No. 757,368. PATENTED APR. 12, 1904.

J. TRUAX.

CONSTRUCTION OF BULKHEADS.

APPLICATION FILED JAN. 2, 1904.

NO MODEL. 3 SHEETS—SHEET 1.

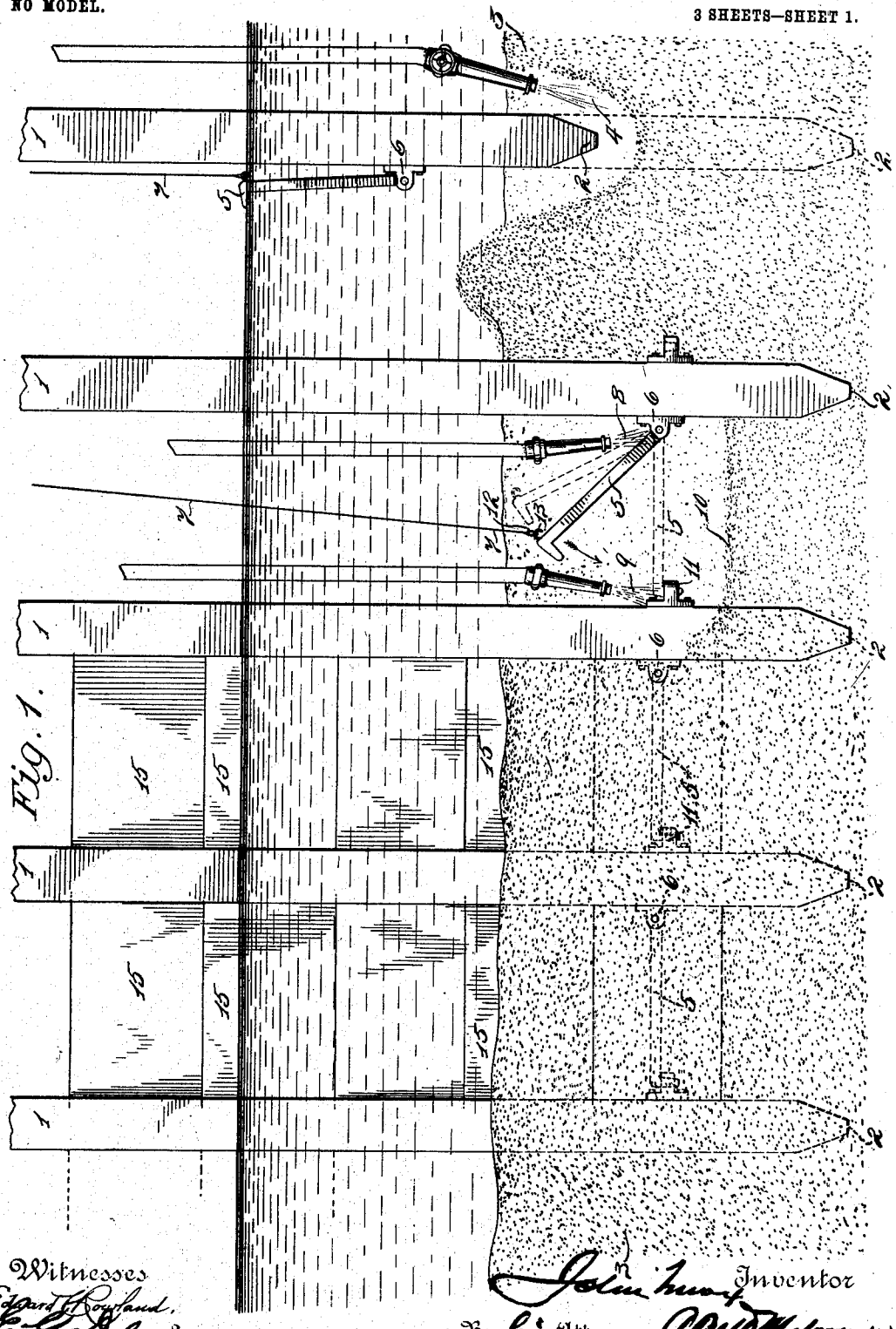


Fig. 1.

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NO MODEL. 3 SHEETS—SHEET 2.

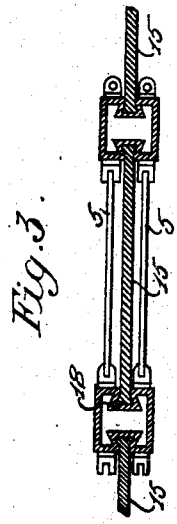


Fig. 3.

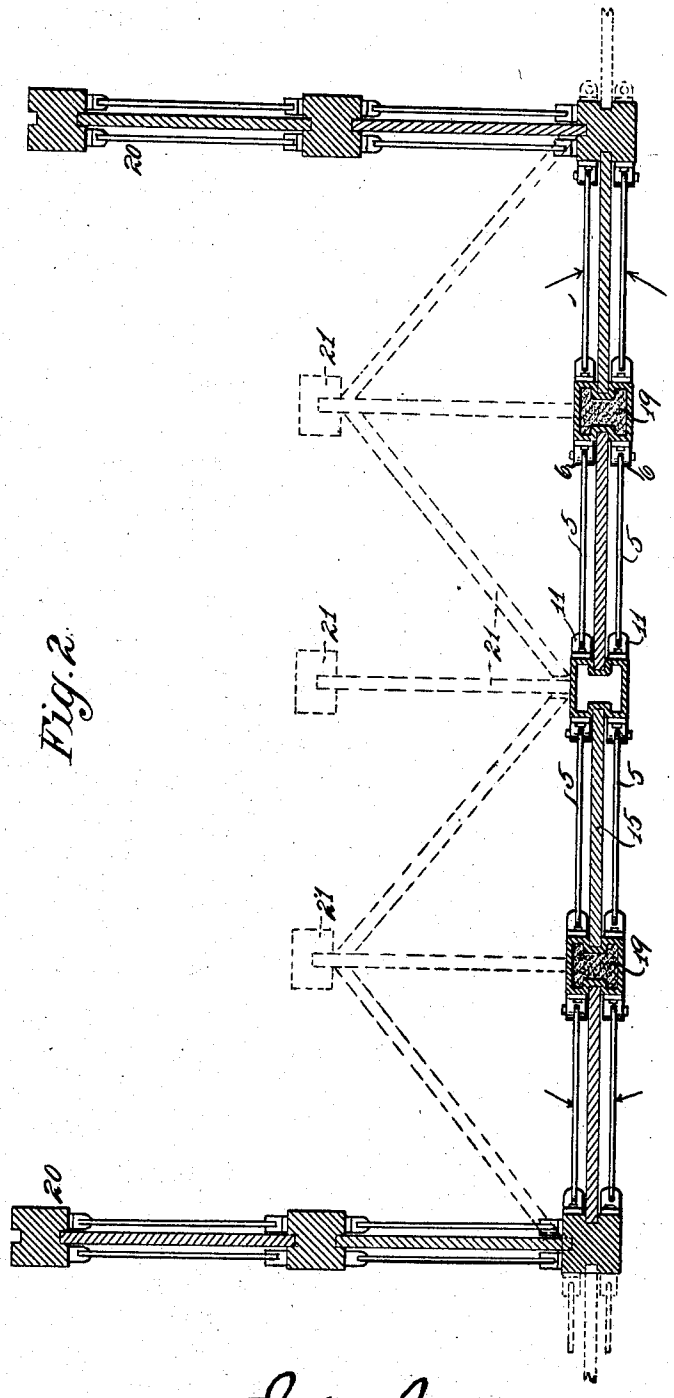


Fig. 2.

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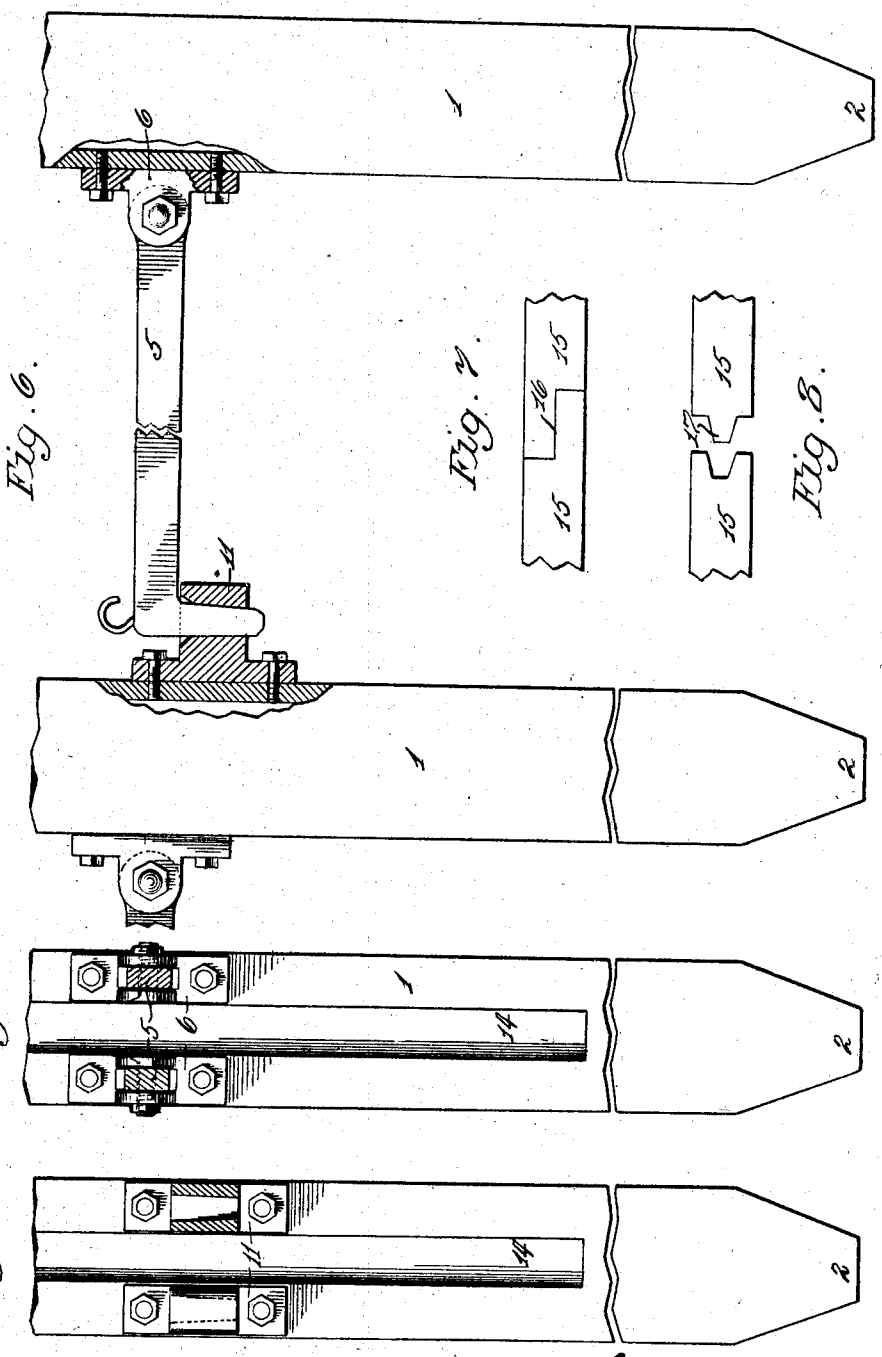
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NO MODEL. 3 SHEETS—SHEET 3.



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No. 757,368. Patented April 12, 1904.

UNITED STATES PATENT OFFICE.

JOHN TRUAX, OF LONGBRANCH, NEW JERSEY.

CONSTRUCTION OF BULKHEADS.

SPECIFICATION forming part of Letters Patent No. 757,368, dated April 12, 1904.

Application filed January 2, 1904. Serial No. 187,377. (No model.)

To all whom it may concern:

Be it known that I, JOHN TRUAX, a citizen of the United States, residing at Longbranch, county of Monmouth, and State of New Jersey, have invented certain new and useful Improvements in Construction of Bulkheads, of which the following is a specification.

This invention relates to bulkheads for sea-walls, mine-shafts, coffer-dams, caissons, deep-foundation work, piers, retaining-walls, subway-walls, dams, irrigation-work, locks, and other uses. Its principal object is to build at low cost a bulkhead which is not only effective, but also stanch, so that it may be adapted to withstand the severest usage—as, for instance, in forming sea-walls at points exposed to great violence from storms.

In the accompanying drawings, Figure 1 is an elevation illustrating one method of forming a sea-wall according to my invention. Fig. 2 is a sectional plan of the sea-wall seen at Fig. 1. Fig. 3 is a fragment illustrating piles and filler-plates dovetailed together. Figs. 4 and 5 show the point portions of a pair of grooved gage-piles, the former illustrating catches upon the sides of the groove and the latter showing in cross-section hooks adapted to said catches. Fig. 6 is a detail showing the manner of hooking together the lower portions of adjoining gage-piles. Fig. 7 shows lap-jointed, and Fig. 8 tongue-and-groove-jointed, filler-plates.

In the several views like signs identify like parts.

As seen at the right of Fig. 1, a pile 1, having, as usual, a point 2, is sunk in the ocean-bed 3 in any suitable way, as by means of a hydraulic jet 4, which clears away the sand below the pile, allowing the latter to sink, the sand filling in around the pile after the latter is in position. In like manner two or more gage-piles are placed at suitable intervals to form the framework of the bulkhead. One of the important features of my invention resides in connecting the sunken portions of the gage-piles together to prevent them from spreading or moving. This I accomplish by means of hooks 5, pivoted to ears 6, secured to the sides of the piles near their points. When sinking the piles, the hooks occupy dormant positions alongside of the piles, being supported by lashings or by cords 7 in an upright position, so that they may not turn about their pivots. In this position the hooks sink readily with the piles into the excavations made for them by hydraulic action. After the freshly-sunken pile becomes sufficiently fixed in position a clearing is made below the hook thereon and between the piles by means of one or more jets 8 9, as indicated at 10. The lashing or cord 7 is then either cut or lowered, and the hook gravitates toward the adjoining pile and falls into an eye or catch 11, secured upon the side of the latter. The cord 7 may be formed with a loop 12, caught over a small hook 13, provided upon the outer end of the hook 5, and may be subsequently slipped off. It will be understood that the gage-piles may be accurately set, so as to insure the engagement of the hooks 5 with the catches.

As seen at Figs. 2, 4, and 5, two hooks preferably extend from each pile to the next, one upon each side of a groove 14, formed in the pile, these grooves extending from the top of the pile nearly to the point thereof and one upon each side of the pile. By using front and rear hooks the piles are more firmly secured together than by the use a single hook, and particularly any twisting of the piles is prevented. The piles having been thus firmly secured, the spaces between them are filled by iron plates 15, placed one above another and extending from pile to pile, the side edges of the filler-plates fitting in the grooves 14 of adjoining piles. By means of the jets 8 and 9 or otherwise the sand may be cleared from beneath the bottom filler-plate, and the weight of the other plates thereon is sufficient to cause the same to settle to the bottom of the grooves, the lower plate occupying a position between the front and rear hooks. The filler-plates or runners are preferably jointed together at their top and bottom edges either by means of a lap-joint 16, as at Fig. 7, or a tongue and groove 17, Fig. 8. As seen at Fig. 3, the

grooves in the piles may be of dovetail form, as at 18, and the side edges of the filler-plates may be formed to fit the grooves, thus firmly securing the piles together.

In forming a sea-wall the filler-plates may be about five feet long and three feet high and two inches in thickness. The piles may be either solid or hollow, both kinds being shown at Fig. 2, and when hollow piles are used they may be filled with cement, rubble, or other material, as at 19. The hollow piles are preferred, being less expensive and lighter, so that they are easier to handle than solid piles, while, if desired, they may be used as part of the hydraulic means for clearing away the underlying sand in a known manner and afterward filled with cement. It will be seen that the utmost security of the structure is obtained both before and after the placing of the filler-plates and that when finished it is capable of withstanding the most severe assaults of water and is adapted for all purposes where great stability is desired at relatively low cost.

It will be observed that the filler-plates may be independent of the means which connect the sunken portions of the gage-piles, so that adjoining gage-piles may be first sunken and connected and thereafter the filler-plates may be inserted, which facilitates and reduces the cost of the work and renders the structure better adapted for the purpose.

In forming a sea-wall and in some other cases one or more of the gage-piles may be braced by a similarly-constructed bulkhead 20, placed, preferably, at right angles to the main bulkhead, already described. Suitable anchorage 21 for the upper portions of the piles is indicated at Fig. 2 in dotted lines.

Variations may be resorted to within the scope of my invention and portions of my improvements may be used without others.

In cases where there is great force of sea-waves to be resisted the gage-piles may be set on an incline, care being taken that the hook or latch will register with the eye or catch in the contiguous pile. If desired, guide-wires may be attached to the end of the latch before the pile is set and run through the eye or catch on the adjoining pile. This guide-wire may extend up through the sand and water to the operator. By drawing on this guide-wire the latch when loosened will be more readily and rapidly housed in the catch when the sand is driven away by means of the jets 8 9.

Having thus described my invention, I claim—

1. A pile having a hook pivoted thereto near its point.

2. A pair of piles, one having a hook pivoted thereto near its point, and the other having a corresponding catch.

3. A series of piles, each having a hook pivoted thereto near its point, and also having a catch for coöperation with the hook of the adjoining pile.

4. A pile provided near its point with a movably-mounted member for connecting it to the next pile.

5. A pile having upon one side a pivoted hook and upon the opposite side a catch.

6. A pile having grooved sides and provided with a pivoted hook.

7. A series of gage-piles having grooved sides, and means independent of the grooves for anchoring the sunken portions of the piles to one another.

8. A series of piles having grooved sides, each pile being provided with a hook and a catch for anchoring the sunken portions of the piles together.

9. A pile provided upon one side with a pair of hooks and upon the other side with a pair of catches.

10. A series of piles having grooves in their sides, and each provided upon one side with hooks one at each side of the groove, and upon the other side with catches similarly disposed.

11. A series of piles having grooves in their sides, and means at the sides of the grooves for connecting the piles together.

12. A bulkhead comprising a series of gage-piles having grooved sides, the spaces between adjoining piles being filled by plates placed one above another with their edges in the grooves; and means being provided independent of the plates and grooves for positively connecting the sunken portions of said piles.

13. A bulkhead comprising a series of gage-piles, means positively connecting the sunken portions of said piles, and plates independent of said connecting means and placed one above another and filling the spaces between said piles and connected thereto.

14. A bulkhead comprising a series of gage-piles connected together by sunken hooks; and filler-plates independent of said hooks and mounted between said piles and connected thereto.

15. A bulkhead comprising a series of gage-piles having grooved sides and means connecting their sunken portions together by hooks placed in both front and rear of the grooves, and filler-plates between said piles and occupying said grooves.

16. A bulkhead comprising gage-piles having sunken means for positively connecting them together, means being also provided for anchoring the upper portions of said piles, and the spaces between said piles being filled with plates independent of said connecting means and placed one above another and connected by their edges to the piles.

17. The herein-described method of forming a bulkhead, consisting in sinking a series

of gage-piles, then connecting their sunken portions, and then sinking filler-plates between the piles.

18. The herein-described method of forming a bulkhead, consisting in sinking a series of gage-piles, then connecting their sunken portions in both front and rear, then sinking filling-plates between the piles, and piling said plates one upon another between the piles above their sunken portions.

19. The herein-described method of forming a bulkhead, consisting in providing a series of gage-piles each with means for connecting it to the next, sinking said piles with said connecting means in dormant position, and then moving said connecting means to effective position.

20. The herein-described method of forming a bulkhead, consisting in providing a gage-pile near its point with a connecting device, sinking said pile at a suitable distance from another gage-pile, with said connecting device in dormant position, clearing a space for said connecting device, and causing the latter to connect said piles.

21. The herein-described method of forming a bulkhead, consisting in pivoting a hook to a gage-pile near its point, sinking said pile with said hook extending up alongside thereof, and at a suitable distance from another gage-pile, clearing a space beneath said hook between the piles, and causing said hook to catch upon said other gage-pile.

22. The herein-described method of forming a bulkhead, consisting in sinking at suitable intervals gage-piles provided with dormant hooks, clearing spaces between the piles, by hydraulic action, for the movement of the hooks, causing said hooks to connect the piles, and sinking filler-plates between the piles.

23. A sea-wall comprising a series of gage-piles set at an inclination and connected together, at a point below the water or sand line, by latch and catch devices, substantially as described, and fillings between the piles.

24. The herein-described method of forming a bulkhead, consisting in providing gage-piles with connecting means, sinking the piles at intervals, holding the connecting means in dormant position during the sinking operation, making a clearance below the connecting means between the piles, guiding the connecting means into engagement, to connect the piles, and filling the space between the piles.

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