A. W. ROBINSON.

HYDRAULIC DREDGE.

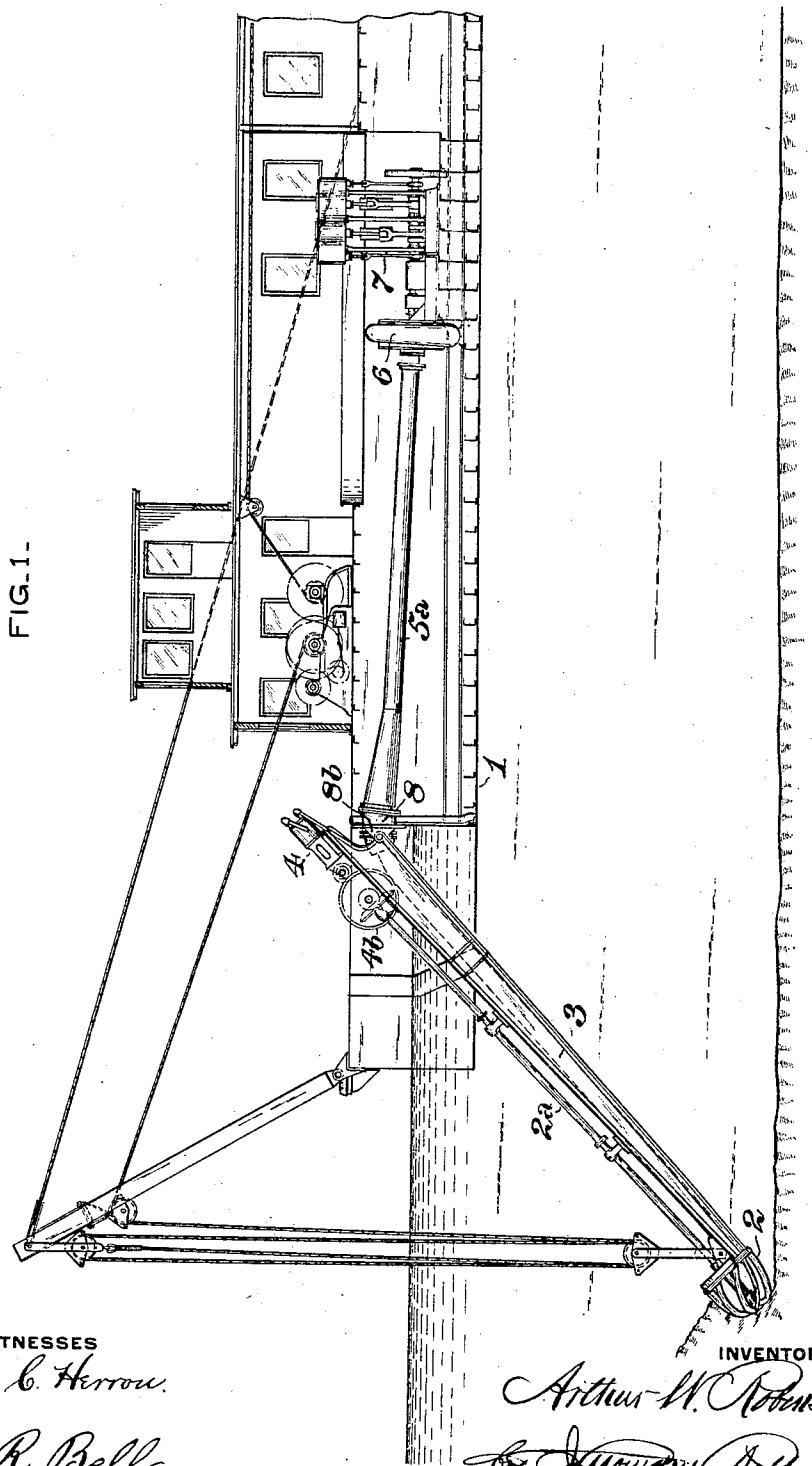
APPLICATION FILED SEPT. 29, 1910.

1,052,176.

Patented Feb. 4, 1913.

3 SHEETS—SHEET 1.

FIG. 1.



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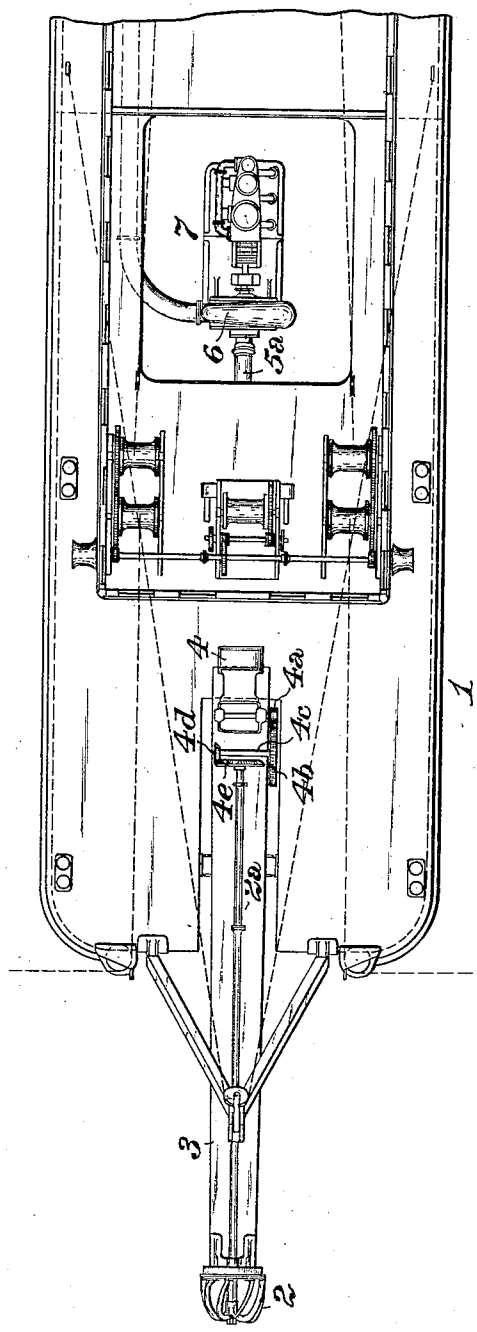
3 SHEETS—SHEET 2.

FIG. 2.



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3 SHEETS—SHEET 3.

FIG. 3.

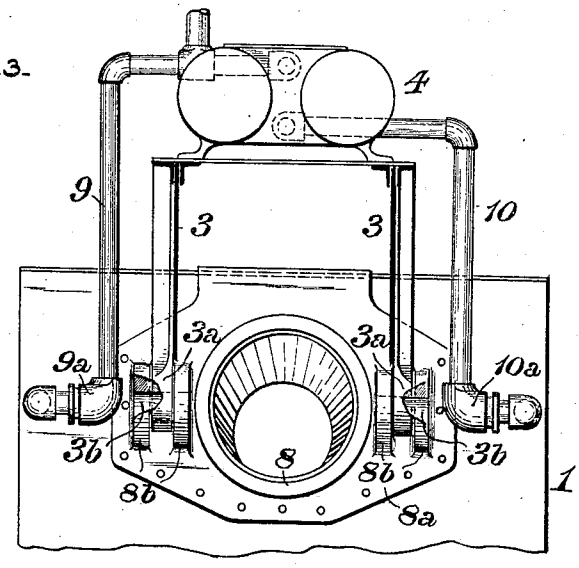
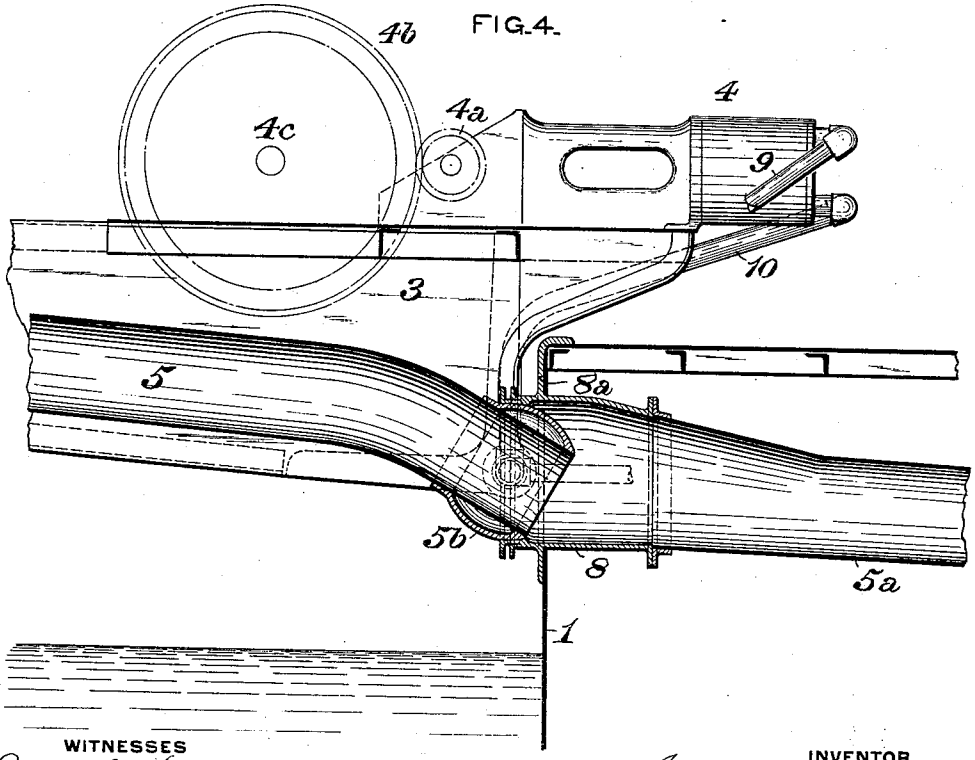


FIG. 4.



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HYDRAULIC DREDGE.

1,052,176. Specification of Letters Patent. Patented Feb. 4, 1913.

Application filed September 29, 1910. Serial No. 584,467.

To all whom it may concern:

Be it known that I, ARTHUR W. ROBINSON, of Montreal, in the Province of Quebec and Dominion of Canada, have invented a certain new and useful Improvement in Hydraulic Dredges, of which improvement the following is a specification.

My invention relates, generally, to dredges of the type in which a rotary cutter, mounted on the lower end of a suction frame, is used to excavate the material in order that it may be sucked up and discharged hydraulically by a centrifugal pump, and more specifically relates to the means for flexibly connecting the suction frame and pipe to the hull of the dredge; and mounting and connecting the driving engine of the cutter.

My present invention is an improvement upon that which is set forth in Letters Patent of the United States No. 746,994, granted and issued to me under date of December 15, 1903, and its object is to effect a simplification of the mechanism and to render it of more economical construction and more ready access when in operation.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a vertical longitudinal section through the forward portion of a hydraulic dredge, illustrating an application of my invention; Fig. 2, a plan or top view of the same; Fig. 3, a transverse section, on an enlarged scale, through the suction frame, showing the engine for driving the rotary cutter, and its pipe connections, in elevation; and, Fig. 4, a longitudinal central section through the suction frame, the forward portion of the hull of the dredge, and the adjoining portions of the suction pipe.

My invention is herein exemplified as applied in a hydraulic dredge in which the material which is dredged is excavated by a rotary cutter, 2, fixed upon a cutter shaft, 2^a, which is journaled in bearings on a suction frame, 3, formed of two substantial plate girders disposed in parallel planes and connected by suitable transverse members, and coupled, with the capability of swinging movement in a vertical plane, to the hull, 1, of the dredge, within a well or open space at the front end of the hull, as hereinafter more fully described. The cutter shaft is rotated by a double cylinder engine, 4, mounted on the upper end of the suction frame, and the excavated material or "spoil" is delivered from the cutter to the outer section, 5, of a suction pipe, which is supported on the suction frame, and is coupled, by a ball and socket joint, to the inner section, 5^a, of said pipe. The spoil is sucked up through the suction pipe sections, 5, 5^a, by a centrifugal pump, 6, located at the inner end of the section, 5^a, and actuated by an engine, 7, by which pump it is delivered to a suitable discharge pipe, in the usual manner.

In the practice of my invention, I provide a tubular socket casting, 8, which is connected, at its inner end, to the inner section, 5^a, of the suction pipe, and is provided, at its outer end, with a substantial transverse flange, 8^a, which is firmly secured to the hull, 1, of the dredge, at the inner end of a well or open space at the front of the hull. Lugs, 8^b, are formed upon or secured to the flange, 8^a, said lugs being located, in pairs, on opposite sides of the body of the socket casting. Corresponding lugs, 3^a, each adapted to fit between the members of one of the pairs of lugs of the socket casting, are secured to the girders of the suction frame, 3, which is hinged to the socket casting by pivot pins, 3^b, passing through the lugs, as clearly shown in Fig. 3. The suction frame is therefore capable of being swung in a vertical plane, about the common axis of the pivot pins, 3^b, within the well of the hull, against the sides of which it bears, as against guides.

A spherical faced ball casting, 5^b, is secured around the inner end of the outer suction pipe section, 5, and fitted within a correspondingly bored seat in the socket casting, 8, thereby forming a ball and socket joint between the inner and outer sections of the suction pipe, the center of which joint is in the common axis of the pivot pins, 3^b, so that the outer section of the pipe is adapted to partake of the swinging movements of the suction frame, 3, while maintaining continuity of communication with the inner section. The specific construction of the ball and socket joint does not form part of my present invention, and it may be of any suitable and preferred type. The joint may be packed either by an ordinary gland or by the special vacuum packing set forth in Patent No. 746,994 before referred to. The center of the joint is located as near the water level of the dredge as pos-

sible, to avoid the loss of effect in suction which would result if it were elevated to any considerable extent.

The engine, 4, which rotates the cutter shaft, is mounted on the top of the suction frame, the upper portion of which is extended, as far as practicable over the hull, in rear of the axis of the pivot pins, 3^b, in order to bring the center of gravity of the engine and intermediate driving gearing as nearly as possible over the hinge support, and to keep the gearing as high up as possible, so that the gear wheels will be out of the water when the suction frame is in its lowest position. The engine may be of any suitable and preferred design, but is preferably provided with a driving pinion, 4^a, which is located on the outside of the suction frame so as to engage directly with a large gear wheel, 4^b, on a countershaft, 4^c. The countershaft carries a bevel pinion, 4^d, which engages a corresponding gear, 4^e, on the cutter shaft, 2^a.

The steam pipe, 9, and exhaust pipe, 10, through which, respectively, steam is supplied to and exhausted from the engine, 4, are fitted with swivel joints, 9^a, and 10^a, located in line axially with the pivot pins, 3^b, so that no interruption of communication through said pipes, or strain upon them, results from the rising and falling movements of the suction frame. The stop or controlling valve of the steam pipe may be located at any convenient point within the hull, or be worked from the pilot house overhead, so that no special operator is required for this engine.

The suction frame is shown in Fig. 4, as in its highest position, and the ball casting as at the extremity of its movement for that position. The outer suction pipe section is formed with a bend, so curved that, for average depth of water, the opening through the ball casting discharges horizontally or straight into the inner section of the suction pipe, while, at the same time, the angle of movement of the ball casting is sufficient to provide for the extreme move ment of the suction frame.

I claim as my invention and desire to se cure by Letters Patent:

1. In a hydraulic dredge, the combination, with a dredge hull having a well at its front end, of a suction frame comprising two connected longitudinal plate girders, the tops of which are in the well and project over the hull, and hinge connections coupling the lower side of the upper end of the suction frame to the hull in advance of the projecting portion of said frame, a driving gear on said girders, a motor fixed upon the tops of the girders over the hull so that the center of gravity of said motor and driving gear is over the hinge connections.

2. In a hydraulic dredge, the combination, with a dredge hull having a well at its front end, of a suction frame comprising two connected longitudinal plate girders which are undercut, the tops of which are in the said well and project over the hull, a cutter shaft journaled on said suction frame and carrying a rotary cutter on its lower end, a motor fixed upon the projecting portion of the suction frame, gearing through which said motor rotates the cutter shaft, and hinge connections coupling the lower side of the upper end of the suction frame to the hull in advance of the projecting portion of said frame, the center of gravity of said gearing and motor being substantially over the hinge connections.

3. In a hydraulic dredge, the combination, with a dredge hull, of a suction frame comprising two connected longitudinal plate girders, a socket casting fixed to the hull, hinge connections coupling the suction frame to said socket casting, an outer suction pipe section supported on the suction frame, a ball casting secured to said outer suction pipe section and fitting the socket casting in line axially with the hinge connections, and an inner suction pipe section secured to the socket casting.

4. In a hydraulic dredge, the combination, with a dredge hull, of a suction frame comprising two connected longitudinal plate girders, each having a hinge lug secured upon it adjacent to its inner end, a socke casting having a transverse flange, through which it is secured to the hull and pairs of hinge lugs, each pair adapted to receive one of the lugs of the suction frame, pivot pins passing through the hinge lugs of the socket casting and suction frame, an outer suction pipe section supported on the suction frame, a ball casting secured to said outer suction pipe section and fitting the socket casting in line axially with the pivot pins, and an inner suction pipe section se cured to the socket casting.

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Witnesses:
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