(No Model.)

3 Sheets—Sheet 1.

J. THOMPSON.

DREDGING MACHINE.

No. 341,614. Patented May 11, 1886.

Fig. 1.

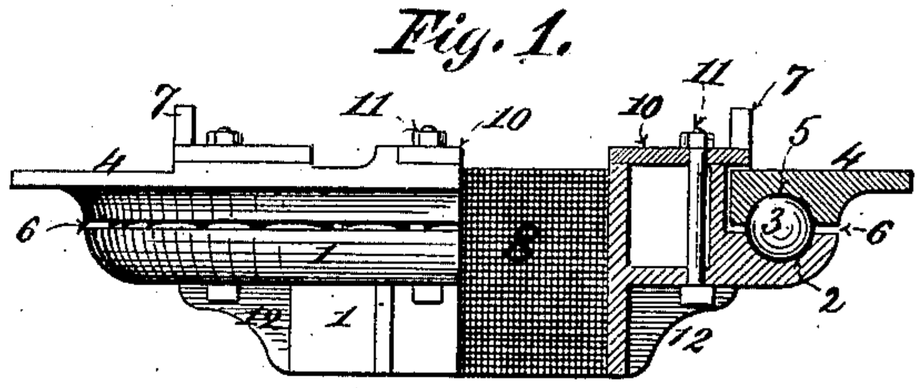


Fig. 2.

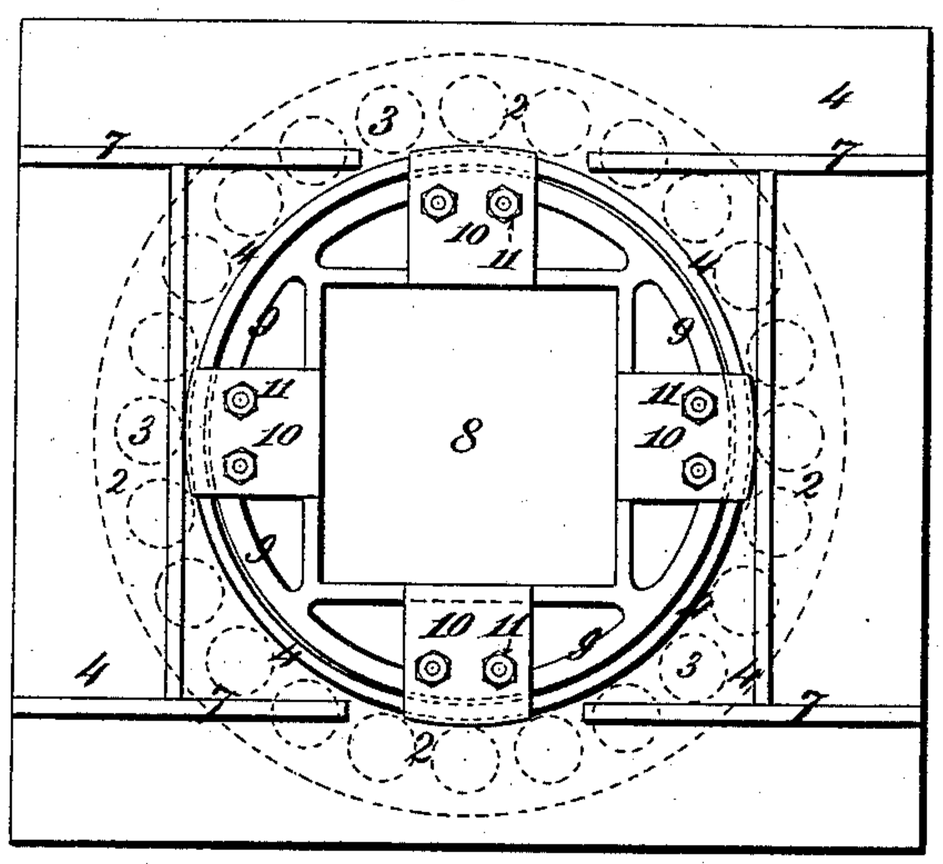
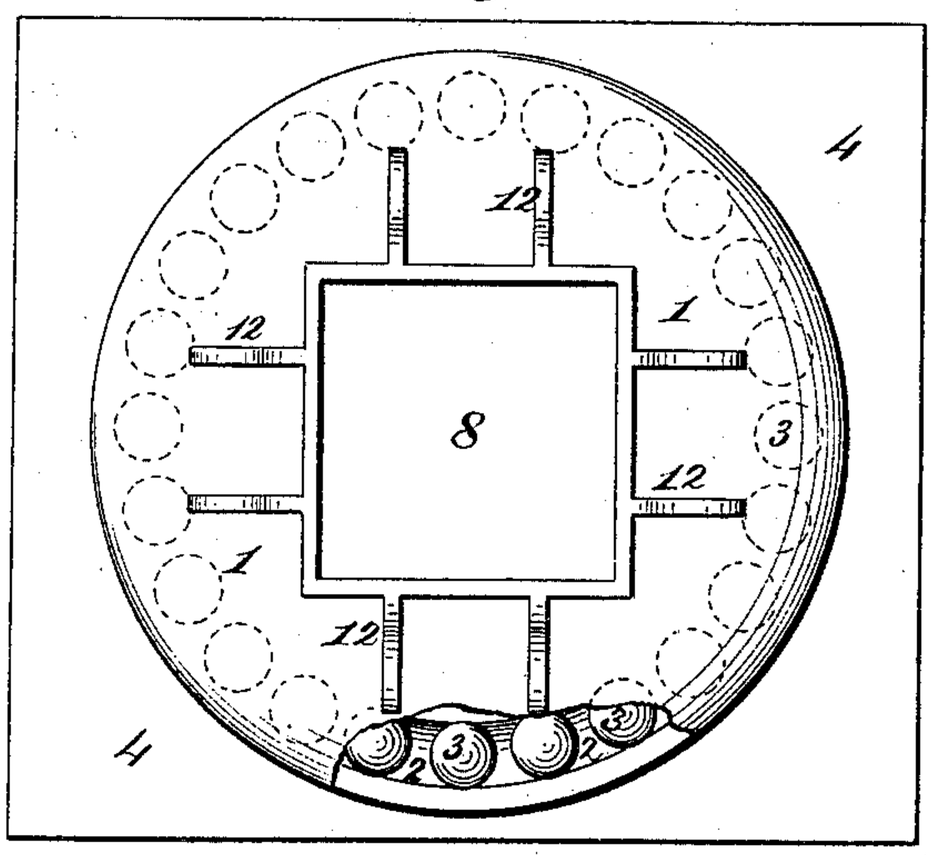


Fig. 3.



Witnesses:
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Walter A. Whittemore

Inventor:
John Thompson
by Phillips Abbott
his Attorney.

(No Model.) 3 Sheets—Sheet 2.

J. THOMPSON.

DREDGING MACHINE.

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Fig. 4.

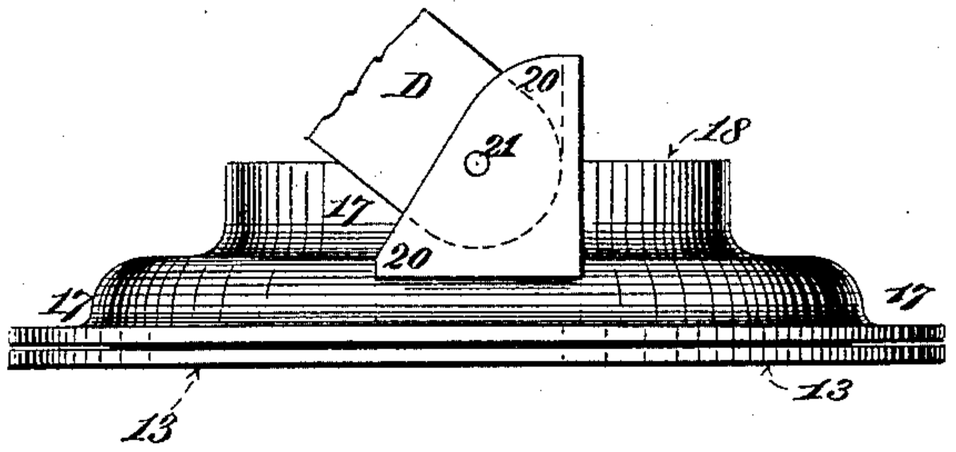


Fig. 5.

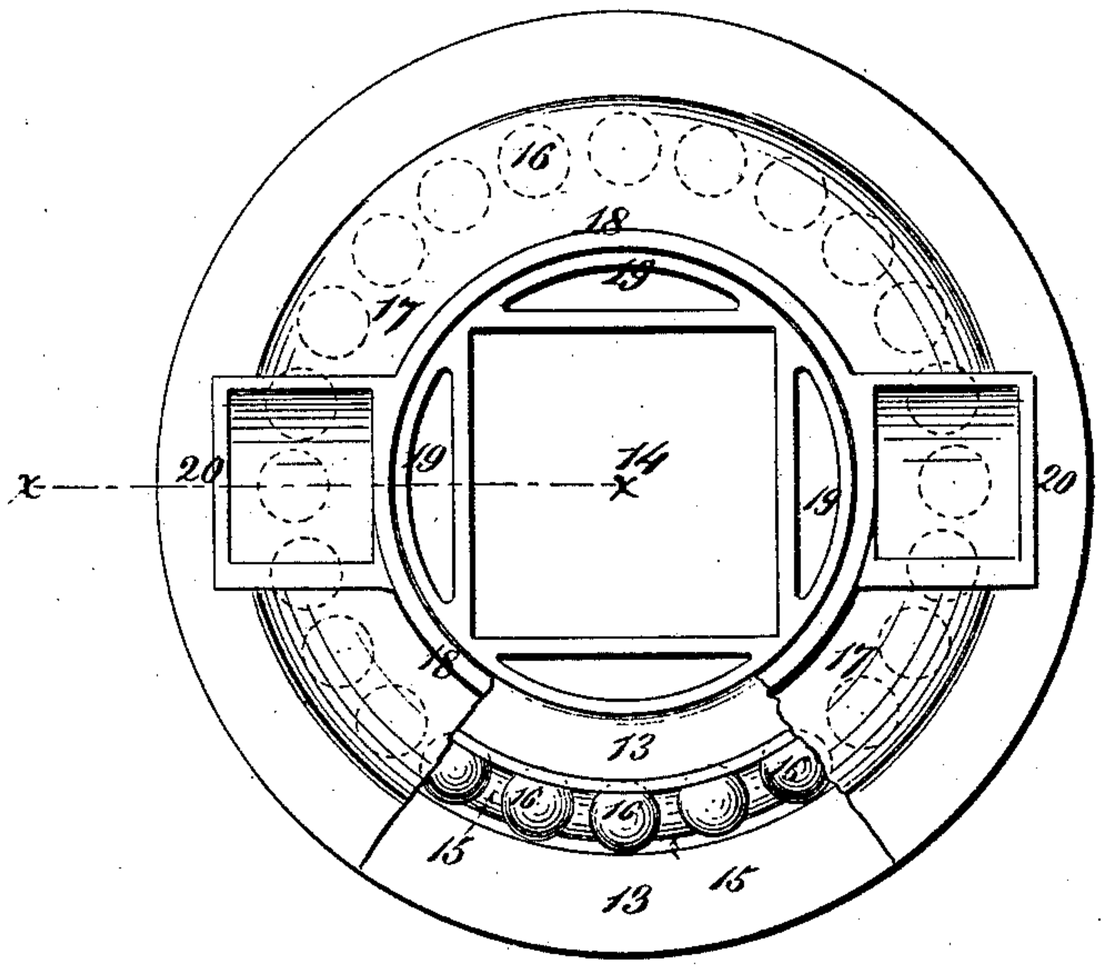
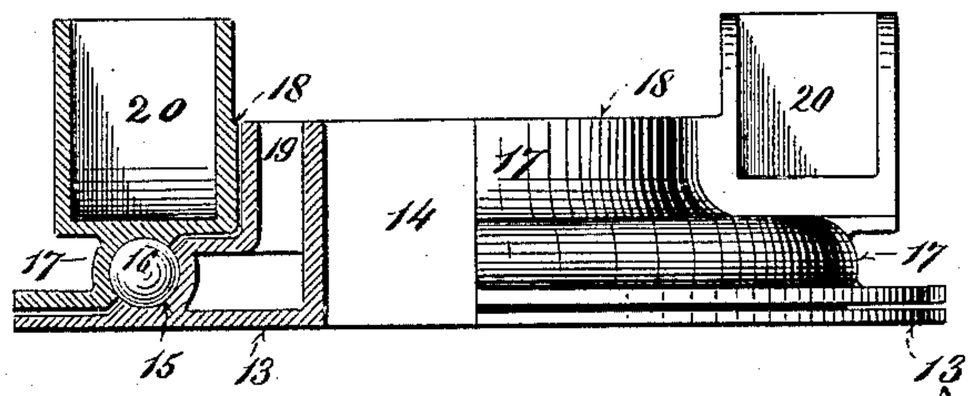


Fig. 6.



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(No Model.) 3 Sheets—Sheet 3.

J. THOMPSON.

DREDGING MACHINE.

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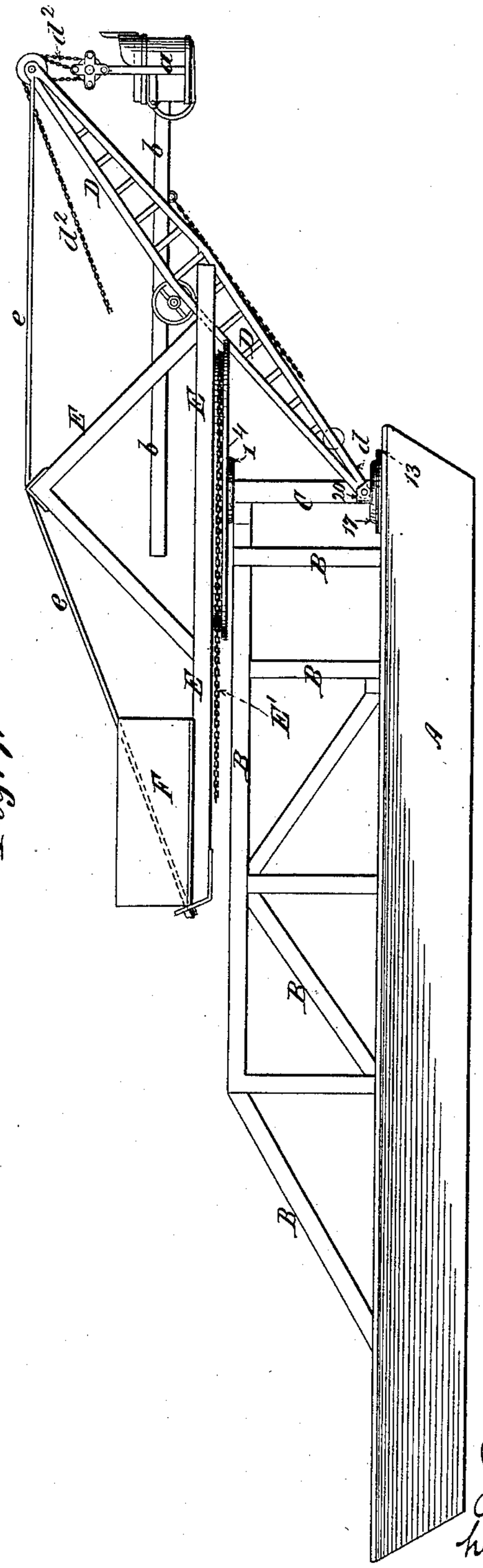

Fig. 1.

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UNITED STATES PATENT OFFICE.

JOHN THOMPSON, OF BUCYRUS, OHIO, ASSIGNOR TO THE BUCYRUS FOUNDRY AND MANUFACTURING COMPANY, OF SAME PLACE.

DREDGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 341,614, dated May 11, 1886.

Application filed October 27, 1885. Serial No. 181,190. (No model.)

To all whom it may concern:

Be it known that I, JOHN THOMPSON, a citizen of the United States, and a resident of Bucyrus, in the county of Crawford and State of Ohio, have invented certain new and useful Improvements in Dredging-Machines, of which the following is a specification.

My invention relates to improvements in the class of machines in which dredges, derricks, steam-shovels, and the like are embraced, which embody a swing boom, arm, or table, and it has special reference to the construction of the pivotal parts of such machines, whereby the swinging of the boom, &c., and the load is rendered more easy and safe and greater durability of the mechanism is secured.

In the drawings I represent my invention as attached to a dredging-machine. It is, however, applicable also to the machines generally of the class above stated.

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

Figure 1 illustrates a partially plan view and partially vertical section of that part of the invention which is applied at the top of the mast, and which supports the turning frame. Fig. 2 illustrates a top plan view of the apparatus shown in Fig. 1. Fig. 3 illustrates a bottom plan view of the apparatus shown in Fig. 1, a part of the lower plate being broken away. Fig. 4 illustrates a side plan view of the plates upon which the lower end of the boom is supported and rotates. Fig. 5 illustrates a top plan view of the apparatus shown in Fig. 4, a part of the upper plate being broken away. Fig. 6 illustrates in partial vertical cross-section and partially in plan the apparatus shown in Figs. 4 and 5, taken on the line *x x* of Fig. 5. Fig. 7 illustrates a plan view of the devices shown in the other figures as applied to a dredging-machine.

A is the scow or float.

B is a frame erected thereon for the support of certain parts of the mechanism.

C is the mast, which is rigidly attached to the frame B, and also preferably to the scow at its foot.

D is the boom. It is supported at the lower end, at *d*, as hereinafter described, and carries its load or bucket *a* by means of the lifting-chain d^2, attached to the upper end of the boom, the bucket *a* being supported on a sliding gaff, *b*, all as usual.

E is a frame, which supports the boom-bracing stay-rods *e e*. The forward parts of this frame also support and swing the boom and sliding gaff, and the rear parts sustain a counterbalance-weight—such as rocks, earth, or the like—placed in a box or crate, F.

The frame E, with its stay-rods and counter-balance, and the gaff and bucket and upper part of the boom all swing together in the operation of the machine, they being all centered at the head of the mast C, and actuated by the pull of the engine on the draft-chains E′, as usual, and the foot of the boom (seen at *d*) also during the swinging of the load and the parts above stated travels around or rotates at the foot of the mast. It will be readily understood that these movable parts and the load, whatever its character may be, are so heavy that the friction at the meeting surfaces of the pivotal points, as heretofore constructed, is very great, so much so, in fact, that a large part of the power required to operate such machines is devoted to the swinging action, and the strain consequent on the swinging action has tended to fracture of parts of the mechanism, and has prevented speedy accomplishment thereof. To overcome these defects I employ the following devices: Those shown at the head of the mast, being shown in Figs. 1, 2, and 3, and those at the foot thereof, for the rotation of the boom, in Figs. 4, 5, and 6.

At the upper end of the mast I bolt or otherwise rigidly attach a casting or plate (shown at 1) provided with a circular groove, 2. In the groove I place a number of metallic balls, preferably hardened steel, (seen at 3,) over the casting 1, and rigidly attached to the under side of the swinging frame E, I place another casting or plate, 4, which has a circular groove, 5, formed in it, which is the counterpart of the groove 2, formed in the lower plate, 1. These two grooves are not quite half-circles, so that the faces of the two plates will not quite meet, as seen at 6, the balls 3 keeping them a little separated. The plate 1 is bolted firmly to the upper part of the mast, and the plate 4 is rigidly bolted to the frame-work E, as stated. Suitably-located ribs or flanges, 7 7, formed on the upper plate, 4, aid

in properly confining and fastening the framework E to it, bolts passing through them into the frame. The mast projects through the square opening 8 in the plate 1. There is an upwardly-extending circular flange, 9, extending from the lower plate, 1, about which the upper plate turns, it being made circular also to fit about the said flange, and there are horizontal plates 10 extending from the square recess in the center of the lower plate, the outer edges whereof overlap the upper edges of the upper plate, 4, to hold the same firmly in place, and to aid in preventing rocking movement of the upper frame, E. These plates 10 are firmly stayed and greatly strengthened by the stay-bolts 11, which pass through the lower part of the plate 1, up through the plates 10, as shown, and brackets 12 are provided for the lower plate, which brace and support the same against the mast.

In Figs. 4, 5, and 6 I show the devices provided for the support and rotation of the lower end of the boom D. They are of an analogous character to those at the head of the mast. 13 is the lower plate, which is provided with a square hole, 14, through which the mast passes. This plate is firmly bolted to the deck or to the mast, as preferred. It is also provided with a semicircular groove. 15, for the reception of the anti-friction balls 16. The groove is preferably so formed as to lie in a plane directly at right angles to the axis of the boom; or, in other words, the bottom of the groove is in line with the center of the boom, so that it supports the balls 16 in the most complete manner. Against the thrust of the boom 17 is the upper plate, which is also provided with a semicircular groove for the reception of the balls 16. The grooves in these two plates, however, are not quite half-circles in cross section, but so much less therefrom as to produce a separation of their contiguous faces, the same as in the case of the upper plates, 1 and 4. The upper plate is made circular on its inner periphery, (seen at 18,) corresponding with an upwardly-extending circular flange, 19, formed on the lower plate. The upper plate is also provided with two sockets, 20, open at the top and on one side, which receive the two lower ends of the boom D, it being preferably bifurcated at the lower end. Any other suitable device may, however, be employed instead of these sockets for securing the boom to the plate 17, if desired, and the boom may be made otherwise than bifurcated. A pin, 21, passes through the sides of the sockets and through the lower ends of the boom, to confine it more securely in place, and to prevent it from springing out of the sockets in the event of the breaking of any part of the mechanism, which usually causes the boom to jump violently. Other means of securing the boom may be employed.

It will be understood that the grooves in the several plates, 1 and 4 and 13 and 17, and the balls contained in them, respectively, are to be thoroughly lubricated.

The operation is as follows: As soon as the bucket *a* and its contents or other load, as the case may be, is in the desired position for swinging them by the revolution of a winding-drum, (not shown,) with which the chains E′ are connected, there being of course two of them, as usual, they are respectively wound up or unwound on the drum. The chains are attached to opposite sides of the swinging frame E. Thus, depending on the direction of movement of the drum, they turn the frame and the parts connected with it to the right or left, as the case may be, and in so doing the balls 3 in the grooves of the upper plates, upon which the entire swing-frame E and its adjacent parts are supported, roll round upon their axes in the grooves in which they are contained. Thus there is no sliding of surfaces over each other, as in the case of meeting plates or wheels on axles, but, on the contrary, a rolling motion, which is practically free from friction; and the same is true of the castings at the foot of the mast which support the boom. The upper end of the boom is carried around by the frame E, with which it engages, as usual, and being so turned the upper one of the castings at the foot of the mast turns with it, rolling on the balls 16.

An important feature in the mechanism is the counterbalance-weight F. Its weight is sufficient to balance that of the frame and boom and about half the weight of the load. Thus rocking of the frame E or uneven pressure on the balls at any particular side of the upper castings is avoided as much as possible.

It will be obvious to those skilled in this art that the frame E may be rigidly attached to the mast C, the mast itself being made to turn as a pivot or spindle for the swinging frame, &c. This construction is especially applicable to light machinery. If so constructed, the castings with the grooves and balls may be placed under the foot of the mast or at any suitable point on it, the upper plate being attached to the mast, and the lower one to any suitable support on the frame or on the scow. It is also obvious that little wheels may be used instead of the balls, the grooves in the plates being properly formed to receive them.

I do not limit myself to the details of construction shown, since it is obvious that many deviations therefrom may be made and still my invention be employed.

I claim—

1. The combination, in a dredge or like machine, of a rotatable frame supported on balls or wheels held in grooves formed in plates placed one above the other, a load-supporting boom or arm guided by the said frame, the lower end whereof is attached to a rotatable plate resting on balls or wheels placed in grooves formed in it and in a stationary under plate, and mechanism to rotate the frame

and the boom or arm, substantially as and for the purposes set forth.

2. The combination, in a dredge or like machine, of a load supporting and swinging frame supported on balls or wheels placed in grooves formed in plates superimposed one over the other, the lower one being stationary and the upper one rotatable, and mechanism for turning the frame, substantially as and for the purposes set forth.

3. The combination of a load-supporting boom or arm the lower end whereof is supported on a rotatable plate which rests and turns on balls or wheels placed in grooves formed in a stationary under plate, substantially as and for the purposes set forth.

4. The combination, in a dredge or like machine, of a rotatable frame supported on balls or wheels held in grooves formed in plates placed one over the other, the under plate being stationary and the upper one movable with the frame, the front end of the frame supporting and guiding a load-carrying boom or arm, and a counterbalance-weight placed on the rear end of the frame, substantially as and for the purposes set forth.

5. The combination, in a dredge or like machine, of a rotatable frame supported on balls or wheels held in grooves formed in plates placed one over the other, the under plate being stationary and the upper one movable with the frame, the front end of the frame supporting and guiding a load-carrying boom or arm, a counterbalance-weight placed on the rear end of the frame, the lower end of the boom being supported on a rotatable plate which rests and turns on balls or wheels placed in grooves formed in it and in a stationary under plate, substantially as and for the purposes set forth.

6. The herein-described apparatus for supporting the lower end of the boom in dredging and like machines, consisting of a lower plate provided with a circumferential groove formed on its upper surface, the bottom of the groove being in line with the central line of the boom, and an upper plate provided with a groove on its under side which is the counterpart of the groove in the lower plate, and anti-friction balls placed between the plates, and held and rotating in the grooves therein, respectively, substantially as and for the purposes set forth.

7. The herein-described apparatus for supporting the lower end of the boom in dredging and other like machines, consisting of a plate provided with open sockets on the opposite sides thereof for the reception of the ends of a bifurcated boom, the said plate resting and turning on anti-friction balls or wheels placed and turning in a groove formed on its under side and in the upper side of a stationary under plate, substantially as and for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 23d day of October, A. D. 1885.

JOHN THOMPSON.

Witnesses:
JOHN H. IVES,
JOHN J. CAULDWELL.