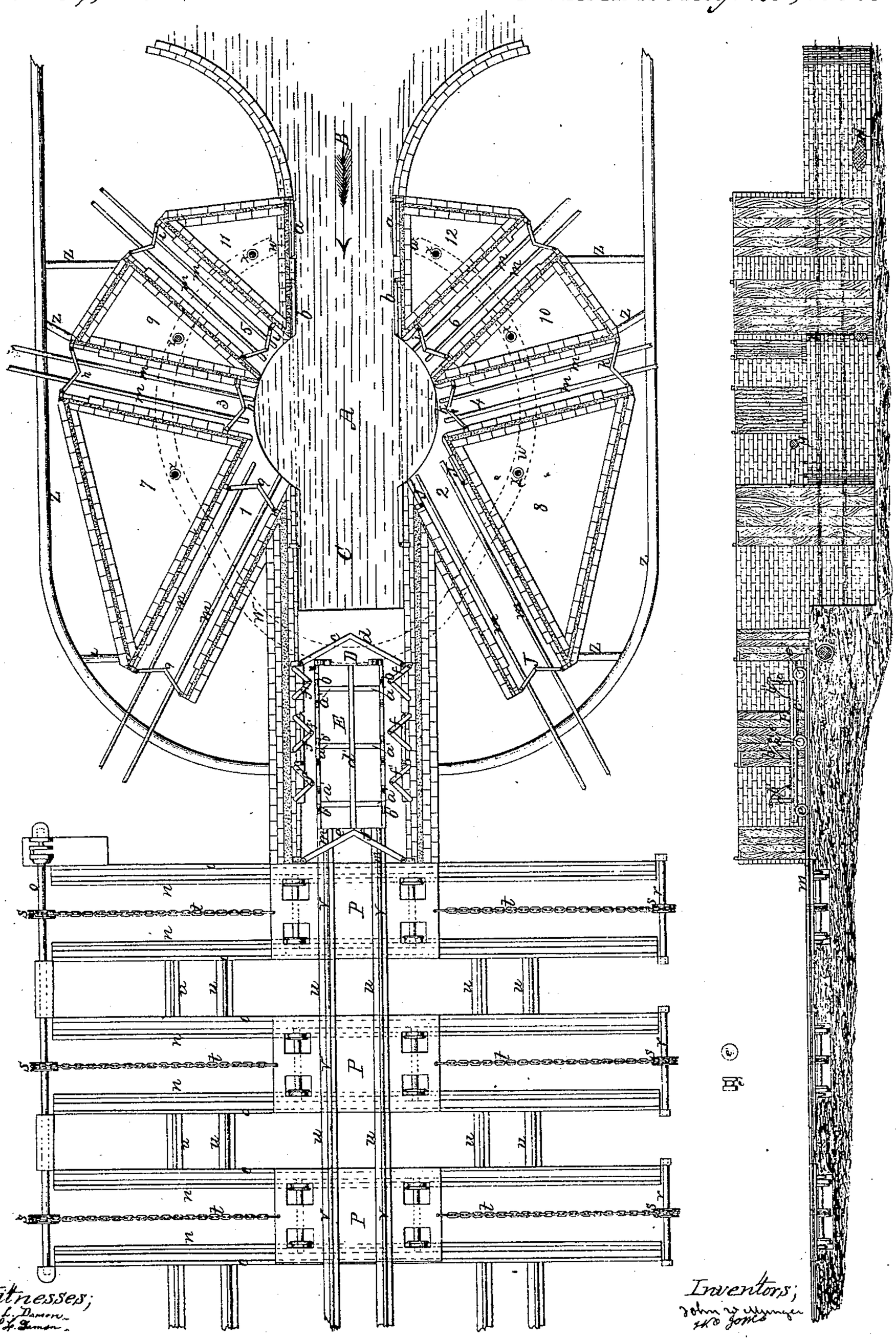
Munger & Jones.

Dry Dock.

No. 57,550. Patented Aug. 28, 1866.



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IMPROVEMENT IN DRY-DOCKS.

Specification forming part of Letters Patent No. **57,550**, dated August 28, 1866.

To all whom it may concern:

Be it known that we, JOHN W. MUNGER and W. O. JONES, both of Portland, in the county of Cumberland and State of Maine, have invented certain new and useful Improvements in the Construction of Docks and of Docking-Vessels; and we 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 our invention, reference being made to the accompanying drawings, constituting part of this specification, in which—

Figure 1 shows a top plan and view of a dock embodying our improvements. Fig. 2 is a vertical transverse section of the same.

The same letters refer to like parts in all the figures.

The following several methods have heretofore been pursued in the construction of docks:

First, a dock is excavated to the requisite depth. Within the area of this excavation a bed is made, upon which it is designed a vessel shall rest while undergoing repairs. Into the dock a vessel is floated and lifted to such elevation as the rise of the tide will effect. The water is then exhausted and the vessel allowed to sink and rest upon the bed so placed within the area of the dock. With this form only a single vessel can be placed in the dock at a time, and with the entrance and departure of every single vessel the dock must be charged and drained.

The object of our invention is, first, to produce a dock of such construction that numbers of ships or vessels can be placed in condition and position to receive repairs at the same time, and this also with a comparatively less expenditure of time and labor in floating the vessels to their destined position in the dock. It has also for its object the floating of vessels of great length and depth of draft within a comparatively contracted space.

Second, in "sectional docks," so called, a frame is constructed and so placed within a dock as that a vessel may be floated over the same. The vessel is then raised thereupon by screws. This involves the application of great mechanical power and much expense, and the vessel is liable to suffer injury from the unequal operation of the lifting-power. It is also an object of our invention to obviate this difficulty by floating the vessel to the desired height before placing her upon the ways.

Third, another method of raising vessels from the water for repairs is by means of floating docks, where a hollow hull is sunk under a vessel, closed, and then emptied of its water by pumping.

Fourth, marine railways, where vessels are drawn up an inclined plane, are open to the objection of racking and straining the hull and rigging when force is applied to the hull, being placed in so unusual and unnatural a position.

Our invention consists, first, of a central basin of any diamater, having a channel of communication with the waters of the sea, and in which the tides rise and fall naturally.

In the accompanying drawings, A shows the basin, and B the channel. Both the central basin and channel are first excavated to a depth below low-water mark that the wishes of the constructors may require. The segments of the circle described by the arcs and the dotted lines are left of such depth as will be hereinafter specified. By this arrangement vessels of any burden and draft can first be floated into the central basin with the incoming tide; and the effect also is that the depth of water in the basin at high tide is the sum of the rise of the tide and the depth of the excavation. The channel communicating with the waters of the sea is continued, on the side of the central basin opposite to that at which it enters the basin, to any desired distance, with the same depth and width as the other portion thereof. The purpose of this continuation of the channel is to provide space for vessels of any length when the diameter of the central basin may not be sufficient to allow of their being confined therein. This continuation is seen at C. At the inner end of this continuation of the channel is constructed a main dock in a direct line with the channel of communication with the sea. This is seen at D. The depth of this dock is less than that of the channel. This is intended for the reception of vessels of the larger size.

Around the circumference of the central basin are constructed other docks of sizes to meet the various uses and the tonnage and size

of vessels for which they are intended. These are indicated at 1 2 3 4 5 6. Between the docks thus located around the central basin are constructed tanks or cisterns, for the purposes and in the manner hereinafter described. These cisterns are seen at 7 8 9 10 11 12. The docks and cisterns thus referred to are of less depth than the channel B.

At the opening or entrance of the channel of communication with the sea are set gates of the description shown in the drawings. These are so arranged that pressure of water from without serves to hold them firmly pressed together. Some distance within this channel are arranged other gates, which are intended to serve two purposes—first, to confine the water within the central basin when desired, and, second, to prevent the entrance of water into the basin. These gates are seen at *a b*, and are all so arranged as when closed to project outward somewhat when intended to prevent the entrance of water, and inward when used to confine the water within the basin, by which arrangement the pressure of the water on either side, according to the purpose for which the gate is employed, serves to close and hold the same. In the main dock D are also located gates at different intervals, and constructed in the same manner as those before described. These gates are seen at *c d e f*, and have various purposes—first, to close the inner end of the dock, and, second, to shorten the length thereof, in order to economize water when any vessel does not require the whole extent of the dock, and also to prevent the entrance of water therein when admitted into the central basin for the entrance of other vessels at the time when a vessel may have been placed for repairs in the dock now being described.

All the side docks located, as before specified, around the circumference of the central basin have gates of the same description as these thus described, and intended for similar purposes. These are illustrated at *g h i j k l*.

All of the gates thus specified have on their edges of contact with each other either a double or single bevel, so that when closed and projecting either outwardly or inwardly these edges will form a joint. The several docks thus described are made by raising walls or embankments upon the surface of the ground, as hereinafter more fully set forth, and their depth and that of the segments of the circle indicated by the dotted lines is the same.

Commencing at the circumference of the central basin, and in each of the docks thus referred to, are laid down radial railways extending throughout the length of the docks and beyond the same upon the surface of the earth to any desired extent. These are illustrated at *m*. At right angles to these radial ways, and communicating with the same, as hereinafter set forth, are laid transverse ways, upon which vessels, when moved out upon the radial ways, can be further hauled off to either side. These transverse ways are shown at *n*, and placed in excavations in the earth. Upon these ways run carriages, which, by being placed in these excavations, run level with the surface of the ground. The sides of these carriages rest upon smooth tracks, the object of which is to prevent their tipping to either side when any weight placed thereupon rests upon the side of any one of them. The carriages are indicated at *p* and the side tracks at *o*. At one end of these transverse ways is placed a propelling-shaft arranged with trucks or pulleys. At the other end thereof are separate shorter shafts, each having a single truck or pulley.

By imparting revolution to the propelling-shaft any number of the transverse carriages *p* can be moved simultaneously by means of bands or other appliances passing around the trucks and attached to both ends of the carriages.

The propelling-shaft is indicated at Q, the short shafts at *r*, the trucks at *s*, and the bands at *t*.

Continuations of the radial ways in sections are laid down between the transverse ways, (shown at *u*,) and tracks are also constructed upon the tops of the carriages, so that by moving the carriages to such position as that the tracks thereon match the radial ways a continuous line of track is made, and vessels can then be hauled out therefrom, and then, if desired, moved off transversely by the employment of the carriages, as before indicated. The tracks on the carriages are seen at *v*. When a vessel has been thus hauled off the carriages can be relieved thereof by moving the vessel forward by means hereinafter described, so that it may rest upon the sections of the radial ways lying between the transverse ways, and the carriages can then again be employed to move off another vessel in the same manner.

We will now proceed to describe the uses and operation of the tanks or cisterns to which allusion has before been made, and numbered 7 8 9 10 11 12. These cisterns have a subterraneous intercommunication or aqueduct, which has an outlet into each of them, and also an outlet into the central basin. The aqueduct is indicated by the dotted lines at *w* and the outlets into the cisterns at *x*. The outlet into the central basin is shown at *y*, Fig. 2. The use of this aqueduct is as follows: When, for the purpose of placing a vessel in any of the docks heretofore described, the central basin has been filled and the vessel floated into the desired position in any dock, the water in the dock so used must first be drawn off in order to allow the vessel to subside upon the ways where it is intended to be placed. This is effected by means of the gutters *z*, which communicate with the several docks by means of gates or valves, and lead off into the sea. Suppose at the same time the central basin to be filled with water to the height of the walls by which it is surrounded, by opening the outlet *y* of the subterraneous aqueduct

w, leading into the central basin, all the water therein above the level of the outlet *y* is conducted into the cisterns, and by then closing this outlet the water is preserved in the cisterns for filling the central basin, as future use may require.

Vessels are first raised in the central basin as high as the tide will perform this office, and then additional elevation is obtained by the use of pumps or any water-forcing apparatus. By this arrangement of the cisterns water thus brought by artificial means into the central basin can be preserved and devoted to the same purpose on repeated occasions.

The channel of communication with the sea may be made of any desired length, and may have, besides the gates at its outer and inner ends, other gates at different distances throughout its length. The use and operation of these gates, when employed, may be illustrated as follows: Suppose the central basin to be filled with water and the inner gate, *b*, of the channel to be closed so as to confine the water in the basin; by opening the outer gate, *a*, a vessel can then be admitted into the channel and drawn along close to the inner gate; then by closing one of the intermediate gates, leaving only sufficient space for the length of the vessel, the quantity of water necessary to be supplied by artificial means will be much less than as if the vessel were placed in the central basin, and then lifted by filling the whole basin. Thus a large economy of labor and time is effected, and when the vessel is raised to a level of the water confined in the central basin the inner gates can be opened and the vessel hauled into the basin.

The central basin is intended more particularly for vessels of the largest size, and to serve in lieu of a turn-table for the admission of vessels into any of the docks 1 2 3 4 5 6, into which they are desired to be placed.

It will be seen that the dock D is exactly opposite the channel of communication with the sea. The docks 1 and 2 are placed on each side thereof and inclined at a slight angle from the direction of the entrance-channel B. This arrangement has for its object convenience and ease of placing in the docks 1 and 2 vessels whose length exceeds the diameter of the central basin. By swinging the sterns somewhat in the entrance-channel B, vessels of the described length can be entered in the docks 1 and 2 when it would be impossible to turn them in the central basin. The cisterns are located between the docks so arranged round the circumference of the central basin. The docks and cisterns are constructed by raising walls in the desired position around the central basin, A, and in such way that the sides of the docks form also sides for the cisterns. The ends of the cisterns are then closed, as seen in the drawings.

The walls may be made of brick or stone, or in any way to constitute a barrier impervious to water and of sufficient strength to resist the lateral pressure of the water; but we do not claim any particular method of construction. The outer end of the channel B may be protected by a sea-wall for the sake of durability.

As before specified, ways or rails are laid within the several docks, and extend through the same to the yard into which vessels are intended to be carried. This is accomplished as follows: Carriages are constructed in the following manner, one of which is placed in each dock. E indicates one of these carriages, and has a body which is made flat, and has two shoes on its under side extending the length of the carriage-body, and placed at the same distance apart as the rails of the ways *m*. Upon the upper side of the carriage are attached chocks, which have pawls working into grooves or journals to hold the chocks in any desired position. The shoes are indicated at *c'*, the chocks at *a'*, and the pawls at *b'*. These chocks are made so as to conform to the shape of and to admit the bottom of a vessel's hull. The chocks turn on pivots, and can be raised up edgewise, or as far as necessary, and then held by the pawls and journals.

In the center of the carriage is a bed for the keel of the vessel to rest upon. This is shown at *d'*. Rollers composed of two trucks rigidly attached to a short shaft are then placed on the ways, the space between the trucks embracing as well the tracks of the ways *m* as the shoes *c'* on the under side of the carriage. The ways are composed of a flat broad rail, upon which is placed a narrow rail, and both then bolted down by the same bolt to the foundation upon which the rail is laid. The bearing of the shoes on the carriage is upon the shaft of the trucks, and the bearing of the rollers upon the rails is on the trucks thereof.

The rollers thus constructed will convey the carriage as many times beyond the length of the carriage, without passing out from under the same, as the diameter of the trucks of the rollers exceeds that of the shaft thereof.

By this arrangement the carriages do not require to be so often fleeted by the rollers as would otherwise be the case. Thus, when a vessel is placed upon the carriage or carriages in any of the docks by the means and in the manner heretofore described, the carriage is then rolled out upon the radial ways. When the carriage thus employed has been rolled out onto the carriages in the transverse ways, these transverse carriages can be relieved from the burden of the vessel, as follows: By allowing the rollers upon which the ship-carriage E is placed to rest upon the sections *u* of the radial ways, between or beyond the transverse ways, it will be seen that the carriages on the transverse ways can be drawn from under the ship-carriage E, the trucks *e'* raising the ship-carriage E above the carriages *p* sufficiently for that purpose, and thus the

carriages *p* may again be employed in a similar manner. The vessel is thus always kept on an even keel.

Upon the tops of the walls of the docks are placed swinging chocks *f'*, with pawls attached, to sustain and steady a vessel when placed on the dock-carriages E. These pawls bear against the sides of a vessel and catch into holes made for their reception.

Near the mouth of the sea-channel B is a sluiceway for water, (marked H,) to be used as a means of raising water into the tanks.

When hauled out upon the transverse ways, a vessel is returned to any of the docks by the use of the same means by which it was removed therefrom. When once replaced within any of the docks, the inner or shore end of the dock is closed by means of the gates before described—as illustrated in dock D, by gates *e* and *f*. Water is then admitted into the dock by opening the outer gates thereof, until it has risen to a sufficient depth to float the vessel. This is accomplished, as before described, by first admitting the natural rise of the water from the sea, then closing the gates *b*, so that they project inwardly, and then raising the level of the water in the central basin by artificial means. The vessel is then floated into the central basin and parallel with the sides of the channel. The water is then withdrawn from the central basin, A, in the manner before described, until the level of the water in the basin is the same as that of the waters of the sea. The gates *b* are then opened and the vessel drawn through the channel B into the waters of the sea.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination and arrangement of the docks D 1 2 3 4 5 6 with the channel B and central basin A, as and for the purposes set forth.

2. The arrangement and construction with the docks, as described, of the cisterns 7 8 9 10 11 12, in the manner and for the purposes set forth.

3. In combination with the docks so arranged and constructed, the ways and carriages, outlets and gutters, as and for the purposes set forth.

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