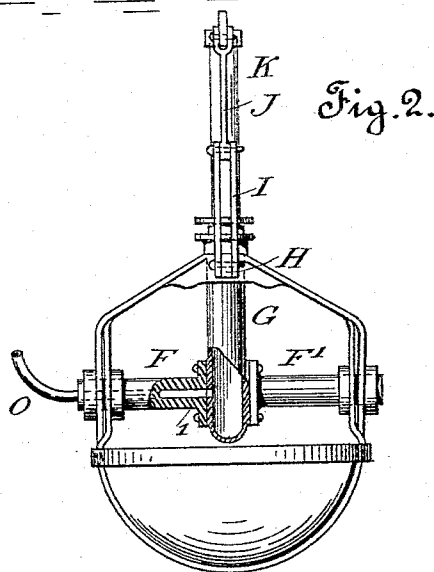
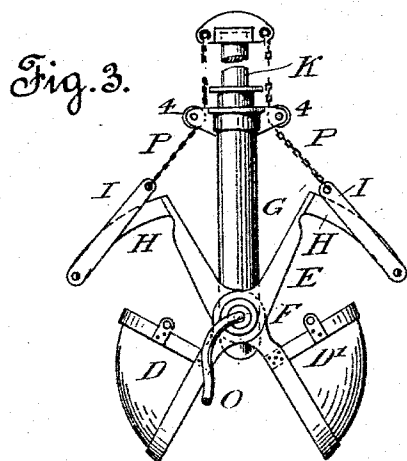
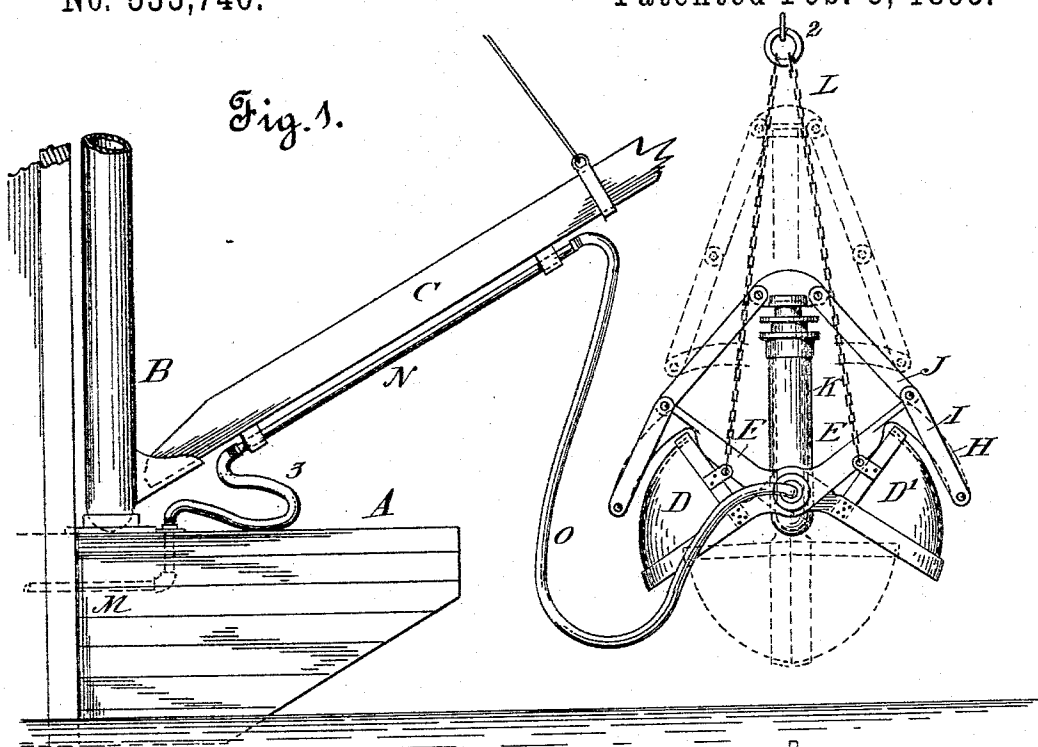


(No Model.)

W. B. PLESS.
DREDGING APPARATUS.

No. 533,740.

Patented Feb. 5, 1895.



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM B. PLESS, OF STOCKTON, CALIFORNIA, ASSIGNOR TO THE PLESS
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DREDGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 533,740, dated February 5, 1895.

Application filed February 16, 1894. Serial No. 500,345. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. PLESS, a citizen of the United States, residing at Stockton, in the county of San Joaquin and State of California, have invented certain new and useful Improvements in Dredging Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to improvements in dredgers of the class ordinarily called "clam-shell" dredgers, in which a bucket composed of two hinged sections is suspended from a swinging boom and provided with connections for hoisting the bucket and also for closing the sections so as to scoop up the mud or other material which is being dredged.

The bucket to which my present improvements are applied is substantially like that shown in my Patent No. 502,934, dated August 8, 1893, and in my application for patent filed January 2, 1894, and serially numbered 495,338; that is, a bucket composed of two jaws, each being practically a quadrant of a hollow sphere, hinged together and provided with lever arms to which the force used for closing them together is applied. The sections of the bucket are also connected by hoisting chains to some source of power, so that after receiving its load the bucket can be hoisted and then swung with the boom to the position for discharging its contents.

In the patent above referred to the means for closing the bucket sections is a chain attached to the lever arms and then passing over the end of the boom and down to the hull of the boat, where it is connected to winding machinery. In the application above named, the same operation is produced by a similar chain carried to the hull or scow, but there operated by a hydraulic cylinder and plunger. In both cases there is a direct upward pull upon the closing chain which, while it effects the closing of the bucket sections in soft material in a satisfactory manner, has a tendency to lift the bucket from the bottom; and this lifting tendency reduces the efficiency of the bucket for dredging in hard pan. In such material, if there is a positive lifting action from above, the sections will tend to close upon upward arcs, because the center of motion (which is the hinge), has a tend-

ency to rise. In order to be thoroughly effective, the movement or arc described by the cutting jaws while closing should be downward. The weight of the bucket is in favor of this unless overcome by the lifting action just mentioned.

The object of the present invention is to apply the power which closes the sections in such a way as to insure this downward cut; and incidentally to aid in effecting it by increasing the weight of the bucket.

Another object is to apply the power in such a way that the bucket will cut and fill in any position in which it strikes the bottom. Where the bucket, by reason of inequalities of the bed or bottom, or obstructions of any kind, is tilted in any direction, flexible closing chains extending to the scow and there put under strain, tend first, to straighten the bucket instead of to cause it to cut, and the result is that the bucket is only partly filled.

In my present improvements the force is always applied on a line perpendicular to the hinge joint of the sections, so that the first strain, instead of taking up slack chain, is exerted directly upon the bucket arms, no matter what the angle of the bucket may be.

My invention is fully hereinafter described in detail, and the description should be read in connection with the accompanying drawings, in which—

Figure 1 is a side elevation showing part of a dredge hull or scow, a rotary mast, a swinging boom (broken away,) and a bucket supposed to be suspended from the end of the boom. This figure does not show proper relative proportions between the bucket and the hull the bucket being relatively enlarged to insure clearness in delineation. Fig. 2 is an end elevation of the bucket closed. Fig. 3 is a side elevation of the same bucket but shows a modified form of the means for applying the power to close it.

A represents the hull of a dredger, B the rotary mast, and C the swinging boom or crane. The latter is shown as broken off, but is of course supposed to extend farther outward.

The dredging bucket is composed of the two quadrants of hollow spheres D D', which are the excavating jaws. To each jaw is secured

a bail E, pivoted upon a stationary shaft or pin, which is preferably made in two parts F F', as shown in Fig. 2, one of such parts at least being hollow. The inner ends of the parts F F' are flanged and are bolted in line to the vertical cylinder G with the interior of which the hollow part F of the shaft communicates, as shown at 1.

Formed with or secured to each of the bails E is an arm H extending approximately at right angles to the bail and having pivoted at its extreme end a link I, which is preferably a double link secured on both sides of the arm H so as to secure the transmission of the pull or strain in a right line. To the end of each link I is pivoted another link J. These links J connect the bucket arms to the upper end of the plunger K, which works within the cylinder G. The dotted lines in Fig. 1 show the plunger as raised to its fullest extent, and the bucket jaws closed in consequence. The chains L in Fig. 1 are the ordinary hoisting chains attached to the bucket sections, which, after joining at the ring 2, are connected by a single chain passing over the end of the boom to whatever hoisting machinery may be used on the hull.

The means for operating the plunger K may be water, air, steam or any fluid or liquid which by pressure or expansion becomes a source of power and motion. I shall in this case suppose that hydraulic power is used and assume that the scow is provided with a suitable force pump and with valved connections leading from it, such as are shown in my application above referred to, through which water is alternately forced and exhausted. With this explanation it will be understood that M is a pipe leading from such a pump and preferably carried up the boom as shown at N. To allow the boom to swing, a flexible section 3 of hose is provided, or some other suitable form of flexible joint can be used at that point. From the end of the pipe N a hose O extends to the hollow shaft F, so that water supplied by the pump can be admitted to the hydraulic cylinder. The hose permits the suspension chains and the bucket to swing as freely as may be necessary in operating the dredger.

It will no doubt have been understood from the foregoing description that the admission of water or other fluid to the cylinder will cause an upward movement of the plunger K in a direction which is always perpendicular to the shaft upon which the jaws of the bucket are pivoted. This motion is communicated directly to the arms of the bucket, which commence to close the jaws directly, no matter what the position of the bucket upon the bottom may be. When the bucket from any cause rests at an angle and chains are used to close the jaws by an upward pull the chain on one side is necessarily slack; and hence the first strain is more effective in straightening up the bucket than in closing the jaws. It results necessarily that only a partial load

is taken. When the devices now being described are employed the first movement of the plunger is transmitted directly to the bucket sections, because the motion is always perpendicular to the plane of the hinge, no matter what the angle may be. It is also evident that when these improvements are used the jaws tend to cut upon downward arcs or curves. This is due partly to the weight of the bucket, increased by that of the cylinder and plunger, and partly to the reactionary force of the upward push of the plunger. The distinction between this movement and that produced by the independent pull of a chain from the scow is evident, and the dredger is rendered much more effective (especially in hard pan) by using the former. This feature, and the positive transmission of power which causes the dredger to cut when at any angle to the bed or bottom, constitute the most important advantages of my present improvements.

In Fig. 3 of the drawings I have shown a slightly modified construction of the connections between the bucket sections and the power plunger. Instead of connecting the arms of the bucket by rigid links flexibly connected, I substitute for the upper links short chains P and provide the cylinder with guide sheaves 4, over which the chains pass and from which they extend vertically to the cross head or cap of the plunger. The operation is precisely like that before described.

It will be understood that in both cases the opening of the bucket to discharge its contents is automatic—that is, the pressure of water or whatever fluid is used, is maintained in the cylinder until the boom and bucket have been swung to the point of discharge. The water is then let out of the cylinder by a proper valve controlled by an operator on the scow. The plunger drops by its own weight and the jaws of the bucket are opened by the pressure of the load of material aided by the downward movement of the plunger.

Having described my invention, I claim—

1. In a dredger a bucket consisting of a hollow shaft, jaws pivoted thereon, a power cylinder and plunger in communication with the hollow shaft, and connections between the said jaws and the plunger, substantially as set forth.

2. A bucket for dredgers composed of two jaws hinged upon a common shaft, a power cylinder secured to said shaft, and connections from said jaws to the plunger of the cylinder, whereby the upward movement of the plunger closes said jaws, substantially as described.

3. A bucket for dredgers composed of two jaws hinged upon a common hollow shaft, a power cylinder secured to said shaft, connections from said jaws to the plunger of the cylinder, and a pipe connected to the hollow shaft, substantially as and for the purposes set forth.

4. A bucket for dredgers comprising a hol-

low shaft, downwardly closing jaws, a power cylinder communicating with the hollow shaft, and a vertically moving plunger connected to said jaws so as to close them by its upward movement, substantially as set forth.

5 A bucket for dredgers comprising a hollow shaft, downwardly closing jaws, a power cylinder mounted upon and communicating with the hollow shaft, and a vertically moving plunger connected to said jaws so as to close them by its upward movement, substantially as set forth.

10 6. In combination with a dredge boat having a swinging boom, a suspended bucket composed of two hinged jaws, a power cylinder and plunger, a hollow shaft upon which the jaws are hinged and the cylinder mounted, and a flexible pipe connected to said hollow shaft and extending to the dredge boat, substantially as set forth.

20 7. A dredger bucket composed of two quadrant shaped jaws forming when closed a hollow hemi-spherical receptacle, and hinged or

pivoted at both ends upon a common shaft, in combination with a power cylinder mounted upon said shaft and extending above it, links connecting the plunger of said cylinder with the jaws of the bucket, and means for supplying water to the cylinder whereby the upward motion of the plunger transmitted through the said links closes the jaws of the bucket, substantially as set forth.

8. In combination, the bucket jaws, the two part hollow shaft upon which said jaws are hinged, a power cylinder located between and secured to the two parts of said shaft, and a plunger in said cylinder connected to the bucket jaws, substantially as set forth.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 7th day of February, 1894.

WILLIAM B. PLESS.

Witnesses:

L. W. SEELY,
JOHN COFFEE.