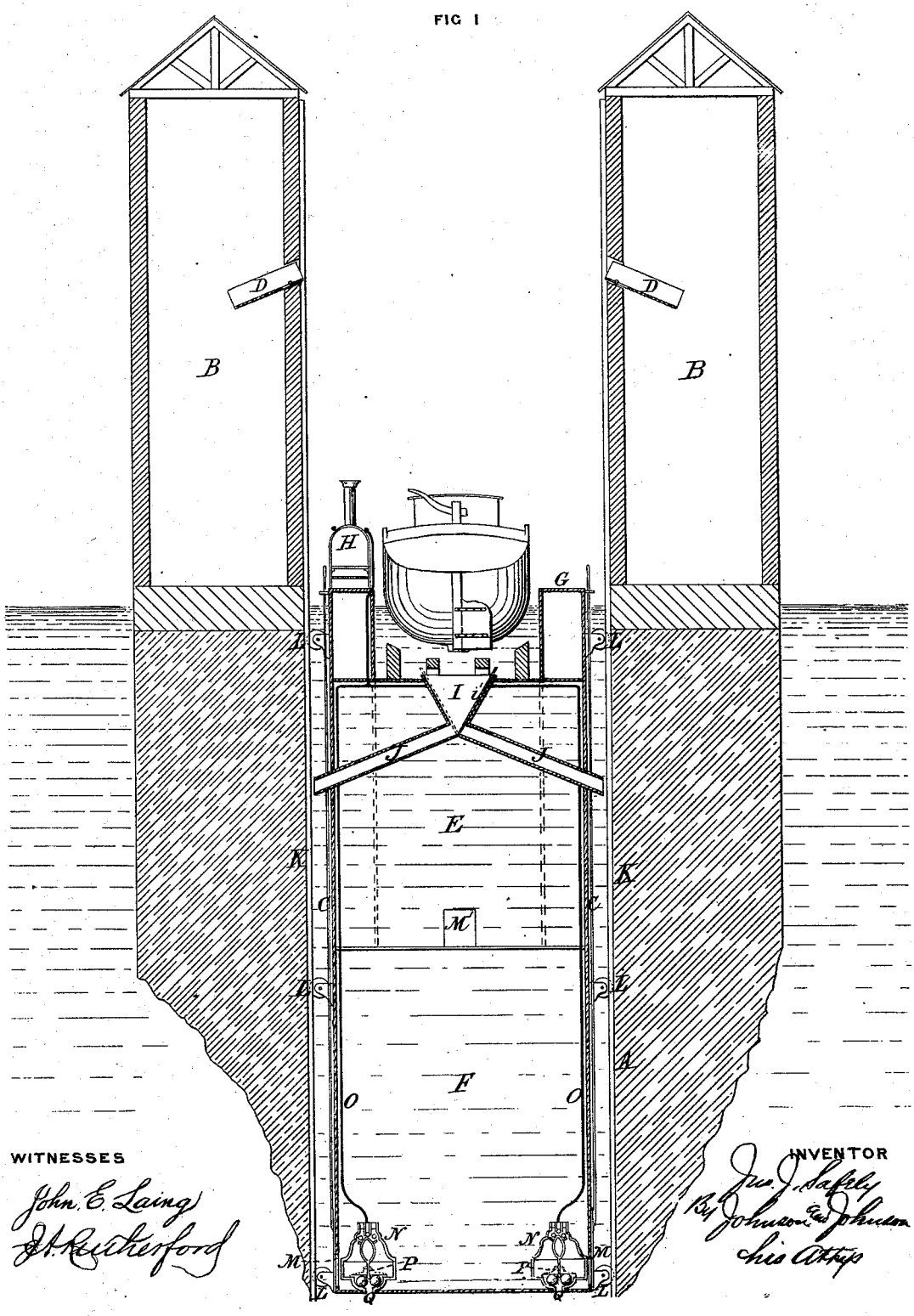
3 Sheets--Sheet 1.

J. J. SAFELY.

Method of Elevating Vessels for Transferring Grain

No. 162,695. Patented April 27, 1875.

FIG 1



WITNESSES

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THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

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FIG II

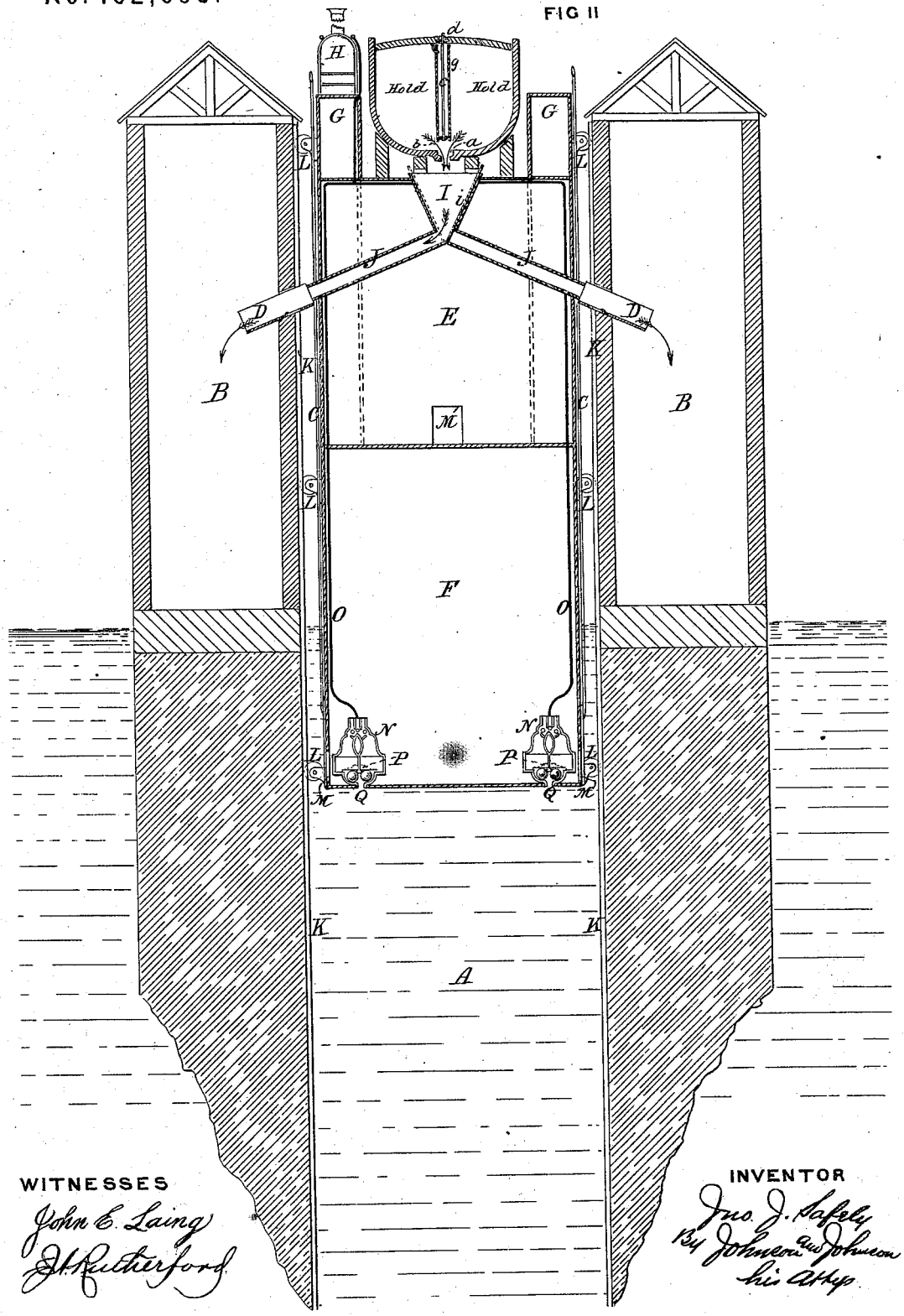

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FIG III

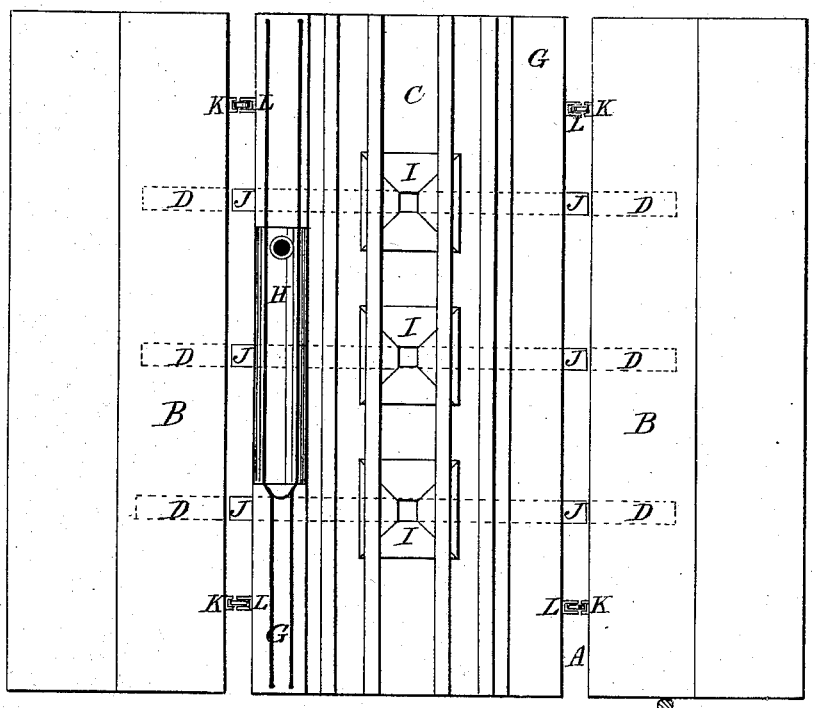


FIG IV

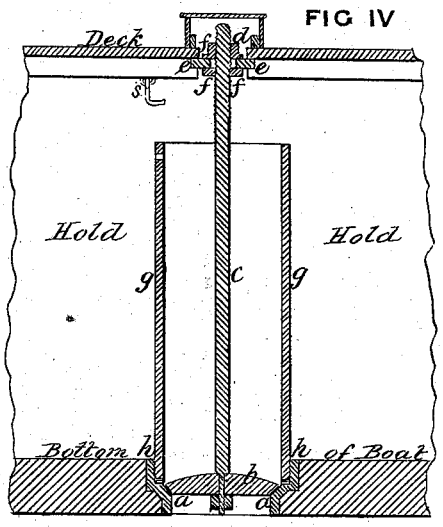
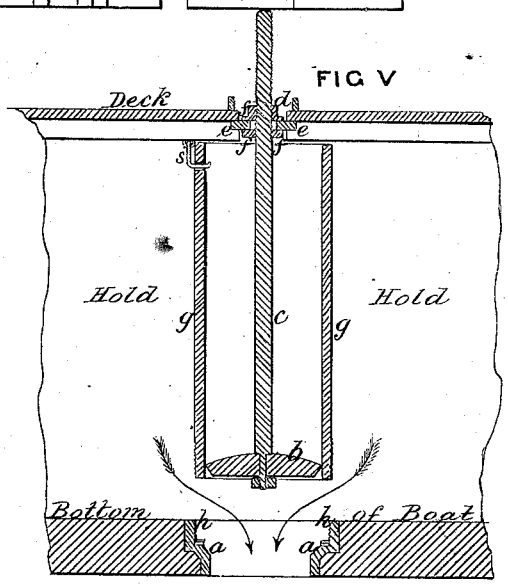


FIG V



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UNITED STATES PATENT OFFICE.

JOHN J. SAFELY, OF OTTUMWA, IOWA.

IMPROVEMENT IN METHODS OF ELEVATING VESSELS FOR TRANSFERRING GRAIN.

Specification forming part of Letters Patent No. **162,695**, dated April 27, 1875; application filed October 5, 1874.

CASE A.

To all whom it may concern:

Be it known that I, JOHN J. SAFELY, of Ottumwa, in the county of Wapello and State of Iowa, have invented a certain new and useful Method of Elevating Vessels for Transferring Grain, Coal, or other like material from one vessel to another, and from vessels into elevators or elevated bins; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to a novel method of elevating boats for transferring grain, coal, and other like material, which can be passed through a conduit from one boat to another, and from boats into elevators or elevated bins, by means consisting of an elevating floating-dock, with suitable air-tight compartments, and wherein are combined a steam boiler or boilers for operating vacuum-pumps, known as the "Hall Pulsometer," to effect the elevation of the dock and laden boat to the required height above the water; suitable conduits or chutes opening at the dock-surface, through which the grain, coal, &c., is received and transferred into bin-chutes, with which said dock-conduits are brought to a level, and made to form a junction; and suitably-arranged gates in the sides of the dock for submerging it to release the unloaded boat or to receive a laden one, which, being provided with valved bottom openings, is supported when raised upon the dock-surface with such openings immediately above, and forming a continuation of the receiving-hopper conduits in the floating-dock, so that the contents of the boat must pass through said elevated dock to its place of transfer, and thereby unload the boat in a comparatively short time, and at a great saving in cost over the method now practiced in the use of grain-elevators, while for coaling steamships in ports the saving of time and expense is by my invention in a vast degree made advantageous to the marine service.

The celerity and completeness of the operation is mainly due to the combined free and forced displacement of the water from the dock, and so controlling such displacement by the action of the pumps and dock-gates as to make the communication of the elevating-bins with the hold of the boat through the dock upon which the elevation of the boat was effected.

In the accompanying drawings, Figure 1 represents a vertical transverse section of a floating-dock in connection with receiving elevators or bins, and embracing my invention of elevating vessels for transferring grain, &c., the floating-dock being shown submerged to receive the boat to be raised and unloaded; Fig. 2, a similar section, showing the floating-dock elevated with the boat and in position to effect the transfer of the material from the boat into the bins; Fig. 3, a top view of the floating-dock in position between the bins; Fig. 4, a section showing one of the valves of the boat in its sealed position in carrying the grain or coal; and Fig. 5, a similar section showing the valve open when the boat is elevated out of water to effect the discharge of the grain.

My invention is alike applicable for unloading laden vessels into water-slip receiving-bins, or for coaling steamships *in transitu* at coaling-stations.

When employed for effecting the transfer of grain into bins, I construct a water-slip, A, on one or both sides of which are reared receiving elevators or elevated bins B, of any suitable construction for the purpose, by the side of or between which the laden vessel is elevated upon and by means of a floating-dock, C, in a position to effect the transfer of the material from the bottom of the boat into and through the floating-dock to the place of deposit. The water-slip must be of sufficient depth to allow the dock-surface to be submerged, as shown in Fig. 1, a distance that will admit the laden vessel to enter the slip above the dock, so that when the latter is raised from its submerged position it will bring up the laden boat with it, as shown in Fig. 2. The elevators or elevated bins B are provided with suitably-constructed chutes D,

which are adjustably arranged to be put into junction with the dock-conduits as the latter are elevated.

The dock is built of any suitable material in substantial manner, and with one or more water-tight compartments, E and F, into which the water is let to lower the dock, or displaced therefrom to raise the dock.

The dock-surface is constructed in a suitable manner for receiving and affording proper support to the bottom of the boat when resting thereon; and the sides of its upper compartment are extended to form air-chambers G to the dock, to keep it afloat, and which must always be out of water to form deck-surface for one or more steam-boilers H, for use in connection with suitably-operating pumps within the water-compartments.

The floating-dock is constructed to receive the grain from the bottom of the boat, and for this purpose it is provided with hoppers I opening at its dock-surface at distances apart corresponding to the openings in the bottom of the boat, and from these hoppers conduits J branch to each side and project through the sides of the dock in positions vertically in line with the chutes D of the receiving-bins, so that the dock in being raised can be stopped, and held at a level to bring its conduits to join those of the bins, and thus make the passage from the boat to the bins. To effect this ranging of the bin and the dock chutes the bin sides are provided with guides K, into which small rollers L, on the dock sides, work as the dock rises and falls, thereby keeping the latter with its conducting-chutes always in position for use.

The hoppers may have suitable water-tight slides, and provided with valves *i*, by which to let out the grain or coal from either or both sides of the dock.

It is obvious that one side of the slip may be formed by heavy-timber framing, and the dock employed for coaling ships, or making the transfer from boat to boat, or from boat to cars.

The submerging of the dock to receive the boat is effected by letting water into the compartments by opening gates M M′ arranged in the sides of the dock. These gates are fitted in any suitable manner, and are water-tight. They are operated from the deck-surface by rack-and-pinion connection with crank-handle, or in any desired way. The inflow of the water can be regulated to submerge the dock to the proper depth to permit the boat to pass in between its deck sides in position to be raised. The upper and lower dock compartments are filled in this way, and the gates may be arranged in the sides of one and in the ends of the other, so as not to interfere with their operation.

There is a special advantage in dividing the dock into separate horizontal compartments, as will presently be stated.

The raising of the dock to elevate the boat is effected by means of pumps N, of the construction and operation known as Hall's steam vacuum-pump, arranged in the lower water-compartment, and connected, by pipes O, with one or more steam-boilers, H, arranged upon the deck sides, so that the steam is caused to act by direct pressure to displace the water from one chamber of the pump while the other is filling, the action being self-controlling in the admission of the steam into the pump-chambers. Any suitable number of these vacuum-pumps may be used, but I prefer to locate one in each corner of the dock. The inlet-pipe P of each opens into the compartment, and their outlet-pipes Q pass through the bottom of the dock and open into the outside water, so that the chambers, being alternately filled from the compartment, discharge the water through the bottom openings with great rapidity, and simply by the action of steam-pressure within the pump-chambers. It will be observed, however, that the pumps only act to displace the water from the lower compartment. As soon as the dock is raised by this means enough to bring the floor of the upper compartment above the level of the outer water, then the gates M^1, of this compartment are opened and the water let out to continue or aid in bringing the dock to a proper height. Both of these compartments, therefore, while acting in conjunction to raise the dock in the way described, serve also as means, in conjunction with the regulation of the steam-pressure, for regulating the ascent and determining the height at which the dock must be raised to bring its chutes on a level with those of the receiving-bins, without regard to the combined weight of the dock and the vessel; for the outlet of the water can be regulated either by the increasing or diminishing the steam-pressure in the pumps, and by the gates, and thus bring and hold the dock with its loaded boat at any desired height above the water, for use either in transferring grain into the elevator or car, or coaling steamships in mid-stream, or in port. In this way, also, the displacement of the water is effected in a very short time, and the pumps only required to displace a portion of it, so that, in fact, the pumps serve as the prime motors to raise the dock a certain distance, while its complete elevation is effected by letting the water run freely out of the upper compartments of the dock when raised above the floating-level of the water.

I have described a floating-dock in connection with the operation of raising laden boats, to effect the transfer therefrom of grain, coal, &c.

In connection with such means, however, it is required that the boat shall be of such construction as to be adapted to carry out such method of transfer as embraced in my invention, and to this end I construct a boat for transporting and transferring grain, coal, &c., with bottom openings, which are sealed while the boat is *in transitu* and opened when the

boat is elevated from the water to a proper position for the opening of such sealed outlets, the object being to obtain a boat with bottom openings, sealed from the inflow of water into the boat, and capable of being uncovered to open a communication therefrom through the dock with the elevators, or elevated bins, whereby the contents of the boat will pass quickly therefrom without manipulation when the openings in the boat are in positions directly above the conduit-hoppers of the dock, and these, in turn, form a junction with the chutes of the bins or hold of a vessel, whereby the laden boat and the dock co-operate to effect the transfer of the material into any desired place directly from the bottom of the boat. The openings are made in the bottom of the boat, about twenty feet apart, more or less, and these are fitted with valve-seats *a*, for the reception of disk-valves *b*, about fourteen inches in diameter, carried by vertical screw-stems *c*, which extend above the deck of the boat and pass through a female screw-nut, *d*, held in place by means of a box, *e*, secured to the deck and fitting between collars *f f* on said nut, so that, by means of a crank-handle, or other suitable arrangement, the nut may be turned to either raise or lower the valve to open or close the bottom openings. As the valves cannot be sealed perfectly water-tight I combine therewith removable cast-iron pipes *g*, open at both ends, inclosing the valve and its stem, and serving to protect and shield them from the grain or coal in the hold of the boat, and to exclude the water therefrom, the said pipe being screwed or otherwise secured in a water-tight seat, *h*, surrounding both the bottom opening and the valve. The leakage through the valve-joints may, therefore, rise in the pipe on a level with the outside water, but cannot enter the hold of the boat. There is a space between the top of the pipe and the deck of the boat to allow room for raising said pipe to open the communication from the boat's bottom, but before doing so all the valves of the boat should be raised to let out the leakage in the pipes when the boat is raised out of water. In this way the bottom-openings can be sealed for the transportation of grain, coal, or other like material, and opened to allow such material to pass freely out when everything is ready for that operation. The pipes may be held open when raised to let out the grain by hooks *s*, on the under side of the deck, or by any suitable device, as shown in Fig. 5; and they may be unscrewed from their water-tight seats by hand-rods inserted into holes in the upper open ends of said pipes. These upper open ends must, however, always be above the material in the hold. The deck end of each valve-stem may be covered by a hood.

I have described a floating-dock having an upper and a lower compartment, but it is obvious that the dock may have only one compartment, and the water displaced therefrom by the vacuum-pumps, as may be required, to bring the dock to the proper height.

After the boat has been unloaded the gates of the dock are opened, the compartment or compartments E and F are again filled with water, to submerge the dock and release the vessel therefrom, and be in readiness to receive and elevate another laden boat.

The steam-pipes may be protected by non-conducting material in any suitable manner.

It is obvious that the dock can be constructed to elevate two boats at a time, and to allow them to be unloaded from opposite sides.

The air and water tight compartments G may be extended as far down the sides, as shown by dotted lines in Fig. 1, as will float the dock in safety when submerged, and to keep the dock and vessel as much above the water as will bring the boat to the proper height. These compartments are filled with air for the purpose.

The dock can be stopped at any desired point in its course up or down.

I claim—

1. The method herein described of transferring grain, coal, &c., and other like material, from boats, by elevating the laden boat upon a floating-dock, and effecting the transfer through valved openings in the boat's bottom, and through corresponding side conduits in the raised floating-dock, to the place of transfer.

2. A floating-dock constructed for elevating laden vessels, to effect the transfer of their contents, having combined therein a steam boiler or boilers, vacuum-pumps in the water-compartment connected with said boiler or boilers, conduits or chutes opening at top of the dock to receive the contents from bottom openings in the boat, and at the sides of said dock, to deliver the contents where desired, with suitable gates by which to let in and shut off the water from said floating dock, and air-buoying compartments, the several parts co-operating to effect the object stated.

3. A floating-dock and a laden boat thereon, elevated by the displacement of the water directly through the bottom of its water-filling compartment, substantially as described.

4. The combination of a floating-dock, constructed and operated substantially as described, with elevators or elevated bins, constructed for use on one or both sides of said dock, and having conduit communication therewith, substantially as and for the purpose specified.

5. The method herein described of elevating the floating-dock and the laden vessel thereon, to bring the dock-conduits at a height to form a junction with the elevator or bin-conduits without regard to the combined weight of the dock and the vessel.

6. A floating-dock divided into upper and lower water-compartments, in combination with air-buoying compartments, vacuum-pumps, arranged and operated to displace

the water from the lower compartment, and gates to let out the water from the upper compartment when its floor has reached a level above the outer water, whereby the dock is quickly elevated by the combined free outlet and forced displacement of the water therefrom.

7. The combination of the guides and rollers upon the elevated bins and the dock sides, to maintain the conduits of the latter in vertical range with those on the bins, to effect their junction when the dock has reached its proper height.

8. The combination, in a floating-dock constructed with deck-conduits for the transfer of grain from boats, of the air-tight buoying-compartments G, and the valved compartments E and F, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have affixed my signature in presence of two witnesses.

JNO. J. SAFELY.

Witnesses:

A. E. H. JOHNSON,

J. W. HAMILTON JOHNSON.