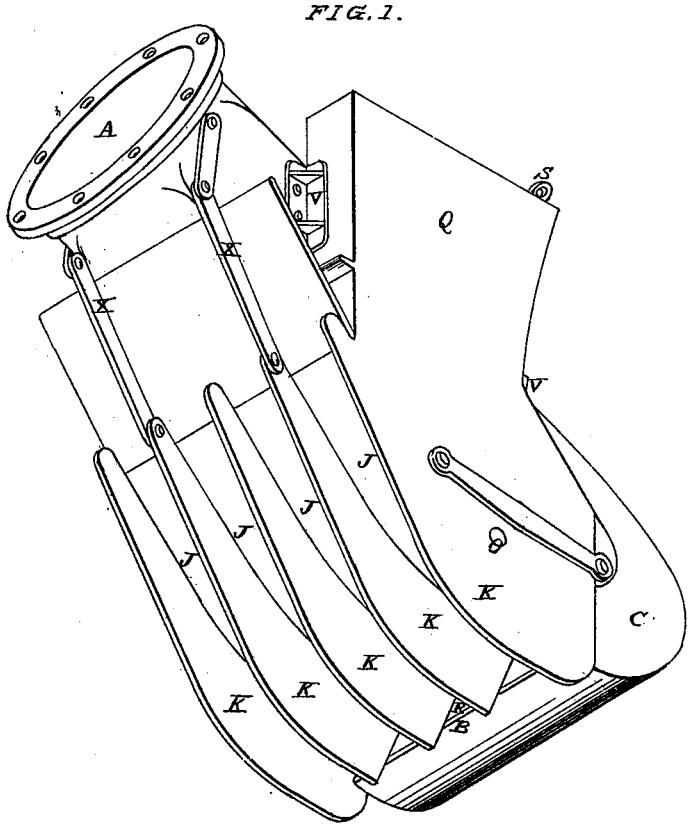
2 Sheets—Sheet 1.

J. B. EADS.

Hydraulic Dredging Machine.

No. 196,646. **Patented Oct. 30, 1877.**

FIG. 1.



ATTEST:

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By Knight Bros.

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2 Sheets—Sheet 2.

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FIG. 2.

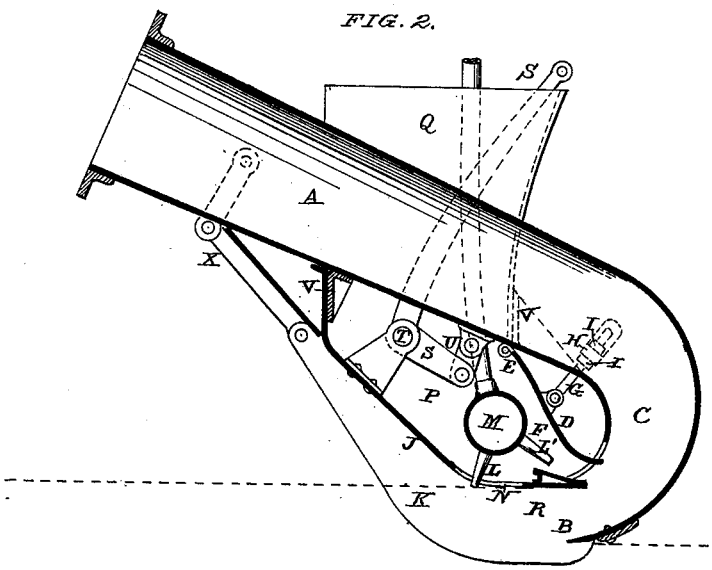
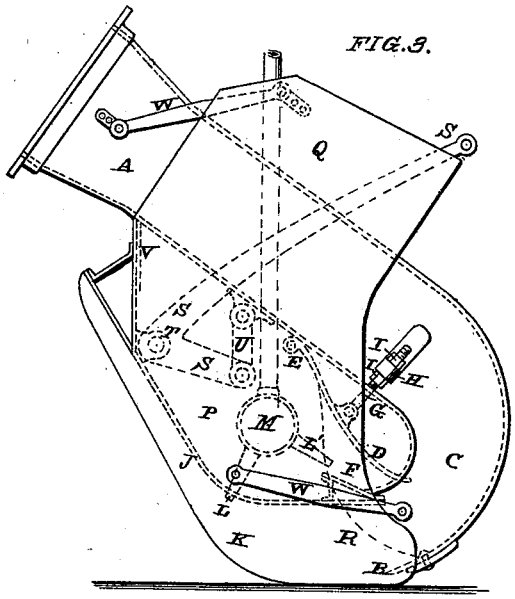


FIG. 3.



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UNITED STATES PATENT OFFICE.

JAMES B. EADS, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN HYDRAULIC DREDGING-MACHINES.

Specification forming part of Letters Patent No. **196,646,** dated October 30, 1877; application filed July 7, 1877.

To all whom it may concern:

Be it known that I, JAMES B. EADS, of the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Hydraulic Dredging-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This is an improvement on my previous invention entitled "Improvement in hydraulic dredging-machines," now on file in the Patent Office. In said invention a scraper at the lower end of a suction-pipe was used to collect the material to be dredged up, and a gage-plate in the scraper, by bearing upon the top of the material in advance of the edge of the scraper, regulated the depth of cut. The scraper was also supplied with orifices for the admission of water to mix with the sand or other dredged material, and vertical cutters acting as runners to carry the scraping-edge over obstructions.

The first part of my present improvement consists in providing means for the vertical adjustment of the scraper proper relatively to the gage-plate, so as to regulate at will the depth of the cut.

The second part of my improvement consists in providing on each side of the suction-pipe water-ducts, through which the clear water from above passes down into the chamber above the gage-plate, and is discharged by atmospheric pressure immediately onto and back of the scraper and mingles with the dredged material, and is drawn up by the suction-pump.

The water, in its passage to the earth or sand dredged up, passes between the gage-plate and an adjustable plate upon the upper side of the end of the suction-pipe, so that the increase of the earth-opening between the scraper-cutter and the gage-plate causes a contraction of the water-opening above the gage-plate, and vice versa, so that, by the vertical adjustment of the scraper portion relatively to the gage-plate, the amount of earth and water may be proportionally adjusted. The plate forming the top of the water-passage, in proximity to the dredged earth, is adjustable, so as to regulate still further the size of the water-passage.

The gage-plate has a number of longitudinal slots, through which a number of water-jet nozzles protrude or come flush with the surface of the gage-plate, and which are all set in a transverse cylinder fixed to rotate on its axis, so as to adjust the inclination of the nozzles, by which the jets may be directed either onto the scraper and into the end of the suction-pipe, or downward to disintegrate the bottom. The jet-cylinder may be fed by a hose extending down to it through the upwardly-extending water-ducts, or through joints at each or either end of the cylinder from outside. Other nozzles extend from the cylinder and discharge into the water-passage above and to the rear of the gage-plate.

In the drawings, Figure 1 is a bottom perspective view of my improvement. Fig. 2 is a longitudinal section of same. Fig. 3 is a side view, somewhat modified in construction.

For the general construction and arrangement of the dredge-boat and dredging apparatus I refer to my former application for description. I shall herein confine myself to the parts in connection with my present improvement.

A is the suction-pipe, conneced to the boat by a joint forming the subject-matter of my Patent No. 189,436, granted to me the 10th day of April, 1877, or any other suitable joint which will allow of the flexure of the pipe at the point of connection with the boat. The pipe ends at bottom in a scraper similar to that described in my application aforesaid, having a cutting-edge, B, and a curved passage-way, C, for the ascent of the sand, earth, or dredged matter.

D is a plate hinged at the upper forward side E to the bottom of the suction-pipe, and forming the top of the water-way F, leading into the passage C. This plate is adjustable, to regulate the size of the water-opening, by screws G, which are connected to the top of the plate, and extend upward through bearings H, and are provided with set-nuts I, for purpose of adjustment.

The parts above are all firmly connected to the suction-pipe, or form part of it; but the parts now about to be described are adjustably connected to the suction-pipe.

J is the gage or sole plate, which is formed to run upon the surface of the sand or earth at the bottom of the water.

K are vertical plates or cutters, of which there are a number running parallel, (five are shown,) and these serve to strengthen the plate J, and to cause the scraper to be lifted over solid obstructions, and also to slice the material entering the dredge into a number of separate bodies, each of which may be lubricated and disintegrated by a separate water-jet from a nozzle, L, discharging water through a longitudinal slot, N, in the gage-plate J.

The nozzles are connected to a transverse water-cylinder, M, which is constructed to be adjustable on axial bearings O at its ends, so that the jet-nozzles may be inclined as may be required. Nozzles L′ discharge into the water-passage F. The water-cylinder M is contained in a water-chamber, P, which is supplied with water by water-ducts Q at each side of the suction-pipe. These water-ducts are open at top, so as to take their water-supply at a distance from the bottom, where the water is clear, or comparatively so. The water-cylinder M is supplied with water from a forcing-pump, through a hose or pipe extending through one or both of the water-ducts, or having connection with the pipe through its axis from the outside. The cylinder may be rotated by any suitable combination of levers or toothed gear, so as to adjust the jets at any desired angle through an arc of one hundred and twenty or one hundred and thirty degrees.

The lower end of the suction-pipe, to which are attached the scraper B and plate D, is adjustable vertically in relation to the gage-plate J, so as to regulate the depth of cut by increasing or decreasing the distance between the edge B of the scraper and the plate J, which latter is supported by the surface of the earth at the bottom of the water.

It will be observed that the plate D ascends and descends with the scraper, so that as the earth-passage R decreases in depth the water-passage F increases, and thus the relative quantity of earth and water is adjusted according to the condition of the earth or sand, (some earth requiring a greater proportion of water than other earth,) and a high velocity of current through the suction and discharge pipes from the pumps requiring a less ratio of water than a low velocity.

The relative vertical adjustment of the scraper and parts attached to it, and the gage-plate and connected parts, may be made by any suitable means. I have provided for this purpose two bell-crank levers, S, fulcrumed at T to the gage-plate portion of the apparatus, and whose shorter arms are connected by links U to the bottom of the suction-pipe.

It will be seen that by movement of the levers a vertical adjustment is had of the lower end of the suction-pipe and scraper. It will only be necessary that connection should be made to the levers S, so as to move them forward, and thus raise the scraper, because the weight of the scraper and suction-pipe would be ample to cause the backward movement of the levers when relieved from the forward draft upon them. This draft or attachment to the levers can be made at the upper end of the suction-pipe, near the universal joint, or on the boat, by any simple and easily-arranged device. The lower end of the suction-pipe may work in vertical guides V, or may be guided by connecting-rods W, or both, so as to insure its proper position relative to the gage-plate part in its vertical adjustments thereupon. The front or upper portion of the gage-plate may be hinged, and is connected to the suction-pipe by the hinged draw-bars X, (see Fig. 1,) to admit of the movement between the scraper and gage-plate, which stands at an inclination, so as to cause the whole to rise over obstructions; or the draw-bars may be dispensed with, as in Fig. 3.

I claim as my invention—

1. The combination, with the gage-plate J, of the adjustable scraper B at the lower end of suction-pipe A, substantially as set forth.

2. The combination, with the gage-plate J and the scraper B, of the plate D, forming the top of the water-passage F, and connected to the scraper, so as to rise and fall therewith, substantially as and for the purpose set forth.

3. In combination with the gage-plate J and vertical plates of the water-ducts Q, forming, respectively, the bottom and sides of the water-passage F, the adjustable top plate D, substantially as and for the purpose set forth.

4. The combination of the gage-plate J with slots or orifices N and adjustable jet-nozzles L, substantially as set forth.

5. The combination, with the scraper part A B D and gage-plate part J Q, adjustable upon each other by the mechanical arrangement, of levers and links S U W, governing said adjustment.

JAS. B. EADS.

Witnesses:
SAML. KNIGHT,
GEO. C. FABIAN.