

(No Model.)

3 Sheets—Sheet 1.

A. K. STONE.  
DREDGER.

No. 360,927.

Patented Apr. 12, 1887.

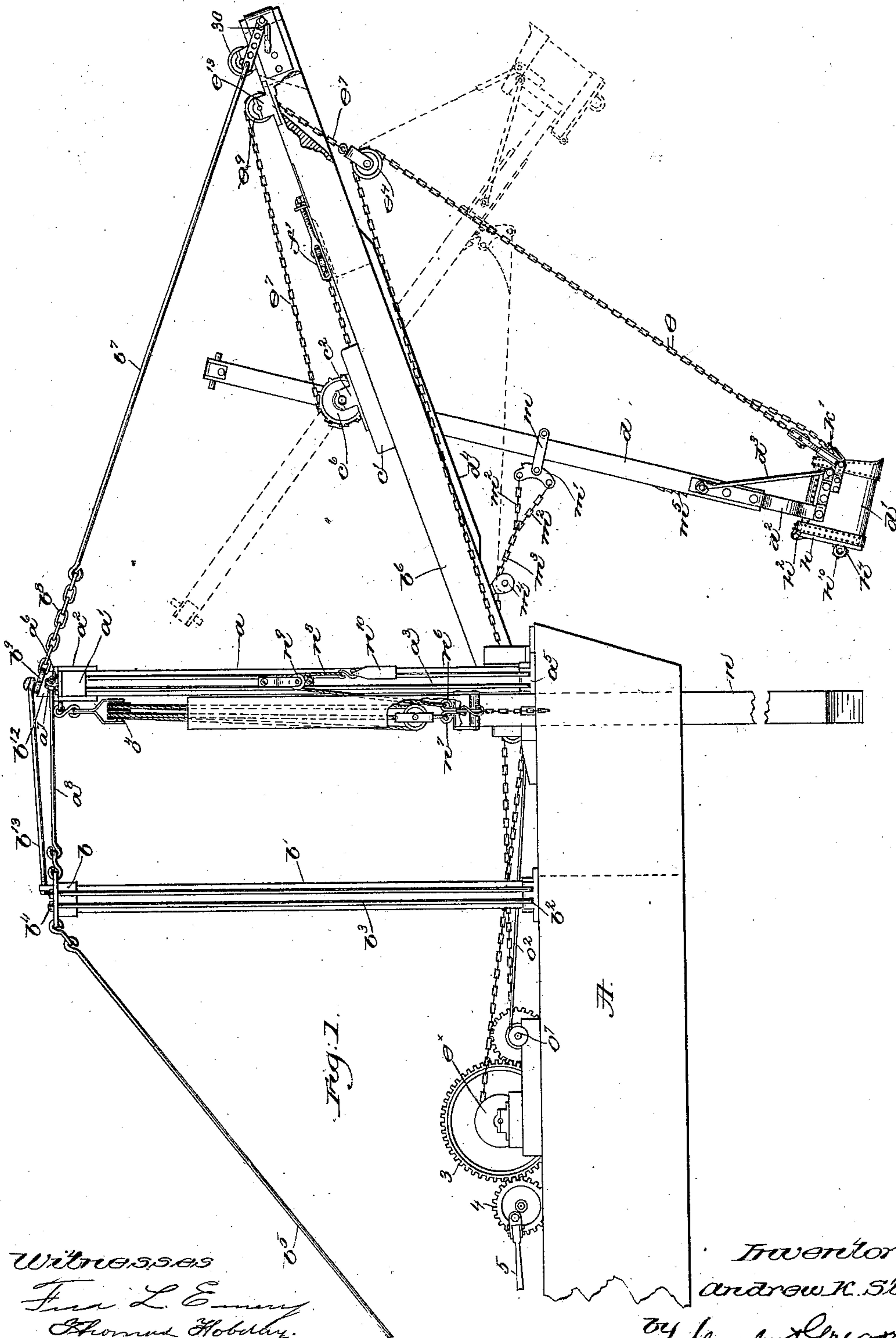


Fig. 1.

Witnesses

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Thomas Hobday.

Inventor.

Andrew K. Stone

by Crosby & Gregory  
Attys.

(No Model.)

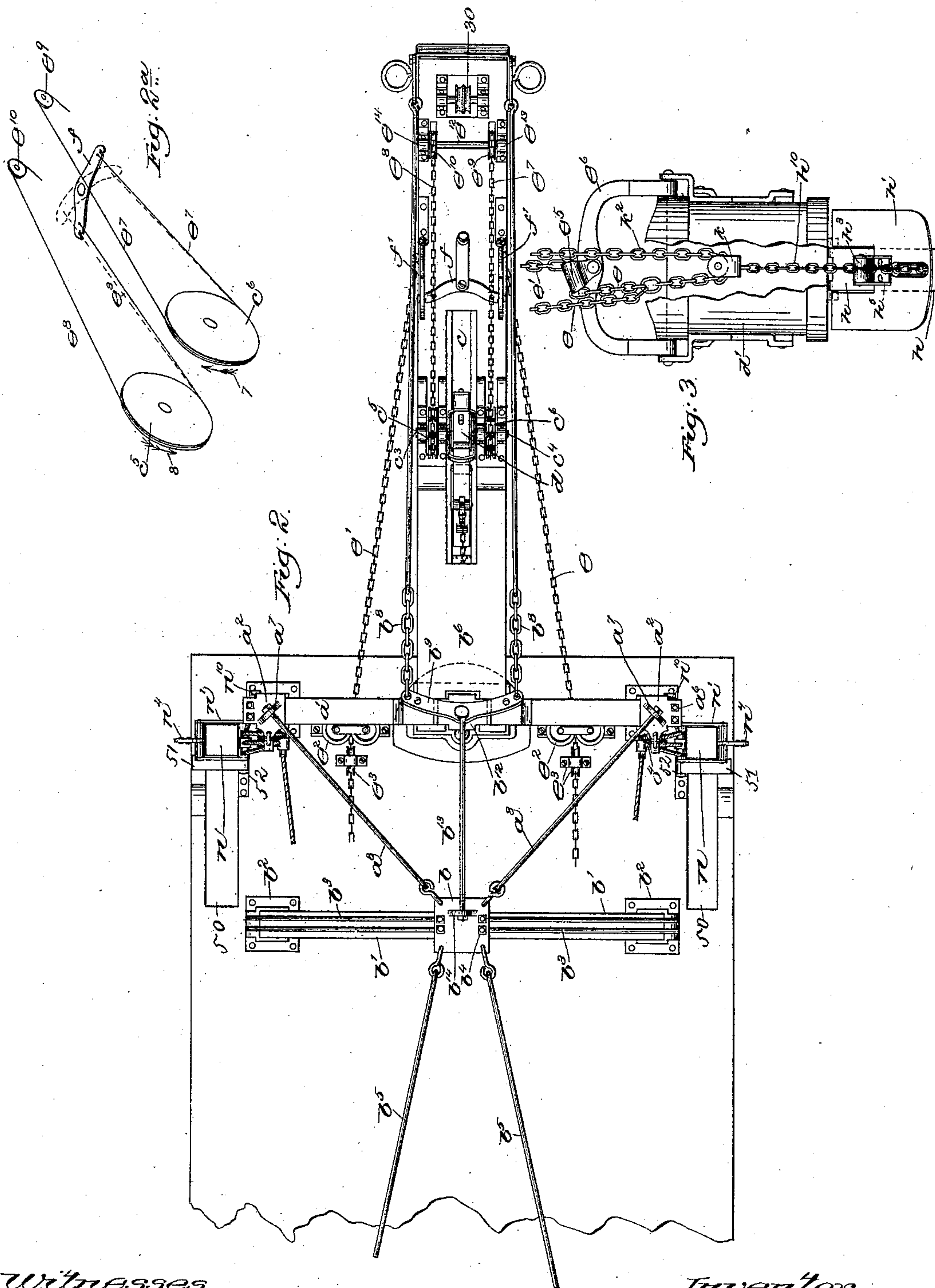
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Thomas Hebditch

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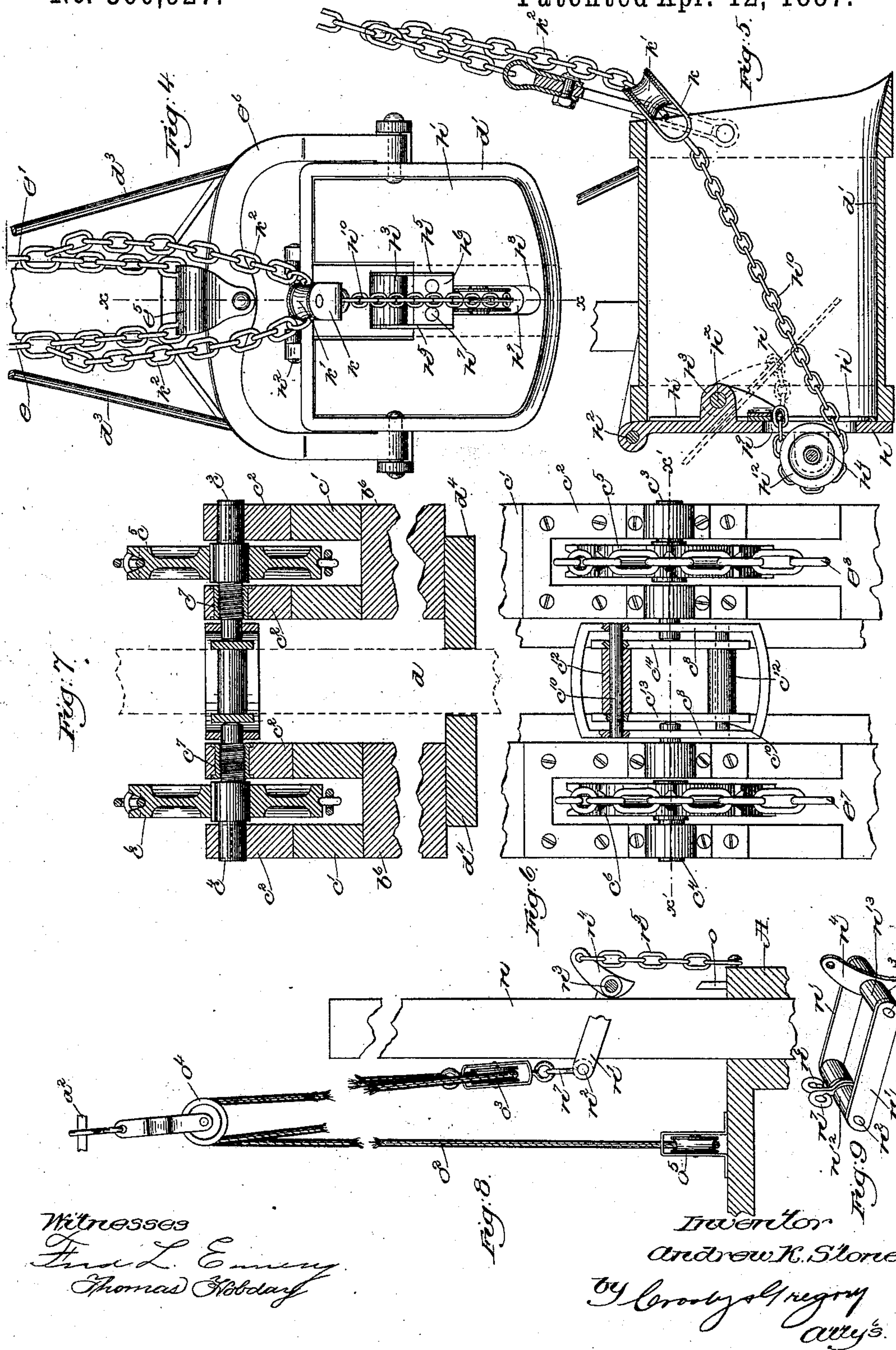
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# UNITED STATES PATENT OFFICE.

ANDREW K. STONE, OF BOSTON, MASSACHUSETTS.

## DREDGER.

SPECIFICATION forming part of Letters Patent No. 360,927, dated April 12, 1887.

Application filed June 11, 1886. Serial No. 204,851. (No model.)

*To all whom it may concern:*

Be it known that I, ANDREW K. STONE, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Dredgers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention in dredging-machines relates more particularly to that class employing but a single bucket.

Prior to my invention I am aware that dredging-machines have been constructed in which the bucket-handle has been held by a clamping mechanism operated through suitable levers and chains connected thereto by an operator stationed at the forward end of the dredging-boat.

In accordance with my invention I obviate the employment of an operator to actuate the clamping mechanism by operating the clamping mechanism automatically, as will be described hereinafter, whereby the bucket handle or beam may be automatically clamped or held at any desired part of its length, so that the bucket may be kept at any desired distance below the surface of the water until acted upon by drawing the chains to lift the bucket.

My invention also has for its object to provide each "spud" or post by which the dredging vessel or boat is anchored with a clamping device, which serves to drive the said spud deeper into the bed or bottom to secure a firmer anchorage at each listing or careening of the boat, due to the swinging boom being turned to one side of the boat to discharge the load contained in the bucket.

Another object of my invention is to provide a bucket constructed so as to diminish the resistance offered to its passage through the water.

My invention further has for its object to render my machine capable of dredging from each anchorage or position a greater extent of bed or bottom than has been hitherto accomplished.

My invention consists, essentially, of a swinging boom or frame, a bucket and its attached handle, and means to lift said bucket, combined with a clamping mechanism to clamp the

bucket-handle, and with means to automatically operate the said clamping mechanism.

My invention also consists of spuds by which to anchor the boat, a clamping device fitted on each spud, combined with means to act on said clamping device to change its position on the spud, to enable the said spud to be buried deeper in the bed or bottom, and thereby secure a firmer anchorage.

My invention further consists of a novel bucket having its bottom composed of two parts pivotally connected together, combined with means connected to the bucket-lifting mechanism to close the bottom of said bucket.

Other features of my invention will be pointed out in the claims at the end of this specification.

Figure 1 is a side elevation of a sufficient portion of a dredging boat or vessel provided with my improved apparatus to enable my invention to be understood; Fig. 2, a plan view of Fig. 1; Fig. 2<sup>a</sup>, a detail to be referred to; Fig. 3, a detailed view of the bucket in the act of discharging its load; Fig. 4, a front view of the bucket on an enlarged scale; Fig. 5, a section of Fig. 4 on line *xx*; Fig. 6, an enlarged detail, in plan and section, of the bucket-handle-clamping mechanism; Fig. 7, a section of Fig. 6 on line *x'x'*; Fig. 8, an enlarged detail showing the clamping device used in connection with the spuds, and Fig. 9 a detached view of the clamp for the spuds.

Referring to Fig. 1, A represents a dredging boat or vessel, of usual construction, to support the working parts of the apparatus. The boat A has erected upon it uprights *a*, connected by a cross-beam, *a'*, which has its ends inserted through caps *a*<sup>2</sup> on the uprights *a*, the said beam being secured upon the uprights *a* by stay-rods *a*<sup>3</sup>, which are fastened at one end to plates *a*<sup>5</sup>, attached to the boat, and are secured at their other ends to the caps *a*<sup>2</sup> by nuts *a*<sup>6</sup>. Each cap *a*<sup>2</sup> has a lug, *a*<sup>7</sup>, (see Fig. 2,) provided with an opening, through which one end of a brace, *a*<sup>8</sup>, is extended and secured thereto, the other end of said brace being connected by links to a cap, *b*, fitted upon beams *b'*, which rise from the sides of the boat toward its center. The beams *b'* have their lower ends set in plates *b*<sup>2</sup>, secured to the boat, the said plates having ears, to which are fast-



ened one end of stay-rods  $b^3$ , the other end of said stay-rods being inserted through said cap and secured thereto by nuts  $b^4$ , the said cap having connected to it stay-rods  $b^5$ , extended 5 toward the stern of the boat.

Projecting from the bow of the boat A is a boom or frame,  $b^6$ , pivoted at one end on the said boat, and having its other end supported by stay-rods  $b^7$ , connected by links  $b^8$  to the 10 ends of a lever,  $b^9$ , pivoted to a stud or projection,  $b^{10}$ , of a cap,  $b^{12}$ , (see Fig. 2,) fitted on the cross-beam  $a'$  near its center, the strain imposed upon the cap  $b^{12}$  by the said boom and the parts supported thereby being counter- 15 balanced by the brace  $b^{13}$ , connected to the said cap and to a lug,  $b^{14}$ , on the cap  $b$ . (See Figs. 1 and 2.)

The boom  $b^6$  has a longitudinal slot,  $c$ , near its center, and on opposite sides of said slot 20 are mounted blocks  $c'$ , supporting journal-bearings  $c^2$  (see Figs. 1 and 7) for shafts  $c^3$   $c^4$ , which have splined upon them sprocket-wheels  $c^5$   $c^6$ . (See Figs. 2, 6, and 7.)

Each shaft  $c^3$   $c^4$ , as herein shown, has a right- 25 hand screw-thread near its end toward the slot  $c$ , the said threaded portion of each shaft engaging threads on the inner surface of a sleeve,  $c^7$ , supported in the journal-bearings  $c^2$ . The shafts  $c^3$   $c^4$  have their threaded ends reduced 30 in diameter to enter openings in sides  $c^8$  (see Fig. 6) of a frame located in the slot  $c$  between the bearings  $c^2$ , in which slot the bucket-handle  $d$  moves, the said sides being connected near their ends by rods  $c^{10}$ , the said rods having 35 mounted on them rollers  $c^{12}$  and supporting-bar  $c^{13}$   $c^{14}$ , the said bars constituting a clamp for the handle or beam  $d$ , having at its lower end the bucket  $d'$ , firmly secured thereto by arms  $d^2$  and stay-rods  $d^3$ , (see Figs. 1 and 3,) 40 the rollers  $c^{12}$  and bars  $c^{13}$   $c^{14}$  forming a guide for the bucket-handle as it is raised or lowered. The bars  $c^{13}$   $c^{14}$  are rendered effective to clamp and thereafter release the said bucket-handle by means of the shafts  $c^3$   $c^4$ , in a manner 45 as will be hereinafter fully described.

Secured to the under side of the boom  $b^6$ , I have herein shown two strips or plates  $d^4$ , (see Figs. 1 and 7,) one on each side of the slot  $c$ , the said strips or plates serving to guide and 50 steady the movement of the bucket-handle  $d$ .

The bucket  $d'$  is raised from its normal working position (shown in full lines, Fig. 1,) to its dotted-line position by means of elevating-chains  $e$   $e'$  on opposite sides of the boom 55  $b^6$ . The elevating-chains  $e$   $e'$  are each passed between horizontal sheaves  $e^2$ , (see Fig. 2,) and beneath a sheave,  $e^3$ , located behind the sheaves  $e^2$  on the boat A, the said chains having one end secured to the usual drums,  $e^x$ , 60 only one of which is shown in Fig. 1, and on which the said chains are wound as the bucket is raised, the said drums being revolved through suitable gears, 3 4, operated through shafting 5 by an engine. (Not shown.)

65 The drums upon which the elevating-chains  $e$   $e'$  are wound are mounted on a shaft common to both, and are made capable of rotating in-

dependently or both together by means of suitable friction clutch or device, such as now commonly found in dredging-machines of ordinary 70 construction.

Each elevating-chain is carried along the side and toward the end of the boom  $b^6$ , the said chains near the forward end of said boom being passed over pulleys  $e^4$ , (only one of which 75 is shown in Fig. 1,) and having their ends connected to an ear,  $e^5$ , pivoted to the handle  $e^6$  of the bucket  $d'$ , as clearly shown in Figs. 3 and 4.

The blocks of the pulleys  $e^4$  have secured to 80 them auxiliary chains  $e^7$   $e^8$ , (see Figs. 1 and 2,) the said chains passing up through slots in the boom  $b^6$  and over pulleys  $e^9$   $e^{10}$ , mounted on a shaft,  $e^{12}$ , supported in bearings  $e^{13}$   $e^{14}$ , secured to the boom  $b^6$ , and the said chains are then re- 85 spectively passed over and under the sprocket-wheels  $c^5$   $c^6$ , and are connected to the ends of a pivoted lever,  $f$ , the ends of the said lever being movable in guides  $f'$ .

The elevating-chains  $e$   $e'$  actuate the auxil- 90 iary chains  $e^7$   $e^8$  to rotate the sprocket-wheels  $c^5$   $c^6$  to turn the threaded shafts  $c^3$   $c^4$ , and thereby press the clamping-bars  $c^{13}$   $c^{14}$  against the bucket-handle to clamp the same and hold it 95 fast in any desired position.

When the "equalizing-lever"  $f$ , as it may be called, occupies the central or normal position shown in Fig. 2, the clamping-bars  $c^{13}$   $c^{14}$  will be out of contact with the bucket-handle  $d$ , and the said bucket-handle is then free 100 to descend by gravity or to be raised by pulling both elevating-chains  $e$   $e'$  equally; but when it is desired to clamp the bucket-handle at any desired point, so that the bucket may have a most effective working position below 105 the water-surface, either one of the elevating-chains will be drawn more tightly than the other. For illustration, suppose the chain  $e$  to be drawn more tightly than the chain  $e'$ , then the chain  $e^7$  will be drawn to move the 110 lever  $f$  into the dotted-line position, Fig. 2<sup>a</sup>, and as the lever is moved into said dotted-line position the sprocket-wheel  $c^6$  will be rotated in the direction of the arrow 7, the wheel  $c^5$  moving in the reverse direction, as shown by 115 arrow 8.

The wheels  $c^5$   $c^6$  rotate their shafts in opposite directions, and, as both have right-hand threads engaging the stationary sleeves  $c^7$ , the said shafts will travel toward each other. 120

When the lever  $f$  is moved into the dotted-line position shown in Fig. 2<sup>a</sup>, the inner ends of the shafts  $c^4$   $c^3$  press the clamping-bars  $c^{14}$   $c^{13}$  against the bucket-handle  $d$ , thereby securely clamping said handle against further move- 125 ment.

When it is desired to release the bucket-handle from its clamped position, as indicated by Fig. 2, the elevating-chain  $e'$  will be drawn to move the lever  $f$  back into its full-line position, thereby moving the wheels  $c^5$   $c^6$  in an 130 opposite direction to that indicated by arrows 7 and 8, thus withdrawing the shafts  $c^4$   $c^3$  from contact with the clamping-bars  $c^{14}$   $c^{13}$  and leav-



ing the bucket-handle free to be moved in either direction.

As herein shown, the chain  $e$  must be pulled upon to clamp the bucket-handle; but when it is desired to clamp the bucket-handle by the chain  $e'$  the chains  $e'$   $e^8$  will be rove or passed under instead of over the sprocket-wheels. When thus rove, the chain  $e'$ , when pulled upon, will cause the shafts to move toward each other and clamp the bucket-handle.

The bottom of the bucket  $d'$  is composed of two plates,  $h$   $h'$ , the plate  $h$  being hinged, as at  $h^2$ , to one side of said bucket near its center, and provided at its inner side with an ear,  $h^3$ , and slotted, as at  $h^9$ . The other plate,  $h'$ , has riveted to it a plate,  $h^6$ , having two ears,  $h^5$ , which embrace the ear  $h^3$ , the said ears  $h^5$  being connected by a pivot,  $h^x$ . The plate  $h'$  has a slot,  $h^8$ , in line with the slot  $h^9$ . The plate  $h$  has at its outer side two ears,  $h^4$ , which hold a pin, on which turns a pulley,  $h^{12}$ . The chain  $h^{10}$ , connected at one end to the bottom plate,  $h'$ , and passed around the pulley  $h^{12}$  and through the slots  $h^9$   $h^8$ , is passed through the bucket and attached to the block  $k$  of the pulley  $k'$ . The plate  $h'$  constitutes the greater part of the bottom of the bucket.

Around the pulley  $k'$  is passed a chain,  $k^2$ , having its ends joined to the elevating-chains  $e$   $e'$ , as shown in Fig. 4. As the bucket descends through the water, the elevating-chains  $e$   $e'$  are slackened or unwound, thus permitting the plate  $h'$  to be turned by the water into dotted-line position, Fig. 5, thereby affording a passage for the water through the bucket, consequently diminishing the resistance of the water to the descent of the bucket. When the bucket has reached the point where it is to be loaded, the elevating-chains are tightened or wound sufficiently to close the bottom by bringing the plate  $h'$  into its full-line position, Fig. 5.

In order that the bucket may be carried back toward the boat to enable a comparatively large extent of territory to be dredged from each anchorage, I have encompassed the bucket-handle below the boom  $b^6$  by a collar,  $m$ . (See Fig. 1.) The collar  $m$  has pivoted to it a pawl,  $m'$ , the said pawl being herein shown as having fastened to each end links  $m^2$ , which are joined to a chain,  $m^3$ . The chain  $m^3$  is passed over a pulley supported in bearings  $m^4$ , secured to the under side of the boom  $b^6$ , the said chain then being carried along the deck of the boat and fastened to a drum. (Not shown.) As the chain  $m^3$  is wound upon its drum, the bucket is carried back from its elevated or dotted-line position, Fig. 1, by means of the chain  $m^3$ , the pawl  $m'$  being then engaged with a rack,  $m^5$ , on the bucket-handle.

When the bucket has been carried back so that its handle has a substantially vertical position, the pawl is unlocked or disengaged from the rack, and the bucket-handle is permitted to pass through the said collar, thereby enabling the bucket to be brought farther backward toward the boat.

When the bucket occupies a position with the pawl unlocked, as shown in Fig. 1, the said bucket may be lifted upward in a substantially vertical path by holding the chain  $m^3$  fast or taut and hoisting the chains  $e$   $e'$ .

With the bucket loaded and in its elevated position, as shown in dotted lines, Fig. 1, the boom  $b^6$  may be swung round, so as to bring the bucket on either side of the boat and into position to discharge its load.

If the bucket is swung to the port side of the boat, the elevating-chain  $e'$  will be wound up, and when the bucket is in position to discharge its load the door may then be opened by slackening or unwinding either elevating-chain, the position of the chains  $e$ ,  $e'$ ,  $h^2$ , and  $h^{10}$  being clearly shown in Fig. 3, the chain  $e$  being loosened to open the door.

When the boom  $b^6$  is swung to one side to permit the load in the bucket to be discharged, the boat  $A$  is listed to that side.

In order to secure a firmer anchorage, I have placed upon each spud or post (see Fig. 8) a clamping device composed of sides  $n'$ , joined at their ends by rods  $n^2$   $n^3$ , on which are mounted rollers  $n^{12}$   $n^{13}$ , to enable the clamping device to be readily moved on the spuds. The rod  $n^3$  has pivoted to it a lever,  $n^4$ , the said lever having its shorter arm cam-shaped to bear against the spud or post  $n$ , the other arm, as herein shown, having an eye to be engaged by a hook on a chain,  $n^5$ , the other end of said chain being firmly secured to the boat  $A$ , as shown in Fig. 8.

The rod  $n^2$  has secured to it a rope,  $n^8$ , which passes over a pulley,  $n^9$ , the pulley-block of which is secured to the upright  $a$ , the rope  $n^8$  supporting a weight,  $n^{10}$ , which normally keeps the clamping device in the oblique position shown in Fig. 8.

As the boat is "listed" the clamping device on the spud located on the elevated side of the boat is struck by an upright,  $o$ , herein shown as secured to the boat, the said upright elevating one end of the clamping device, while the weight  $n^{10}$  raises the other end, thus bringing the said clamping device near the top of the spud.

The bucket is herein shown as elevated by two chains "single-rove;" but when the dredge is to be used for digging hard material one of the chains, as  $e$ , will be "double-rove," or "rove in full." In the latter case the chain  $e$  will pass under a pulley, (not shown, but the pulley-block of which is secured to the block  $e^5$ ), and then up over a pulley,  $30$ , on the boom  $b^6$ , (see Figs. 1 and 2,) then down again and secured to the said pulley-block.

When one chain, as  $e$ , is "rove full," the machine can only discharge its load on one side of the boat, the bucket being opened by the chain  $e'$ .

I have herein shown one manner of automatically clamping the bucket-handle; but I do not desire to limit my invention to a clamp of the exact construction herein shown, for the same, as well as the mechanism for operating



the clamp at the proper time, might be varied by the use of equivalent parts operating in substantially the same manner without departing from my invention.

5 When the boat is moved forward, the dipper or bucket handle lies upon the bottom, and the boat is moved forward by pulling upon the backing-chain, and, in order to relieve the strain upon the dipper-handle when the boat  
10 is drawn forward, the boat at its forward end and near its sides is provided with slots 50, (see Fig. 2,) through which the forward spuds, *n*, are extended. Each forward spud, *n*, is housed, as shown in Fig. 2, by means of a  
15 clamp, 51, hinged at one end, as at 52, and extended across the slot 50, the free end of the clamp 51 being locked between two upright lugs secured to the deck of the boat, or in other suitable manner.

20 When it is desired to move the boat forward, one of the clamps 51 will be turned on its hinge to uncover the slot, the spud in the said slot remaining embedded in the mud, while the other spud is hoisted clear of the  
25 bottom, it being maintained perpendicular by means of its clamp, in order to be dropped when the boat is far enough ahead. In practice the spuds at the aft end will be extended through slots in a similar manner, and when  
30 the boat is drawn forward one aft and one forward spud on the same side of the boat will be embedded, as above described, the embedded spuds relieving all strain when the wind is abeam upon the dipper-handle as the  
35 boat is moved forward. By this means all quarter-anchors and their attachments are dispensed with, and strain upon the boom and dipper-handle caused by the drifting of the boat, owing to the force of the wind and cur-  
40 rent, are obviated, thus permitting easy working of the clamping mechanism.

I claim—

1. In a dredging-machine, a swinging boom or frame, a bucket and its attached handle,  
45 and means to lift said bucket, combined with clamping mechanism, substantially as described, to clamp said bucket-handle, and with means, substantially as described, to automatically operate the said clamping mechanism,  
50 as and for the purpose set forth.

2. In a dredging-machine, a swinging boom or frame, a bucket and its attached handle, and means to lift said bucket, combined with  
55 clamping mechanism, substantially as described, and with means, substantially as described, connected to and rendered effective by said lifting mechanism to operate the said clamping mechanism, substantially as speci-  
60 fied.

3. In a dredging-machine, the boat, spuds by which to anchor said boat, a clamping device, substantially as described, fitted on each  
spud, and means, substantially as described, to

act on said clamping device to change its position on the said spud, combined with means, sub-  
stantially as described, connecting said clamp-  
ing device with the boat, as and for the pur-  
pose set forth. 65

4. In a dredging-machine, the bucket hav-  
ing its bottom composed of two parts pivot-  
ally connected together, combined with means,  
substantially as described, connected to the  
bucket-lifting mechanism to close the said  
bottom, substantially as set forth. 70

5. In a dredging-machine, a swinging boom  
or frame, a bucket and its attached handle  
provided near the bucket with a rack, a col-  
lar movable on said bucket-handle, and a pawl  
pivoted to said collar and adapted to engage  
said rack, combined with means, substantially  
80 as described, connected to said pawl, to oper-  
ate substantially as set forth.

6. In a dredging-machine, a swinging boom  
or frame, the bucket and its attached handle,  
and the elevating-chains *e e'*, combined with the  
85 bucket-handle-clamping mechanism, substan-  
tially as described, and with the auxiliary  
chains *e' e''*, connected to the chains *e e'*, and  
with the lever *f*, all substantially as de-  
scribed. 90

7. In a dredging-machine, the bucket hav-  
ing its bottom composed of plates *h h'*, the  
plate *h'* being pivotally connected to the plate  
*h*, combined with the chains *h<sup>10</sup>* and *h<sup>2</sup>*, the lat-  
ter being connected to the elevating-chains, as  
95 and for the purpose set forth.

8. In a dredging-machine, the boat, spuds  
by which to anchor it, a clamping device on  
each spud, having the lever *n<sup>4</sup>*, and a chain to  
connect said boat and lever, combined with the  
100 upright *o*, to act on one end of the said clamp-  
ing device, and with the weight *n<sup>10</sup>*, con-  
nected, substantially as described, with the  
other end of said clamping device, as and for  
the purpose set forth. 105

9. In a dredging-machine, the boat, the  
swinging boom or frame, and the bucket and its  
attached handle supported by said boom or  
frame, combined with uprights *a*, cross-beam  
*a'*, the beveled cap *b<sup>12</sup>*, and rods *b<sup>7</sup>*, to support  
110 said swinging boom and its attached parts,  
substantially as specified.

10. In a dredging-machine, the boat pro-  
vided at its forward end with side slots, a  
spud extended through each slot, and clamp-  
ing mechanism to hold said spuds embedded  
115 in the mud, combined with a clamp extended  
across the slot to house the spud, substantially  
as and for the purpose set forth.

In testimony whereof I have signed my name  
to this specification in the presence of two sub-  
scribing witnesses. 120

ANDREW K. STONE.

Witnesses:

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J. H. CHURCHILL.