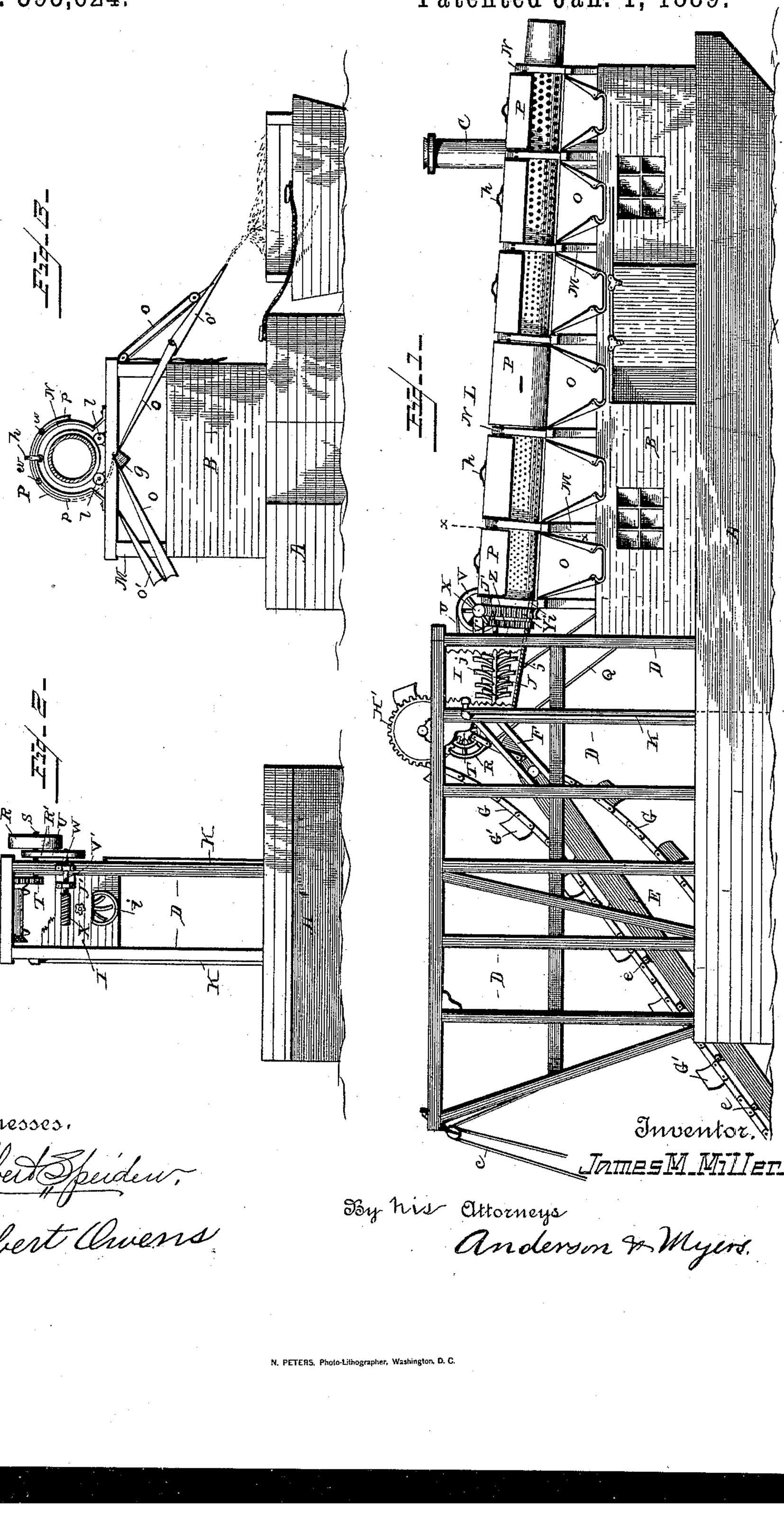
(No Model.)

# J. M. MILLER.

## APPARATUS FOR DREDGING, WASHING, AND SEPARATING SAND AND GRAVEL.

No. 395,624. Patented Jan. 1, 1889.



Witnesses.
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# UNITED STATES PATENT OFFICE.

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

## APPARATUS FOR DREDGING, WASHING, AND SEPARATING SAND AND GRAVEL.

SPECIFICATION forming part of Letters Patent No. 395,624, dated January 1, 1889.

Application filed March 31, 1888. Serial No. 269,092. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES M. MILLER, a citizen of the United States of America, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Apparatus for Dredging, Washing, and Separating Sand and Gravel, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to mechanism for dredging, washing, and separating sand and gravel; and it has for its object to provide an apparatus which will dig mixed sand and gravel from the bed of a river and deliver it, first, to a washer wherein the contained mud is taken up by the water, and finally to a screen, by which the sand is graded as to fineness and the gravel is separated from the sand, the muddy water leaving the screen with the sand and then separating from the latter.

My invention will first be described in connection with the accompanying drawings, and then clearly pointed out in the claims.

Figure 1 of the drawings is a side elevation of the apparatus. Fig. 2 is an end elevation with cabin and screen removed, looking to the rear. Fig. 3 is a transverse section of the screen, taken on the line *x x*, Fig. 1, and a rear end elevation of the barge and its cabin with the frame-work for the dredge removed, and showing, also, a scow alongside the barge.

Referring to the drawings, A represents a barge having a cabin, B, in which are located the boilers and engines for operating the apparatus, no part of which, however, except the smoke-stack C, is seen. In rear of the cabin there is an open frame-work, D, for supporting the dredging and washing mechanism, the bottom and deck of the barge being cut out, as shown in Fig. 3, as far back as the dotted lines in Fig. 1, to permit the required movements of the dredge-ladder E, whose upper end is journaled in slotted supports F, one of which is secured at each side of the frame-work, the ladder being raised and lowered by means of a block and fall, *c*, (a portion only of which is shown,) attached to its lower end. The upper side of the ladder is provided at suitable intervals with friction-rolls *e*, over which passes the endless chain G, to which the buckets G′ are attached, and which also passes at the bottom over a smooth bearing-drum (not shown) and at the top of the frame-work D over a driving-drum, H.

I represents the washer-box, secured in the frame-work D in front of and just below the driving-drum. The bottom of the box is concave and inclines downward toward the discharge-spout *i*, which enters the end of the screen. A shaft, J, passes longitudinally through this box in a horizontal plane, and is provided with a series of fixed agitator-blades, *j*, each of a length to reach to within about half an inch of the bottom, and all the blades being curved toward the rear for a purpose soon to be explained. Water is supplied to this box by means of two supply-pipes, K, leading from a pump (not seen) in the engine-room.

L represents a revoluble screen consisting of a perforated sheet-metal cylinder mounted on friction-rolls *l*, secured on top of frames M, rising above the cabin-roof, the screen being held in place by metal bands N, passing over it and secured to the frames, as clearly seen in Fig. 3. By thus locating the screen over the top of the cabin I have saved all the space that it would otherwise have necessarily occupied, and also dispensed with braces for the aprons.

O represents a series of sheet-metal aprons, whose upper ends are secured to a girder, *g*, extending longitudinally under the screen and attached to the frames M, and whose lower ends are supported by the upper outer edges of the cabin, the side edges of the aprons being turned upward and inward, as seen in Fig. 1, and O′ represents a chute hinged to the outer end of each apron for conveying the sand and gravel into a scow lying alongside the barge, each chute being lowered and raised by a block and fall, *o*, as seen in Fig. 3.

The different sections of the screen (by which I mean those parts under which the aprons are placed) are each perforated with holes of one size, the perforations in the section nearest the washer being the smallest, those in the next section a little larger, and so on to the last two sections, the perforations in which are of a size to pass gravel. That part of the screen which overhangs the end

of the cabin is without perforations, and serves to convey stones, shells, and other like refuse matter overboard.

P represents a series of movable sheet-metal deflectors, secured in position between the bands N by means of small flanged wheels *w* on overhanging portions *p* of the deflectors, two of which wheels bear upon the upper side and one upon the lower side of each band, as seen in Fig. 3. Each deflector is provided with a hand-hold, *h*. The purpose of the deflectors is to direct all the sand and gravel to the aprons on one side of the barge when but one scow is to be filled at a time, as seen in Fig. 3, wherein the deflecting position of the deflector is shown in dotted lines. When, however, it is desired to load two scows at once—one on each side of the barge—the deflectors are thrown up over the screen, as seen clearly in full lines in Figs. 1 and 3.

The dredge, the washer, and the screen are all operated by a belt, Q, leading from a main shaft (not seen) in the engine-room to a belt-pulley, R, on a shaft, S, journaled in the frame-work D. A pinion, T, on the inner end of shaft S, gears with a cog-gear, H′, on the driving-drum H of the dredge, and a belt, U, leads from a pulley, R′, on shaft S to another pulley, V, on a shaft, W, journaled in a bracket, V′, secured to the frame-work D in front of the washer-box I. The inner end of the shaft W is provided with a worm-screw, X, which gears into an annular gear-wheel, Y, secured over the end of the screen, and an annular toothed gear-wheel, Z, secured to the end of the screen, meshes with a pinion, J′, on the end of the agitator-shaft J.

When the apparatus is in operation, the dredge-buckets empty their contents into the washer-box I, and at the same time the box is supplied with clear water through the supply-pipes K. By means of the small pinion J′, gearing into the large wheel Z, the agitator-shaft J is caused to revolve very rapidly, and thus thoroughly agitate the contents of the box, which, by reason of the peculiar formation of the agitator-blades, are retarded in their passage from the washer, the mud in the meantime becoming thoroughly incorporated with the water. Then the muddy water, sand, and gravel leave the box through spout *i* and enter the screen, which revolves slowly, from which the two former escape through the finer perforations and flow together down the aprons and through the chutes onto the barge, where the sand will remain, and the water, still holding the mud in solution, will flow overboard. In this manner the gravel has become separated from the sand, and will descend through the screen until it reaches the larger perforations, when it too will fall onto the aprons and be conducted into the compartment in the scow provided to receive it, while rocks, shells, and other like refuse matter will pass out of the lower end of the screen and fall overboard.

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

1. The combination, with a barge, of a dredge, a washer into which the dredge empties the dredged material, means, substantially as described, for supplying clear water to the washer, a revoluble screen in communication with the washer, and mechanism for operating the dredge, the washer, and the screen, as set forth.

2. The combination, with a barge provided with a cabin, of a dredge located at one end of the barge, a washer into which the dredge empties the dredged material, means, substantially as described, for supplying clear water to the washer, a revoluble screen mounted longitudinally of the barge above the cabin and in communication with the washer, aprons inclined outwardly and downwardly from underneath the screen and supported by the cabin, and mechanism for operating the dredge, the washer, and the screen, as set forth.

3. The combination, with a barge and a dredge and revoluble screen mounted on the barge, of a washer located between the dredge and screen, so as to receive the dredged material from the former and empty it into the latter, said washer consisting of a box having a concave inclined bottom, and an agitator-shaft mounted in a horizontal plane in said box and provided with a series of blades of various lengths reaching to near the inclined bottom of the box, pipes for supplying clear water to the washer, and mechanism for operating the dredge, the washer, and the screen, substantially as described.

4. The combination, with the barge and a dredge and revoluble screen mounted on the barge, of a washer located between the dredge and screen, so as to receive the dredged material from the former and empty it into the latter, said washer consisting of a box having a concave inclined bottom, and an agitator-shaft mounted in a horizontal plane longitudinally in said box and provided with rearwardly-curved blades of unequal lengths reaching to near the inclined bottom of the box, pipes for supplying clear water to the washer, and mechanism for operating the dredge, the washer, and the screen, substantially as described.

5. The combination, with the revoluble screen and downwardly and outwardly inclined aprons secured underneath the same on each side, of swinging deflectors adapted to be swung to either side of the screen for the purpose of deflecting the screened material onto either one of the aprons, as desired, substantially as described.

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

JAMES M. MILLER.

Witnesses:

WM. HUNTER MYERS,

ROBERT OWENS.