No. 692,557. Patented Feb. 4, 1902.

J. A. SWENSON.

MINING DREDGE.

(Application filed Apr. 27, 1901.)

(No Model.) 4 Sheets—Sheet 1.

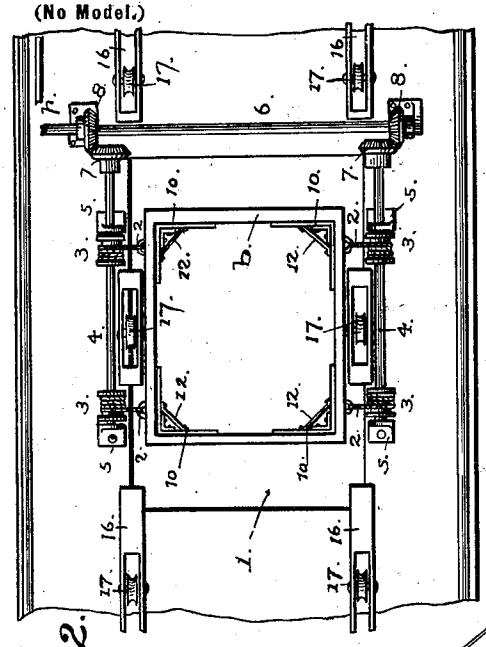

Fig. 2.

Fig. 1.

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Fig. 4.

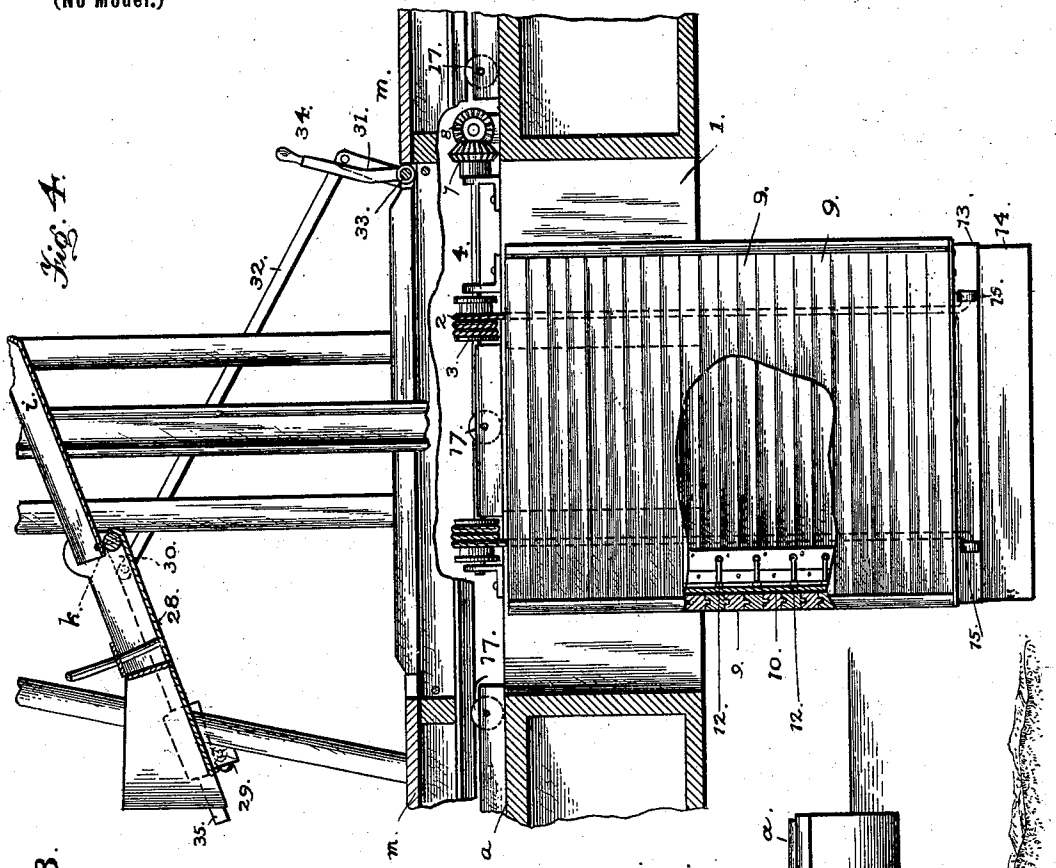

Fig. 3.

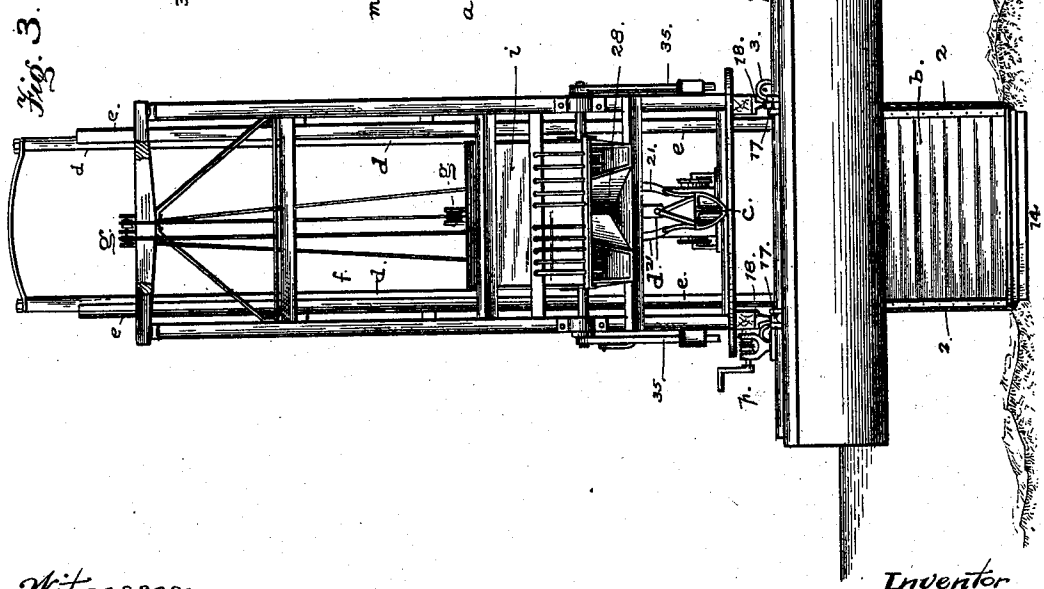

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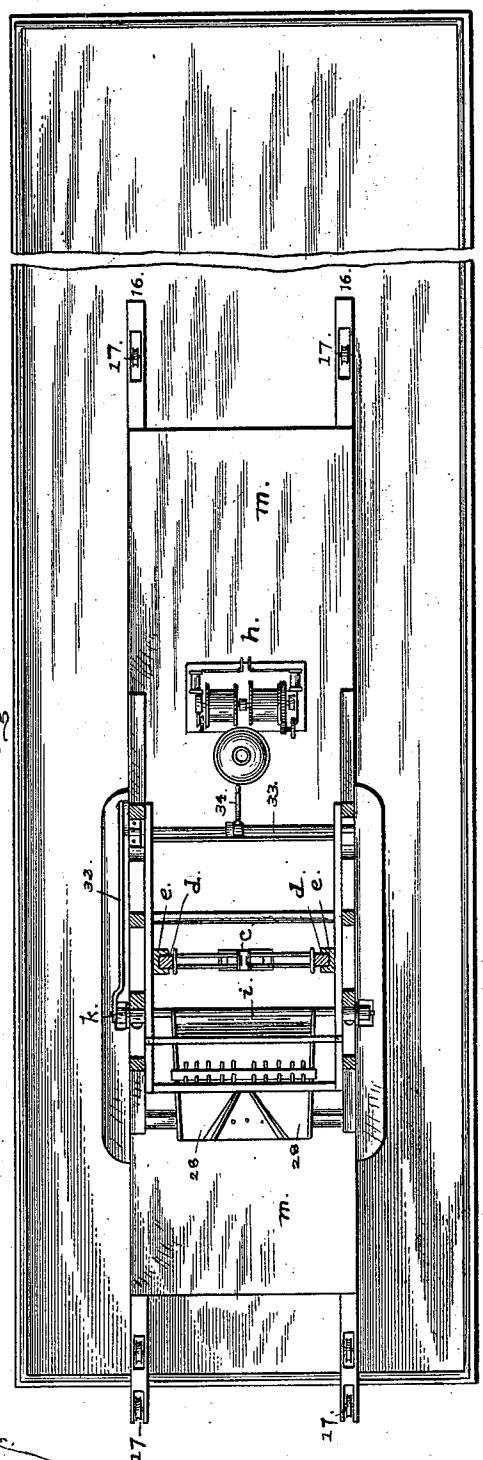
Fig. 5.



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(Application filed Apr. 27, 1901.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 6.

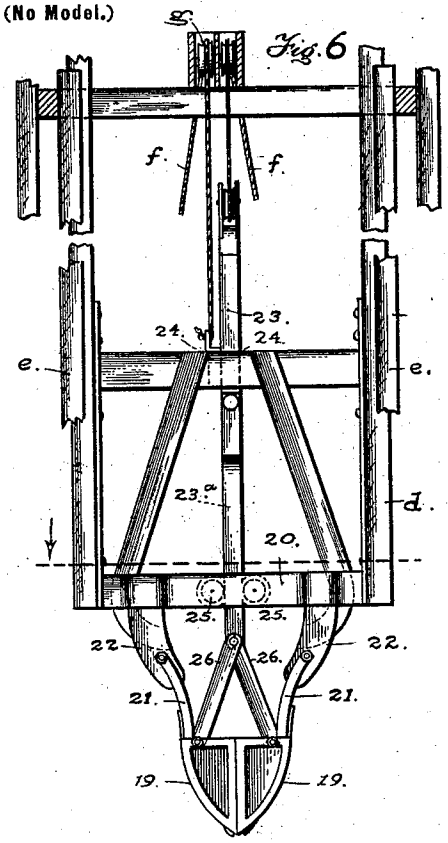


Fig. 7.

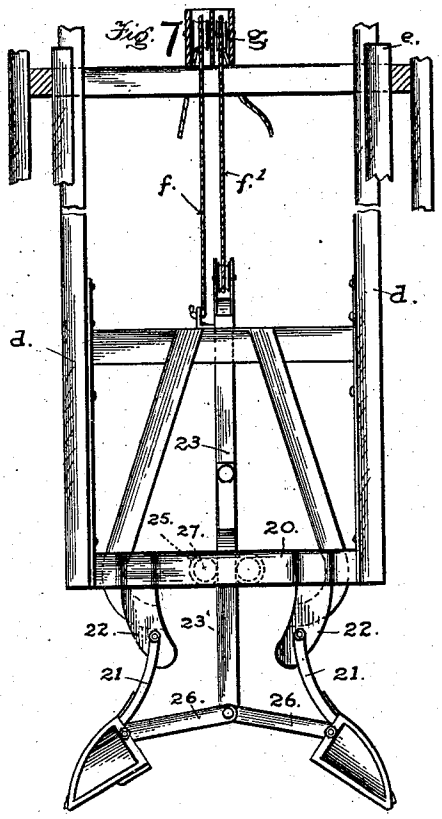


Fig. 8.

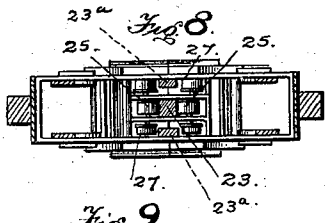


Fig. 9.

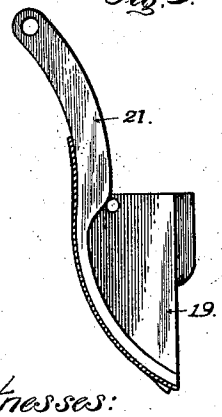


Fig. 10.

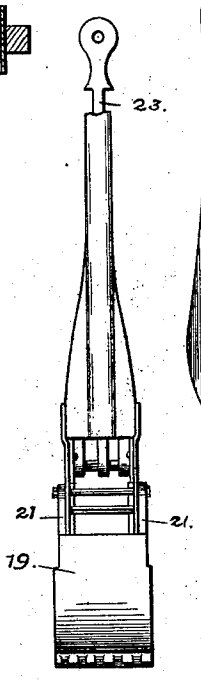


Fig. 12.

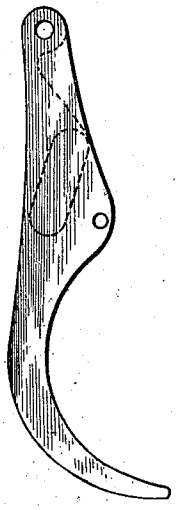
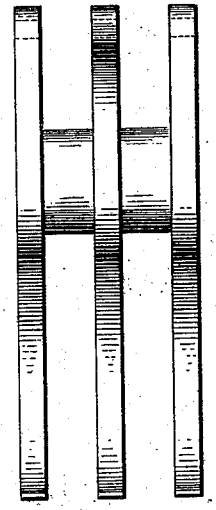


Fig. 11.



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UNITED STATES PATENT OFFICE.

JOHN A. SWENSON, OF SAN FRANCISCO, CALIFORNIA.

MINING-DREDGE.

SPECIFICATION forming part of Letters Patent No. 692,557, dated February 4, 1902.

Application filed April 27, 1901. Serial No. 57,686. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. SWENSON, a citizen of the United States, and a resident of the city and county of San Francisco and State of California, have invented new and useful Improvements in Mining-Dredges, of which the following is a specification.

This invention relates to improvements made in dredging-machines or apparatus of the class or description which are employed for operating beneath the surface of rivers and streams where it is desired to work the bed or bottom for gold; and the invention consists in certain novel parts and combination of parts and mechanism, as hereinafter described, and pointed out in the claims at the end of this specification.

The accompanying drawings, forming part of this specification and to which reference is therein made by figures and letters, illustrate a construction of dredger for mining purposes embodying all the novel features of this invention and a machine that is well adapted for working in comparatively smooth water.

Figure 1 is a side elevation of a dredger embodying the present improvements representing the caisson resting on the bed of the stream in position for work. Fig. 2 is a top plan, on an enlarged scale, of the caisson and the part of the scow-deck surrounding the caisson-well. Fig. 3 is a front elevation of the dredger, taken from the left side of Fig. 1. Fig. 4 is a side elevation, on an enlarged scale, of the caisson and parts of the upper works with one side of the caisson broken away. Fig. 5 is a top plan of the dredger with the upper works cut off on the line $x\ x$ Fig. 1. Fig. 6 is a front elevation of the dredging implement or appliance used in the machine, together with its carrying-frame and the stationary guides in which it works. Fig. 7 is a similar view of the dredging implement with the jaws open. Fig. 8 is a horizontal section on the line $y\ y$, Fig. 6. Fig. 9 is a side view of the dredging implement removed from the frame. Fig. 10 is a longitudinal section, on an enlarged scale, of one of the jaws or scoops of the dredging implement. Figs. 11 and 12 are details of grappling-claws that are substituted for the scoops when the implement is used to bring up rocks and bodies too large to be seized and raised by the scoops.

The principal parts of this machine are herein described and referred to as the scow a, the caisson b, the dredging implement c, the slide frame or head d, carrying and operating the dredge, and the stationary guides e, wherein the latter is suspended and operated by means of ropes and tackle $f\ g$, connecting with a hoisting-engine h on the deck of the scow. Other parts coöperating with these and containing novel features are the hinged trough or chute i and the operating-shaft k, by which it is brought under the load after the dredge is elevated and is thrown out of the path of the implement in advance of its descent into the caisson for another load; also, the movable truck m on which the guide-frame is mounted.

The caisson is suspended in a well or opening 1 from winding-drums 3 3 on two horizontally-set shafts 4 4, mounted in bearings 5 on the scow-deck. Two of these cables 2 2 and drums on each longitudinal side of the scow will usually be found sufficient for raising and lowering the caisson and through the medium of which they are operated with equal movement to raise and lower the caisson evenly. Power is applied to this common shaft from an engine-driven shaft p on the scow.

The caisson is raised to clear the bottom of the stream in moving from one location to another and is lowered into position to rest on the bottom after the scow is brought to an anchorage. Aside from such vertical movements the caisson is stationary in the well of the scow.

The improvements in the construction of the caisson have for their object to enable the vertical length of the inclosure to be increased or reduced, according to the depth of the body of water in which the machine is required to work, and the manner of constructing the caisson for that purpose will be understood more clearly by reference to Figs. 2 and 5 of the drawings. The sides are built up of heavy planks or timbers 9, laid horizontally and united by tongue-and-groove joints properly calked to render them water-tight. At the four corners are heavy right-angle plates 10, extending from top to bottom on the inside, to which each plank is separately secured by screws from the inside. At short intervals apart brace-irons 12 are bolted in place di-

agonally across the angle-plates for the purpose of adding strength to the structure at the corners. Being spaced at proper distances apart, these irons also form a ladder in each corner, by which the workman can readily descend and ascend in the caissons. On the bottom is secured an iron rim 13 with a deep cutting edge 14 and having a ledge of angle-iron bolted to the outside and against the under side of the bottom planks. On the angle-iron are eyes or staples 15, to which the ropes 2 are fastened. Each plank is fastened to the angle-plates in the corners by screws or bolts from the inside. This construction is of advantage in allowing repairs to be made to any portion of the caisson-walls in situations where machine-shops and skilled labor are not available, as duplicate parts or sections can be carried on the scow for use in making repairs. Provision is made also for altering the height of the caisson by making the corner-plates 12 and angle-irons of different lengths, so as to break joints, the upper lengths or sections of which can be removed and replaced by new ones of proper length to carry the caisson up to the required length.

When lowered into place over the locality where the work is to be carried on, the caisson sinks by its own weight into the sand or soft stratum overlying the bed-rock, the deep rim cutting into and making a close joint all around the bottom sufficiently tight to exclude the water. After this is done the material inclosed within the caisson is excavated and raised to the surface by the clam-shell dredge, the whole mass of the material being removed and the bed-rock or bottom being uncovered for carrying on the mining operations proper on the entire area within the inclosure before the caisson is raised and moved to position for working another portion.

Instead of shifting the caisson horizontally to adjust it with relation to the dredging or excavating and elevating implement, as is done in similar machines, however, the caisson remains stationary in the well of the scow, and the dredging implement is advanced or moved from point to point longitudinally of the inclosure, so as to act on successive portions or sections of area. For this purpose the upright frame *s* is mounted on a movable platform *m*, set on guide-rails 16, to travel fore and aft over the well and is connected with means for advancing it step by step at intervals during the operation.

The truck is formed of flanged rollers 17 in boxes fixed on the deck at intervals apart and rails 18 on the bottom of the platform resting on the grooved rollers.

The clam-shell is composed of two separate scoops 19, with curved bottoms and straight meeting faces forming a cutting and excavating tool of the clam-shell pattern. The two halves 19 are suspended from the cross-head 20 of a sliding frame *d*, working in grooved ways *e* in the upright guide-frame, the arm 21 of each scoop being pivotally attached to depending and downwardly-curved rigid extensions 22 of the parallel bottom bars 20 of the slide *d*. A vertical slide-bar 23, working between guide-rollers 24 25 and through the top and bottom cross-heads of the slide-frame, is connected to each scoop of the dredge by links 26, which are pivotally connected to the sides of the scoop and also to the lower end of the slide-bar, the latter part being composed of a straight central member 23 and laterally-bent members 23^a, as illustrated in Figs. 6 and 8. There is a separate set of guide-rollers 27 for the central bar, and these two members are provided in the slide-frame, and from the top end of the central bar the tackle runs up to the sheave *g* on the top of the stationary frame, from which the ropes are carried down to the hoisting apparatus on the deck. By one rope *f* of the hoisting-tackle connected to the top cross-head of the carrier *d* the dredge is lowered into the caisson for a load and when closed on the material is elevated to a point above the line of the chute *i* and by the other rope *f'* the jaws or scoops are opened in their descent and are closed after entering the material. In the descending movement when the scoops are opened to their fullest extent the throw or separation is about equal to the width or transverse distance between the sides of the caisson, so as to excavate and take in the material widthwise of the inclosure every time the dredge descends. The work being carried down vertically by successive lowering and raising of the clam-shell in this manner, the entire area of the confined mass is operated by shifting the dredge and its operating means horizontally over the stationary caisson a distance about equal to the width of cut made by the scoops in a fore-and-aft direction, and as all this excavating mechanism, including the chute that receives the material from the dredge-scoops, is mounted on the platform the same is advanced step by step at intervals without disturbing the relative positions and adjustment of the parts.

The chute is composed of a stationary trough 28, carried on supports 29 outside the rim of the slide-frame, and a hinged way 1 with raised sides attached at the front to the higher end of the stationary member 28, from which point as a center it is capable of turning vertically upward out of the path of the clam-shell in the ascending and descending movements of that part.

The rock-shaft *k*, to which the tray is secured, is connected by arms 30 31 and a connecting-rod 32 with an operating-shaft 33 on the truck having a hand-lever 34 and the weight of the tray is counterbalanced by a weighted lever 35, fast on the shaft *k*.

The operating-shaft 33 is located on the truck in convenient position to bring the hand-lever within reach of the engineer at the hoisting-engine.

Usually the lower end of the trough is divided into two separate spouts for discharg-

ing the material into two receptacles for handling or treating it to better advantage, and each spout is provided with a "grizzly." These last-mentioned features of construction are not important parts of this invention, however, and may be omitted.

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

1. In a dredging-machine, the combination of a scow having a well or opening, a caisson open at both ends movable vertically therein, means for raising and lowering the caisson, a platform movable longitudinally on the scow over the top of the caisson, a dredging implement carried on the truck and means for lowering the dredging implement into and for raising it out of the caisson and for operating it to cut, excavate and elevate the material, the position of the dredging implement being controlled by the movements of the truck.

2. In a dredging-machine, a scow having a well or opening, a caisson suspended in said opening, open at both ends, and a dredging implement adapted to cut, excavate and elevate the material within the caisson, said dredging implement having longitudinally-progressive movement within the caisson.

3. In a dredging-machine, a scow having a well or opening, a caisson open at both ends and vertically movable therein, a platform movable longitudinally over the top of the caisson and adapted to support and bring into operative position by successive steps a dredging implement.

4. The combination with a scow having a well or opening; of a caisson open at both ends, vertically movable in the well, and a dredging implement adapted to cut, excavate and elevate the material inclosed within the caisson and having longitudinal progressive movement horizontally in addition to its vertical movement.

5. The combination with a scow having a well or opening, and a caisson suspended in the well and open at both ends; of a movable platform on the scow adapted to travel longitudinally over the top of the caisson and dredging apparatus mounted for operation on the platform, and adapted to excavate and elevate the material within the caisson by successive descending and ascending movements of the dredging implement, and horizontal progressive movements of the platform at intervals.

6. In a dredging-machine, a sectional caisson composed of horizontally-laid planks joined by tongue-and-groove joints, angle-plates at the corners, angle-rims uniting the angle-plates, diagonal brace-irons and bolts securing the planks to the angle-plates.

7. In a dredging-machine, a sectional caisson consisting of horizontally-laid planks, joined by tongue-and-groove joints, angle-plates at the corner, angle-irons uniting the angle-plates, spaced diagonal braces at the corners, bolts securing the planks to the angle-plates and a bottom rim forming a tight joint having a ledge extending under and bolted against the bottom plate.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

JOHN A. SWENSON. [L. S.]

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EDWARD E. OSBORN.