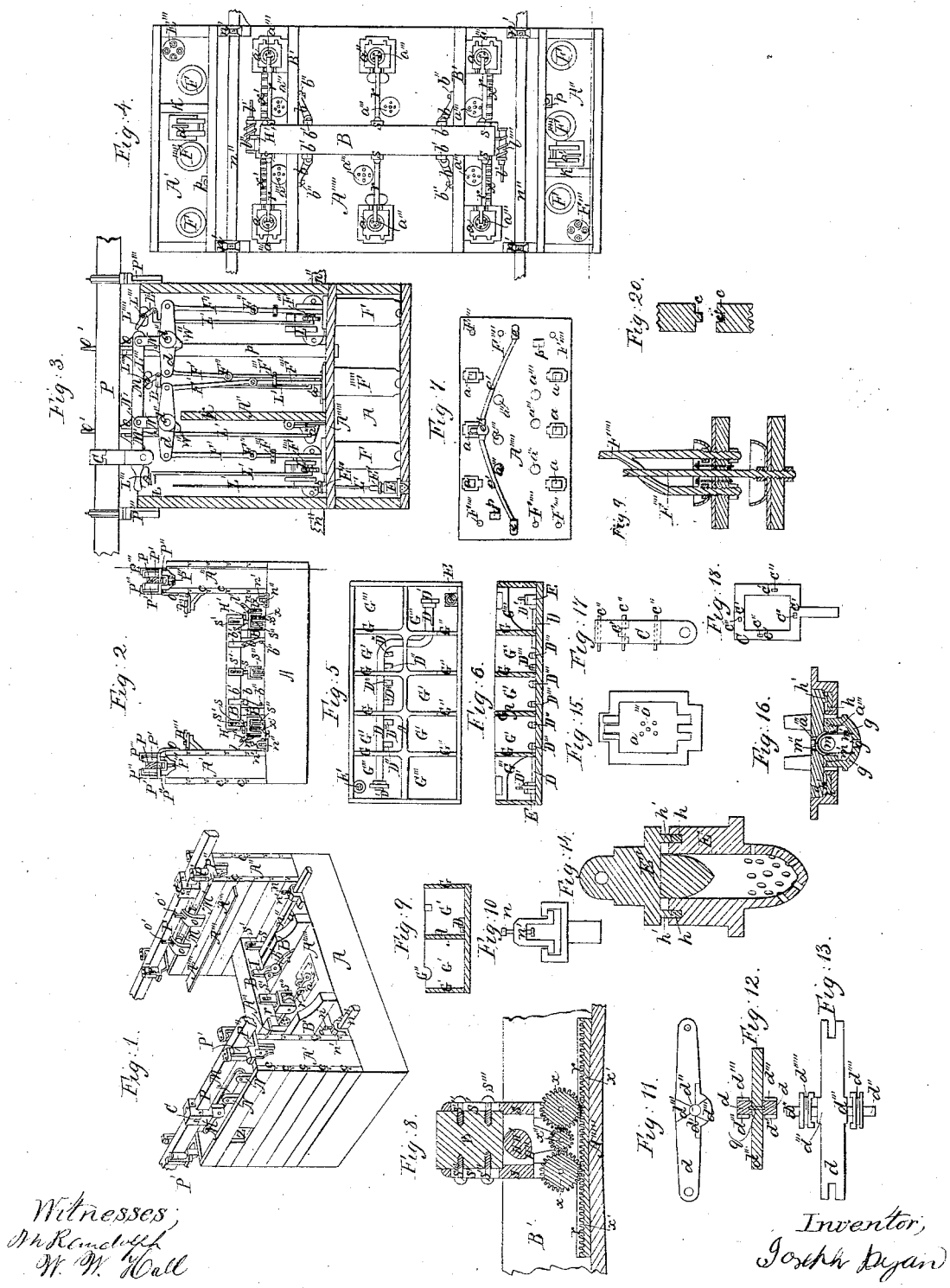
J. Ryan.

Dry Dock.

No. 50,390. Patented Oct. 10, 1865.



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IMPROVEMENT IN DRY-DOCKS.

Specification forming part of Letters Patent No. **50,390,** dated October 10, 1865.

To all whom it may concern:

Be it known that I, JOSEPH RYAN, of the city and county of St. Louis, and State of Missouri, have invented a new and useful Improvement in Sectional Dry-Docks; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings and the letters of reference marked thereon and forming part of this specification, in which—

Figure 1 is a perspective view of one entire section of the dock. Fig. 2 is a side elevation of one section. Fig. 3 is a transverse section of the ballast-chamber and pump-well of the trunk A″, taken on the red line shown in Figs. 2 and 4. Fig. 4 is a plan of the entire deck of one section, including the ballast-chambers A′ and A″. Fig. 5 is a plan of the section below deck. Fig. 6 is a longitudinal section of one section below deck. Fig. 7 is a plan of the bottom side of the deck. Fig. 8 is a sectional view of the end of the beam or cradle-timber B, disclosing the cam-wheel H, which is used for raising it. Fig. 9 is a transverse section of one section, taken below deck. Fig. 10 is an elevation of the connecting-head *n′*. Fig. 11 is a side elevation of the working-beam *d*. Fig. 12 is a transverse section of the working-beam *d* and a longitudinal section of its shaft *d″*. Fig. 13 is a top view of the working-beam *d* with it clutches *d‴*. Fig. 14 is a sectional view of the sinking-valve E. Fig. 15 is a top plan of the scuttle-door *a*. Fig. 16 is a sectional view of the scuttle-door *a*. Fig. 17 is a side elevation of the wrist C. Fig. 18 is a plan of the wrist C. Fig. 19 is a sectional view of the double plungers in the center pump, F‴′. Fig. 20 is a sectional view of the planking-joints used in constructing the water-vessels with the oakum packing in the groove *c*.

The invention relates to so constructing a sectional dry-dock that it can be kept on an even keel by the use of the engines on one or on both sides at a time, and it can be so completely under the control of the engines that one or more of the sections may be raised or lowered on one or both sides at the same time for the purpose of straightening vessels that have become hogged or bent out of shape, for which purpose extreme facility is afforded in the manner of shifting the cradling-timbers and staging; also, in the mode of operating the pumps and scuttle-valves, as well as in the construction of the bulk-heads in the hold of the dock-section and the pump-wells; also of the ballast-chambers.

The bottom vessel, A, of the dock-section is subdivided into the small water-chambers G′ and the well-rooms G‴ by the bulk-heads G (clearly shown in Figs. 5, 6, and 9.) The longitudinal bulk-head is built crowning on the top, for the purpose of giving increased strength to that part on which the ship rests and impart an equal proportion of the superincumbent weight to the more buoyant ends. The side walls of the vessel A will also be built crowning on top, but not so much so as the longitudinal bulk-head G. This construction is clearly shown in Figs. 1, 2, and 6. The transverse bulk-heads G will also be constructed crowning on top, as shown in Fig. 9, for the same purpose. A small opening, G″, (shown in Figs. 5 and 9,) is left in the top edges of the transverse bulk-heads G, for the passage of the atmosphere from one cell to another, so as to equalize its pressure. The air is admitted to the hold during the process of pumping through the pipes *p*, (shown in Figs. 3, 4, and 7.) The exhaust-pipe D lies along on top of the floor of the water-chambers, with its extreme ends opening into the opposite well-rooms, G‴. The two ends of the pipe D are supplied with the gates D′, the opening of either of which will supply water to the pumps in their respective ends or receive it from the scuttle-valve E. The chambers G′ are constructed in pairs, which are connected together by small openings D‴, as shown in the bottom of the longitudinal bulk-head in Fig. 6. The pipe D has branch pipes D″ opening into it at suitable points, two of which are located in each pair of cells or chambers and opposite the apertures D‴ in the center bulk-head. There are two or more scuttle-valves, E, in the bottom of each section of the dock, by means of which the water is let into the hold for the purpose of sinking the dock. The construction of the valves E is clearly shown in Fig. 14. The plug E′ has a projecting ring, *h′*, which rests upon the soft-metal packing *h*, run into the groove left in the top of the base of the valve for this purpose, so as to make it perfectly water-tight.

The valves E are operated by means of the valve-rods L′, which pass through the stuffing-boxes E″ in the deck A′′′′′.

The whole top of the vessel A is covered over with the deck A′′′′′, on both ends of which are erected the ballast-chambers. (Represented in the drawings by A′ and A.″) At suitable places on the deck A′′′′′ are metal scuttle-doors *a*, one of which will be placed over each chamber G′ in the hold. The doors *a* are shown in Figs. 1, 3, 4, 15, and 16. The door *a* has a projecting tongue, *h*′, on its lower side, which shuts down on a soft-metal packing, *h*, which is run in the groove left for the purpose in the frame in which the door *a* hangs. This arrangement (clearly shown in Fig. 16) secures a perfectly water-tight joint when the door is closed. The door *a* is provided with the scuttle-valve *a*‴, through which the atmosphere escapes when the dock is sinking. The construction of the valves *a*‴ is clearly shown in Fig. 16. The cylindrical cup *g* is screwed fast to the center of the bottom side of the door *a*. When the water begins to enter and fill up the chamber G the condensed atmosphere will force up the ball *m* and escape through the orifices *g*′ and *n*′. As soon as the air is all expelled the ball *m* will fall by the action of gravity upon the orifice *g*′ and close it firmly against the admission of water from above.

The connecting-sleeves *e* (shown in Fig. 7) are attached to the bottoms of the scuttle-doors *a*′ (shown in Fig. 4) in the bottoms of the ballast-chambers A′ and A″. The two sleeves *e* are connected together by the pipes *e*′ and the sleeve *e*″, from which there is a cock opening under the door *a*″, from which water may be supplied to hose for the purpose of washing decks.

By connecting the two ballast-chambers together by means of the sleeves *e* and *e*″ and pipes *e*′ the water-ballast may be shifted from one chamber to the other for the purpose of keeping the dock on an even keel.

The ballast-chambers A′ and A″ are each subdivided into two compartments by the partitions K, (shown in Fig. 3,) the two compartments in each chamber being connected together by the valve-doors *a*′′′′.

By using the partition K the ballast may be shifted from one side of the section to the other, so as to keep the section on an even beam.

The ballast-chambers are built entirely on top of the deck A′′′′′, which forms the bottoms of them. They are each supplied with an escape-valve, Z. (Shown in Fig. 1.)

There are three pumps which raise the water from the pump-wells G‴ to the ballast-chamber on each end of the section. These pumps are worked jointly or severally by the driving-rod P, through the medium of the wrist C, the connecting-links M and M′, the vibrating levers N, the working-beams *d*, the connecting-rods F, and the valve-rods F′′′′. The driving-rod P rests on the rollers P″, which are arranged in the metal frames P‴, attached to the upper edge of the trunk-frames, as shown in Figs. 1, 2, and 3. Arranged in the same frame P‴ are the vertical rollers P′, which press against the sides of the driving-rod P and keep it in place laterally.

The wrist C is made of four pieces of metal, as shown in Figs. 17 and 18. The joints C′ of the wrist C are arranged one on each of the four sides of the square, as shown in Fig. 18, and are a tongue-and-groove joint held together by the wedge-keys C″, as shown in Fig. 17. By tightening up the keys C″ the wrist C can be firmly secured to the driving-rod P at any desired point it is wished, to operate the particular section of the dock to which it belongs.

The connecting-link M′ is connected with the link M by a strap-joint at N′, so that the end of the link M′ which is attached to the wrist C may be raised up and still continue to operate in case a neighboring section of the dock raises the rod P up off of its bearing-roller P″.

The vibrating levers N are provided with the clutch *d*′′′′′ on their lower ends, as shown in Fig. 13. While the pumps are in operation the clutch *d*′′′′′ is thrown up against its corresponding clutch *d*‴ on the side of the working-beam *d*, and the motion of the lever N is imparted to the beam *d* through the medium of this clutch-joint. These clutches are provided with grooves, into which are thrust the ends of the levers *o*′, which rest on the fulcrums *o*, affixed to the sides of the trunk-frame near its top. The bottom ends of the levers *o*′ connect with the bar N″, which passes under the working-beam and operates the clutch *d*′′′′ on the opposite side. The lever *o*′ and its connecting-rod N″ operate the two clutches *d*′′′′ and *d*′′′′′ in harmony with each other, so that when the clutch *d*′′′′′ leaves its hold upon the beam *d* on one side the clutch *d*′′′′ will seize it on the other and hold it firmly in its horizontal position without motion.

The working-beam *d* (shown in Figs. 3, 11, 12, and 13) rests on the rock-shaft *d*″, which has a collar, *q*, entering a groove in the beam *d* to keep it in its position. The cap *d*‴ is screwed fast to the bottom of the beam *d*. At either end of the working-beams *d* are connected by working joints the connecting-rods F′, which connect at the knuckle-joint F″ with the pump-rods F′′′′, which pass through the stationary guides F‴. The two ends of the beams *d* which are nearest each other drive the double plunger in the center pump, F′′′′′. The arrangement of the double plungers in the pump F′′′′′ is clearly shown in Fig. 19, in which it is shown that the pump-rod of the lower plunger passes through a stuffing-box in the upper plunger. When both of the working-beams *d* are in motion the pump F′′′′′ is a double-action pump, but when one of the beams *d* is stopped the pump F′′′′′ becomes a single-action pump.

The valves E, L, Z, a', and a'''' are operated by means of the valve-rods L′, which terminate at their upper ends in a short elbow at right angles to the main stem of the rod, as shown in Fig. 3. The extreme end of the elbow is hinged to the arm L″, attached to the rock-shaft L‴. The rock-shaft L‴ is turned over by means of the movable lever L⁗, which can be removed at pleasure. When the valves are open the elbow of the rod L′ rests upon the top of the rock-shaft L‴, and in that position is not liable to be knocked down by accident, as the end of the arm L″ must be raised up to the highest point in the arc of the circle it describes before it can begin to descend. By throwing over the rock-shaft L‴ with the lever L⁗ the valve can be closed almost instantly, as may be required in case of accidents.

There are two or more heavy beams, B′, placed on top of and across the deck A⁗, on which rests the cradle-timber B. The cradle-timber B is held fast to the beam B′ by means of the links *b*. The links *b* are fastened to the cradle B by means of the socket *b′* and to the beam B′ by the eyebolt *b″*. The cradle-timber B has two or more metal pedestals, *s*, secured to it at proper points by means of the screw-bolts *s‴*, which pass through slots *s′* in the sides of the pedestals. In the bottom part of these pedestals are the wheels *s″*, (shown in Fig. 2.) The wheels *s″* travel upon the track *r*, (clearly shown in Figs. 4 and 8.) Each of the pedestals *s* has a cam-wheel, H, (shown in Fig. 8,) which is operated by a wrench placed upon its journal H′. When the cam-wheel H is turned up so that the flat place H″ on its periphery comes in contact with the cradling B the cradling will be lifted up off of the beam B′ and rest firmly on the pedestal which rests on the wheels *s″*, and in this position it can be moved easily from one side of the section to the other, for the purpose of doing which it is provided at either end with the cog-wheels *x*, which gear into the cogged track *x′* laid down upon the deck. The two wheels *x* work in harmony with each other by being connected by the intermediate wheel, *x″*. The wheels *x* are put in motion by turning the crank *l′* of the endless screw *l″*, which gears into the cog-wheel *l*, (clearly shown in Fig. 2.) The wheel *l*, being upon the same shaft as one of the wheels *x*, imparts motion to the whole. Before moving the cradling the links *b* must be disengaged from their fastenings at *b″* and thrown up out of the way. When the cradle is being raised up the bolts *s‴* will slide up in the slot *s′* left in the pedestal for that purpose.

Attached to the sides of the trunks A′ and A″ are the stagings A‴, (shown in Figs. 1 and 2.) The stagings A‴ are hinged to the sides of the trunks by suitable metal hinges at A⁗, and can be thrown up out of the way when not needed.

The bulk-heads are constructed of tongued and grooved lumber, the joints *c* of which are calked with a thread of oakum, *c′*, laid in the groove, as seen in Fig. 20. By this arrangement the calking will always remain tight in places it is difficult to calk, such as the interior of the ballast-chambers.

The different sections of the dock are held in position by means of the string-timbers *n″*, passing along over the decks of all the sections, and fastened to them by going through the connecting-head *n′* and having the set-screw *n* turned down tight on them. The connecting-head *n′* is clearly shown in Fig. 10. By releasing any one of the screws *n* the particular portion of the dock to which it is attached may be allowed to settle down independently of the other parts of the dock.

Having thus described my invention, what I claim as new, and desire to secure the use of by Letters Patent, is—

1. Connecting the entire series of chambers G′ in the hold of the vessel A of my improved dry-dock with the two pump-wells G‴ thereof by means of a main pipe, D, branch pipes D″, and controlling-gates D′, so that either pump may be used singly in connection with all of said chambers or compartments, substantially in the manner herein specified.

2. The scuttle-doors *a* and the scuttle-valves *a‴* and E, constructed and operating as described.

3. The separation of each of the ballast-chambers A′ and A″ into two compartments by means of the partition K, and the connecting the chambers A′ and A″ together by means of the pipe *e′* and the sleeves *e* and *e″*.

4. The wrist C, the rollers P′ and P″, in connection with the frame P‴, and the clutches *d⁗* and *d⁗*, in connection with the levers *o* and connecting-bar N″, all constructed and operating substantially as described.

5. In combination with the center pump, F⁗, in either well G‴ of my improved dry-dock, a double plunger operated by the working-beams *d*, substantially in the manner and for the purpose herein set forth.

6. In combination with an improved dry-dock, constructed substantially as described, the bent valve-rod L′, in connection with the arm L″, the rock-shaft L‴, and the lever L⁗, constructed and operating substantially as set forth.

7. The movable cradle-beam B, in connection with the cam-wheel H, the endless screw *l″*, the cog-wheel *x* and rack *x″*, and the tracks *x′* and *r*, substantially as described.

8. In combination with and as a part of my improved dry-dock, constructed as herein set forth, the hinged staging A‴, constructed and arranged substantially as described.

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Witnesses:
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