(No Model.) 2 Sheets—Sheet 1.

J. L. ALLISON & R. G. NASH.

CENTRIFUGAL DREDGING MACHINE.

No. 494,094. Patented Mar. 21, 1893.

FIG. 1.

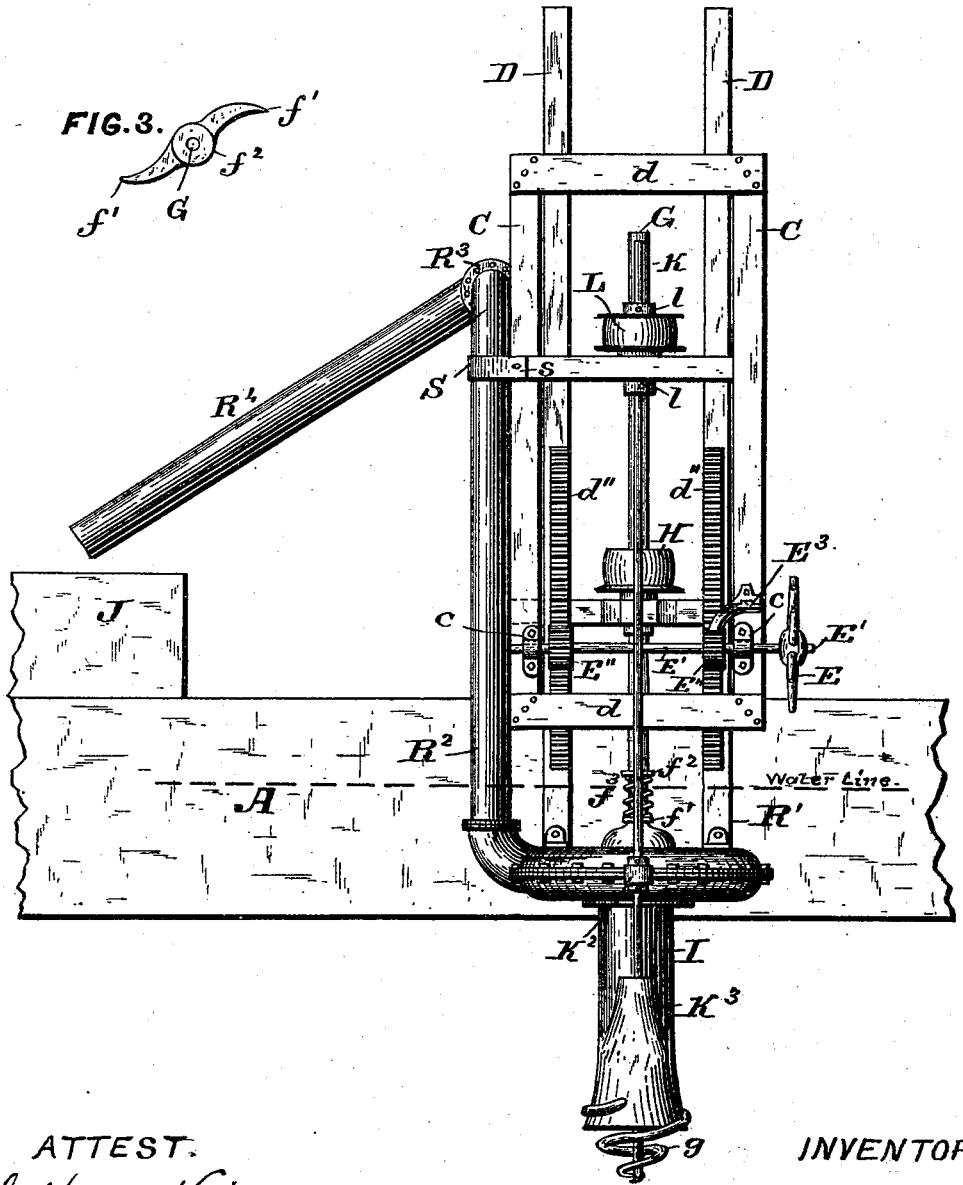

FIG. 3.

ATTEST.

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FIG. 4.

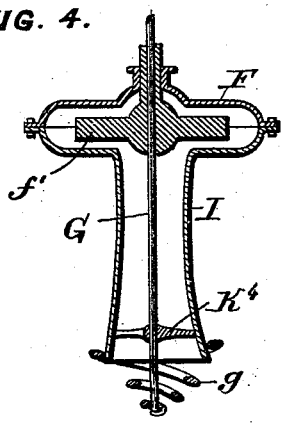
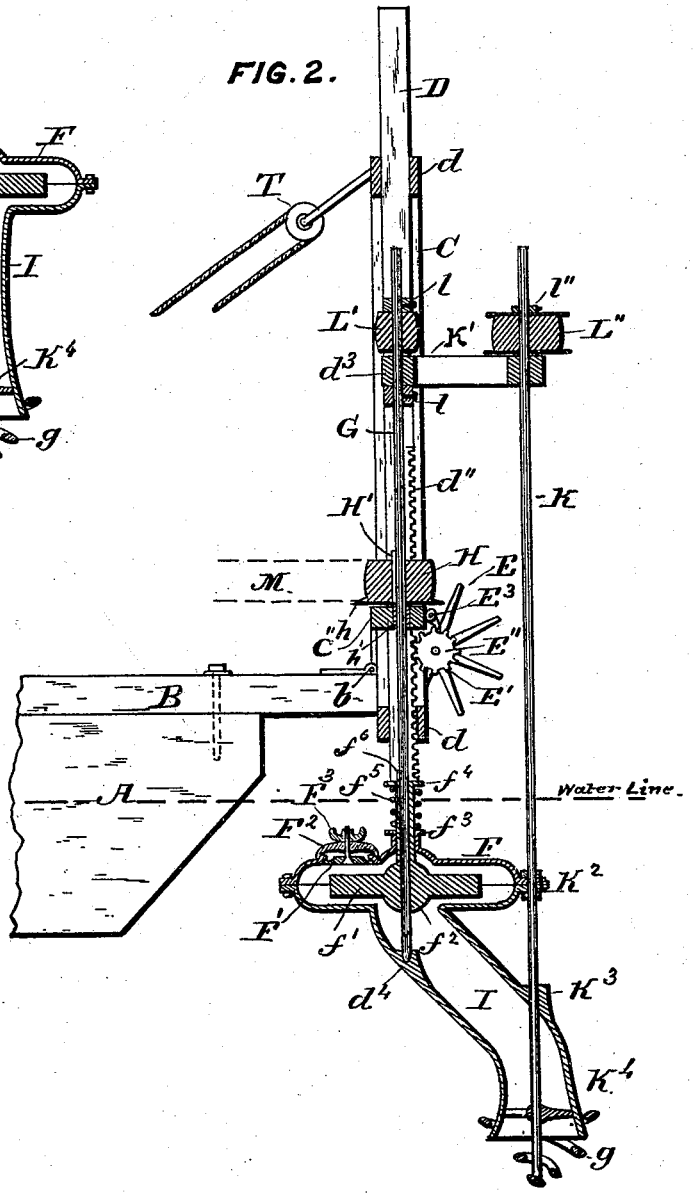


FIG. 2.



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UNITED STATES PATENT OFFICE.

JAMES L. ALLISON, OF WADDINGTON, NEW YORK, AND RODNEY G. NASH, OF MORRISBURG, CANADA.

CENTRIFUGAL DREDGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 494,094, dated March 21, 1893.

Application filed February 18, 1892. Serial No. 421,991. (No model.) Patented in Canada May 20, 1890, No. 34,353.

To all whom it may concern:

Be it known that we, JAMES L. ALLISON, a citizen of the United States of America, residing at Waddington, St. Lawrence county, New York, and RODNEY G. NASH, a citizen of Morrisburg, in the Province of Ontario, in the Dominion of Canada, have jointly invented certain new and useful Improvements in Centrifugal Dredging-Machines, (a portion of the same having been heretofore patented in Canada, May 20, 1890, to the applicants herein under Letters Patent No. 34,353;) and we do hereby declare that the following is a full, clear, and exact description of our invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of our invention is to provide means for expeditiously and economically removing earth, sand and gravel from below the surface of the water, by an apparatus easily and cheaply constructed and repaired, and applied to an ordinary scow, or other vessel, for operation; being easily changed in altitude while working, and quickly brought above the water for inspection and repairs when required.

In the accompanying drawings, Figure 1, is an end elevation of our improved centrifugal dredging machine, showing a portion of the scow upon which it is mounted. Fig. 2, is a sectional side elevation of the same; being sectionalized on a vertical plane passing through the center of rotation of the shafts actuating the arms of the pump and the agitator respectively as hereinafter explained; but said shafts being both shown entire. Fig. 3, is a sectional plan view of the arms and hub forming together the valve of the pump. Fig. 4. is a sectional side elevation of the lower end of said machine with a straight suction pipe and omitting the secondary shaft and appurtenances as hereinafter explained.

Like letters of reference indicate corresponding parts in all the figures; and in which

A represents a scow; B two strong horizontal beams or brackets, secured at and overhanging one end of the scow.

C, is an upright frame hinged to the ends of the two beams or brackets by the hinge *b*, allowing said frame to be tilted by drawing the upper end thereof inboard by means of an ordinary rope and tackle, a portion of which is shown at T, (Fig. 2.)

D is a narower frame fitted within the frame C and connected thereto slidingly by guide boards *d*, *d*, *d*, *d*, fastened to and forming part of the frame C.

To the uprights of the frame D, is framed the cross-bar d^3 containing the journal for the shaft G, as shown, and to this again is secured the bracket K′ containing the journal for the shaft K; which shaft is placed parallel to and directly in front of shaft G. The uprights of the frame D, are provided with racks *d″*, *d″*, into which gear pinions E″, fast upon a cross shaft E′; which is journaled to the shaft E′ by bearings *c*, and provided with the hand-wheel E; said cross-shaft with pinions E″ gearing in the racks *d″*, serve to raise or lower the frame D within the frame C.

F, represents the centrifugal pump firmly secured to the lower end of the frame D, in a horizontal position, by means of the brackets R′; the inlet, or suction, I being at the bottom thereof, and the delivery pipe R^2 at the upper outer circumference, said delivery pipe R^2 being gradually curved from a horizontal to a vertical position, and the upper end thereof secured to the frame D by a strap S, or otherwise; and may be provided with a revolving joint R^3, to allow the discharge or mouth to remain at the same level while the frame D is raised or lowered: Or said delivery pipe R^2 may be made telescopic.

G, is the shaft of the centrifugal pump, stepped at its lower end in the step d^4, rigidly secured to the casing of the suction pipe I; which pipe is rigidly attached to the inlet of said pump; and from said step d^4, said shaft G extends upward through the valve of the pump and most of the frame D, being journaled therein at the cross-bar d^3 as shown. Said shaft G is provided with a keyway throughout its length.

H, is a belt-pulley, with a flange *h* at its lower end for the purpose of preventing the belt from slipping downward; it is extended downward in the shape of a sleeve and journal neck *h′*, which is journaled in a box se-

cured to a cross-bar c'' fast on the frame C. Said pulley is further provided with a gib-key H′ in a suitable keybed, fitting slidingly in the keyway of the shaft G, upon which it is mounted, allowing the said shaft to rise and fall freely while the pulley is being held vertically by its journal h', but imparting its rotary movement to said shaft G. To the said shaft G, and just above the journal in d^3 is firmly secured a secondary belt-pulley L′, by means of a gib-key fitting the keyway in said shaft, upon which it is mounted, and a keybed in said pulley; the collars l, l, being secured by setscrews to said shaft G just above said secondary pulley and below said journal in d^3, respectively, to prevent any longitudinal motion of said shaft G within the frame D. Upon said shaft G, near its lower end, is slidingly secured, by means of the gib key f^6 in manner similar as the belt-pulley H, the valve of said pump. Said valve consists of the arms f', the hub f^2, and attached thereto is the sleeve and journal neck f^4; which latter is journaled within the upper casing of said pump, and holds between its upper flange and said casing, a spiral spring wound around said neck and holding the arms of said valve normally in the center of the pump-casing F; but permitting the free movement of said valve longitudinally on said shaft G, when the tension of said spring is overcome by any obstacle lodging between the arms of said valve and the pump casing; while at the same time, said valve is held to the same rotary movement as said shaft G, by reason of the keyway, gib and gib-bed arranged in similar manner as upon the pulley H above described.

Near the upper end of the shaft K, and immediately above the journal in the bracket K′, is secured the belt-pulley L″, having flanges at both ends as shown, to prevent the belt from slipping therefrom; and from the journal in K′, said shaft K passes downward through a journal K^2 rigidly affixed to the casing of said pump, collars being secured to said shaft, by setscrews, immediately above and below said journal K^2 to limit the longitudinal motion of said shaft K; thence said shaft K passes downward through a boss in the front of the suction pipe I, into the interior of said suction pipe, near the mouth of which it passes through a journal in a spider rigidly secured within the mouth of said suction pipe; and projecting below said mouth, said shaft K is armed with a helical steel strap g, forming an agitator and guard combined, rigidly secured to the lower end of said shaft. The interstices between the convolutions of said agitator g, being made of such size as to prevent the admission into said suction pipe I of any stone or other solid substance of sufficient size to wedge between the valve and casing of said pump, so as to stop the working thereof. When in working order, an endless belt is passed over the pulleys L″ and L′ without twisting; so that the motion of L′ is communicated to L″; but, as will be readily seen, the relative speed of the two shafts G and K, may be varied according to the differential circumference of the pulleys L′ and L″.

Instead of the bent suction pipe I, and the secondary shaft K, as hereinbefore shown and described, the said suction pipe I may be extended downward from the pump F in a straight line as shown in side sectional elevation at Fig. 4, and the shaft G extended through the spider K^4 therein and armed at its lower extremity with the agitator g secured thereto, as shown in said last mentioned figure:—When so constructed, the secondary shaft K, the bracket K′, the pulley L″, the bearings K^2 and K^3 and the collars on said secondary shaft, are all dispensed with; but in all other respects the apparatus is constructed and operated in the same manner as when the bent suction pipe is used as herein explained and set forth.

Power may be supplied by a steam engine placed on the scow A, and from there transmitted through a belt in the usual manner (partially shown by the dotted lines at M) to the pulley H heretofore described. Motion being given by the engine to the shaft G, by means of the belt M and pulley H, and to the shaft K through the secondary pulleys L′ and L″ by means of a secondary belt as hereinbefore explained, the agitator being lowered onto the material to be excavated, stirs the same up with water and the mixture so made is drawn up by and through the centrifugal pump F, and delivered through the pipes R^2, R^3, and R^4 into the bin J, or other receptacle. The depth of the pump F and the agitator g, attached thereto, may be adjusted at any time, either before starting or during operation, to the depth of the sand bed, by raising or lowering the frame D (to which said pump is secured) by means of the hand wheel E gearing into the racks d'' on said frame; the pulley H being held in the same vertical position or elevation by the cross-arm C″ and box attached thereto, to which its sleeve is journaled. By changing the relative speeds of the pump and agitator, by the relative sizes of the pulleys L′ and L″ as above explained, the relative amount of silt, or other substance operated upon and water fed to the pump, can be regulated so as to furnish such proportion thereof as is best adapted to the substance being operated upon; it having been found by trial that some substances, such as coarse gravel, require a much larger proportion of water therewith than fine even sand or soft soil.

It is not designed to tilt the frame, as above explained, while in operation: that being done only for the purpose of bringing the apparatus out of the water, when moving the scow from place to place or for examination and repairs; and for this latter purpose, the casing of the pump F may be provided with one or more hand holes with the plate F′, yoke F^2, and bolt and hand nut F^8, (shown at Fig. 2) to close the hole in the usual manner. And it

is apparent that the hinge *b*, may be dispensed with, by fastening the supporting arms high enough above the water to permit the pump and suction to be raised vertically therefrom. While in operation the centrifugal pump is wholly below the surface of the water, thereby keeping the bearings cool and self lubricated.

The scow may be moved forward or sidewise by means of anchors, chains and windlasses, or any of the means now commonly employed for like purpose, in order to reach the position from which it is desired to remove the sand or other substance.

Having now described our improved centrifugal dredging machine and the manner of operating the same, what we claim as our invention, and desire to secure by Letters Patent of the United States, is—

1. In a centrifugal dredging machine, the combination of a scow, an upright frame hinged to suitable arms secured to said scow, a frame slidingly connected to the said hinged frame, means for raising and lowering said sliding frame, a centrifugal pump secured to the lower end of said sliding frame and provided with a pump valve feathered to its shaft and held movably longitudinally thereon by a spring; a delivery pipe, a shaft journaled within said sliding frame, a suction pipe with offset therein, and a secondary shaft journaled to said sliding frame and pump and passing through the mouth of said suction pipe and provided with an agitator, all substantially as shown and set forth.

2. In a centrifugal dredging machine, the combination of a scow, an upright frame hinged to suitable arms secured to said scow, a frame slidingly connected to the said hinged frame, means for raising and lowering said sliding frame, a centrifugal pump secured to the lower end of said sliding frame and provided with a pump valve feathered to its shaft and held movably longitudinally thereon by a spring; a delivery pipe, a shaft journaled within said sliding frame, a suction pipe with offset therein, and a secondary shaft journaled to said sliding frame and pump and passing through the mouth of said suction pipe and provided with an agitator, and the tackle for tilting said frames, all substantially as shown and set forth.

3. In a centrifugal dredging machine, the combination of a scow, or vessel, suitable arms fastened thereto for supporting the frames, two upright frames, hinged to said support one sliding within the other, with means for raising and lowering the inner frame, a centrifugal pump fastened to the lower end of the inner frame with suction and delivery pipes attached thereto, a main shaft driving said pump and an agitator at the mouth of the suction pipe driven by a secondary shaft.

4. In a centrifugal dredging machine, the combination of a scow, or vessel, suitable arms fastened thereto for supporting the frames, two upright frames, hinged to said support one sliding within the other, with means for raising and lowering the inner frame, a centrifugal pump fastened to the lower end of the inner frame with suction and delivery pipes attached thereto, a main shaft driving said pump and an agitator at the mouth of the suction pipe driven by a secondary shaft differentially coupled to said main shaft.

5. In a centrifugal dredging machine, the combination of a scow, or vessel, suitable means for securing thereto the frames herein mentioned; two upright frames, one sliding within the other, with means for raising and lowering the inner frame, so that when in operation the centrifugal pump shall be wholly immersed within and covered by water, a centrifugal pump fastened to the lower end of the inner frame with suction and delivery pipes attached thereto, and an agitator at the mouth of the suction pipe.

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Witnesses:
CHARLES G. IDLER,
BENCE NASH.