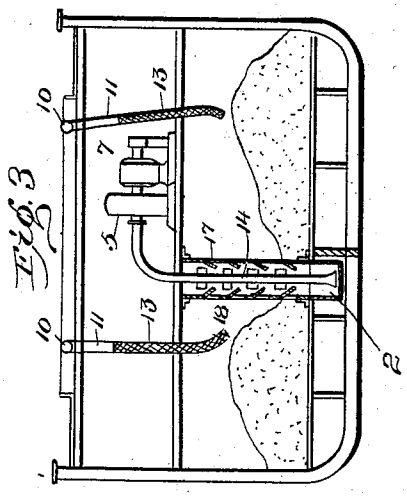


Fig. 3.

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UNITED STATES PATENT OFFICE.

ALEXANDER McDOUGALL, OF DULUTH, MINNESOTA.

VESSEL FOR TRANSPORTING GRANULAR SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 689,741, dated December 24, 1901.

Application filed September 10, 1901. Serial No. 74,895. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER McDOUGALL, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful improvements in vessels for transporting granular substances, such as sand, gravel, earth, coal, ore, or any cargo that can be moved by water-flow; and I do hereby declare the following to be a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in vessels for transporting granular substances —such as sand, gravel, earth, coal, ore, or any cargo that can be moved by water-flow—and is an improvement upon the device illustrated in my former patent, No. 393,996, of December 4, 1888, and of the method disclosed in my Patent No. 397,741, of February 12, 1889. In these patents a special boat of peculiar design is essential. My present invention relates to a device which may be attached to existing boats and barges of the ordinary type, as well as being built in a boat especially designed for the purpose, and it is also designed to unload cargo that has been loaded in dry bulk.

Generally speaking, my invention consists of means whereby a cargo of sand, gravel, earth, coal, or ore may be introduced within a vessel in any manner, but preferably by being mixed with water and loaded by decantation. The material may be removed from the vessel when desired by introducing a jet of water upon it and pumping out the mixture.

My invention has particular relation to the means for unloading vessels. That shown for loading is not absolutely necessary, as the vessel may, if desired and it be convenient, be loaded in the ordinary manner.

The device consists of one or more sumps, which are water-tight boxes extending from the planking or plating to the top of the ceiling or false bottom or part way up to the deck, and are arranged, preferably, just aft of the hatches or under or between the hatches, as may be desired, either in the central line of the vessel or to one side thereof. The sumps are covered with sump-boxes, which form vertical extensions thereto. The walls of the boxes are perforated with a number of holes, which may be closed when necessary by valves, or they may have open windows covered by small gates, or they may have plugged openings, as is described in the above-mentioned Letters Patent. An exhaust-pump communicates with the bottom of the sumps. The sump-boxes are each sufficiently large to admit the entrance of a man to adjust the plugs or valves or open and close the gates, if such be used. In addition to the sump-boxes and exhaust an inlet-pump is used to supply a mixture of water and sand or of water alone to the hold of the vessel. In practice I prefer to have this pump discharge upon both sides of the vessel and through both hatchways. I also prefer to provide the discharge ends of this pump with flexible pipes or couplings, so that the water or a mixture of solid material and water may be directed to any part of the hold of the vessel.

In operation for handling granular substances a mixture of the material is pumped into the hold of the vessel, some of the holes in the sump-boxes being left open. The material will settle to the bottom of the vessel and the water will be decanted off through the holes in the sump-boxes and flow into the sumps, from which it will be removed by the exhaust-pump and discharged overboard. As the material accumulates in the bottom of the vessel the lowermost holes in the sump-boxes are closed to prevent the material from passing into the sumps. As the level of the material rises the holes in the boxes are closed, the lower ones first and the others as necessary, until the vessel is loaded to the desired extent. In lieu of this the vessel may be loaded from an ordinary coal or ore dock through chutes.

To unload the material, all the holes in the sump-boxes are first opened. Water is forced through the inlet-pump upon the top of the material, preferably that adjacent to the sump-boxes. This is rendered possible if flexible couplings be used upon the discharge extremities of the pump. The mixture of material and water thus formed will pass into the sump-boxes and from there will be removed by the exhaust-pump, which will force it to its destination ashore.

If desired, a center bulkhead may be used in the vessel to prevent the water from shipping from side to side while loading or unloading; but this is not always necessary.

In order to better understand the nature of my invention, attention is called to the accompanying drawings, in which—

Figure 1 is a top view of a shallow or single-deck barge with my attachment in place. Fig. 2 is a mid-ship sectional view thereof, taken through one of the sump-boxes. Fig. 3 is a cross-section of a double-deck vessel through the sump-box, and Fig. 4 is an enlarged sectional view of a portion of a sump-box wall and a closure therein.

In all the several views like parts are designated by the same numerals of reference.

The vessel 1 may have my attachment built in as an integral part thereof or not, as desired. The sumps 2 are shown as being arranged aft in the hatchways for greater convenience in locating them and to render them more accessible and also to trim the vessel by the stern, so as to secure a better flow of water; but this is not essential, as they may be located between the hatchways. Neither is it necessary that they be located in the accurate fore-and-aft line shown alongside the keelson, as they may be placed in either bilge, if any advantage would accrue from such irregularity of position.

3 represents the sump-boxes, arranged above the sumps, as shown, and extending up to the deck. The walls of the boxes are perforated, as shown. The sump-boxes may have angle-irons on their edges through which bolts may pass to secure them to the deck and false bottom.

4 is the feed-pump, and 5 the exhaust-pump, both shown as being directly coupled to their driving-engines and located amidships, with the donkey-boiler 6 between them. It is of course understood that both pumps may be operated by the same engine and that an electric motor 7 may be used instead of a steam-engine. (See Fig. 3.) In this view the pump 5 is coupled directly to the motor and both are carried below the upper deck, so as to reduce the lift as much as possible. Furthermore, it will be seen that either or both pumps can be located away from the vessel, as upon the quay or dredge. The entrance-pipe 8 communicates with the dredge when the vessel is being loaded and overboard while unloading.

9 is a branch pipe connecting the feed-pump 4 with the fore-and-aft mains 10. These latter mains have branches 11 passing into the hold of the vessel through the hatchways or through deck-openings 12 between the hatchways.

13 represents flexible exhaust-pipes by means of which a stream of sand and water or of water alone may be directed to any portion of the hold and force the cargo to the sump-boxes.

An exhaust-leg 14 is arranged within each sump-box 3 and connects with the fore-and-aft main 15, which in turn connects with the exhaust-pump 5. The exhaust-pipe 16 passes overboard while the vessel is unloading and connects by suitable piping, which will force the cargo ashore while unloading.

The walls of the sump-box 3 are perforated with numerous holes 17, which may be closed by any suitable means, that shown in the drawings being merely for the purpose of illustration. The closure shown consists of a gate 18 for each hole, hinged in position and arranged to drop to a vertical position or to be held open by any means—as, for instance, by a short length of chain, as shown.

The operation of the entire device is as follows: To load, a mixture of material and water is forced from the bottom of the river or other source of supply through the pump 4 to the hold of the vessel and evenly distributed on the bottom thereof by means of the flexible pipes 13. Some of the perforations in the walls of the sump-boxes are opened at the beginning of this operation. The material will settle to the bottom of the vessel and the water will pass off through the lowermost perforations in the sump-boxes and will flow into the sumps and will be removed therefrom by means of the pump 5. As the level of the material rises in the hold of the vessel the lowermost perforations are closed, as is shown, care being taken that as the level of the material rises in the hold all perforations below that level shall be closed. The mixture of material and water is pumped into the hold and the water in the sumps pumped overboard until the vessel is completely loaded. To unload either wet or dry cargo or when a cargo of sand, gravel, earth, coal, ore, or other material is loaded into the vessel without the use of water to flow it, some perforations in the sump-boxes are first opened and a stream of water is caused to pass upon the top of the load of material through the flexible pipes 13 and preferably adjacent to the sump-boxes. The cargo will be carried or forced in solution with the water through the perforations in the sump-boxes to their interiors, falling into the sumps, from which it will be removed by means of the exhaust-pump 5 and conveyed to its destination ashore.

It will be seen that the device may be modified to a great extent without departing from the spirit of my invention. In the first place, the feed-pump 4 may be dispensed with entirely, a mixture of material and water being forced into the vessel's hold from a dredge, and while unloading the water for mixing with the material may be introduced from a source of supply on shore or through suitable seacocks. As before pointed out, any form of closure may be used for the perforations in the sump-boxes, that shown being, in my opinion, the best for the purpose, as a different form of valve would likely be choked by the material.

Before claiming my invention I desire to

define what I mean by the term "granular substance." This I mean to be sufficiently broad and inclusive to embrace all comminuted, pulverized, crushed, ground, or triturated material, which will not be injuriously affected by mixing with water and which can be carried in suspension. This term will include sand, gravel, ore, earth, or coal; also, silt, which is not truly granular.

Having now described and ascertained the nature of my invention, what I claim, and desire to secure by Letters Patent, is—

1. An improvement in means for transporting granular material, consisting of a vessel, a valved sump-box or sump-boxes therein, an exhaust-pump therefor, and a feed-pump discharging within the hold of the vessel outside of the sump box or boxes, substantially as described.

2. An improvement in means for transporting granular material, consisting of a vessel, a valved sump-box or sump-boxes therein, an exhaust-pump therefor having flexible discharge ends within the hold of the vessel, outside of the sump box or boxes, substantially as described.

3. An improvement in means for transporting granular material, consisting of a vessel, a sump-box or sump-boxes therein, the said box or boxes having perforated walls, a closure for said perforations, an exhaust-pump connected with the sump-box or sump-boxes, and a feed-pump discharging within the hold of the vessel, outside the sump box or boxes, substantially as described.

4. An improvement in means for transporting granular material, consisting of a vessel, a sump-box or sump-boxes therein, the said box or boxes having perforated walls, a closure for each of said perforations, an exhaust-pump connected with the sump box or boxes, and a feed-pump discharging within the hold of the vessel, outside of the sump box or boxes, substantially as described.

5. An improvement in means for transporting granular material, consisting of a vessel, a sump-box or sump-boxes therein, the sump box or boxes having perforated walls, a closure for said perforations, an exhaust-pump connected with the sump box or boxes, and a feed-pump, having flexible discharge ends, within the hold of the vessel, outside of the sump box or boxes, substantially as described.

6. An improvement in means for transporting granular material, consisting of a vessel, a sump-box or sump-boxes therein, the said box or boxes having perforated walls, a closure for each of said perforations, an exhaust-pump connected with the sump box or boxes, and a feed-pump, having flexible discharge ends, within the hold of the vessel, outside of the sump box or boxes, substantially as described.

7. An improvement in means for transporting granular material, consisting of a vessel, a sump-box or sump-boxes therein, the said box or boxes having perforated walls, gates for closing said perforations, an exhaust-pump connected with the sump box or boxes, and a feed-pump discharging within the hold of the vessel, outside the sump box or boxes, substantially as described.

8. An improvement in means for transporting granular material, consisting of a vessel, a sump-box or sump-boxes therein, the said box or boxes having perforated walls, gates for closing said perforations, an exhaust-pump connected with the sump box or boxes, and a feed-pump, having flexible discharge ends, within the hold of the vessel, outside of the sump box or boxes, substantially as described.

This specification signed and witnessed this 28th day of August, 1901.

ALEXANDER McDOUGALL.

Witnesses:
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