

No. 665,835.

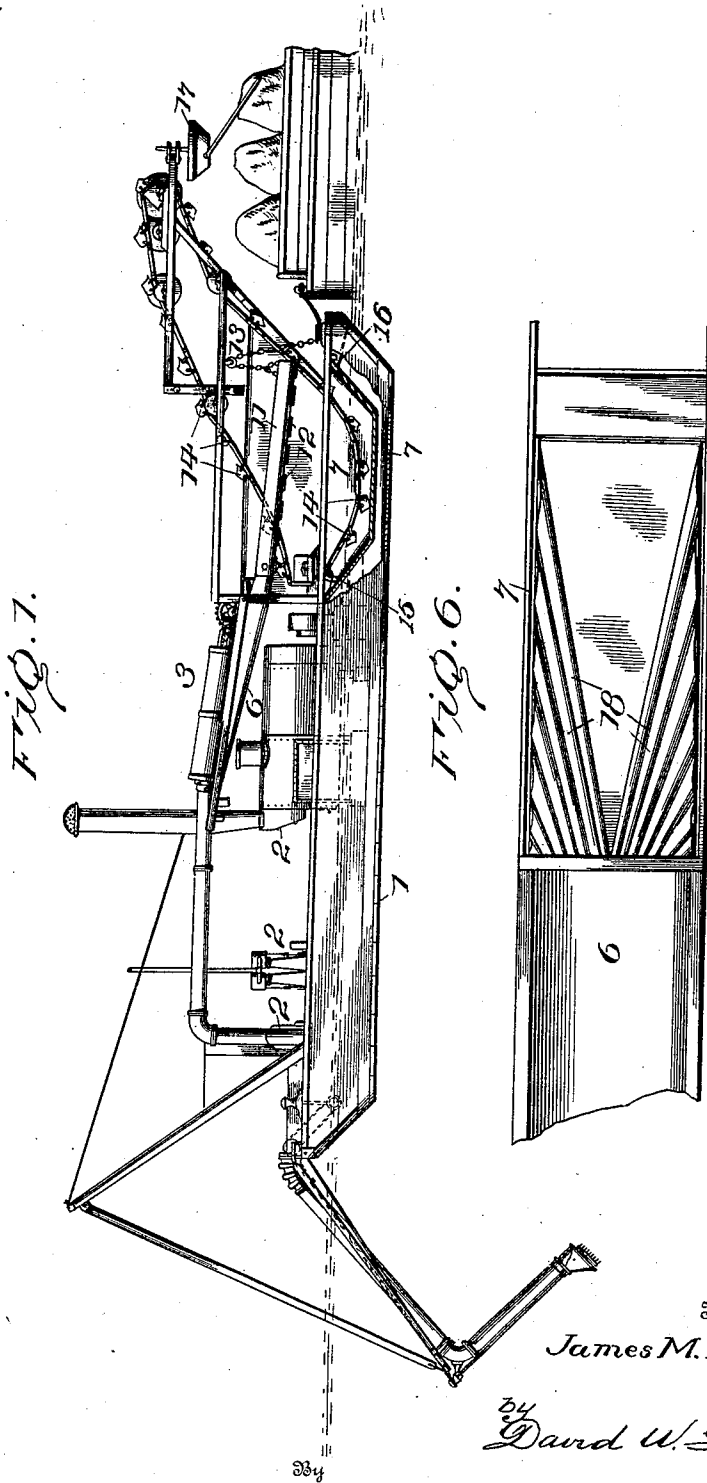
Patented Jan. 8, 1901.

J. M. MILLER.
SAND WASHING APPARATUS.

(Application filed Oct. 13, 1900.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses

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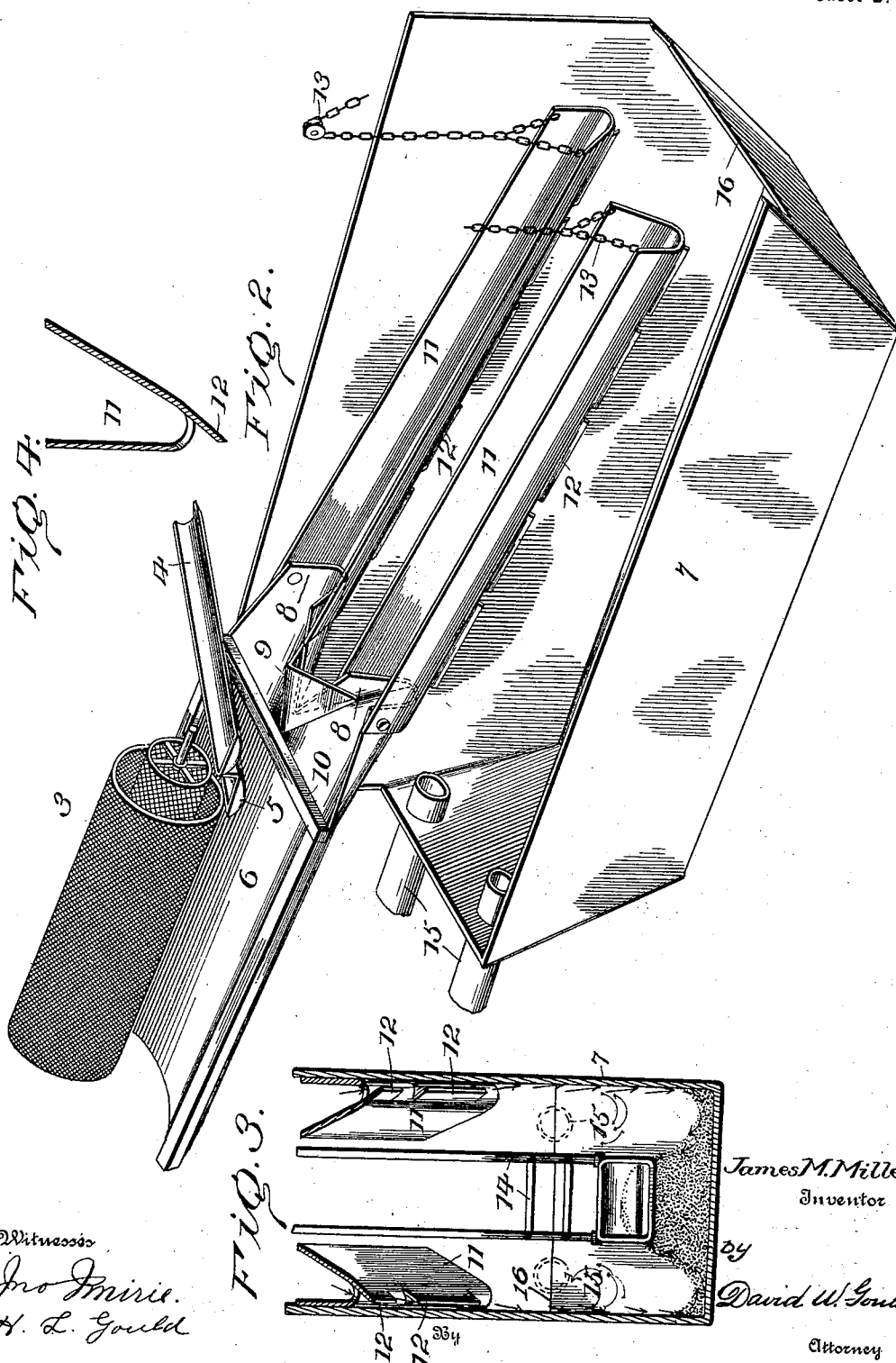
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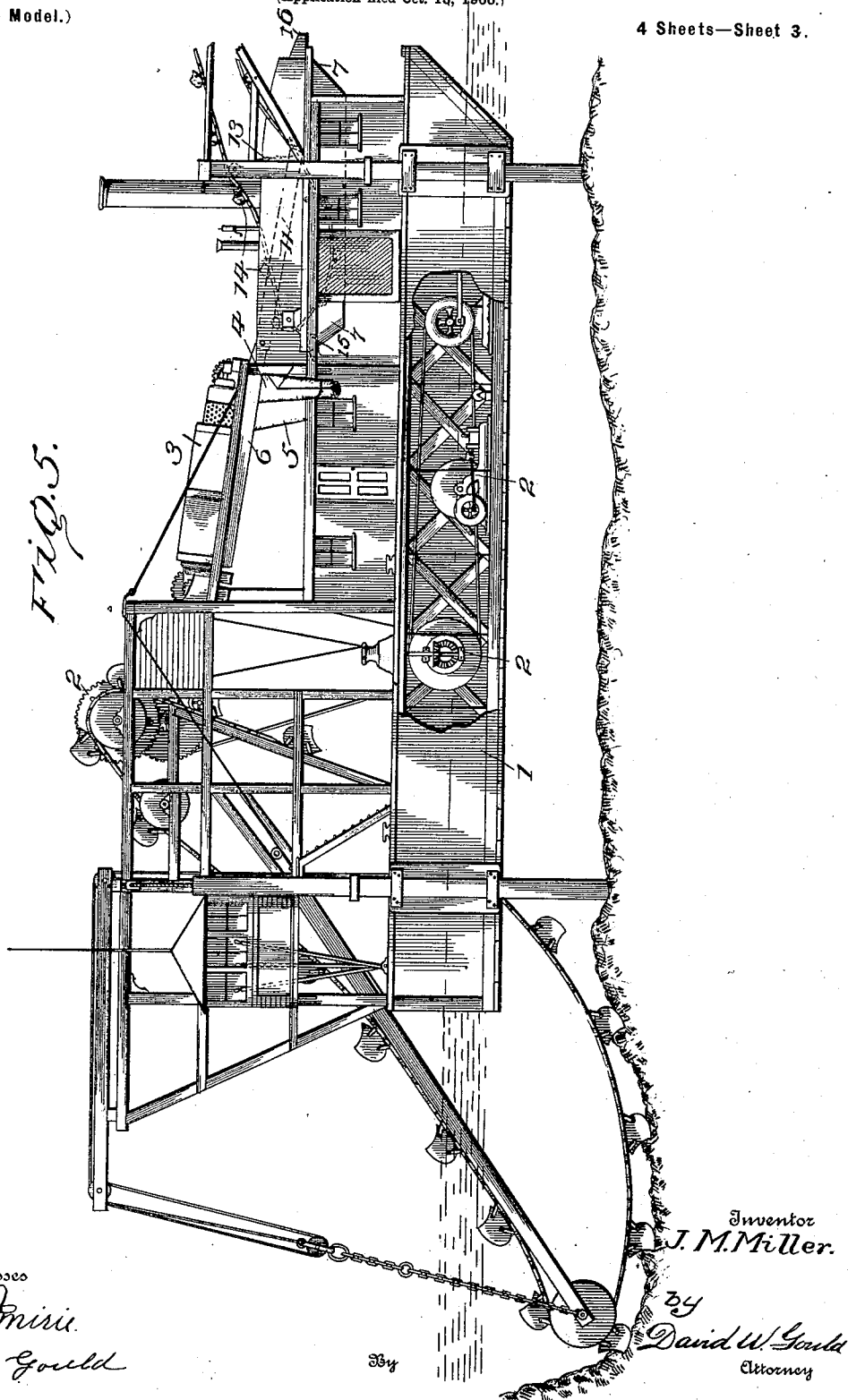
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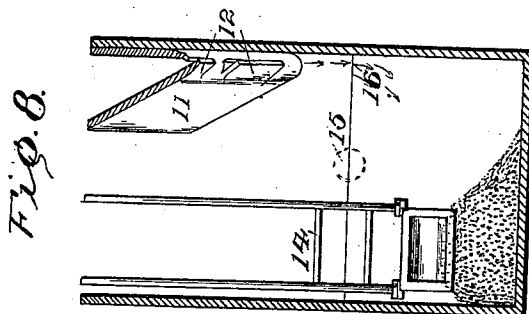
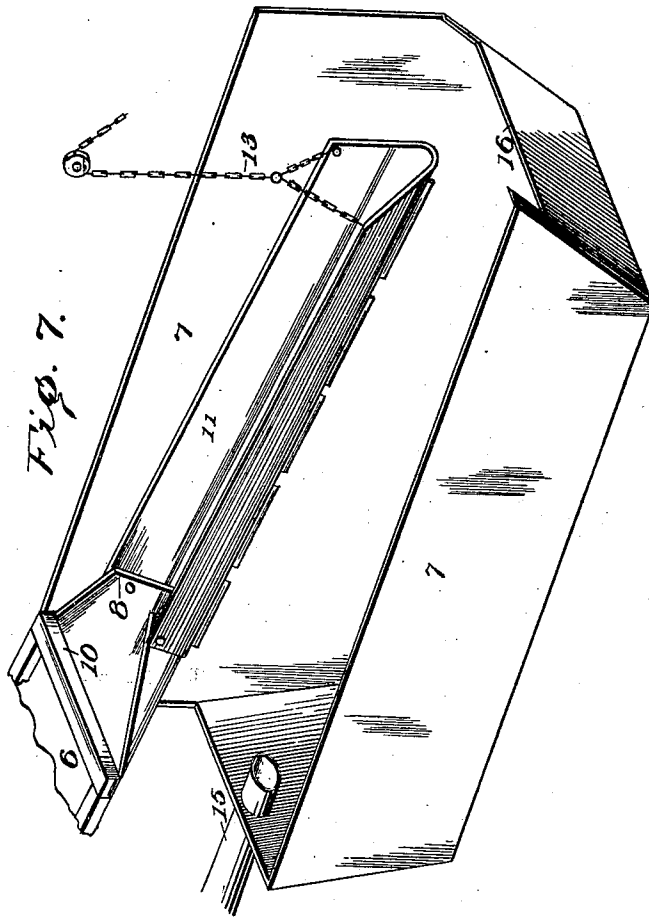
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

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

SAND-WASHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 665,835, dated January 8, 1901.

Application filed October 13, 1900. Serial No. 32,993. (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 Sand-Washing Apparatus; and I do hereby 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.

The invention relates to certain new and useful improvements in sand-cleansing apparatus for use in connection with sand dredging and screening machinery.

The main object of the invention is the production of sand-cleansing apparatus designed to receive the material directly from the screen, separate the sand and mud and water, force the latter overboard, and meanwhile deposit the cleansed sand in a ridge centrally on the bottom of the tank in position to be taken up by an endless chain of buckets for delivery.

In present practice the material is usually delivered from its screen directly to scows specially constructed with overflow-openings to discharge the mud and water. The constant agitation of the material on the scow, due to the delivery, results in a loss of more or less sand through the overflow-openings, while a considerable portion of the mud and other impurities remain. In my improvement the material is delivered to the cleansing apparatus in a manner to practically avoid agitation of the contents of the tank, and hence a greater portion of the sand in a more cleanly condition is retained than by the present practice. The jarring incident to the travel of the buckets after taking the sand from the tank and before delivery causes the water taken up with the sand to overflow the sides, thereby delivering the sand in a practically dry condition. Furthermore, the necessity of overflow-openings in the scows now in use requires that all material be loaded on deck and prohibits direct delivery to vessels, ordinary scows, or the like, while by the use of my improvement the sand may be delivered direct to any suitable carrier.

Other objects of the invention will be apparent from the following detailed descrip-

tion, taken in connection with the accompanying drawings, in which—

Figure 1 is a view in elevation, partially broken out, of a hydraulic dredge provided with my improvement. Fig. 2 is a perspective view illustrating the sand-cleansing apparatus, the tank and troughs being foreshortened and a portion of one side wall of the tank omitted. Fig. 3 is a vertical section of the cleansing apparatus, showing the delivery-buckets in elevation, the direction of the material after delivery from the troughs being indicated by arrows and the accumulation of the cleansed sand illustrated. Fig. 4 is an enlarged vertical section of one of the troughs, taken on a line through one of its deflecting-lips. Fig. 5 is a view in elevation, partially broken out, showing my invention applied to an endless-chain bucket-dredge. Fig. 6 is a plan view illustrating a modified form of delivery to the cleansing-tank. Fig. 7 is a perspective view of a modified construction of my improvement, the tank being foreshortened and one side wall and the delivery-buckets being omitted. Fig. 8 is a cross-section of the same, the delivery-buckets being shown in elevation.

In the drawings, 1 represents the hull of the dredge, 2 the machinery by which power is supplied to operate the various parts, 3 a revoluble screen for the separation of the material, 4 a chute for boulders or the like, 5 a gravel-chute, and 6 a chute for the finer material, all of which parts may be of usual and well-known construction and arrangement.

The sand-cleansing apparatus is located in the stern or delivery end of the dredge and comprises a tank 7, which in the hydraulic dredge indicated in Fig. 1 is set into the deck and rests on the bottom keelsons. The tank has inclined end walls and vertical side walls projecting a considerable distance above the end walls. The chute 6, which, as before described, receives the fine material from the screen, has its rear or delivery end projecting a slight distance over the front end wall of the tank and is divided at its central portion and bent upward to form discharge ends 8. A deflector 9, overlying the divided portion of the chute, insures the passage of all material through the discharge ends, a head-

board 10, forward of the deflector, checking a too-rapid delivery of the material. Pivoted to each discharge end of the chute is a trough 11, having one wall vertical to rest snugly against the side wall of the tank, as shown in Fig. 3. In the bottom of each trough a series of downwardly-projecting lips 12 is formed by cutting the material and bending the cut portion downward, as clearly shown in the drawings. These lips are arranged so that their free ends project toward and in proximity to the side walls of the tank. The rear or free ends of the troughs are each connected with a suitable elevating device, as a block and fall 13, to permit a variation in the incline of the trough for a purpose hereinafter described. The troughs are of such size as to permit an endless series of buckets 14 to pass between them to take up the cleansed sand.

Projecting through the front wall of the tank and near the side walls are two pipes 15, one at each side, through which pipes a steady stream of water under pressure is delivered from any suitable source during the operation of the apparatus. The rear wall of the tank is cut out at 16 on a level with the mouths of pipes 15 to provide an overflow for the refuse material from the tank. The delivery-buckets 14, suitably supported and driven, are designed to pass into the tank, travel from one end to the other therein, and deliver the material taken up to a hopper 17, from which it is discharged into the carrier. The inclination of the end walls of the tank facilitate the passage of the buckets along the entire bottom of the tank, preventing the accumulation of sand at the ends of the tank. The length of travel of the buckets from the tank to the hopper will permit most of the water taken up with the sand by the buckets to escape therefrom, delivering the sand to the hopper in a practically dry condition.

In Fig. 5 I have illustrated my invention as applied to the endless-chain bucket-dredge, in which class of apparatus the machinery necessary to drive the various parts occupies practically all available space below deck, and hence the cleansing-tank is preferably supported in the roof-frame of the afterdeck-house, the overflow-opening 16 of the tank being so located with relation to the stern of the dredge as to discharge directly overboard. With the exception noted the construction and arrangement of the parts hereinbefore described are identical in both classes of dredge.

In Fig. 6 is shown a modified form of delivery from chute 6 to the cleansing-tank, in which instead of the specially-formed troughs 11 a series of ordinary troughs (or pipes, if preferred) lead from the chute to near the side walls of the tank, discharging from their ends only and being arranged in sufficient number and size to permit their discharge ends to extend practically continuous of the side walls of the tank, as clearly illustrated, thus distributing the material evenly through-

out the length of the side walls. The free or discharge ends of these troughs 18 may be supported in a manner to permit their being raised or lowered or may be rigidly supported by the side walls of the tank.

In operation, assuming the parts to be constructed and arranged as described, the machinery of the dredge is started, and when the dredged material has reached the tank the latter will have been filled or partially filled with water from pipes 15. The fine material from the screen passes down chute 6 and in the preferred construction along the troughs 11, passing out the series of openings in the bottoms thereof and being directed by the lips 12 against the side walls of the tank above the level of its contents. The material runs down the side walls, as indicated by arrows in Fig. 3, and passes into the water, the lips being so arranged and in such number as to distribute the material evenly. The sand being heavier than the refuse will descend to near the bottom of the tank and by the momentum gained in its fall and under the influence of the eddies created by the current of mud and water in descent will curve inward from the sides and heap up in a ridge about centrally of the bottom, as illustrated in Fig. 3, while the mud and water will through the above-mentioned eddies remain in a column on each side the vertical plane of the ridge of sand and holding in suspension all refuse material. This column of water will be met at or near its surface by the cross-currents from the pipes 15, which will drive off the refuse material through the overflow 16, and thereby create an upward current, causing the refuse to continually move toward the surface until met by the cross-currents and driven off. The force of these cross-currents is so regulated as to effectively carry off refuse material without creating a current sufficient to disturb the sand on the bottom of the tank. It will thus be seen that the mud and water are separated from the sand and forced out of the tank, while the sand is piled up on the bottom in a convenient position to be taken up by the buckets.

In the continued operation of my cleansing apparatus agitation or stirring up of the contents of the tank is prevented, as the material is delivered against the side walls and not directly into the contents, and hence the sand when once deposited on the bottom of the tank will not be disturbed until taken up by the buckets.

The troughs are designed to have such inclination from the horizontal as will feed the material at the proper speed; but should this inclination be altered, as by the loading or lightening of either end of the dredge for any purpose, the troughs may again be set at the proper incline through use of the block and fall 13 in an obvious manner.

While I have described and shown the extended side walls of the tank as being an integral part of the tank, it is evident that, if

desired, they may be separate therefrom and in use slightly overlie at bottom the upper edge of the tank-walls. Such a construction would permit their ready removal when not in use to give added space for other purposes.

I am aware that a washing-tank has heretofore been used in connection with a dredge; but in all such constructions with which I am familiar the material is discharged directly into the contents of the tank, keeping the sand constantly agitated and stirred up, whereby the sand and refuse do not properly separate and the object desired is defeated. The gist of my improvement, therefore, resides in the manner of delivery to the tank, wherein practically all agitation is avoided and the sand once cleansed and deposited remains undisturbed except by the buckets, and while I have shown and described the preferred construction for accomplishing this result I am not to be understood as limiting myself thereto, as changes in form and the substitution of equivalents may be used without departing from the spirit and scope of my invention.

In the above description the use of a plurality of troughs discharging against the opposite side walls of the tank is indicated; but it is to be understood that my apparatus will be effective in the use of a discharge against one side wall of the tank only, in which construction the sand will be piled up on the bottom of the tank adjacent the opposite side wall, the buckets being arranged to take up sand from this position. In this construction only one pipe 15 will be used and the discharge end of chute 6 arranged to direct material toward but one side wall of the tank, all as clearly shown in Figs. 7 and 8.

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

1. In a sand-cleansing apparatus, an elongated settling-tank adapted to contain a body of comparatively still water, means for feeding material to the longitudinal sides of the tank above the water-level, and means for forcing a stream of water lengthwise the tank near the water-level.

2. In a sand-cleansing apparatus a settling-tank of considerable cross-sectional area and adapted to contain a body of comparatively still water, one or more feed-troughs extending practically the length of the tank and adapted to feed the material to the side wall or walls throughout the length of the same, and means for forcing a stream of water lengthwise the tank near the water-level.

3. In a sand-cleansing apparatus a settling-tank of considerable cross-sectional area and adapted to contain a body of comparatively still water, feed-troughs formed with perforations at intervals through which the material is adapted to be fed to the side walls of the tank throughout their length, and means for forcing a stream of water lengthwise the tank near the water-level.

4. In a sand-cleansing apparatus, a settling-

tank of considerable cross-sectional area and adapted to contain a body of comparatively still water, vertically-adjustable feed-troughs extending practically the length of the tank and adapted to feed the material to the side walls throughout their length and means for forcing a stream of water lengthwise the tank near the water-level.

5. A cleansing apparatus comprising a tank, troughs formed with downwardly-extending lips to deliver the material against the side walls of the tank, and means to force a stream of water lengthwise the tank and adjacent its side walls.

6. The combination, with a screen and a chute leading therefrom, of a sand-cleansing apparatus comprising a settling-tank of considerable cross-sectional area and adapted to contain a body of comparatively still water, feed-troughs extending practically the length of the tank and adapted to feed the material to the side walls throughout their length, said troughs being secured to the end of the chute, and a deflector fixed in the chute and adapted to direct the material into the troughs.

7. In a sand-cleansing apparatus, a settling-tank of considerable cross-sectional area adapted to contain a body of comparatively still water, and feed-troughs formed at intervals with perforations through which the material is adapted to pass, said troughs being provided with lips underlying the perforations and adapted to direct the material to the side walls of the tank.

8. In a sand-cleansing apparatus, a settling-tank of considerable cross-sectional area adapted to contain a body of comparatively still water, and provided with vertical side walls, and means for feeding material against the vertical side walls throughout the length of the tank and above the water-level, whereby a vertical impetus and free fall is given the material in a path in close proximity to the side walls.

9. A cleansing apparatus comprising a tank, troughs arranged lengthwise the tank and adapted to direct the material against the sides thereof, said troughs being pivotally connected with the chute and elevating mechanism for the free end of said troughs.

10. In a sand-cleansing apparatus, a settling-tank of considerable cross-sectional area adapted to contain a body of comparatively still water and formed with vertical side walls, and adjustable means for feeding the material against the vertical side walls throughout the length of the tank and above the water-level whereby a variable vertical impetus and free fall may be given the material in a path in close proximity to the side walls.

11. In a sand-cleansing apparatus, a settling-tank of considerable cross-sectional area and adapted to contain a body of comparatively still water, said tank being formed with vertical side walls, means for feeding the material against the vertical side walls throughout their length and above the water-level,

whereby a vertical impetus and free fall is given the material in a path close to the side walls, and means for forcing a stream of water longitudinally of the tank near the water-level.

12. In a sand-cleansing apparatus, an elongated settling-tank adapted to contain a body of comparatively still water, feed-troughs extending practically the length of the tank and adapted to feed the material to the longitudinal side walls throughout their length, means for forcing a stream of water lengthwise the tank near the water-level, and a conveyer working in the tank and adapted to take material therefrom.

13. In a sand-cleansing apparatus, an elongated settling-tank adapted to contain a body of comparatively still water, feed-troughs extending practically the length of the tank and adapted to feed the material to the longitudinal

side walls throughout their length, and a conveyer operating in the tank between the feed-troughs and adapted to take the material from the tank.

14. In a sand-cleansing apparatus, an elongated settling-tank adapted to contain a body of comparatively still water, feed-troughs adapted to direct the material against the longitudinal side walls of the tank, a conveyer operative longitudinally and centrally of the tank, and pipes forcing a stream of water longitudinally of the tank and on each side the conveyer.

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

JAMES M. MILLER.

Witnesses:

DAVID W. GOULD,

FRANK D. BLACKISTONE.