W. J. QUIMBY.

DIGGING AND DREDGING MACHINERY.

APPLICATION FILED JUNE 2, 1910.

1,108,001.

Patented Aug. 18, 1914.

3 SHEETS—SHEET 1.

Fig. 1.

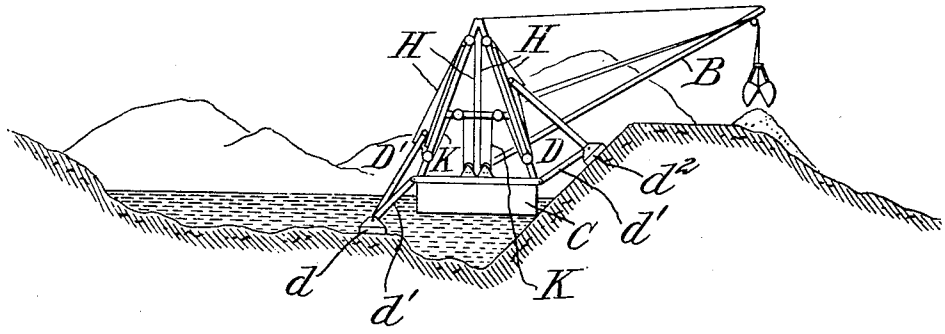


Fig. 4.

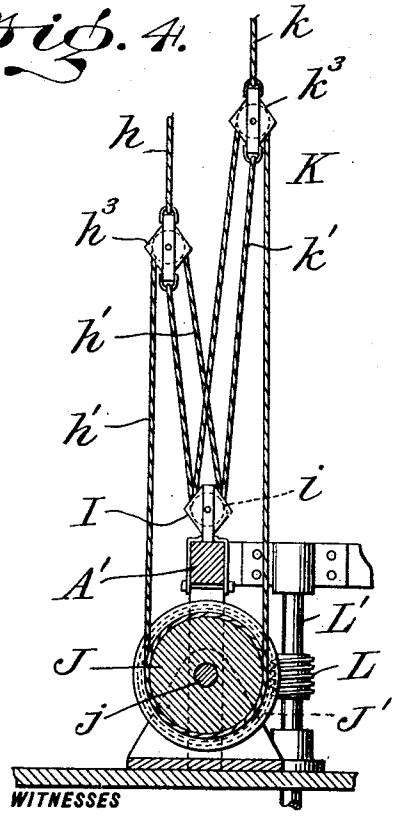
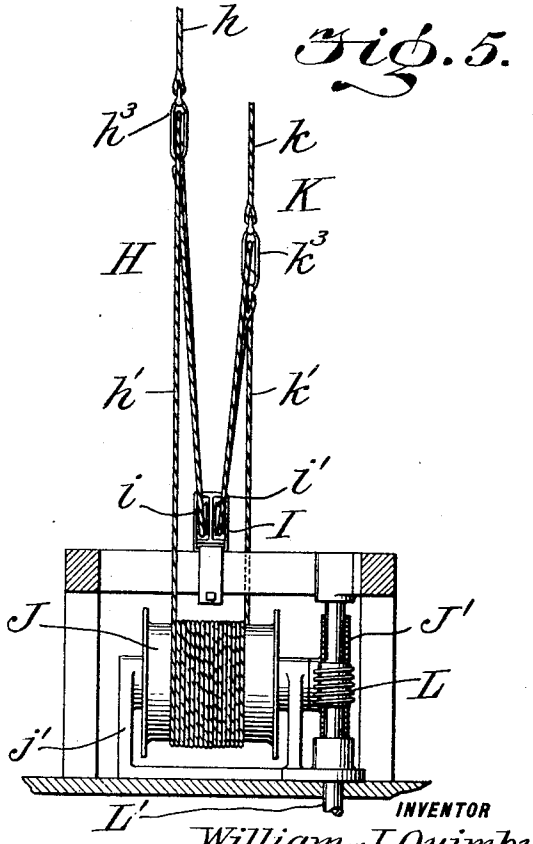


Fig. 5.



WITNESSES

M. C. Talbott

M. E. Freeman

INVENTOR

William J. Quimby

BY Griffin & Burchard

ATTORNEYS

W. J. QUIMBY.

DIGGING AND DREDGING MACHINERY.

APPLICATION FILED JUNE 2, 1910.

1,108,001.

Patented Aug. 18, 1914.

3 SHEETS—SHEET 2.

Fig. 2.

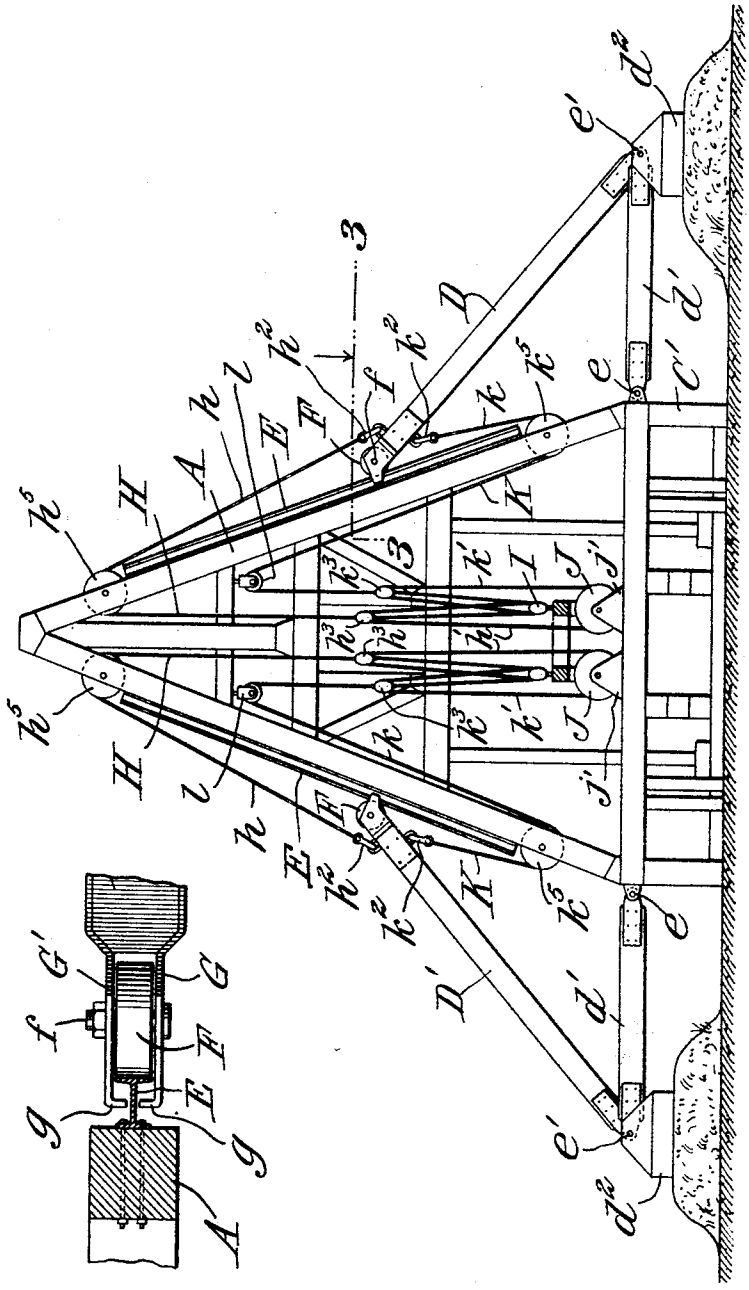


Fig. 3.

WITNESSES

R. C. Abbott

M. E. Freeman

INVENTOR

William J. Quimby

BY Griffin & Bernhard

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

W. J. QUIMBY.

DIGGING AND DREDGING MACHINERY.

APPLICATION FILED JUNE 2, 1910.

1,108,001.

Patented Aug. 18, 1914.

3 SHEETS—SHEET 3.

Fig. 6.

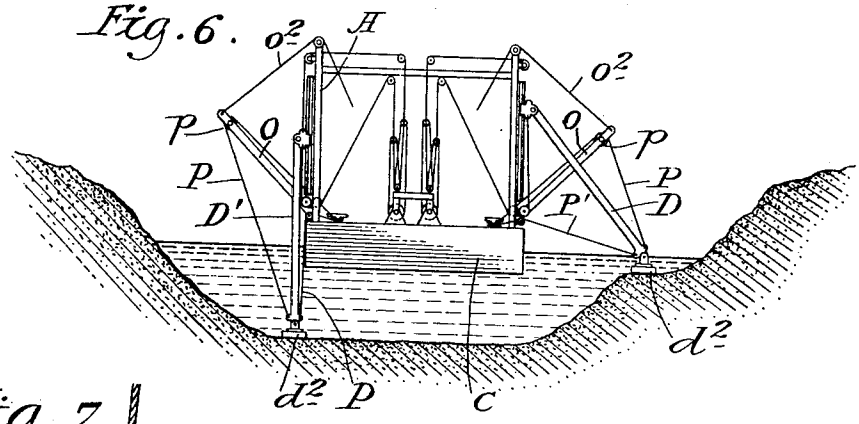


Fig. 7.

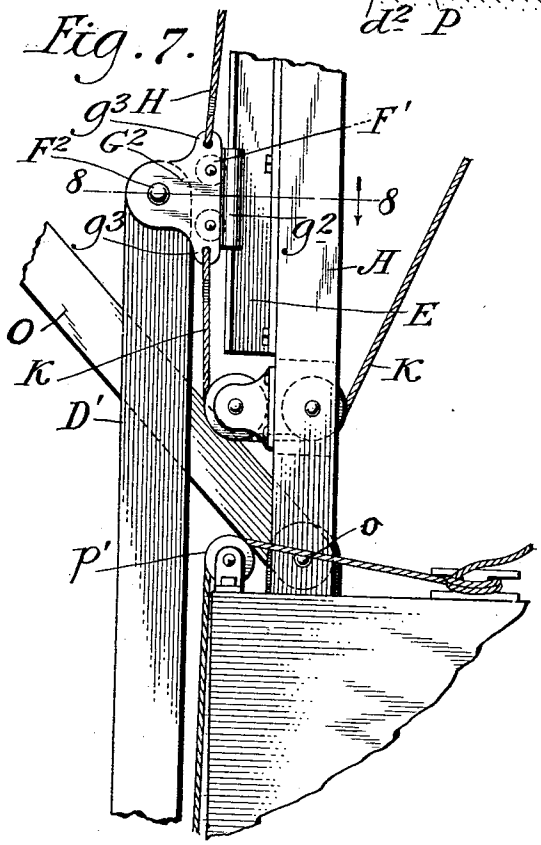


Fig. 8.

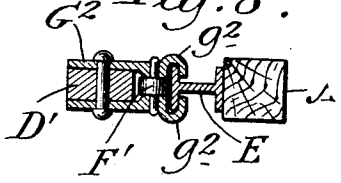
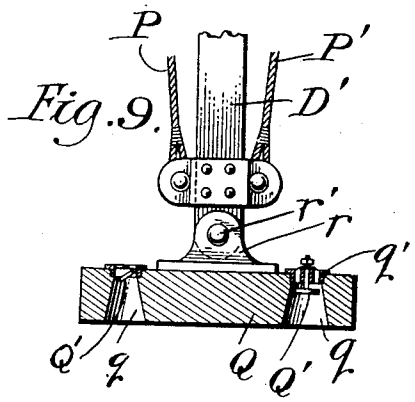


Fig. 9.



WITNESSES

A. R. Appleman

J. F. Mothershead

INVENTOR

William J. Quimby.

BY Griffin & Bernhard

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM J. QUIMBY, OF NEW YORK, N. Y., ASSIGNOR TO THE HAYWARD COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

DIGGING AND DREDGING MACHINERY.

1,108,001. Specification of Letters Patent. **Patented Aug. 18, 1914.**

Application filed June 2, 1910. Serial No. 564,704.

To all whom it may concern:

Be it known that I, WILLIAM J. QUIMBY, a citizen of the United States, residing in the city of New York, borough of Manhattan, county and State of New York, have invented certain new and useful Digging and Dredging Machinery, of which the following is a specification.

The invention relates particularly to that part of digging and dredging machines known as the spud, the function of such spud, broadly stated, being to steady or retain the machine in a fixed position when the boom is swung to one side or the other of the machine, or when it is otherwise operated in a manner tending to displace it from a working position relative to the line of the cut.

In most digging and dredging operations it becomes necessary to position the spud footings, at the respective sides of the machine, at different elevations, but, in many of the machines heretofore constructed, the extent of such variation was comparatively limited. The present invention, however, embodies a structure which permits of the positioning of the spud footings at a much greater variation, thereby enabling the digging and dredging to be done in locations not possible with prior machines. This result is accomplished by mounting the upper spud arm in such manner that it travels on a suitable supporting member, such as an A frame, thereby permitting the spud arm and the spud footing to travel to such extent that working below the deck of the boat, or on a high bank, is easily accomplished.

The invention embodies, also, means for moving the spud arms and their attached footings, and for readily holding or securing the same in any of their operative positions.

Various forms of operating devices may be employed for retaining the spud arm and the footing in their adjusted positions. For example, a brace may be pivoted to the lower end of the spud arm and to the hull or frame of the machine; but it is practicable to employ a boom and one or more cables for retaining the spud arm and footing in their adjusted positions, and for assisting the operations of adjusting the spud arm and footing so that the latter may be submerged to rest upon the bed of a stream, or it may rest upon a high bank adjacent to the line of the cut, or it may assume any position intermediate the two aforesaid positions. By associating a boom with the spud arm and footing, said spud arm is adapted to assume a substantially vertical position alongside the dredge, and in operation, the combined weight of the spud and the footing acts as a counterweight to the dredge, the spud serving, also, as a support for the dredge.

Another distinctly novel feature of the invention is a novel construction of the spud footing having means, such as a valve or a plurality of valves, operating to break the suction between the spud footing and the bed of a stream when said footing is raised, thus permitting a submerged footing to be lifted easily and quickly.

In the accompanying drawings I have illustrated one practical embodiment of the invention, but the construction shown therein is to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a diagrammatic view illustrating a dredge with the spuds at the respective sides adjusted to different positions for the purpose of meeting certain conditions of use. Fig. 2 is a front elevation showing the spuds supported by shorings at the respective sides of a digging machine. Fig. 3 is a horizontal section, on an enlarged scale, and in the plane of the dotted line 3—3 of Fig. 2. Fig. 4 is an enlarged view, partly in section and partly in side elevation, illustrating the connections of the spud hoisting and lowering cables with a power operated drum, the latter being equipped with one form of locking mechanism. Fig. 5 is an elevation, partly in section, looking at one side of the parts illustrated in Fig. 4. Fig. 6 is an elevation of a spud applied to a dredge, showing a boom and operating tackle associated with the spud. Fig. 7 is an enlarged detail view of the track and shoe on a part of the supporting frame employed in the construction of Fig. 6. Fig. 8 is a cross section on the line 8—8 of Fig. 7. Fig. 9 is a detail view of a preferred form of the footing or shoe.

A designates a supporting frame, which is herein shown as an A frame, adapted to support certain operating devices associated with a swinging boom, B, on a dredge, C, shown in Fig. 1, or a digging machine, C′, shown in Fig. 2. These parts are usual in the art, and need not be further described.

The invention shown in Figs. 1 to 5, both inclusive, embodies spuds, D, D′, positioned at the respective sides of a dredge or a digging machine, each spud being shown as an arm or beam pivoted at its lower end by a bolt, e', to a shoe or footing, d^2, and held in position by a brace, d', the latter being pivoted by a bolt, e, to the dredge or the digging machine. With each spud, D or D′, is associated means for retaining the upper end of said spud in operative relation to supporting frame, A, and means for adjusting and locking the spud; but as the two spuds and their operating mechanisms are the same in construction, I will describe one of them only.

The A frame is provided with a track, E, shown in Fig. 3 as embodied in a rail T-shaped in cross section, but it will be understood that any suitable form of track may be employed. The rail is fastened firmly in position upon one side of a member forming a part of frame, A, the head of said rail being exposed for contact with a shoe at the upper or inner end of the spud arm.

A characteristic feature of this invention consists of means for slidably supporting the inner or upper end of spud arm or beam upon the track on the supporting frame. As shown, said slidable supporting means is a shoe, F, preferably in the form of a roller, the latter being attached to the inner end of the spud arm or beam for rotation freely on a horizontal bolt or axle, f. Obviously, other forms of shoes may be provided on the spud arm for connecting it slidably with the track on the supporting frame.

As shown more clearly in Figs. 2 and 3, the spud arm is provided with a guide consisting of plates, G, G′, fastened to the spud arm, and provided with hooks, g, adapted to fit below the head of track rail, E. Said plates, G, G′, are spaced to accommodate the roller shoe, F, said plates operating to support the bolt or axle, f, of said roller shoe. The plates are fitted loosely to rail, E, to preclude sidewise displacement of the spud relative to the rail, whereby said plates serve the functions of slidably connecting the spud to the rail, of precluding sidewise displacement of the spud relative to the rail, and of supporting the axle or bolt of the shoe which is adapted to travel upon the rail. It is evident that the roller shoe enables the spud to travel freely upon the track, lengthwise thereof, and that the roller shoe cannot bind against the rail, thus insuring an easy free movement of the spud with respect to the track.

A characteristic feature of the invention consists in the employment of cables, H, K, for operating the spud. One cable, H, lifts the spud, and the other cable, K, assists in lowering and controlling said spud. Cable, H, is attached to the spud at its upper or inner end, but it is preferred to attach cable, K, to the spud near the upper end, and, also, to operate both cables by a single drum or winch. To save space and secure a compact construction, each cable is in two lengths or sections which coöperate with fall blocks to produce a tackle rigging, as will hereinafter appear, but it is understood that the invention is not to be limited to this particular mechanism for handling the spud.

Hoisting cable, H, consists of lengths, h, h', the length, h, of which is connected to the spud at or near its upper end, as, for example, by a clevis, h^2, pivoted quite close to shoe, F. Said length, h, of the hoisting cable extends upwardly and over a sheave, h^5, supported in the upper part of frame, A, the other end of said cable length, h, being connected to a fall block, h^3. The other length, h', of the hoisting cable has one end attached to fall block, h^3, see Figs. 4 and 5, and runs down beneath one sheave, i, of a double block, I, the latter being connected to, or anchored upon, a timber, A′, of frame, A. After passing around sheave, i, the length, h', of the hoisting cable passes upwardly, and over a sheave in the fall block, h^3, and then said length of cable, h', passes downwardly to, and is coiled in one direction around, a drum or windlass, J.

Coöperating with the spud is a lowering cable, K, comprising two lengths, k, k'. One length, k, of said lowering cable is connected, as by a clevis, k^2, to the spud, said clevis being shown as having a pivotal connection close to roller shoe, F, and to clevis, h^2, the latter connecting length, h, of the hoisting cable to the spud, whereby the lengths, h, k, of the hoisting and lowering cables, H, K, respectively, are connected to the inner or upper end of the spud at the respective sides of shoe, F. Said length, k, of cable, K, passes downwardly beneath a sheave, k^5, and upwardly over a sheave, l, both sheaves, k^5, l, being within the A frame. The other end of said length, k, of the lowering cable is connected to a fall block, k^3, see Figs. 4 and 5. The length, k', of lowering cable, K, is attached to fall block, k^3, and from this fall block the cable-length, k', passes downwardly beneath the other sheave, i', in double block, I, after which said cable-length, k', passes upwardly to, and through, fall block, k^3, and over a sheave therein, and then the cable-length, k', passes downwardly to, and is coiled upon, the drum, J. In this connection it is desired to state that the length, h', of the hoisting cable is wound upon drum, J, in an opposite direction to length, k', of the lowering cable, K, whereby the rotation of the drum in one direction operates to draw upon cable, H, for the purpose of raising the spud and at the same time and by the same rotation of the drum the lowering cable, K, will be paid

out, thus permitting the upward movement of the spud under the pull of said hoisting cable. The rotation of drum, J, in the reverse direction, however, will cause lowering cable, K, to be wound upon the drum, and the hoisting cable to be paid out from the drum, so that the spud will be lowered by the pull of the cable, K, thereon.

The hoisting drum is shown as being mounted upon a shaft, *j*, supported in appropriate bearings, *j'*. To one end of this shaft is connected a worm gear, J', with which meshes a worm, L, on a shaft, L', the latter being operable by an engine, or from any other source of power. The worm meshing with worm gear, J', operates as a lock for precluding rotation of the drum when the shaft, L', is at rest, but said shaft, L', is adapted to rotate the drum in one direction or the other. It is evident, however, that locking devices, other than the intermeshing worm and worm gear, may be associated with drum or windlass, J, for precluding rotation thereof, and, furthermore, various mechanical expedients may be resorted to for operating said drum or windlass in a manner to uncoil one cable from the drum while coiling the other cable upon said drum.

The drum, J, and cables, H, K, provide convenient and easily controlled means for moving the spud relative to the side of the dredge, while the engagement of shoe, F, with the track retains said spud in operative position with respect to frame, A. The entire operating mechanism enables the spud to be lowered, raised and adjusted, the spud having a comparatively wide range of movement. Said spud arm is movable to a position below the dredge, as shown in Fig. 1, or it may be swung outwardly with respect to the dredge, as in Fig. 2, or it may be adjusted to any position intermediate the raised and the lowered positions at the respective sides of the dredge shown in Fig. 1, according to the surfaces available for engagement by the spud shoes or footings, d^2. It is apparent, therefore, that the spud may be raised and swung outwardly with respect to the dredge in a manner to bring the shoe or foot, d^2, into engagement with a bank of an excavation, at the right in Fig. 1, or the spud may be lowered to a vertical position alongside the dredge, as at the left in Fig. 1, so that the spud foot lies below the hull of the dredge and may rest upon the bed of a stream. When the spud is used in connection with a digging machine, adapted for operation upon the ground, the spud foot may be lowered below the level of the frame, or it may be shored up, as in Fig. 2. Obviously, the spuds of a digging machine may be variously positioned so that the shoes or footings may rest upon the ground, or upon any other surface or elevation, adjacent to the respective sides of the digging machine.

Another embodiment of the invention is shown in Figs. 6, 7, and 8, wherein a boom, O, is employed for handling the spud, the brace, *d'*, of Figs. 1 and 2 being omitted. A track, E, is employed on frame, A, which may be either an A frame or a rectangular frame, and to the upper end of spud, D or D', is attached a guide, G^2, the latter having jaws, g^2, offset from the spud, said guide, G^2, having ears, g^3, at top and bottom, respectively. The jaws of the guide are fitted slidably to the rail or track, for precluding sidewise movement of the spud, and within the guide is positioned a roller shoe, F', adapted to ride against the track or rail. The spud has pivotal connection with the guide, by a bolt, F^2, thus permitting the spud to swing inwardly toward, or outwardly from, the dredge. The guide is adapted for sliding movement on the track, in either a vertical direction or in an inclined path, according to the position of rail, E, on supporting frame, A. A hoisting cable, H, is attached to the upper ear, g^3, of guide, G^2, and a lowering cable, K, is attached to the lower ear, g^3, of said guide, said cables being operated by a drum or windlass in about the manner hereinbefore described.

Boom, O, is stepped, or otherwise pivotally supported, at *o*, on the deck of the dredge, or the frame of a digging machine, for the purpose of adjusting it to different positions as may be required by the conditions of service. Said boom is shown as held in position by a cable or line, o^2, connected to the top of the boom and running to the dredge or digging machine. At the outer end of the boom is a sheave or block, *p*, over which runs a cable, P, fastened at one end to the spud or the footing, on the outer side thereof, the other end of said cable, P, extending from the boom into the dredge so as to be made fast to a cleat or to be coiled on a winch. The cable, P, and the boom provide means for swinging the spud and the footing in an outward direction relative to the side of the dredge; but for moving the spud and its footing in an inward direction toward the side of said dredge a cable, P', is employed, the latter being secured to the spud or the footing, and leading over a sheave, *p'*, on the deck or frame, whereby cable, P', may be made fast to a cleat or it may be connected to a winch. It is apparent that by slackening cable, P', and placing tension on cable, P, the spud and its footing will be swung outwardly to the full line position shown at the right of Fig. 6; by pulling on cable, P', and relaxing cable, P, the spud and footing will be moved inwardly toward the dredge, and by manipulating cables, H, K, in a proper manner, the spud may be raised or lowered.

It should be noted that the boom, and the cables, P, P′, associated with the spud, are employed, mainly, for the purpose of adjusting that part of the spud to which the shoe or footing is attached, *i. e.*, for swinging the spud outwardly or inwardly with respect to the dredge. The operations of raising and lowering the spud are performed by other cables, H, K, acting independently of cables, P, P′. Control of the spud under all conditions of service is obtainable by employment of the mechanism described, and the range of adjustment of the shoe or footing within wide limits is rendered possible.

In addition to acting as a support for the dredge, the weight of the spud and the shoe is, in many cases, utilized as a counterweight for the bucket on the swinging boom, and an increase in the extension of the spud secures a proportionately increased effect of the counterweight action of said spud. It is manifest that as the bucket is swung toward one side, the spud has a tendency to fall to the material, and the boom slacks up so as to take the weight off this side of the dredge, but at the same time the opposite side of the dredge picks up the weight of the other spud and its associated shoe, thus securing stability of the dredge.

The shoe or footing, d^2, shown in Figs. 1, 2, and 6 is constructed like others ordinarily used in the art, but in Fig. 9 there is shown a novel construction of the shoe or footing, the salient feature of which is that it will free itself from the soil in the bed of a stream during the act of lifting the spud and its attached shoe.

Shoe, Q, is provided with an aperture, q, or preferably with a plurality of apertures, q, each of which is shown as tapering from the bottom toward the top of said shoe. At the upper end, each aperture is provided with a slot, q', for a valve, Q′, the latter being adapted to open downwardly and to close in an upward direction against the seat. Preferably, the shoe is a casting having the apertures, q, and at its top, said shoe is shown as being provided with lugs, r, to which the lower end of the spud, D, is connected by a pivotal bolt, r'. When the spud and the shoe are lowered into the water, valves, Q′, are closed upon their seats by the pressure of water against the under surfaces of the valves, and as the spud continues to move downwardly, the shoe will rest upon the bed of the stream, whereby the dredge is anchored. The uplift of the spud is not opposed to so great an extent when it is equipped with the valved shoe, Q, as when an ordinary shoe, d^2, is employed, for the reason that, as the shoe is lifted by the spud away from the bed of the stream, valves, Q′, are opened by the pressure from above, thus admitting water below the shoe and relieving the suction between the shoe and the bed.

Having thus fully described the invention, what I claim as new, and desire to secure by Letters Patent, is:

1. In a retaining mechanism for dredges, and the like, the combination with an upwardly extending guide, of a swinging spud, means for pivotally and slidably connecting the inner end portion of said spud to said guide whereby the spud may be raised or lowered relative to the guide and it is adapted to be pivotally shifted in an inward or outward direction relative thereto, a spud foot loosely connected to the outer portion of said spud, a hoisting cable, and a pulling down cable, said cables being attached to the spud adjacent to the pivotal and slidable connection between the spud and the guide.

2. In a retaining mechanism for dredges, and the like, the combination with a frame, and a spud, said spud carrying at one end a spud-foot, the other end of said spud having a sliding and swinging connection with the frame, of a hoisting cable, a pulling down cable, said cables being connected with the spud adjacent to the slidable and swinging connection between the spud and the frame, and means for exerting tension separately on the cables whereby the spud may be raised or pulled downwardly.

3. In a retaining mechanism for dredges, and the like, the combination with a frame, and a spud, said spud carrying at one end a spud-foot, the other end of said spud having a sliding and swinging connection with the frame, of a hoisting tackle, a pulling down tackle, said tackles being connected with the spud adjacent to the sliding engagement between the spud and the frame, and means for separately operating the tackles, whereby the spud and foot may be pulled down to a substantially vertical position or said parts may be raised and swung outwardly to a desired elevated position.

4. In a retaining mechanism for dredges, and the like, the combination with a frame, and a spud provided at one end with a spud-foot, of a guide rail fixed to the frame, means for slidably connecting the other end of the spud to said rail, said connecting means embracing the rail for restraining the spud from movement in a direction outwardly from the frame, a hoisting cable, and a pulling down cable, said cables being connected with the spud adjacent to the sliding connection between the spud and the rail.

5. In a retaining mechanism for dredges, and the like, the combination with a frame, of a single headed guide-rail fixed to the frame, a spud, a guide device for slidably connecting one end of said spud to the guide-rail, a hoisting cable, a pulling down cable, said cables being connected to the spud at that end thereof to which the guide

device is connected, and a spud foot pivoted to the other end of said spud.

6. In a retaining mechanism for dredges, and the like, the combination with a frame, of a single guide-rail secured in an exposed position upon said frame, a spud, a guide device embracing said guide-rail for loosely connecting one end portion of the spud with said rail, whereby the spud is free to have sliding and swinging movement with respect to the guide-rail, a spud-foot connected to the other end of the spud, said spud-foot being movable with the spud to a position substantially in alinement with the guide-rail, a hoisting cable, and a pulling down cable, said cables being connected with the spud adjacent to the guide device.

7. In a retaining mechanism for dredges, and the like, the combination with a frame, of a guide-rail fixedly secured thereto, a spud, a guide device positioned at one end of said spud, said guide-device embracing said guide-rail for precluding the spud from movement in a direction outwardly from the guide rail, said spud having a sliding and swinging movement with respect to said guide-rail, a shoe carried by said guide device, said shoe having traveling contact with the guide-rail, means for hoisting the spud, and separate pulling down means, said hoisting means and the pulling down means being connected with the spud adjacent to the sliding connection between the spud and the guide rail.

8. In a retaining mechanism for dredges, and the like, the combination of a frame, a fixed guide-rail thereon, a spud, a guide device at one end of said spud, said guide device connecting one end of the spud with the guide rail for sliding and swinging movement with respect thereto, a spud foot at the other end of the spud, and two separate cables connected to the spud adjacent to that end thereof having the sliding and swinging connection with the guide-rail, one of said cables exerting a pull in a downward direction on the spud, and the other exerting a pull in an upward direction on said spud.

9. In a retaining mechanism for dredges, and the like, the combination with a frame, of a spud provided at one end with a spud foot, means for connecting the other end of the spud with the frame to permit sliding and swinging movement with respect thereto, and separate cables connected to the spud adjacent to that end thereof which has sliding and swinging engagement with the frame, one cable operating to exert on the spud a pull in a downward direction and the other cable operating to exert a pull on the spud in an upward direction.

10. In a retaining mechanism for dredges, and the like, the combination with a fixed guide, of a swinging and sliding spud, means for pivotally and slidably connecting the inner end portion of said spud to said fixed guide, a spud-foot at the outer end portion of said spud, a hoisting cable connected to said spud, a pulling down cable also connected to the spud, and means whereby the spud and the spud foot may be swung inwardly and outwardly with respect to said fixed guide.

11. In a retaining mechanism for dredges, and the like, the combination with a fixed guide, of a swinging and sliding spud, means for pivotally and slidably connecting the inner end portion of said spud to said fixed guide, a spud-foot at the outer end portion of said spud, a plurality of cable guides positioned adjacent to that end portion of the spud which is adapted for sliding and pivotal movement relative to said fixed guide, a hoisting cable attached to the spud and passing over said cable guides, a pulling down cable also connected to the spud and passing under said cable guides, and means connected to the spud for swinging the latter on the pivotal connection as said spud is raised or lowered by the operation of said cables.

12. In a retaining mechanism for dredges, and the like, the combination with a fixed guide, of a swinging and sliding spud, means for pivotally and slidably connecting the inner end portion of said spud to said fixed guide, a spud-foot at the outer end portion of said spud, an operating drum, separate cables wound on said drum and connected to said spud adjacent to the slidable and pivotal connection of the spud to the fixed guide, said cables operating respectively to exert an upward pull or a downward pull upon the spud, and means connected to the spud for swinging the latter on the pivotal connection when the spud is raised or lowered by said cables.

13. In a retaining mechanism for dredges, the combination of a guide, a spud one end portion of which is retained in pivotal and slidable relation to said guide, a spud-foot pivoted to the opposite end portion of said spud, a hoisting cable and a pulling down cable attached to that portion of the spud which is in pivotal and slidable relation to the guide, a drum for operating the cables, and a member pivoted to the spud for imparting swinging movement thereto when hoisted or pulled down by said cables, each cable embodying a multiplying tackle intermediate said drum and the spud.

14. In a machine of the class described, the combination of a spud provided with a spud foot, a fixed guide, means connecting said spud and guide for securing sliding and swinging movement to the spud, an operating drum, means for controlling said drum, and separate cables coiled reversely to each other on said drum, said cables being con-

nected with the spud and operating respectively to exert strain thereon in a downward direction and in an upward direction.

15. In a machine of the class described, a spud, a footing or shoe movable therewith, said footing or shoe being provided with automatically operated means for introducing water below the shoe.

16. In a machine of the class described, a spud, a shoe attached to the spud, and valves carried by the shoe and adapted to automatically open to allow water to enter below the shoe when the spud is lifted.

17. In a machine of the class described, the combination with a spud, of a shoe attached to the spud, said shoe being provided with transverse passages, and valves positioned in coöperative relation to said passages, said valves being adapted to open automatically for allowing the water to flow through the passages and below the shoe when said spud and shoe are lifted.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM J. QUIMBY.

Witnesses:
JAS. H. GRIFFIN,
H. I. BERNHARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."