

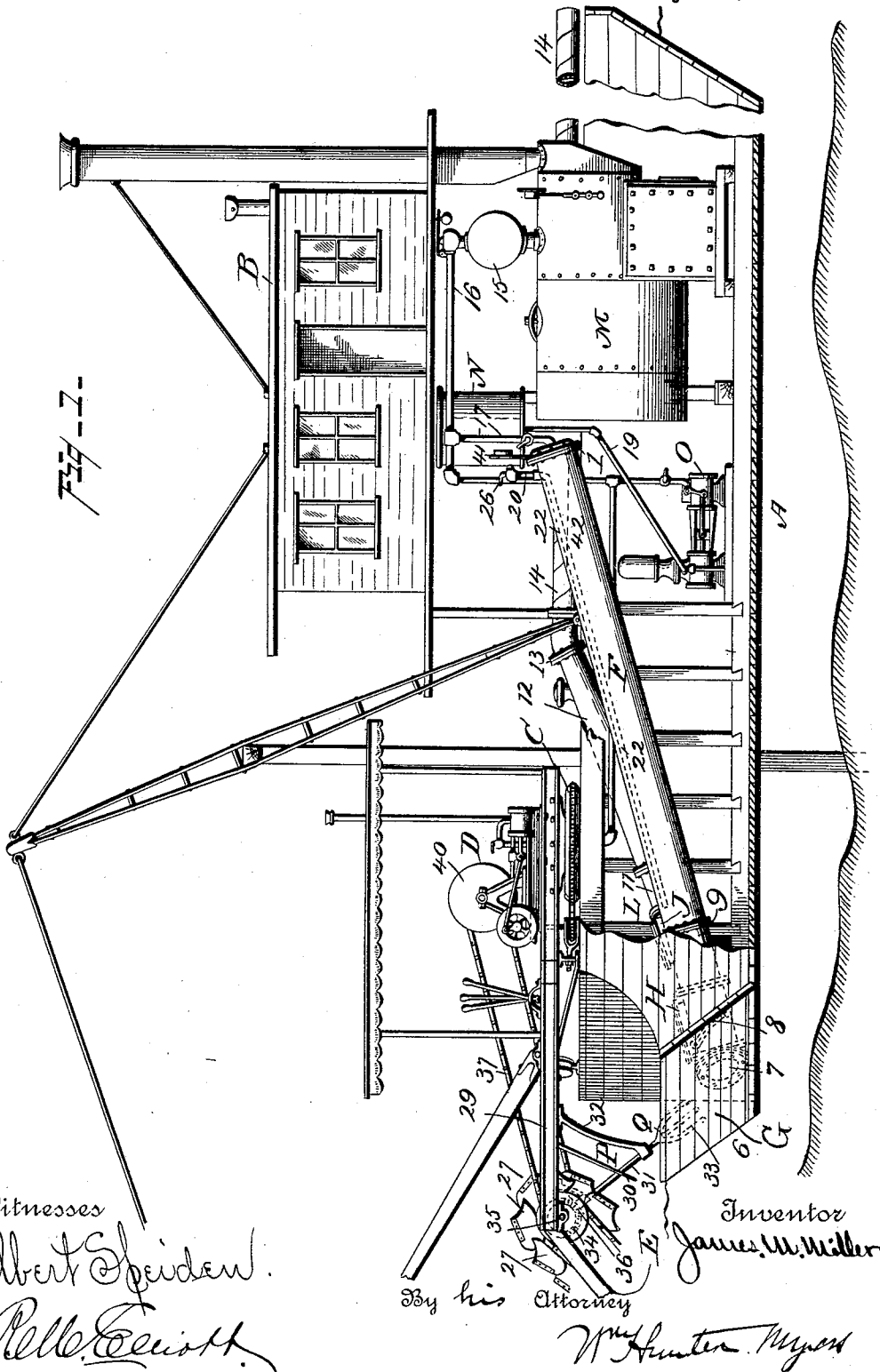
(No Model.)

3 Sheets—Sheet 1.

J. M. MILLER.
DREDGING MACHINE.

No. 479,375.

Patented July 19, 1892.



(No Model.)

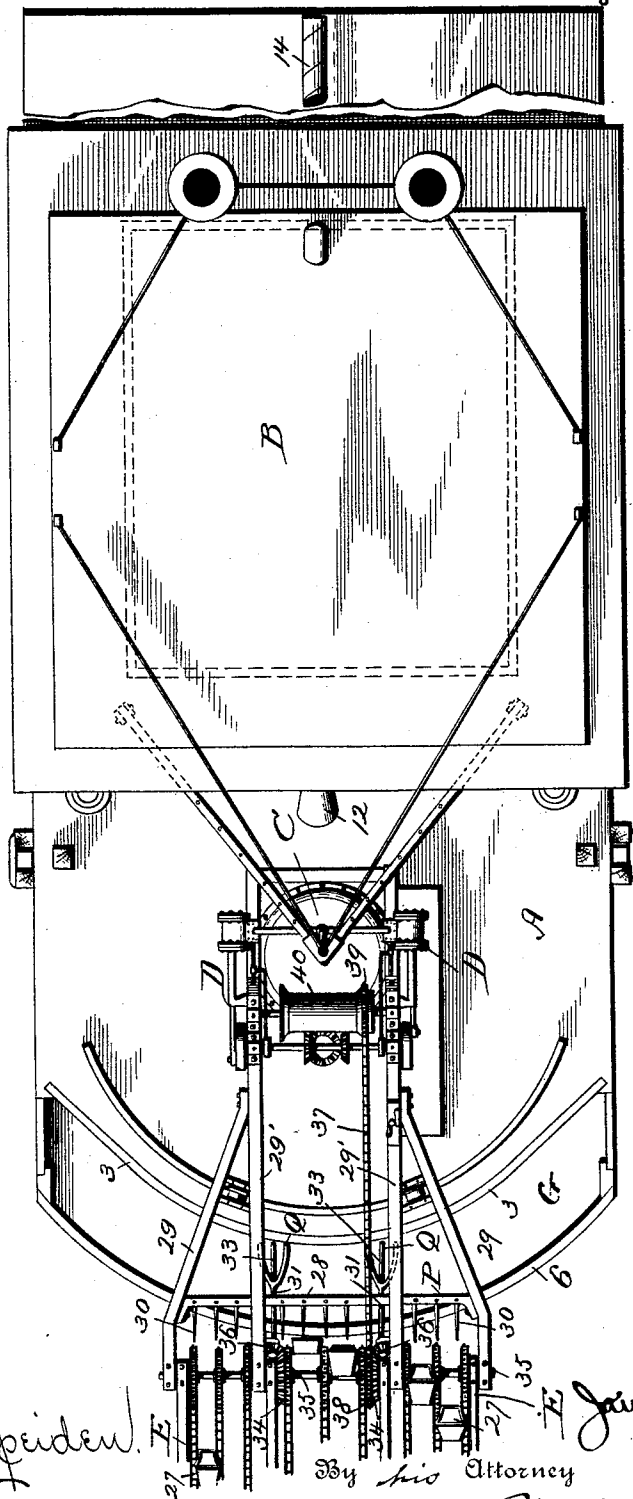
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Fig. 2-



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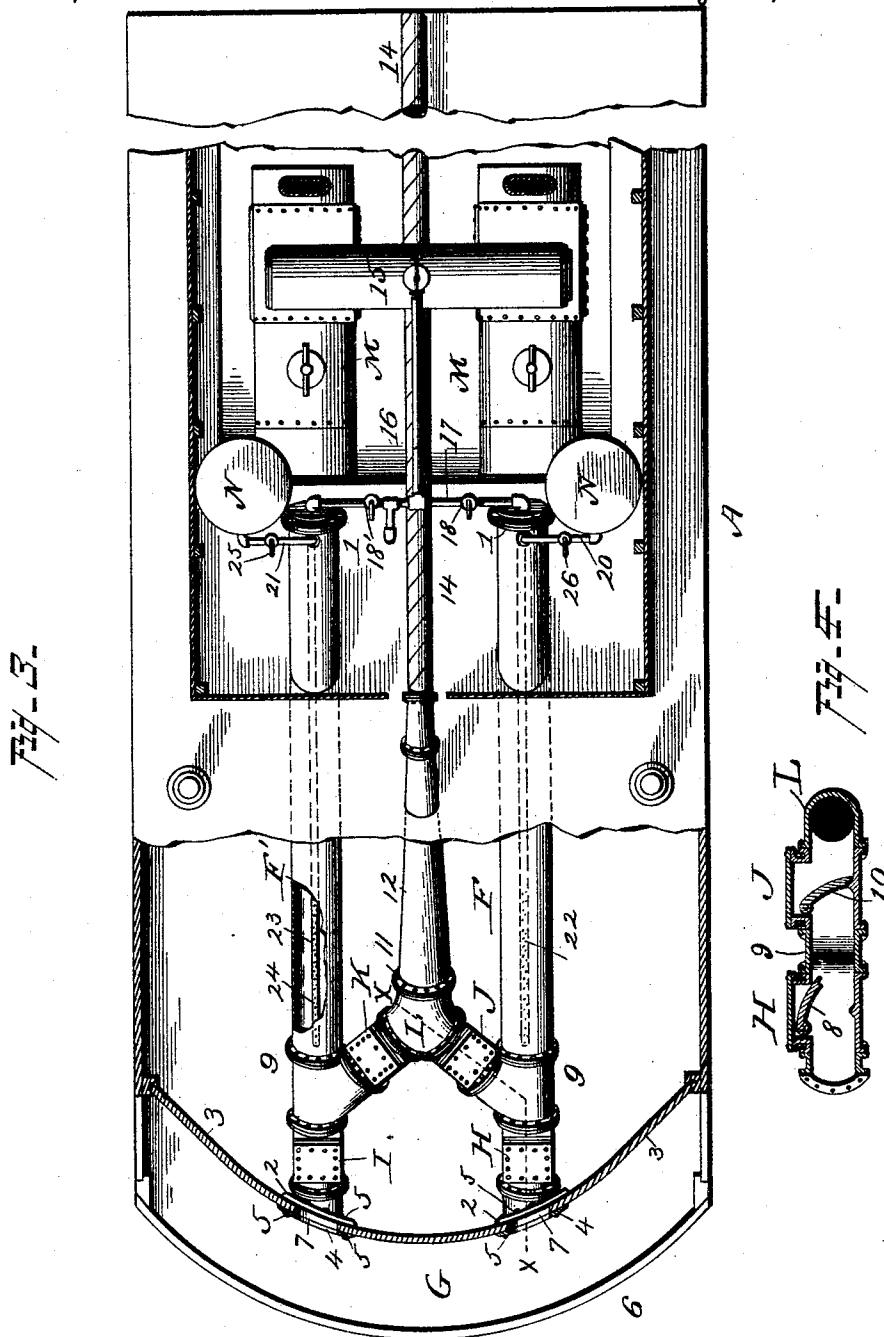
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UNITED STATES PATENT OFFICE.

JAMES M. MILLER, OF WASHINGTON, DISTRICT OF COLUMBIA.

DREDGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 470,375, dated July 19, 1892.

Application filed June 23, 1891. Serial No. 397,228. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. MILLER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Dredging-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to dredging-machines such as are employed for widening or deepening the channels of rivers or harbors.

One object of the invention is to provide a dredge in which the dredged material is first deposited in the barge and then forced under steam-pressure to the dump.

A further object is to provide a dredge having its pumping apparatus so arranged within the barge that a maximum of discharging force is accomplished with a minimum expenditure of power.

A further object is to provide mechanism for automatically separating and removing from the dredged material previous to being taken up and discharged from the dredge all substances which would tend to clog or injure the machine—such, for example, as rocks, &c.

A further object is to provide mechanism for initially agitating, breaking up, and reducing the dredged material placed in the barge to a soft mass, whereby less power will be required to take it up and discharge it from the dredge than were the material left in the condition in which it is deposited from the buckets or shovel.

The invention will first be described in connection with the accompanying drawings and then more fully pointed out in the claims.

In the drawings, Figure 1 is a side elevation of my improved dredge, the hull of the barge being partly in section to show the interior arrangement of the operating mechanism. Fig. 2 is a top plan view showing more particularly the construction and arrangement of the fenders and also the agitators. Fig. 3 is a similar view, partly in section, parts being removed, showing the connection be-

tween the pumps and the discharge-pipe and also the pocket into which the dredged material is deposited by the buckets. Fig. 4 is a vertical sectional view on the line *xx* of Fig. 3, showing the arrangement of the pump-valves.

Referring to the drawings, A designates the barge, B the cabin, and C a turn-table carrying an engine D, which latter, through the medium of interposed mechanism, actuates the turn-table, raises and lowers the ladder E, carrying the buckets, and governs the action of the dredging mechanism. As these parts may be of any well-known or preferred construction, a detailed description of them is deemed unnecessary. The bucket illustrated, however, is of peculiar construction, having an upwardly-curved and forwardly-projecting bottom, and while I make no claim in this application to any form of bucket yet I wish it to be distinctly understood that I have devised a bucket in which the above-noted peculiarity constitutes an essential feature and which I intend to claim in another application for patent.

F designates two parallel steam and vacuum pumps, each of which is constructed of a cylinder of any desired length and diameter and closed at its upper end by a cylinder-head 1. The lower open ends of the cylinders are each provided with a peripheral flange 2, which abuts against one side of a bulk-head 3, and on the other side of the bulk-head are placed plates 4, which latter, together with the cylinders, are held rigidly in position by bolts 5, which pass through the said flanges, plates, and the bulk-head. The bulk-head 3 and the plates 4 are provided with openings of a size equal to the bore of the cylinders in order to allow the latter to open into a pocket G, formed between the bulk-head 3 and the rake 6, which pocket forms a receptacle, into which the dredged material is primarily deposited, there to be disintegrated and admixed with water previous to being taken up for discharge at the dump.

The cylinders F are supported in an inclined position, so that their lower ends at the points where they connect with the bulk-head will be below the surface of the material in the pocket and their upper ends will be raised to any desired height, but by pref-

erence only to height sufficient to cause the dredged material to cover the lower ends only of the cylinders, thus sealing the inlet-openings 7. The object of this arrangement is, first, to prevent the admission of air to the cylinders, and, secondly, to reduce to an approximate minimum the resistance to the admission of the dredged material into the cylinders.

H I designate two valve-cases, one of which is located near the inlet-opening of either cylinder and which carry inwardly-opening valves 8. To each of the cylinders, at a point above the said cases, is secured a joint or connection 9, carrying similar valve-cases J K and inwardly-opening valves 10, and to each of the latter cases is secured one arm of a three-way coupling L, the free arm 11 of which connects with a discharge-nozzle 12. This nozzle is by preference tapered from the point at which it connects with the coupling L to its outer end 13, where it connects with the escape-pipe 14, and by this construction the dredged material is discharged with a far-greater force than if the nozzle were of the same diameter throughout its entire length.

M designates two boilers, the steam from which is led to a drum 15, and from the drum through a steam-pipe 16 to a branch pipe 17, connecting therewith, which latter pipe connects with the cylinder-heads 1, valves 18 being provided to regulate the supply of steam to the respective cylinders.

N designates two water-tanks, which are located above the boilers and connect by means of a pipe 19 with a force-pump O, which stores the water in the tanks under greater pressure than the steam-pressure of the boilers. Connecting with the tanks are pipes 20 21, which connect with pipes 22 23, arranged within the cylinders near the upper sides thereof and extend nearly throughout their entire length. These latter pipes are provided with a plurality of perforations 24 to allow the water to escape in numerous jets, the water-supply being regulated by valves 25 26.

P designates the screen or fender for separating rocks, &c., from the dredged material as it is discharged from the buckets 27 into the pocket G. This fender is arranged behind and adjacent to the buckets and consists of a transverse beam 28, which is rigidly secured at its ends to the side braces 29 of the turn-table and intermediately to the main beams 29', and of a series of fingers 30, secured to the said beam and extending at an angle therefrom, as clearly shown in Fig. 1.

Q designates the agitators, each of which consists of a shaft 31, suitably journaled in brackets 32, carried by the main beams 29' of the turn-table and extending at an angle approximately parallel to the rake 6, and a series of fingers or stirrers 33, secured to the lower ends of the shafts and extending a sufficient distance downward within the pocket G to agitate and disintegrate the dredged material adjacent to the inlet-openings 7. Motion

is imparted to the agitator-shafts by means of bevel-gears 34, carried by the main drive-shaft 35, carrying the dredging apparatus and meshing with similar gears 36, carried by the agitator-shafts.

The ladder E, to which reference has been made, receives motion for its buckets from a sprocket-chain 37, which passes around a sprocket-wheel 38 on the main drive-shaft 35 and around a similar wheel 39, carried by the drum 40 of the engine D. The buckets 27 are so arranged with relation to each other that but one will empty at a time, by which arrangement a constant supply of dredged material is fed to the pocket G with but a small expenditure of power.

Having thus described the different parts of the dredge, I will explain the manner of its operation. The engine D is first started in order to cause the buckets to fill the pocket G with dredged material, and coincidently with the starting of the buckets the agitators begin to work, breaking up and reducing the material in the pocket to a soft mass. It is designed that the upper edge of the rake and the sides of the pocket as far back as the bulk-head shall be on or but slightly above the water-line, so that the agitation of the water caused by the rotation of the buckets will keep the pocket plentifully supplied with water. As soon as the material in the pocket is in condition to be taken up and discharged, the valve 18 is opened to allow steam to fill the cylinder F, after which the said valve is closed and the valve 26 is opened to allow water from the tank to escape through the jet-pipe 22 into the cylinder, thus condensing the steam and creating a vacuum, after which the valve 26 is closed. The vacuum in the cylinders is readily ascertained by means of vacuum-gages 41, one of which is carried by each of the cylinder-heads. The vacuum thus created is filled or practically so by the material in the pocket, which is forced in by atmospheric pressure until it about reaches the level indicated by dotted lines at 42 in Fig. 1, the ingress of the material causing the valve 8 in the casing H to assume the open position shown in Fig. 4. The valve 18 is again opened, admitting steam to the cylinder F, which forces the dredged material therein out through the joint 9 and valve-case J, opening the valve 10 and allowing the material to escape through the nozzle 12 and escape-pipe 14 to the dump. As soon as the material starts to leave the cylinder F the valve 8 is automatically closed by the back-pressure of the material, thus preventing any escape of the same to the pocket G. While the cylinder F is exhausting, the cylinder F' is filled by manipulating the valves 18' and 25, which perform the same function as the valves 18 and 26, so that there is a constant discharge of dredged material from the escape-pipe. The action of the valves 8 and 10 is the same in both cylinders—that is, the former are opened by the ingress of the material and are closed

by the escape, and the latter are closed by the ingress of the material and are opened by the escape.

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

1. In a dredge, the combination, with a barge having a pocket and mechanism for depositing dredged material within the said pocket, of a steam and vacuum pumping apparatus supported in an inclined position on the barge and opening at its lower end into the pocket below the water-line.

2. In a dredge, a barge having a pocket and mechanism for depositing dredged material within the said pocket, in combination with a steam and vacuum pumping apparatus opening into the pocket, a tapered discharge-nozzle, and a discharge-pipe connecting therewith and leading to the dump, and connections uniting the said apparatus and the nozzle.

3. In a dredge, a barge having a pocket and mechanism for depositing dredged material within the said pocket, in combination with a fender located behind the dredging mechanism and a series of agitators arranged within the pocket.

4. In a dredge, a barge having a pocket, mechanism for depositing dredged material within the said pocket, a steam and vacuum pumping apparatus opening into the pocket, and a series of agitators for disintegrating the material in the pocket.

5. In a dredge, a barge having a pocket open at or slightly above the water-line and mechanism for depositing dredged material within the said pocket, in combination with a series of agitators arranged within the pocket and means for actuating the dredging mechanism and the agitators in unison.

6. In a dredge, a barge having a pocket open at or slightly above the water-line and a series of agitators arranged within the said pocket, in combination with a drive-shaft carrying the dredging apparatus and mechanism carried by the shaft for actuating the agitators.

7. In a dredge, the combination, with a barge having a pocket and mechanism for depositing dredged material within the pocket, of a steam and vacuum pumping apparatus supported in an inclined position on the barge and opening into the pocket below the water-line, said apparatus comprising two parallel cylinders, a discharge-pipe, a three-way coupling connecting the said cylinders and discharge-pipe and provided with automatically-operating valves, and steam-supply and water-supply pipes connecting with the cylinders.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES M. MILLER.

Witnesses:

G. W. BALLOCH,
R. M. ELLIOTT.