

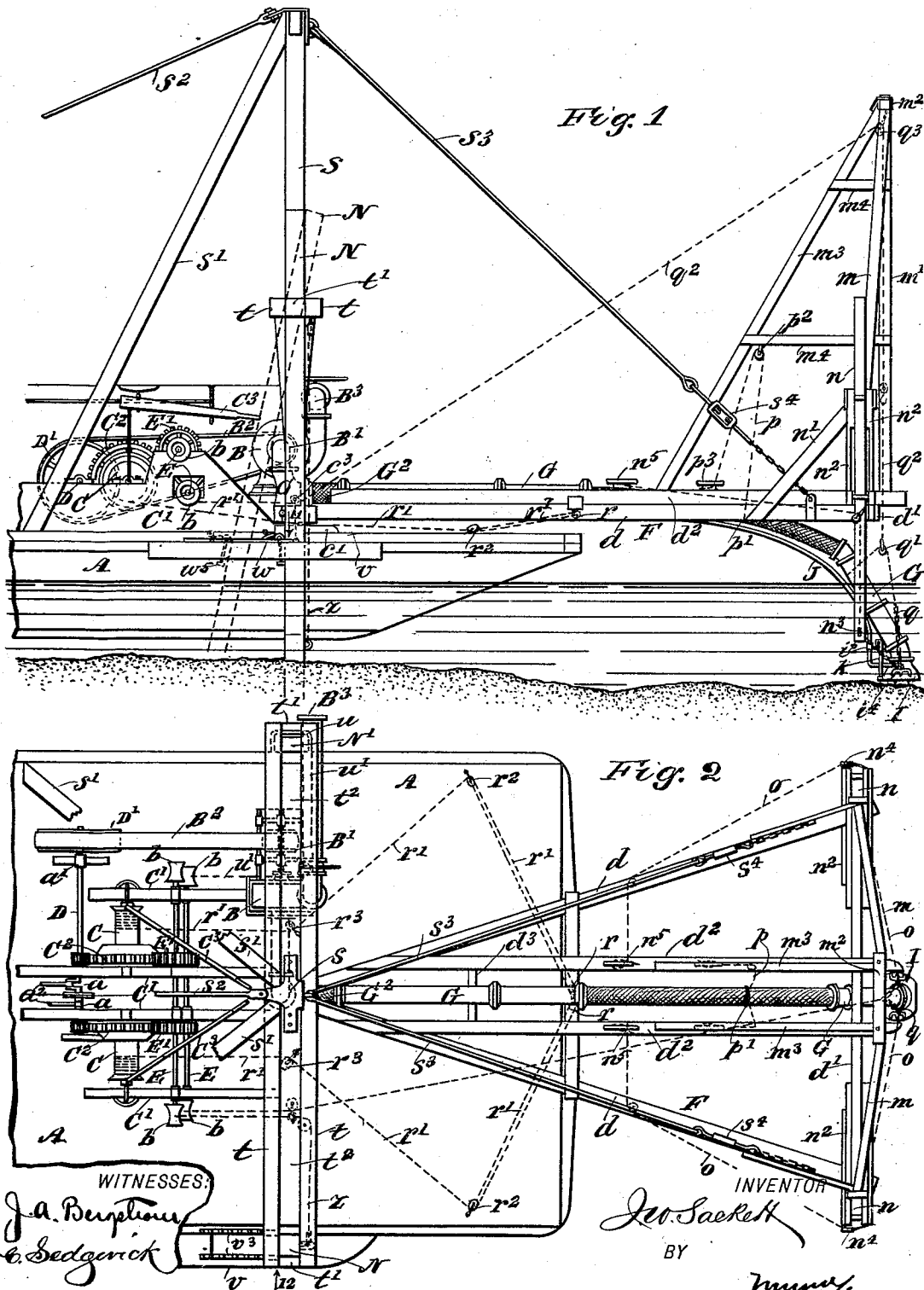
(No Model.)

3 Sheets—Sheet 1.

J. W. SACKETT.
HYDRAULIC DREDGING MACHINE.

No. 508,766.

Patented Nov. 14, 1893.



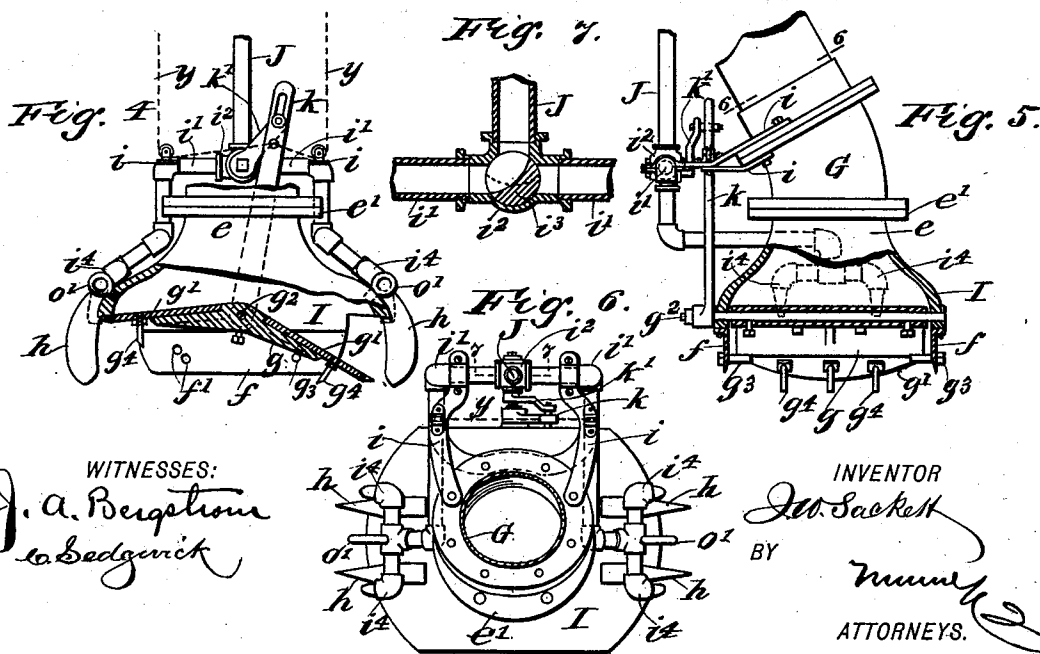
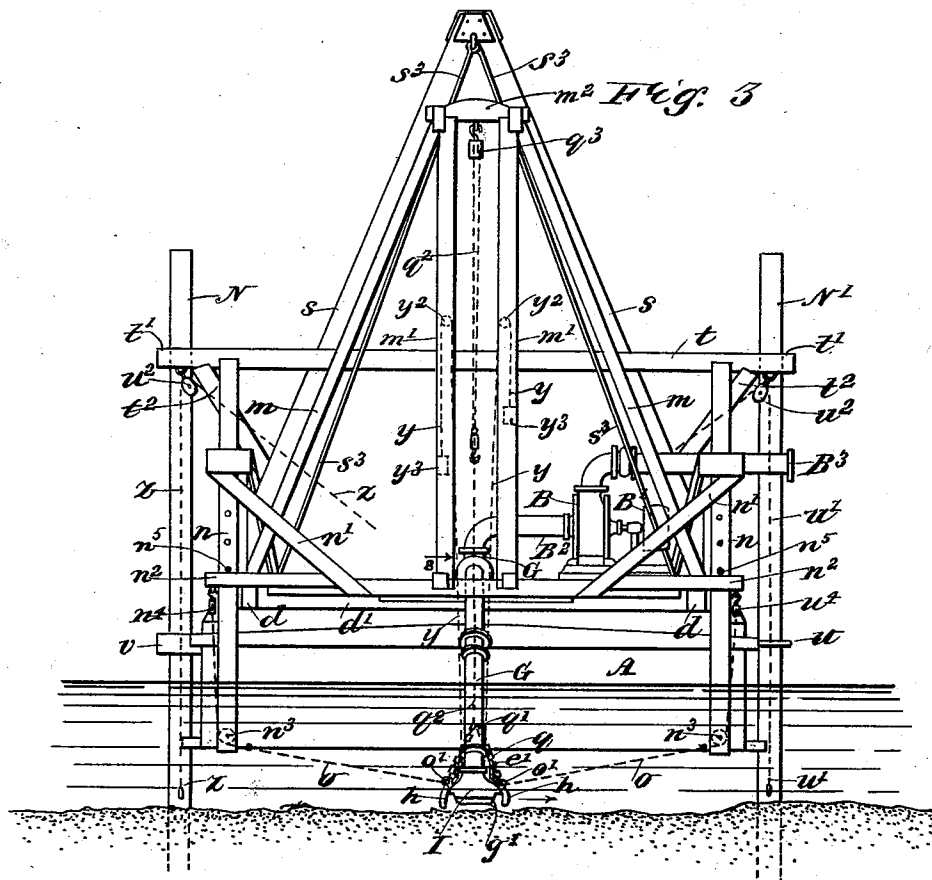
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3 Sheets—Sheet 2.

J. W. SACKETT.
HYDRAULIC DREDGING MACHINE.

No. 508,766.

Patented Nov. 14, 1893.



WITNESSES:
J. A. Berghouse
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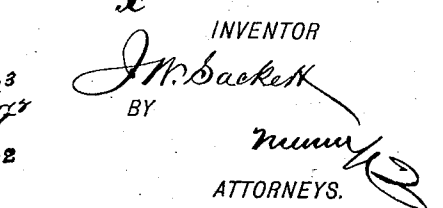
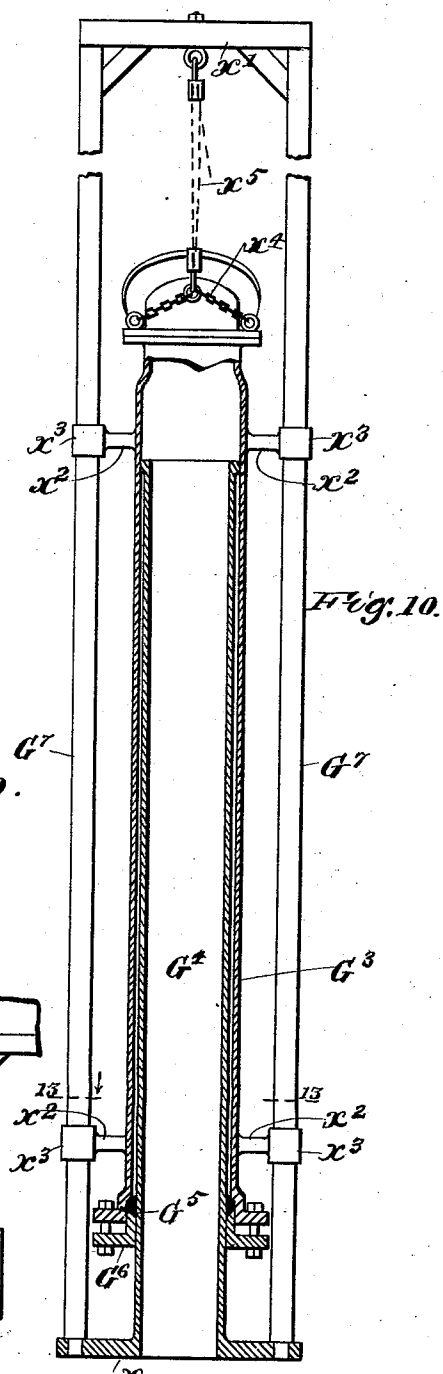
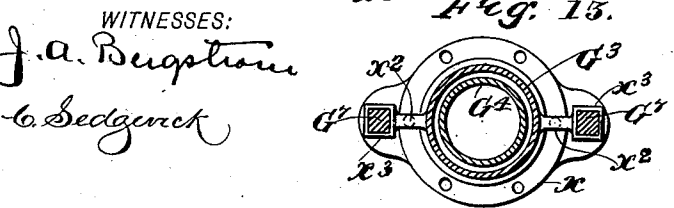
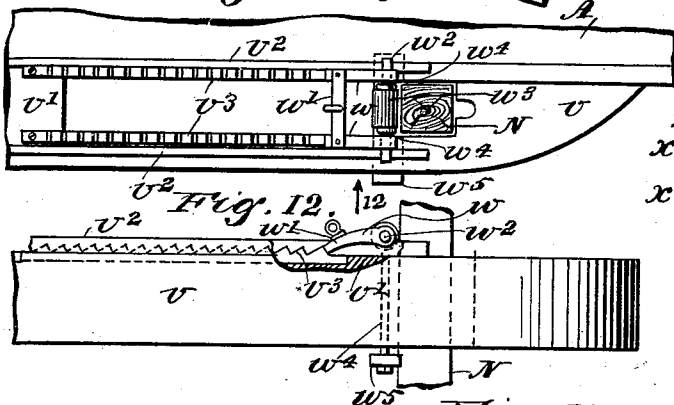
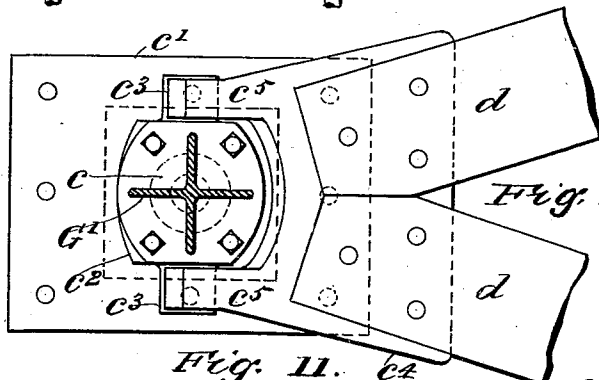
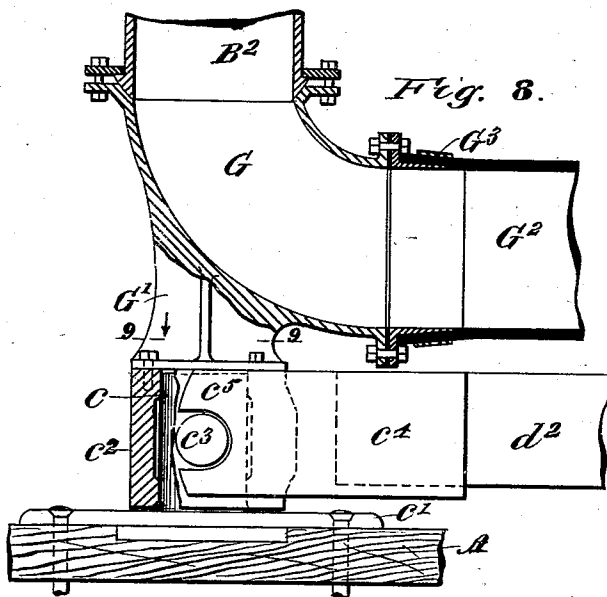
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3 Sheets—Sheet 3.

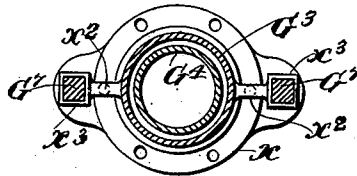
J. W. SACKETT.
HYDRAULIC DREDGING MACHINE.

No. 508,766.

Patented Nov. 14, 1893.



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UNITED STATES PATENT OFFICE.

JOHN W. SACKETT, OF ST. AUGUSTINE, FLORIDA.

HYDRAULIC DREDGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 508,766, dated November 14, 1893.

Application filed November 8, 1892. Serial No. 451,354. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. SACKETT, of St. Augustine, in the county of St. Johns and State of Florida, have invented a new and useful Hydraulic Dredging-Machine, of which the following is a full, clear, and exact description.

This invention relates to improvements in apparatus for deepening channels as well as the removal of material from submerged banks of harbors, to facilitate the erection of wharfs and like purposes.

The nature and object of my invention, consists in the provision of a device of novel construction, which will be well adapted to plow a furrow in the bed of a water course that is to be deepened by the coaction of excavator teeth and hydraulic jets, and at the same time elevate the excavated material mixed with a modicum of water, through an adjustable conduit, that is the feeder of a suitable pump on a float from which pump the raised material is discharged at a preferred point.

My invention further consists in the provision of novel, simple, and reliable means for the support and convenient adjustment of the excavating mechanism as well as its lateral reciprocating movement in service, and also to furnish said mechanism with a novel tilting table, which will be automatically rocked at a proper time, and thus open a receiving throat alternately at opposite sides of the excavator head or box, of which it forms the adjustable bottom wall.

Another feature of the invention, consists in the provision of a novel spud mechanism for the dredging apparatus, which serves to regulate the degree of advance given to the dredger, as becomes necessary to locate its plowing and elevating devices above parts of a water bed that have not been excavated.

My invention further consists in the special construction and combination of different parts of the improved dredger, as is herein-after described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side view in part, of a floating hull, and novel dredging mechanism located

upon and projected from the hull. Fig. 2 is a broken plan view of the hull, and the novel dredging devices on it. Fig. 3 is an end view of the hull, and the dredging apparatus. Fig. 4 is an enlarged front view broken away forwardly, of the hollow excavator head that is a feature of the invention. Fig. 5 is a side view broken away laterally, of the excavator head, an attached conduit in part, and a hydraulic jet attachment on the head. Fig. 6 is a plan view partly in section, of the improved excavator head showing the jet attachment thereto, the section being taken on the line 6—6 in Fig. 5. Fig. 7 is an enlarged broken side view, in section on the line 7—7 in Fig. 6, showing a novel form of valve for the jet device on the excavator head. Fig. 8 is an enlarged broken side view in section, of parts taken opposite the arrow 8, in Fig. 3. Fig. 9 is a plan view in section, of features of improved construction, taken on the line 9—9 in Fig. 8. Fig. 10 is an enlarged partly sectional view, of a modified construction of a part of the conduit, which extends between the excavator head and a sand pump on the float. Fig. 11 is a plan view of parts enlarged and detached, taken opposite the arrow 11 in Fig. 1. Fig. 12 is a side view of parts shown in Fig. 11, taken opposite the arrow 12 in said figure and also in Fig. 2; and Fig. 13 is a sectional plan view taken on the line 13—13 in Fig. 10.

There is a float A, provided to sustain the working parts of the dredger, and as represented it is preferably given a rectangular form and decked over so as to produce a watertight hull, whereon a pump B, of any approved construction adapted for the service, is secured near one side edge of the float, and at a proper distance from the front edge of the latter.

Near the center of width of the float A, and rearward of the pump B, a hoisting device is located and secured upon its deck, consisting essentially of two winch drums C, that are affixed upon two axially co-incident shafts, that are journaled on a bed frame C', the latter extending longitudinally of the float A, between the drums mentioned, and consisting of four parallel pieces properly secured in place, leaving a sufficient space between the inner pair for the introduction of the double

cranks *a* that are a part of a driving shaft D which projects at a right angle to the bed frame; its end portion that lies opposite the pump B, rearward of the same, being rotatably supported by a pedestal box *a'*, as shown in Fig. 2. The winch drums C are of usual form, and have a detachably geared connection with the driving shaft D, there being similar pinions affixed upon the driving shaft near the outer sides of the bed frame C', so as to mesh with large spur wheels C² that are affixed to the drums, and thus transmit rotary motion from the shaft D to the drums and reduce speed; the shaft named receiving rotatable motion from a source of power (not shown) through the connecting rods *a*², shown in part, and which have a loose connection with the cranks *a*. For efficiency in service, it is necessary that the drums, be adapted for independent rotation, to effect which, they each have a friction head on their end portions that are nearest to the spur wheels C², which heads are adapted for engagement or release with regard to the spur wheels by manipulation of the hand levers C³, that are loosely secured to the outer ends of the drums C, and when vibrated slide said drums longitudinally a proper distance to connect or break connection of the spur wheels and drums as occasion may require. Forwardly of the drums C, two parallel counter-shafts E, are journaled in the bed frame C', extending equally beyond the outer sides of the latter; there being journals produced near each end of the counter-shafts which loosely engage boxes on the outer side pieces of the bed frame. The spools *b* are secured one on each end of each shaft and outside of the bed frame, the use of which will be explained. Each shaft E, is geared to the spur wheels independently by pinions E' on said shafts.

The pump B, is of the usual type, adapted for operation by rotary movement of its center shaft, which is furnished with a small pulley B' at the side of the pump case, said pulley being connected by a belt B² with a larger pulley D', on the driving shaft D, so that the pump is actuated by the same source of power that rotates the winch drums C.

Upon the float A, preferably in the center of the deck transversely considered, and at a proper distance from the front edge of the latter, a cylindrical and hollow king-post *c*, is seated and secured, its integral foot flange *c'*, affording a stable base therefor and convenient means for a bolted attachment with the deck of the float as indicated in Fig. 8. The preferably cast post *c*, is designed to sustain in rotatable connection, a horizontal outwardly projecting frame F, which is triangular and of a proper length for efficient service, its inboard end being the apex of an acute angle which is attached to the king-post in a manner that will be explained. The frame F, serves to carry important parts of the dredging mechanism and must be light as well as strong, and to this end, is constructed of

timbers, there being two side pieces *d*, that diverge from their inboard ends, and have their outer or forward ends attached to a transverse timber piece *d'*, two similar pieces *d*², being secured upon the frame pieces *d'*, at an equal distance from the outer ends of the side timbers *d*, and also upon these side timbers near their inner ends, in parallel planes with regard to each other, a sufficient space intervening for the reception of other parts, the brace *d*³, that projects between the parallel longitudinally extending parts *d*², of the corner frame and has its ends secured thereto, affording stability to the engaged parts.

In Figs. 8 and 9, the construction of the parts which produce a rotatable connection between the carrier frame F, and king-post *c*, is clearly illustrated, there being a vertically perforated block *c*², furnished, which loosely fits upon the true cylindrical body of said post, and has a nearly rectangular form externally, opposite trunnions *c*³, projecting therefrom, which are of equal diameter and length. A furcated shoe piece *c*⁴, is provided having its forward portion laterally flanged as shown, said upright flanges which project from a base portion being made to diverge from the rear forwardly, so as to adapt them to have contact throughout their surfaces with the inner end portions of the carrier frame timbers *d*, which are bolted firmly upon the lower part of the shoe, as indicated and may also be laterally bolted through the side flanges if this is deemed necessary. The limbs *c*⁵ of the furcated portion of the shoe piece *c*⁴, are cross grooved in alignment with each other and rounded at the base of each groove, so as to permit these grooved limbs to loosely embrace the trunnions *c*³, and rock upon them when the frame F, is raised or lowered at the outer end. A supply conduit pipe B², is laterally extended from the pump B, toward the king post *c*, and is suitably curved downwardly near said post to engage with the inboard end of a horizontal conduit pipe G, that is practically a portion of the pipe B². For effective service it is essential that the pipe G, be secured to the pipe B², with an adjustable joint connection, which will allow the normally horizontal pipe G, to be changed in adjustment laterally a limited distance; and to permit this, an ordinary concavo-convex joint surface is produced where the upper pipe B² has contact with the upturned end portion of the other pipe, the parts being held adjustably by bolts that pass through the radial flange on the end of the pipe G, and also through a clamping ring or like device which bears upon the ball shaped radial projection of the upper pipe B², the bolts having nuts that serve to draw the parts together so as to prevent leakage and allow the desired limited adjustment of the lower pipe on the upper pipe which will facilitate the connection of parts.

Upon the lower side of the quarter bend of the pipe G, which is attached to a similar

bend on the pipe B², as described, a foot piece G' is formed, consisting of four wings radiating laterally from a common center, and all integral with a bottom flange of sufficient area to cover the upper face of the trunnioned block c², whereon said flange is seated and secured as shown in Figs. 8 and 9, the height of the foot piece being so proportioned to the dimensions of the part it projects from, that the pipe G will be properly sustained at its inner end between the parallel timbers d², of the carrier frame F.

On the end of the curved piece of the conduit pipe G, which projects forwardly of the foot piece G', a thimble piece is fastened, which affords means for attaching a flexible pipe section G² to the quarter bend mentioned; this flexible portion that is preferably formed of gum hose having a proper diameter and strength, is slipped at one end over the thimble piece and clamped in position by an encircling band G³. See Fig. 8. A proper length is afforded to the portion G², of the conduit G, to give a certain degree of flexibility to the inboard end of the supply conduit for the pump, which will relieve any strain on the ball joint if the parts are clamped tightly at said joint. The outer end of the piece G², is clamped or otherwise secured upon a metal portion of the conduit pipe G, and preferably another flexible pipe section is introduced in said pipe to facilitate the downward bending of its forward end portion, which latter is constructed of metal, and terminates at its lower end in an excavator head I.

The head portion I, is an important feature of the invention, and comprises a laterally elongated receptacle which is nearly rectangular at its lower edge, and dome-shaped at the top, converging thereat to produce a cylindrical neck e, that terminates in a radial flange e', whereon a similar flange that is on the lower end of the conduit pipe G, is seated and secured. A sufficient capacity is afforded to the head I, to adapt it to serve as an intake box for excavated material, which has been plowed by the cutters and hydraulic jet devices attached to the head, as will be further described; said details of construction being clearly shown in Figs. 4 to 7, inclusive.

In Fig. 5 which is a side view of the excavator head and attachments, two comparatively thin cutter blades f are shown which depend from the front and rear lower edges of the head I, whereon they are removably affixed, their lower edges which are parallel with the lower edges of the excavator head, being rendered measurably sharp to allow the blades to sink into the bed of earth they engage with when in service.

Within the excavator head a tilting table is introduced which serves as an adjustable bottom for said receptacle; this piece consists essentially of two rectangular leaf plates g', that are secured upon a heavier plate or frame

g, which is shaped to pitch its upper surface from a central line laterally and downwardly, the plates g', that project a suitable distance below the side edges of the part g, having the same degree of inclination as the part whereon they are affixed as shown in Fig. 4. The frame g, of the tilting table is longitudinally perforated near its apex, to receive a shaft g², which is secured thereto, and projects at each end so as to loosely pass through aligning perforations, that may be in boxes affixed to the front and rear sides of the excavator head shell I, at its transverse center. By the pivotal suspension of the tilting table, it is allowed to rock, and alternately project the lower and sharpened edges of the leaf plates g', below the side edges of the excavator head I. Said vibration of the table is limited by the impinge of the upwardly moving side of the table upon the lower side edge of the head shell, as indicated at the left of Fig. 4. A further means for regulating the tilting movement of the table g g', consists in the provision of adjustable studs g³, that are secured upon and project inwardly from the cutter blades f, at such points as will cause a stud to receive the impact of the downwardly inclined side of the tilting table at the same time the rising leaf plate g', is checked by its impinge upon the side wall of the excavator head.

Upon the lower surface of the leaf plates g', a series of spaced prongs g⁴, are projected; preferably a single row of said prongs is located on each leaf plate, extending across from front to rear, and parallel as a row with the lower edge of the plate they are secured upon, and a proper distance from said edges. As the prongs g⁴, project at a right angle from the plates g', it will be seen that on the side of the tilting table that is downwardly inclined, the prongs are inclined inwardly or toward the transverse center of the table, their length being sufficient to cause their sharpened lower ends to project a short distance below the free lower side edge of the table.

Two or more hook-shaped, sharp edged plowing blades h, are affixed on each side wall of the excavator head shell, these pairs of cutters projecting downwardly, below the lower edges of the walls they are secured upon, of a length which will adapt them to have a free engagement of their curve-pointed lower ends with the earth that is to be excavated.

The co-acting hydraulic jet device before mentioned, which is provided to aid in excavating earthy material, consists of a water supply pipe J, that is connected to a source of water supply under pressure, located on the float A, and thence extended forwardly along the carrier frame F, and downwardly near to the conduit G, having its portion that is adjacent to the excavator head I, connected to the conduit by the bracket clamps i, shown

in Figs. 5 and 6, said clamping devices being made to embrace the lateral branches i' of the water supply pipe J.

Intermediately of the branch pipes i' , and main water pipe J, a peculiarly constructed three-way valve i^2 , is introduced, which is designed to feed water under pressure to either branch pipe in a full stream and cut it off from the other branch pipe gradually, so as to avoid a dangerous percussive action of the water. The valve i^2 , is shown sectionally in Fig. 7, and consists of a shell or body having an outlet at each end and on the side near the center. A plug i^3 , which is fitted into a slightly tapering hole in the shell as usual for plug valves, is projected at each side of the shell, and is secured by a washer and bolt at the smaller end, in the ordinary way.

The feature of novelty in the valve, consists in the formation of a water way in the plug i^3 , which is produced by cutting away one side of the plug so as to remove about one half of the material. The cross passage that results from this removal of material, is of such relative dimensions, that when it is disposed in the position shown by dotted lines in Fig. 7, so as to lie directly opposite the side aperture in the valve shell, wherein the end of the water supply pipe J, is inserted and secured, there will be a diminished water way produced by the cross passage of the plug, which will discharge water from the pipe J, into each branch pipe i' . If the plug is further turned in either direction, the entire volume of water flowing from the pipe J, will enter one branch of said pipe, as appears by full lines in the figure last mentioned.

Upon the outer ends of the branch pipes i' , depending pipe sections are secured, and from these depending pieces lateral branches are forwardly extended, which in turn are engaged by depending pipe portions to which spaced jet nozzles i^4 , are connected by proper fittings. Two jet nozzles are by preference furnished for each side of the excavator, each pair being disposed at the outside of the plowing blades h , and stably secured to the excavator head I. It is essential that the flow of water through the branch pipes i^2 , should be so arranged, that water will be projected from the jet nozzles i^4 , on the side of the excavator head where an opening below is produced, due to the tilting of the table g g' . To this end there is an upright arm k , affixed upon the end portion of the shaft g^2 which projects rearwardly beyond the head I. The arm k , is slotted a short distance from its upper end, and is of such a proportionate length as will permit a pivotal connection to be produced between its slotted end and the upper end of a crank lever k' , that is projected at a right angle from the body of the plug i^3 , at its larger end; the pivot bolt therein being adapted to slide in the slot of the arm k , so as to prevent a cramping action that would otherwise result when the levers are jointly vibrated. As the arm k , is projected vertically from the

apex of the angular top face of the tilting table, it will be vibrated in accordance with its rocking movement. Hence if the table tips toward one side, the plug lever will be correspondingly vibrated toward the tipped side of the table, and produce a rotatable movement of the plug i^3 , which will open a free passage from the water supply pipe J, into the nozzles i^4 , that are on the tilted side of the table.

Upon the forward part of the carrier frame F, a derrick frame is erected, which comprises two similar timbers m , that have their lower ends secured upon the cross timber d' , near its ends. The timbers m , are equally inclined toward each other, so as to dispose their upper ends equally distant from the heels of said timbers, and as shown in Figs. 1 and 2, the frame timbers m , incline outwardly and are thus maintained by two centrally located, spaced and parallel housing posts m' , that are vertically erected on the timbers d^2 , that project in advance of the timber d' for such purpose. The upper terminals of the posts m' , are affixed to the inclined timbers m , and also to the head block m^2 , the latter extending across, between the upper ends of both sets of timbers, as indicated in Fig. 3. Two prop braces m^3 , are provided, which have their heels secured to the longitudinal timbers d^2 , and incline toward the housing posts m' to which they are attached at their upper ends, and other braces m^4 , extend horizontally between the prop braces and posts so as to render the entire upright structure substantial.

Two upright stanchions n , are secured to the end portions of the cross timber d' , on the carrier frame F, which ends project beyond the inclined timbers m , said stanchions being held stable by inclined braces n' , and other embracing pieces n^2 , which extend horizontally between the parts n' , and the stanchions; transverse pins n^5 , inserted in proper holes formed in the stanchions above the pieces n^2 aid in supporting the parts n . See Fig. 3. As shown in Figs. 1 and 3, the stanchions n , are projected below the carrier frame F, a suitable distance to cause their lower ends to enter the water in which the device is being operated, so that the chains o , which extend from the opposite sides of the excavator head I, from eye bolts o' , toward the stanchions, may engage pulleys n^3 , on the lower end of the pieces n , and thence project upwardly to pass through the snatch blocks n^4 and thence toward the float A, their free ends being belayed at n^5 , on the timbers d^2 , as shown in Fig. 2. Should it be necessary to slightly alter the lateral adjustment of the excavator head I, this can be done by shortening one chain o , and lengthening the other; the office of these chains however is to serve as guy lines for the retention of the head I, and conduit G, in proper position, bracing these parts in service. The conduit pipe G, is further sustained in place forwardly by a chain or rope p which passes below the con-

duit or engages an encircling band on it at p' , and is thence extended at each side of the conduit upwardly to pass through snatch blocks p^2 , on the frame braces m^4 and thence downwardly, having its end portions belayed at p^3 on the timbers d^2 . The portion of the conduit G, which is above and connected to the excavator head I, is sustained by a chain or rope sling q , which is attached by its ends to the conduit and head, and intermediately of its ends engages loosely a pulley block q' , from which upwardly extends a chain or rope q^2 that passes through another pulley block q^3 , on the upper part of the standing frame, and thence rearwardly to have its other end attached to a spool b , that by rotation will raise the conduit and excavator head, the gravity of said parts causing them to lower as the chain holding them elevated is subsequently slackened. Upon the conduit G, two pulley blocks r are secured near its longitudinal center, for the engagement of two chains or ropes r' , these latter being doubled where they engage the blocks named. Each have one end secured to a pulley block r^2 . The blocks r^2 , are affixed to the deck of the float at opposite points near the front end and side edges of the same, and the other doubled portions of the chains r' , pass through these blocks and are thence extended toward the king post c , engaging loosely other pulley blocks r^3 , that are also shackled to the deck of the float, and from these blocks each chain or rope r' , is led rearward to be wrapped upon the drums C; so that the manipulation of the levers C^3 , will enable an operator to wrap up one chain and relax the other, thus causing a lateral vibration of the carrier frame F, conduit G, and excavator head I.

In the prosecution of the work of dredging with this improved apparatus, it is essential that provision be made for the secure retention of the float and its appurtenances while the frame F, is vibrated and excavation is being thus effected, and also to afford means for the periodic and limited movement of the float and apparatus so as to permit the excavator to engage with an uncut portion of the water bottom. To effect this desideratum there is a set of prop devices provided, which co-act with the ordinary guy lines and which will be described. Across the deck of the float A, a triangular frame is erected that has a position near the rear end of the carrier frame F, comprising two timbers s , which are inclined toward each other and are firmly secured together at their upper ends, as shown in Fig. 3, suitable clamping irons being used to effect such a connection of parts. The frame is rearwardly braced by inclined prop-posts s' , and also by a centrally extended guy rod s^2 , that engages the top of the frame, and projects rearward and downward to have an attachment to the deck of the float. Other guy rods s^3 are swivel connected to the irons at the top of the upright frame s , s , and project forwardly and downwardly, their lower

ends being connected to the side timbers d , of the carrier frame F; and a turn buckle s^4 , is introduced in each guy rod for their adjustment to raise or lower the frame F a limited degree, and adapt the guy rods to support the front part of the carrier frame, thereby relieving the king post c , from a part of the weight and maintaining the frame F, projected and free to swing. At a proper height two cross beams t are secured upon the inclined timbers or shear beams s , s , which they embrace oppositely on their front and rear sides; the cross beams having a length which will project their end portions a short distance and equally, beyond the sides of the float A, as represented in Fig. 2. A spacing block t' , is introduced between the ends of the cross beams t , at each side, and these are secured in place by any proper means. Between the shear beams s , and the cross beams t , strut braces t^2 , are placed and affixed by their ends, their upper terminals being so located between the cross beams, that a suitable pocket or vertical slot will be produced at each end of the joined beams t , for the free introduction of the spuds or props N, N'. The spud N', is held in a vertical position loosely by a loop iron u , which embraces the spud, and projects from the side of the float at a proper point, as shown in Fig. 3, and by dotted lines in Fig. 2. There is a chain u' , secured by one end to the side of the spud N', at a point near its lower end, and thence upwardly extended to engage with a pulley block u^2 , from which it passes toward the transverse center line of the float engaging another pulley (not shown) and from the last pulley extends at a right angle rearwardly to be wrapped upon a spool b , so that to raise the spud, a rotatable movement of the spool is produced which can be effected by the gearing shown in Fig. 2, that is actuated by the spur wheel C' , and is released when said gear wheel is detached from the drum C, which will allow the spud to descend and engage the water bottom, by reason of its own weight. On the other side of the float A, the spud N, is located. This piece of timber is of the same dimensions as the spud N', and in like manner slides through the pocket provided for it at the ends of the cross beams t . An improved means of support and adjustment is provided for the spud N, on the float A, to enable the proper longitudinal movement of the float to be predetermined and effected, said device consisting essentially of a bracket block v , which is cut away on one side between its ends to produce a slot of proper width and length, when said block is secured on the side of the float as represented in Figs. 2 and 11. The spud N, passes through the slot in the block v , and when vertical will rest against the front terminal wall of said slot. Upon the block v , an elongated rectangular frame v' of metal is secured, which is longitudinally apertured to correspond with the slot in the block it rests upon. There are two

parallel flanges v^2 extended throughout the length of the frame $v'v'$, on each of its sides the use of which will be explained. Between the flanges v^2 , and slightly below them a series of ratchet teeth v^3 , are formed on each side of the frame, the teeth extending along the inner faces of the flanges v^2 , a proper distance inclining away from the spud N. when the latter is in the position shown in Fig. 12.

10 A traveler carriage that is adapted to move on the frame v' , is a part of the spud holder, and consists of two similar pawls w , that are held spaced apart at their toes by a cross bar w' , whereon a ring or other projection is

15 formed to afford a convenient means for lifting the pawls. The heels of the pawls are laterally perforated for the reception of the cylindrical end portions of the transverse shaft w^2 , which has an anti-friction roller w^3 ,

20 loosely mounted upon it. At each side of the roller w^3 , an eye-bolt w^4 , is strung upon the shaft w^2 , and projects downwardly; then the pawls w , are placed in position outside of the eye-bolts, and secured to the shaft by cross

25 pins or other means, a sufficient portion of the shaft projecting beyond the pawls to engage loosely with the top edges of the flanges v^2 . A sufficient length is given to the eye-bolts w^4 for their projection below the bracket

30 block v , and the loose engagement with the bolt ends of the transverse keeper plate w^5 , that is held on the bolts by nuts or other means, so that the carriage thus constructed will be prevented from displacement, and its

35 free longitudinal movement on the guide flanges v^2 , permitted if the pawls are not interlocked with the teeth v^3 . the use of this device being fully explained in the description of the operation of the dredging machine

40 which is hereinafter given.

The conduit pipe G, which has been described, is designed to be used in water of a moderate depth; in case there is a greater

45 depth to be operated in, or the excavation is to be of such an extent, vertically considered, that the front portion of the conduit will not suffice to continue the work, a special attachment for the conduit may be utilized, which is shown in Fig. 10, and consists of two pipe

50 sections G^3, G^4 , that have telescopic connection, the pipe section G^4 , sliding within the piece G^3 . These parts are furnished with a stuffing box G^5 , and follower G^6 , that when packed produce a water-tight joint between the pipes.

55 The length of the pipe sections G^3, G^4 , is sufficient to prolong the conduit G, downwardly at its front end so as to allow the excavator head I which is to be secured on the flanged end x , of the pipe G^3 , to have contact with the

60 bottom of the water bed. There are two parallel guide bars G^7 provided, which are connected at the top by a cross-bar, the lower ends of the bars being secured at opposite points in the flange x . The outer pipe section G^3 , is furnished with projecting arms x^2 ,

65 which have slide boxes x^3 , on their ends, that have a loose engagement with the guide bars

G^7 . The upper flanged end of the outer pipe section G^3 is attached to the bent depending flanged end of the conduit G, and a sling

70 chain x^4 , is extended from this upper part of the pipe section G^3 , to which a pulley block is connected, a similar block depending from the cross bar x' , and a rope x^5 is rove through these blocks and led toward the float A, to

75 permit manipulation. It will be seen that if the rope or chain x^5 is drawn upon, the pipe sections will be telescopically extended so as to lengthen the conduit, the entire device being lifted by the means before described.

80

In arranging the dredging apparatus for service, it will be of advantage to provide duplicate spuds N, spaced apart on the same side of the float, and a regulating device for the same as has been described; and

85 to commence operations, the float A, is located at a point where the excavator head I may be made to conveniently engage the bottom. The hull or float A is then guyed by an extension of lines forwardly, rearwardly, and

90 on each side, which are attached to any fixed object. Generally mooring piles are driven for such a purpose; and to effect this insertion of the piles the housing frame m' on the forward part of the carrier frame F, is preferably

95 employed, a suitable hammer block being adapted to slide in the ways and drive the pile, said hammer being elevated by the mechanism on the float. When the spuds N, N' , are lowered, the lateral and longitudinal

100 movement of the entire apparatus will be prevented, so that the dredger mechanism may be put into use; the operation consisting first, in the embedment of the excavator head I, into the soil of the bottom so that the

105 cutter blades f will be forced therein. The carrier frame F, is now swung by the operation of the winch mechanism and chain attachments, as has been already explained, which will cause the prongs g^4 , to interlock

110 with the ground and tilt the table from which they project, in the direction of travel of the excavator head, so that an inlet throat is afforded for excavated material, as indicated at the right side of Fig. 4. The plowing

115 blades h , and co-acting jet nozzles i^4 , are brought into service, and loosen as well as comminute earthy material, which with gravel of moderate size will be raised through the

120 conduit G, by the pump B, and discharged therefrom through a lateral pipe B^3 . The peculiar construction of the excavator head I, and its tilting table, adapts the latter to scoop up the loosened muck and other material from the water bottom, and if large

125 stones are encountered, these will be prevented from entering the head shell by the plowing blades h . After a sweeping movement in one direction is made, the movement of the carrier frame F, is reversed, which will

130 tip the table in the excavator head, so as to open an inlet throat on the opposite side of said head, and scoop up excavated material as has already been explained. In case it is

found that the excavated material is of such a nature that it is inclined to clog the conduit pipe G, entry for clear water may be afforded on the raised side of the table, by preventing the elevated edge of the table from having a close contact with the lower edge of the excavator shell. This result can be attained, if a plug or pin g^3 is inserted in one of the pair of perforations f' , in the cutter blades f , so as to receive the impact of the depressed side of the tilting table before its raised side is against the shell I.

It is of advantage to note the working of the excavator head I, as it is reciprocated below the watersurface, and for this purpose two lanyards y , are attached by one end of each to the upper end of the arm k , and led in opposite directions to engage with the pulleys on the clamps i , and thence led upwardly to rest their bights on the pulleys y^2 , that are pivoted on the rear sides of the housing posts m' , their depending ends having weights y^2 attached, which by their relative position will show, if the tilting table is at work, and if it moves a full stroke.

From the foregoing description, it will be evident that the successive sweeping of the carrier frame F, so as to drag the excavator head I, over a particular spot on the bottom of the water bed, will remove material therefrom, and expeditiously lower the bottom at that point to the desired degree.

The next step is to move the float far enough longitudinally, to locate the excavator head 35 above an adjacent part of the water bottom. When it is desired to move the boat ahead to enable the drag to engage in a new place on the bottom, spud N' , is raised, the spud pawls w are slipped back on the rack as far as may be necessary to give the proper length of movement for the boat, and then interlocked with the ratchet teeth. The boat is then moved ahead until the roller w^3 presses against the spud N , which has been forwardly inclined 45 and rests against the rear end of the slot it is in, bearing upon the lower edge of said slot end. The spud N' is then dropped, after which spud N is raised and made to assume a vertical position and imbedded by its weight 50 in the soil. The spud pawls w being brought to the position they occupied before the boat was moved, serve to retain the roller w^3 in contact with the spud N , and the latter in an upright position at the rear end of the slot it occupies. The spud N is then dropped. A spud on the same side of the boat as N and near the stern is operated in the same manner. Care must be used not to raise the spud N or its mate unless the spud N' is down. 60 Thus the boat is prevented from having a lateral movement while moving ahead and the proper length of the movement ahead is determined. When the new position has been given to the float A, and the spuds made to engage the bottom as stated, operations may be renewed, and the bottom cut away to a proper depth; successive movements of the

float and subsequent dredging operations after each longitudinal movement, resulting in the eventual deepening of the water bottom 70 to the desired depth and area.

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

1. In a dredger, a float, a triangular carrier 75 frame on the float, supported at an angle of the frame and projecting beyond the float, and supports for said frame adapted to rock it vertically and swing it laterally, substantially as described. 80

2. In a dredger, a float, a triangular carrier frame on the float, an upright frame on one side of said carrier frame, adapted to sustain other parts of the dredger, and supporting devices on the float, connected to an angle of 85 the carrier frame opposite the upright frame, and which adapt these joined frames to swing laterally and rock from a horizontal plane, substantially as described.

3. In a dredger, the combination with a float, 90 a king post thereon, a trunnioned swivel block on the post, and a furcated shoe-piece adapted to loosely engage its slotted ends with the trunnions of the swivel block, of a triangular carrier frame projected from the shoe 95 plate beyond the end of the float, and means to adjustably sustain the outer portion of the carrier frame, substantially as described.

4. In a dredger, the combination with a float, a king post thereon, and a swivel block on the 100 post and adapted to support the inboard end of a triangular carrier frame free to swing and rock, of a pump on the float, and a conduit pipe for the pump, said conduit being sustained by the carrier frame and supported at 105 its inboard end upon and by the swivel block, substantially as described.

5. In a dredger, the combination with a float, a pump thereon, means to actuate the pump, and a swinging and rocking carrier frame projected from the float, of a flexing conduit on 110 the carrier frame, curved upwardly at the inboard end, sustained on a post at said end, and adjustably connected to a conduit section that is laterally projected from the pump, 115 substantially as described.

6. In a dredger, an excavator head dome-shaped at the top, and connected therewith the outer end of a pump supply conduit, spaced plowing blades at each side of the 120 shell of the excavator head, and a tilting table centrally pivoted within the shell and adapted to rock to a limited degree as the head is swung laterally, substantially as described.

7. In a dredger, an excavator head dome-shaped at its top, and attached therewith the 125 pendent outer end of a laterally movable pump supply conduit, a hydraulic jet device supported thereon at each side of the head, plowing blades at each side of said head, and 130 a tilting table centrally pivoted within the head at its lower end and adapted to provide an intake throat at each side of the head alternately, substantially as described.

8. In a dredger, a tilting table pivoted within the shell of an excavator head and forming its bottom and adapted to rock, prongs arranged in rows on the lower face of the tilting table, a cutter blade at the front and rear side of the excavator shell and depending from its lower edges, and removable studs on said cutter blades, adapted to limit the vibration of the tilting table, substantially as described.

9. In a dredger, an excavator device, comprising a dome covered shell, rectangular near its lower edges, a centrally pivoted tilting table within the shell at the lower end, the top face of which table inclines laterally from the pivot center, a cross shaft in a perforation in the table and forming its pivot support, cutter blades depending from front and rear edges of the excavator shell, removable studs in the blades, which define the degree of vibration of the table, spaced plowing blades on each side of the shell, and a hydraulic jet device on each side of the shell near the plowing blades, substantially as described.

10. In a dredger, the combination with a float, a pump thereon, a flexing conduit for the pump, a supporting carrier frame for the conduit, partly projected beyond the end of the float, and a support for the inner end of the carrier frame that adapts said frame to swing laterally and rock from a horizontal plane, of an excavator head shell on the conduit, a hydraulic jet device on the shell, plowing blades at the sides of the shell, and a tilting table within the shell and forming the bottom of the shell, substantially as described.

11. In a dredger, the combination with an excavator head shell, dome-shaped at its top and connected thereat with the outer end of a pump supply conduit, and a tilting table within the shell supported on a transverse shaft and inclined on its top side from the center toward its side edges, prongs along each side edge on the lower face of the tilting table, and depending cutter blades on the front and rear edges of the excavator shell, of a pair of curved and spaced plowing blades on each side of the excavator shell, a hydraulic jet device for each side of the head shell, a water supply pipe for said devices, extended from a source of water supply, and a three-way valve connected to an arm on the shaft and adapted to direct water into each jet device alternately, substantially as described.

12. In a dredger, the combination with a tilting table forming the movable bottom of an excavator head shell on a pump supply conduit, an arm on the pivot shaft of said table, and a vibratable frame projected from a float and carrying the conduit and shell, of

two pulley-supported strands or chains leading from opposite sides of the tilting table arm to posts above on the frame, and weights on the free ends of said cords or chains, and adapted to indicate when the table is rocking, substantially as described.

13. In a dredger, the combination with a float, of a transverse vertical frame thereon, a vertically adjustable spud on one side of the float, and a spud on the other side of the float adapted to swing pendent and to slide vertically, substantially as described.

14. In a dredger, the combination with a float, and a transverse frame thereon, of a vertically adjustable spud on one side of the frame and float, means to loosely secure said spud in an upright position, and a power-actuated device adapted to raise said spud, of a spud on the opposite side of the float and transverse frame, loosely engaging the frame and adapted to swing at the side of the float, a power driven device to raise said spud when upright, and an adjustable device on the float loosely embracing the spud at its lower end, and adapted to indicate the degree of swinging adjustment for the spud and hold it from displacement when upright, substantially as described.

15. In a dredger, the combination with a float, a spud held thereon at one side to swing and move vertically, and means to move said spud in an upward direction, of a securing device on the side of the float, comprising a bracket block recessed to form a slot with the side of the float, a slotted frame on the block, having parallel series of ratchet teeth, and a loosely secured device adapted to slide on the frame and having pawls that will interlock with the ratchet teeth, substantially as described.

16. In a dredger, the combination with a spud on the float of the dredger, of an indicating and securing device for the spud, comprising an elongated slotted frame securable on a bracket block at the side of the float, guide flanges on said frame, parallel series of ratchet teeth intermediate of the flanges, a pair of pawls spaced at their toe ends by a cross bar, a transverse shaft carrying the pawls, a loose roller on the shaft at its center, eyebolts at the ends of the roller on the shaft and pendent therefrom, the pawls being secured on said shaft against the eye bolts, and a keeper plate loosely secured on the lower end of the eye bolts, substantially as described.

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Witnesses:

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