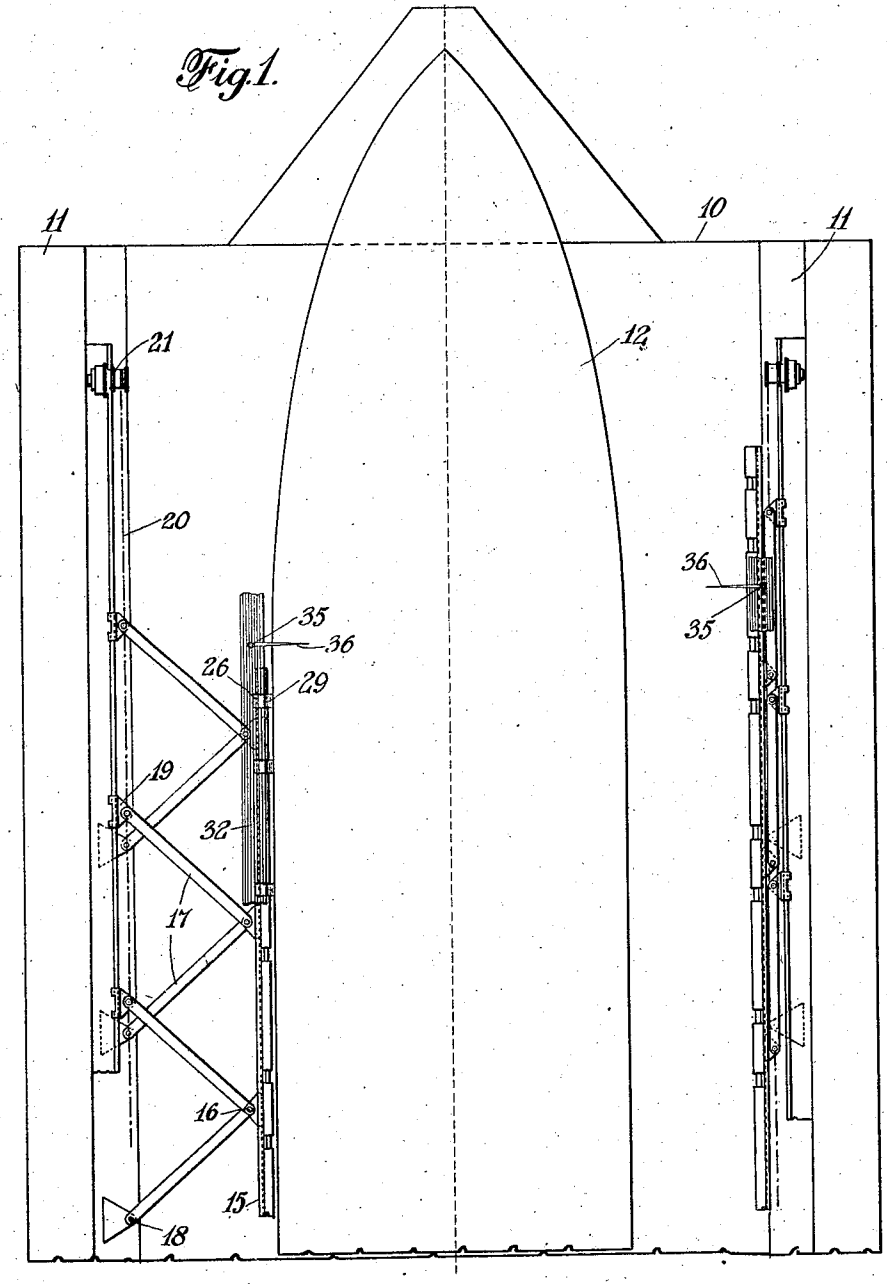
Feb. 15, 1927. 1,617,990

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DRY DOCK

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Fig. 1.



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Fig. 2

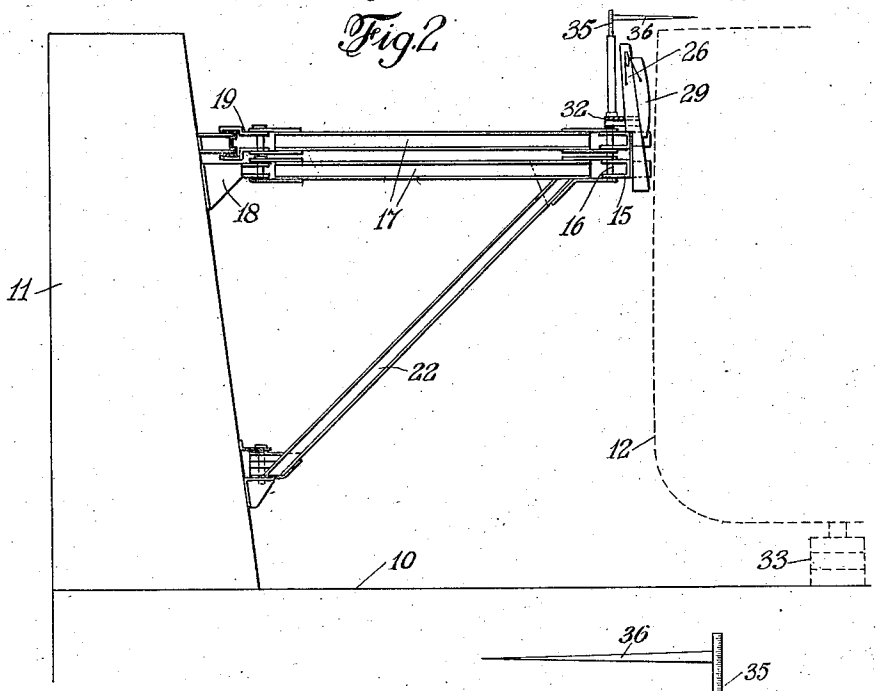


Fig. 3

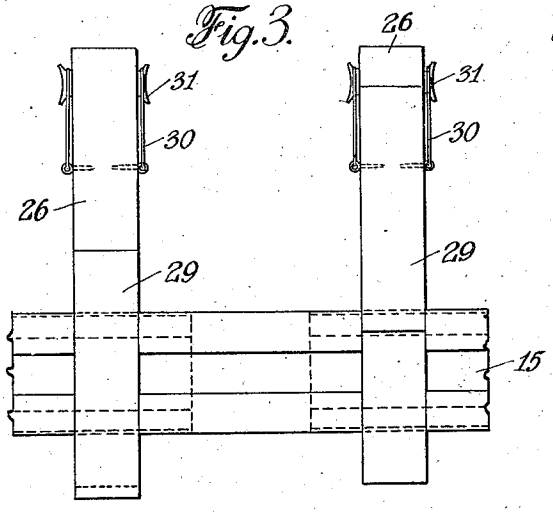
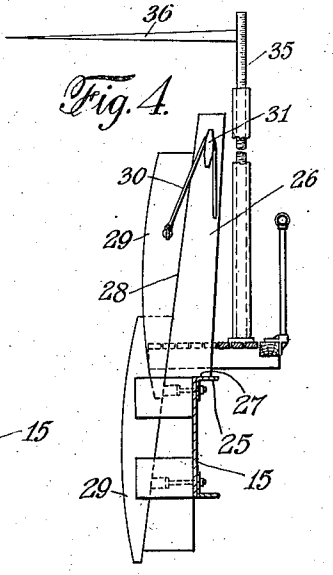


Fig. 4



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Fig. 5.

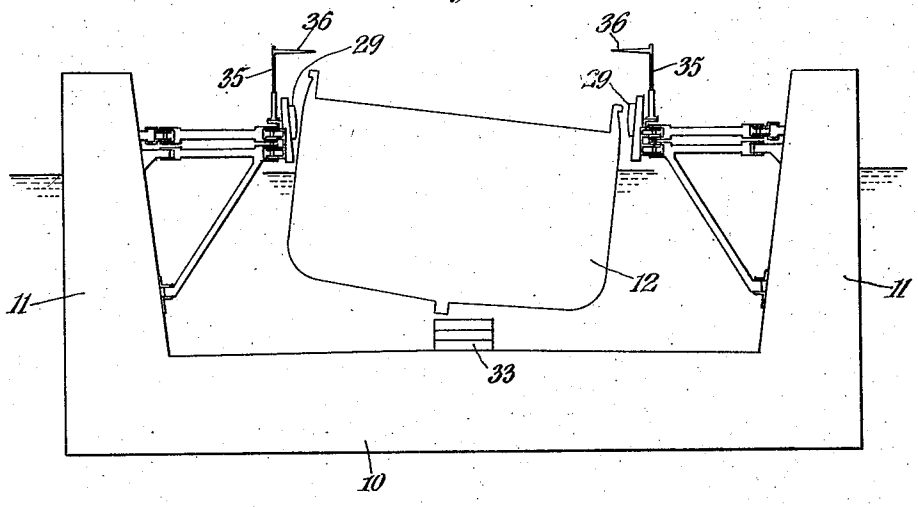
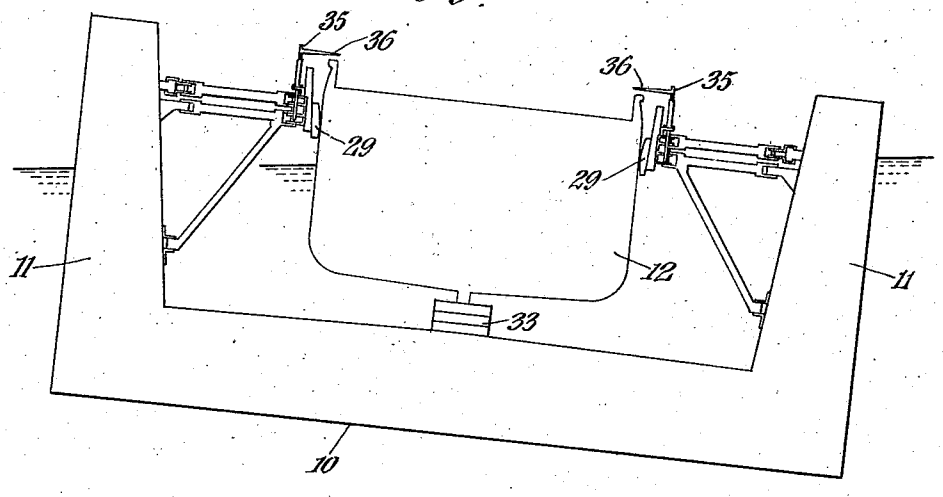


Fig. 6.



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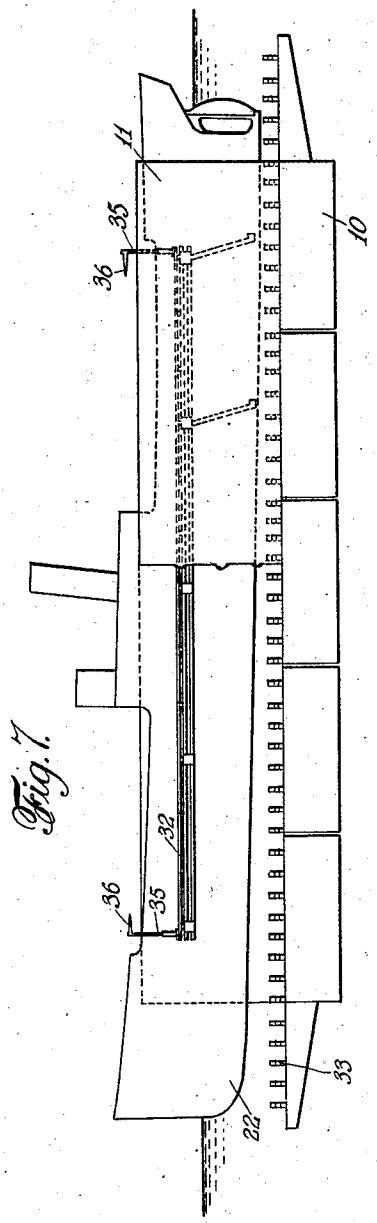


Fig. 7.

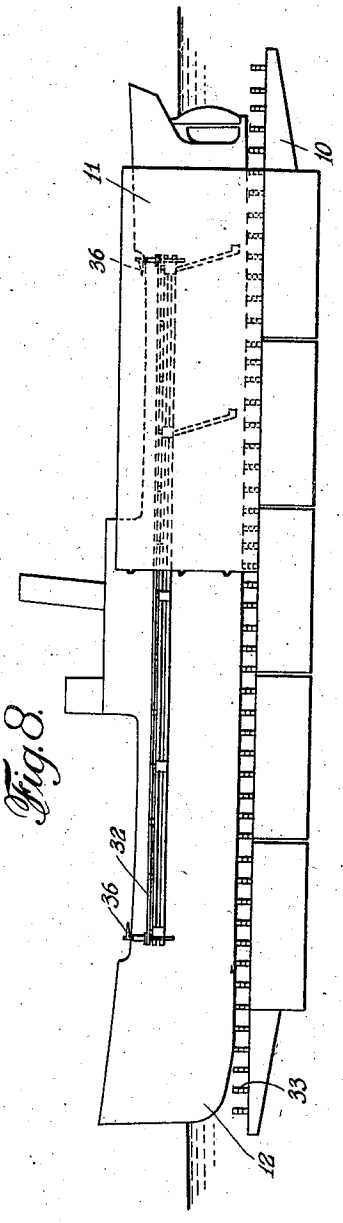


Fig. 8.

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UNITED STATES PATENT OFFICE.

WILLIAM T. DONNELLY, OF BROOKLYN, NEW YORK.

DRY DOCK.

Application filed May 17, 1922. Serial No. 561,700.

The invention relates to dry docks, especially floating dry docks; and more particularly to a method for properly guiding, centering and shoring ships therein, as well as righting same, and to novel means for adjusting and shoring the ships.

Heretofore, the handling of ships in dry docks has been altogether too much in the hands of so called "practical" men who are expected to use their judgment in the docking of a ship. The invention has for its object to provide a scientific method and an engineering device therefor which can be operated with certainty, eliminating thereby the personal equation and all hazard as to results. The arrangement is such, moreover, that the point of resistance to meet the turning moment, due to unbalanced load, is very much better located and much further from the point about which the vessel turns, that is, the center line of the keel. By the improved means, furthermore, the docking of a ship may be accomplished in minimum time as the usual measurements and extreme care heretofore required in the operation of centering the vessel in the dock are obviated. Moreover, the throwing of greater weight on some of the bilge blocks does not occur, and the entire operation of locating the vessel is directly under observation. A further object of the invention consists in means for accommodating or taking up irregularities in the contour of the ship through the improved shoring mechanism, and which is not feasible by the means now generally employed.

In the usual type of floating dry docks, no means are provided for sighting in the locating of the vessel within the dock; and the centering of same therein is a rather difficult operation in consequence. With the improved means herein set forth, not only may a vessel be more quickly and safely guided and readily centered and shored in the dock; but the same may also be accomplished with a vessel having a considerable list or rake, or both. Under such conditions, the dock is first correspondingly listed or raked, and the vessel then rigidly fixed to or united with the dock, whereupon the list of the dock is taken out, or its longitudinal inclination corrected, and the ship lifted out of the water on an even keel. Bilge blocks may then be placed underneath the bilge and properly set up with jack screws or other devices. Heretofore, in the use of floating dry docks, no means were provided to shore the vessel, but there was pulled into position, while the vessel is still floating and resting on the keel blocks, suitable bilge blocks to support the hull.

In the present construction, the docking of a vessel is accomplished thru the use of horizontal guide members, one along each side of the dock and adjustable to correspond to the beam of the ship. The final centering is accomplished by suitable wedges which are dropped to a predetermined distance on the one side, after the guide member has been moved outwardly the proper amount, whereupon the other guide member is brought up and its wedges driven home. The guide members are arranged to have a fixed and a movable pivoted connection with the side of the dock, the movable connection being arranged to be drawn along the dock as by a cable or the like having a few turns over a rotatable drum member. Moreover, the wedges are preferably provided with suitable guides, the latter resting upon the centering guide members and being provided with a cleat and rope whereby the cooperating wedge may be adjusted.

Graduated poles or the like may be provided, moreover, the poles serving when the ship is in position over the keel blocks to indicate the proper inclination of the dock thru correspondence with a bulwark or rail of each side of the ship, both fore and aft. Thereby the dock and ship may be inclined exactly alike or to the same degree so as to take any possible wind or spring out of the dock due to unequal pumping. The graduated poles, furthermore, may serve also to indicate when the ship touches the keel blocks and, at the same time, to measure accurately her draft.

In the accompanying drawings which illustrate the invention—

Fig. 1 is a fragmentary view of a floating dry dock provided with the novel combined centering and shoring means, and shows, also, a vessel in position for docking.

Fig. 2 is a fragmentary end view of the dry dock and centering and shoring means.

Fig. 3 is a detail fragmentary elevation of a plurality of wedges and guides therefor, together with a portion of the corresponding centering and shoring member.

Fig. 4 is a side elevation thereof.

Figs. 5 and 6 are diagrammatic views illustrating the manner of docking a ship with

list; and Figs. 7 and 8 similar views illustrating the manner of docking a ship having a rake.

Similar characters of reference designate corresponding parts thruout the several views.

Referring to the drawings, 10 designates a floating dry dock, of well known or special construction, and to each side or wing 11 of which there is arranged to be attached the combined centering and shoring mechanism hereinafter more fully described. In the operation of docking, the dry dock is sunk and the ship 12 floated therein in the usual manner, the centering and shoring mechanism at one side of the dock having in the meantime been projected toward the center line of the dock a predetermined amount corresponding to the beam of the ship, as shown in Fig. 1, the corresponding mechanism at the other side of the dock, however, remaining in its normal position close along the one side 11.

The shoring mechanism is shown more particularly in Fig. 2, as supporting the ship horizontally near the upper portion of its hull; and consists of a plurality of channels 15 arranged one above the other in horizontal planes running longitudinally of the dock. These channels are pivotally attached, as by a pin 16, to the outer ends of sets of two braces 17. The other ends of these braces of each set are so arranged that one has a fixed and pivotal connection with the side of the dock, as at 18, while the other has a movable and pivotal connection thereto or rather upon a guide 19 thereof. A continuous cable 20 may be attached to the various movable braces of each set and passed over a rotatable drum member or winch 21 mounted on the dock, which drum is adapted to be rotated by suitable means (not shown). In this manner, by correspondingly rotating the drum 21, the freely movable braces will be moved longitudinally along the guide 19 and will thereby draw inwardly or extend outwardly the shoring mechanism to suit the particular beam of vessel to be docked. Struts 22 are provided, moreover, to support the channels 15, one being arranged under each of the fixed and pivotally connected braces and to swing with same, as in being pivoted to the lower portion of the side 11.

It will be appreciated, although the shoring mechanism heretofore described forms a horizontal support for the ship 12, that as the latter will possess various irregularities of contour it may, therefore, not receive the firm support required at the various points. To this end, the members 15 are recessed as indicated to provide seats 25 upon which are seated upon a shoulder 27 at the back thereof, guide or backing members 26. The outer face 28 of a member 26 is inclined and is designed to receive a suitable wedge 29 which may slide vertically thereon and is adjustably secured thereto, as thru a rope 30 attached to the wedge and brought over a cleat 31 of a guide. A platform 32 is provided along the top of the shoring mechanism to afford convenient access to the wedges.

After the shoring member at one side of the dock has been extended the requisite distance to conform to the beam of the ship, the wedges 29 are lowered a predetermined distance so that they substantially contact with the side of the vessel. Thereupon, the shoring mechanism of the opposite side of the dock is extended until it is in substantial engagement with the side of the vessel, whereupon its wedges are lowered and driven home, together with the wedges of the opposite shoring member, to securely hold the ship between the two shoring members. The ship will then be exactly over the keel blocks 33 and in position for having the dock lifted. Free access, moreover, is had to the bottom of the vessel in that ample room is afforded beneath the horizontally disposed shoring members, no bilge blocks being required.

In docking a ship with list or rake, or both, reference being had more particularly to Figs. 5 to 8, the dock is first lowered on even keel and the ship introduced and guided at or slightly above the water line as hereinbefore set forth, although not finally shored. This will effect a centering of the ship substantially at the water line; but at its most important portion, viz, the keel-line, the ship is not properly located in the case of a list. The dock is then listed or raked to correspond with the list and rake of the ship, which is accurately centered but not wedged. This brings the keel directly over the center line of the blocking 33 and substantially parallel thereto; and as the dock is further pumped, causes said keel to rest firmly thereon, after which the wedges are dropped and forced home to firmly unite the ship and dock. The two are then handled as one structure. The listing and raking of the dock may be effected as, for example, with docks of the character set forth in my prior U. S. Letters Patent No. 849,378, in which a plurality of pontoons carry side wings, pumping means being provided to bring into effect the positive control of both lateral and longitudinal stability. The ship being both centered and shored and with keel in position upon the keel blocks 33, the dock with ship united thereto is righted; and both are raised as a single structure, the ship being lifted out of the water on even keel.

In conforming the dock to the ship as aforesaid, adjustable standards or graduated poles 35, with lateral arms 36, are employed; and are located at either side of the dock, or rather the platform 32 thereof, and both

fore and aft so as to cooperate with some common horizontal member or other suitable part of the ship, such as bulwark or rail, to indicate the proper inclination to be given the dock. In this manner, also it may be readily determined when the ship touches the keel blocks, and the comparison or markings on the poles may serve to measure accurately the draft of the ship at this time. The mechanically adjustable members thus provided, and including the laterally movable shoring members, afford ready means for accurately bringing the ship and dock into predetermined relation with each other in all directions.

I claim:—

1. In a floating dry dock: a pair of cooperating, horizontal and longitudinally extending guiding, centering and shoring members disposed longitudinally of the dock upon opposite sides thereof, and means to move independently each of said horizontal members toward each other.

2. In a floating dry dock: a pair of cooperating, horizontal and longitudinally extending centering and shoring members disposed longitudinally of the dock upon opposite sides thereof, means to move independently each of said horizontal members toward each other, and wedging members carried by the said horizontal members.

3. In a floating dry dock: a pair of cooperating, horizontal centering and shoring members disposed longitudinally of the dock upon opposite sides thereof, means to move independently each of said horizontal members toward each other, and adjustable wedging members carried by the horizontal members.

4. In a floating dry dock: a pair of cooperating, horizontal centering and shoring members disposed longitudinally of the dock upon opposite sides thereof, means to move independently each of said horizontal members toward each other, and vertically adjustable wedging members carried by the horizontal members.

5. In a floating dry dock: a pair of cooperating, horizontal centering and shoring members disposed longitudinally of the dock upon opposite sides thereof, means to move independently each of said horizontal members toward each other, backing or guide members supported by the horizontal members, and wedging members slidable vertically thereon and adjustably secured thereto.

6. In a floating dry dock: a pair of cooperating, horizontal centering and shoring members disposed longitudinally of the dock upon opposite sides thereof, means to move independently each of each horizontal members toward each other, backing or guide members supported by the horizontal members, wedging members slidable vertically thereon, cleats mounted on the backing members, and ropes carried over same and attached at one end to the corresponding wedges.

7. In a floating dry dock: a pair of cooperating, horizontal members disposed longitudinally of the dock upon opposite sides thereof and providing seats, means to move independently each of said horizontal members toward each other, backing or guide members supported in the seats of the horizontal member, and wedging members slidable vertically thereon and adustably secured thereto.

8. In a floating dry dock: a pair of cooperating, horizontal members disposed longitudinally of the dock upon opposite sides thereof and providing seats, means to move independently each of said horizontal members toward each other, backing or guide members having an inclined outer face and a shoulder at the back, the shoulder fitting a seat of the horizontal members, and wedging members slidable vertically over the inclined outer face of the backing or guide members and adjustably secured thereto.

9. In a floating dry dock: a pair of cooperating horizontal centering and shoring members disposed longitudinally of the dock upon opposite sides thereof, means to move independently each of said horizontal members toward each other, and graduated poles carried by the shoring members in proximity to a ship to be docked between same to cooperate with a part of the ship for locating the latter in a predetermined position between the said shoring members.

10. In a floating dry dock: a pair of cooperating, horizontal centering and shoring members disposed longitudinally of the dock upon opposite sides thereof, means to move independently each of said horizontal members toward each other, and graduated poles carried by the shoring members upon opposite sides and fore and aft of the dock.

11. In a floating dry dock: a pair of cooperating, horizontal centering and shoring members disposed longitudinally of the dock upon opposite sides thereof, means to move independently each of said horizontal members toward each other, standards carried by the shoring members, and graduated poles adjustable therein and having arms adapted to extend over a ship in the dock.

12. In a floating dry dock: a plurality of graduated members carried by the dock, and adjustable means to mechanically move independently each of said graduated members relatively to the dock to bring a said member in close proximity to a ship therein to cooperate with a part thereof for accurately bringing ship and dock in predetermined relationship with each other.

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