March 14, 1939. S. SHAFER, JR., ET AL 2,150,865

SEDIMENTATION APPARATUS

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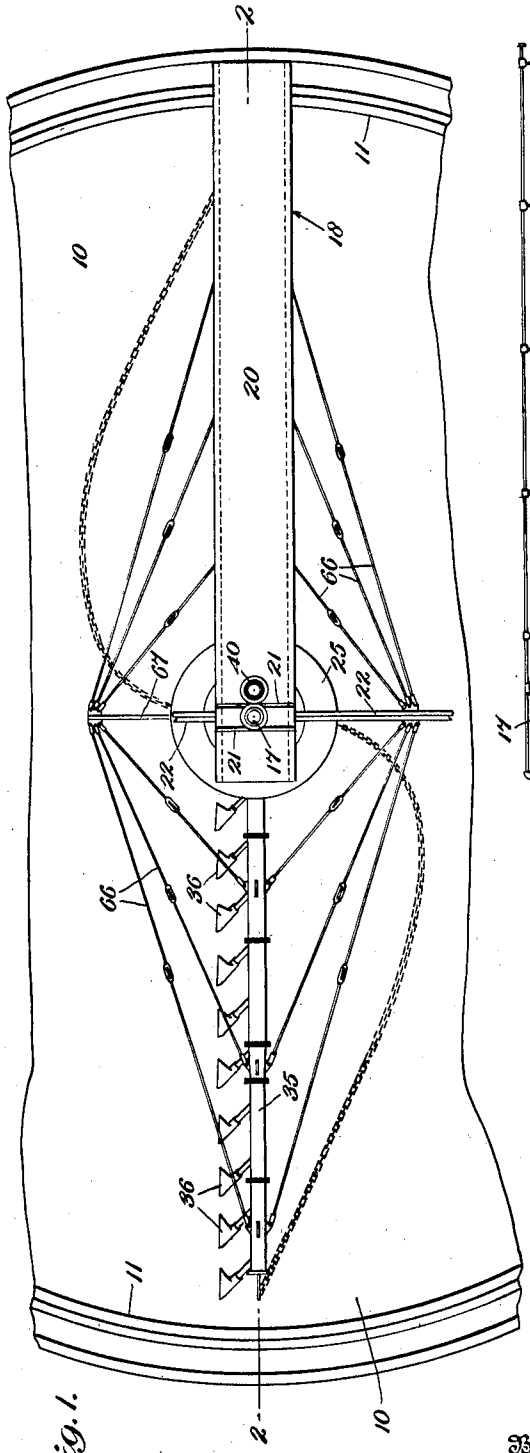


Fig. 1.

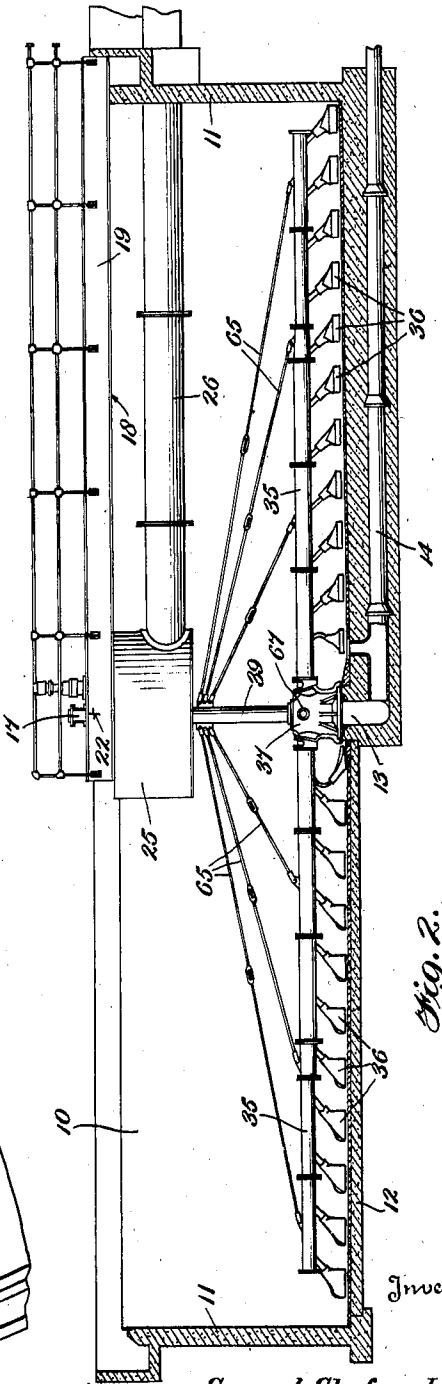


Fig. 2.

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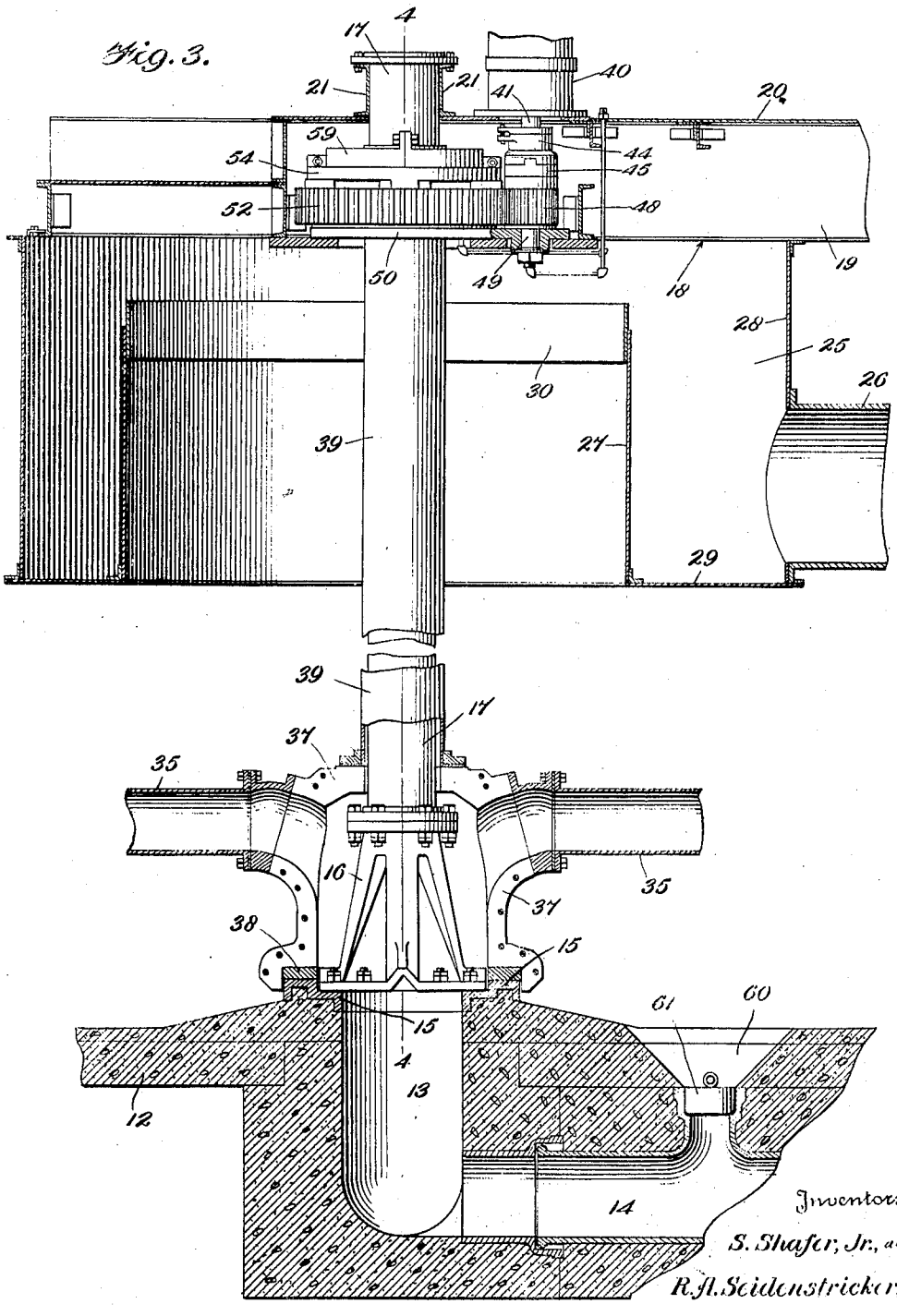
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SEDIMENTATION APPARATUS

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Fig. 3.



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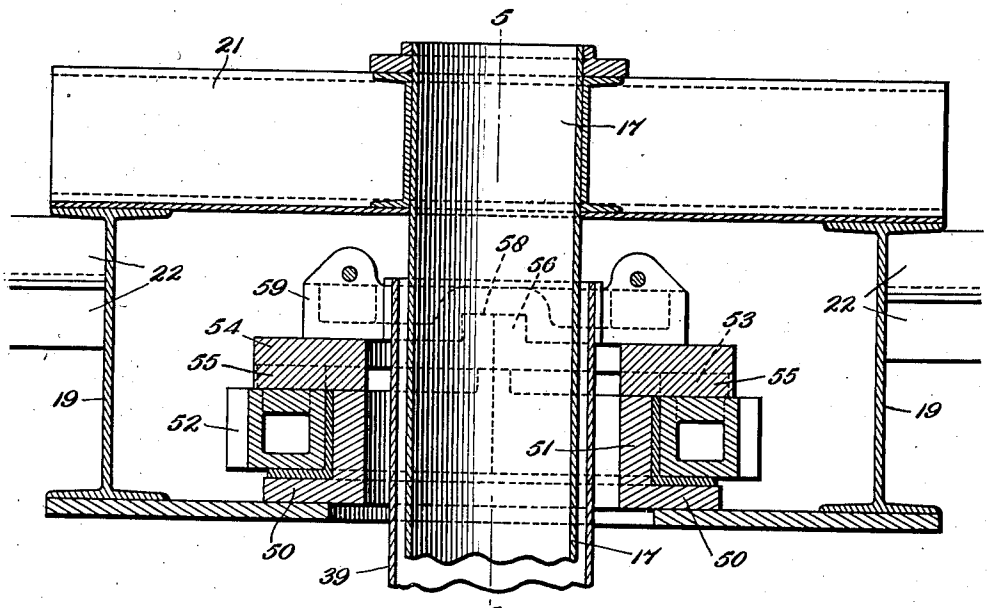
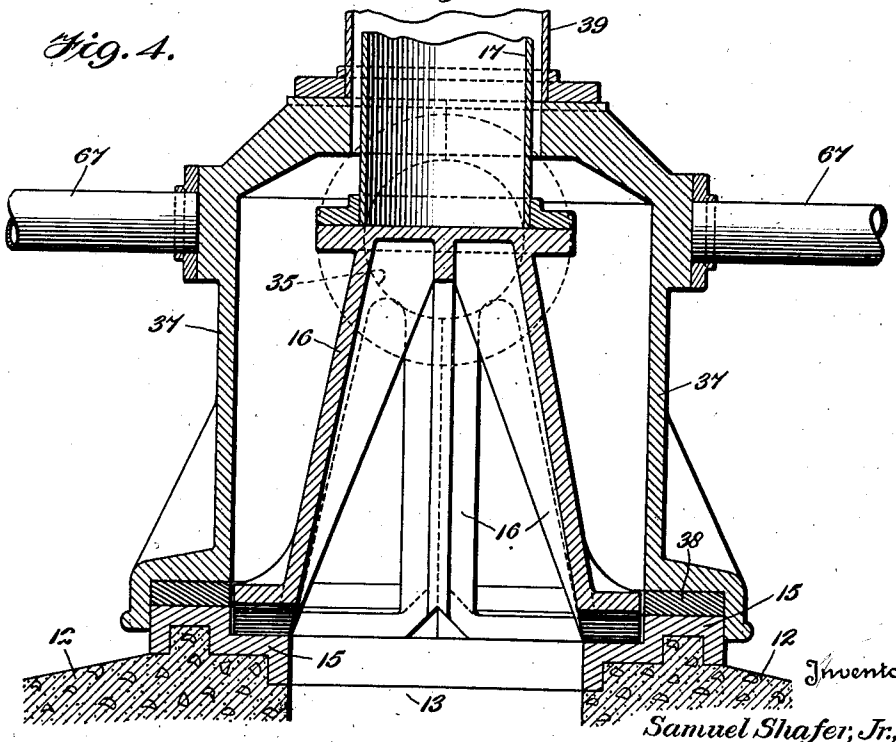


Fig. 4.



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Fig. 5.

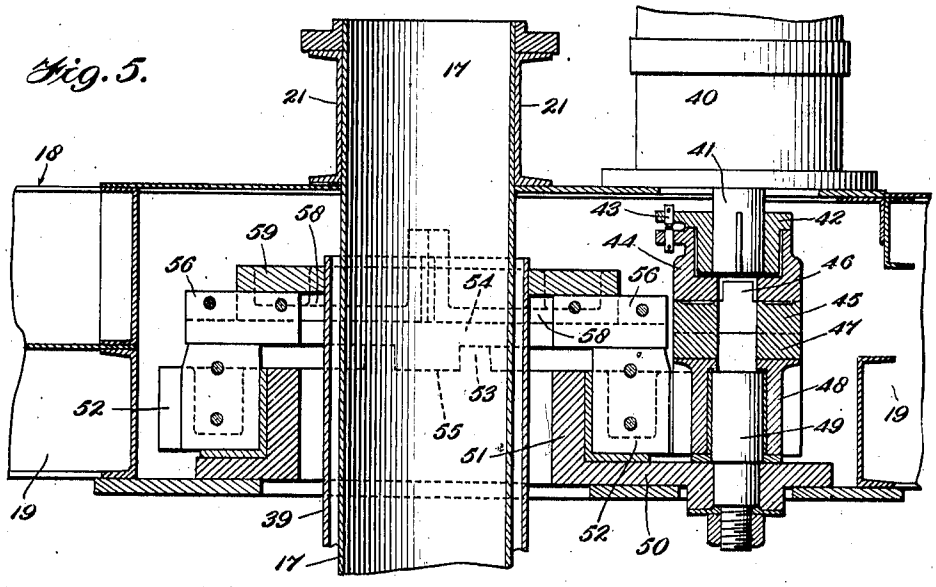


Fig. 6.

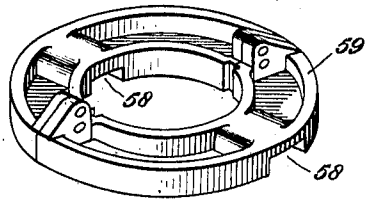


Fig. 7.

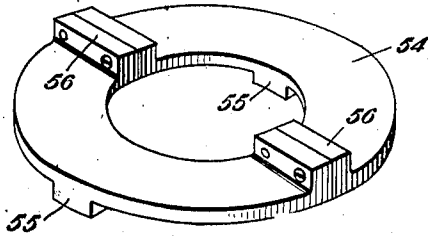
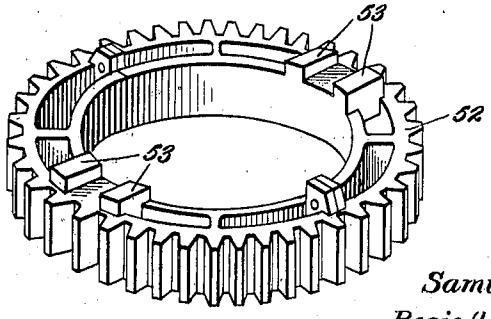


Fig. 8.



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UNITED STATES PATENT OFFICE

2,150,865

SEDIMENTATION APPARATUS

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Application September 25, 1936, Serial No. 102,624

7 Claims. (Cl. 210—55)

The invention relates to sedimentation apparatus, and has for one of its objects to provide an improved modification of the apparatus described and claimed in the prior U. S. Patent No. 1,947,429, granted February 13, 1934, on an application filed by Darwin W. Townsend and James Brower, entitled Sludge remover.

With the above and other objects in view which will appear as the description proceeds, the invention consists in the novel details of construction and combinations and arrangements of parts more fully hereinafter disclosed and particularly pointed out in the appended claims.

Referring to the accompanying drawings forming part of this specification, in which like reference characters designate like parts in all the views:

Figure 1 is a partial plan view of a sedimentation chamber with sludge removing apparatus constructed in accordance with the present invention associated therewith;

Fig. 2 is a vertical sectional elevational view of the parts shown in Fig. 1, taken approximately on the plane indicated by the line 2—2 of said figure;

Fig. 3 is an enlarged vertical sectional view partly in elevation through the central column and driving mechanism for the sludge collector;

Fig. 4 is a still further enlarged vertical sectional view at right angles to Fig. 3, taken approximately on the plane indicated by line 4—4 of the said figure;

Fig. 5 is a vertical sectional view taken approximately on the plane indicated by the line 5—5 of Fig. 4; and

Figs. 6, 7 and 8 are detail perspective views of the several elements constituting a universal coupling between the power unit and the hollow shaft of the sludge collector.

In the said drawings 10 indicates a sedimentation chamber preferably circular in plan and having side walls 11 and bottom wall 12, which latter is provided with a centrally located sludge outlet 13 communicating with the sludge conduit 14, as best shown in Figs. 2 and 3. Positioned upon the bottom 12 surrounding the outlet 13 is the annular bearing member 15 to which is secured as by bolting or otherwise a spider-like base or pedestal 16. Surmounting this base or pedestal and fixedly secured thereto is a vertically extending column 17 here shown as comprising a tube or pipe which extends upwardly to a point above the normal liquid level in the chamber.

Extending from the side wall 11 of the chamber to the column 17 is a bridge structure 18 here shown as comprising a pair of spaced I-beams 19 which are surmounted throughout the greater portion of their length by a plate 20 which constitutes a walkway over which attendants may pass to the center portion of the chamber. The I-beams 19 are suitably secured at their outer ends to the side wall 11 and at their inner ends are provided with a pair of transverse channel irons or beams 21 which embrace and are rigidly secured to the upper end of the column 17. The said column thus serves as a support for the inner end of the bridge structure and suitable brace members 22 may be provided at right angles to the beams 19 and extending therefrom to the side walls 11 in order to brace the structure laterally.

Hung from the beams 19 is an annular feed well 25 into which the influent conduit 26 discharges. This will, as best shown in Fig. 3, comprises inner and outer cylindrical members 27 and 28 joined by an annular bottom member 29, and the said inner member may, if desired, be provided with an adjustable weir 30 for controlling the height of the liquid within the well. As will be readily understood by those skilled in the art, the incoming liquid from the conduit 26 enters the well and fills the space between the walls 27 and 28 until it overflows the weir 30, whereupon it passes downwardly into the chamber substantially axially thereof. The members 27 and 28 may be concentrically disposed, but if they are arranged eccentrically as shown in Fig. 3, a larger volume capacity will be provided at the discharge port of the influence conduit 26, which will reduce the velocity of the liquid and give a more uniform feed thereof over the weir 30.

The sludge removing mechanism is in general similar to that disclosed and claimed in the said Townsend and Brower Patent 1,947,429, and comprises a pair of sludge conduits 35 each provided with a plurality of sludge collecting nozzles 36 into which the sludge is received under the action of the hydrostatic head of the liquid in the chamber. The inner ends of the conduits 35 are connected to a hollow manifold member 37 which encloses the spider pedestal 16 as clearly shown in Figs. 3 and 4. The said manifold member is preferably provided with a lignum vitae or other similar bearing material 38 which rests upon the outer portion of the bearing member 15, whereby the manifold 37 and the conduits 35 are mounted for rotation in a horizontal plane adjacent the floor of the sedimentation chamber. The manifold 37 has secured to its top a hollow shaft 39

which surrounds the stationary column 17, as will be readily understood from the drawings. This said shaft 39 extends upwardly through the feed well 25 to a point above the liquid level and is provided at its upper end with suitable driving connections whereby power may be transmitted through the shaft to the sludge collecting mechanism at its lower end.

The driving mechanism for the shaft 39 comprises a suitable power unit 40 mounted adjacent the inner end of the bridge structure 18 and preferably comprising an electric motor having associated with it a suitable reduction gearing, since the sludge collecting conduits 35 are ordinarily rotated at a relatively slow speed, say from 5 to 15 feet per minute for the outermost sludge collector. The power shaft 41 of the unit 40 has keyed to it a driving member 42 (see Figs. 3 and 5), which is connected by means of a shear pin 43 to an element 44 of a universal coupling, which also includes a floating member 45 having oppositely disposed lugs 46 and 47 arranged at right angles to one another and received respectively in companion recesses in the member 44 and the face of a pinion 48 which is journalled on a stud 49 carried by the supporting base or member 50 which in turn is supported by the inner end of the bridge structure 18. This said member 50 has an upstanding annular flange 51 concentric with the hollow column 17 upon which is journalled a gear 52 which meshes with the pinion 48. As best shown in Figs. 5 and 8 this gear is formed of two complementary sections which are bolted or otherwise secured together as will be readily understood and which sections are each provided with a pair of spaced upstanding lugs 53. Mounted above the gear 52 is a floating disc or member 54 provided on its under surface with a pair of diametrically disposed lugs 55 receivable in the spaces between the lugs 53 of the gear. The upper face of the floating member 54 is likewise provided with a pair of diametrically disposed lugs 56 which are arranged at right angles to the lugs 55, as clearly shown in Fig. 7, and which are receivable in recesses or grooves 58 provided in the under face of the driving member 59 which is splined to the upper end of the hollow shaft 39. There is thus provided a universal coupling for the shaft 39 which will take care of any misalignment of the parts or wobbling of the shaft during rotation, as will be readily understood.

The floor of the chamber 16 may be provided with a drain opening 60 communicating with the sludge conduit 14 and normally closed by a plug or other similar member 61 which, however, may be withdrawn should it be desired to drain the contents of the chamber independently of the sludge conduits 35.

The sluge conduits 35 may be supported by suitable vertical and horizontal brace rods 65 and 66, the former of which extend angularly upward from the conduits to the upper portion of the hollow shaft 39, while the latter extend angularly outward from said conduits to the transverse brace rods or pipes 67, as will be clear from Figs. 1 and 2.

While one form of the invention has been illustrated and described, it is obvious that those skilled in the art may vary the details of construction as well as the precise arrangement of parts without departing from the spirit of the invention, and therefore it is not wished to be limited to the above disclosure except as may be required by the claims.

What is claimed is:

1. In sedimentation apparatus, a chamber for solids-carrying liquids, having sludge-receiving floor provided with a sludge removal outlet; a fixed column structure alined with and extending upwardly above said outlet; means for collecting sludge deposited upon said floor and transferring it to said outlet, including a sludge-conducting dome-like structure surrounding said outlet and the lower portion of said column, and journalled for rotation thereabout; a hollow shaft surrounding said column, secured to and extending upwardly from said dome-like structure to above the level of the liquid in said chamber; a support fixedly secured to the upper end portion of said column; a power drive unit mounted on said support adjacent said column; and driving connections between said power unit and the upper end of said hollow shaft.

2. In sedimentation apparatus, a chamber having a side wall and a bottom provided with a centrally located sludge outlet; a fixed pedestal spanning said outlet but affording communication from the chamber thereto; a fixed column surmounting said pedestal; a bridge structure extending from the side wall of said chamber to said column and having its inward portion supported by the latter; a sludge removing mechanism journalled on the chamber bottom independently of said column for rotation about said outlet and discharging thereto; a hollow shaft surrounding said column and secured to said sludge removing mechanism; a power unit mounted on said bridge structure; and driving connections between said power unit and said hollow shaft, arranged to accommodate wobbling of the latter.

3. In sedimentation apparatus, a chamber having a side wall and a bottom wall, the latter being provided with a sludge outlet; a fixed annular bearing member surrounding said outlet; a spider pedestal secured to said bearing member spanning said outlet; a column secured to and extending upwardly from said pedestal; a bridge structure extending from the side wall of said chamber to said column and having its inner end supported by the latter; a hollow manifold enclosing said pedestal and journalled for rotation thereabout on said bearing member; sludge conduits carried by and communicating with said manifold; a hollow shaft secured to said manifold and surrounding said column; a power unit mounted on said bridge structure; and driving connections between said power unit and hollow shaft.

4. In sedimentation apparatus, a chamber having a bottom provided with a sludge outlet; a fixed column extending upwardly from said bottom above said outlet; sludge removing mechanism in said chamber including a hollow shaft surrounding but wholly free from contact with said column and journalled on said chamber bottom independently of said column for rotation about said outlet, said shaft having horizontal sludge collecting members extending therefrom; a power unit supported by said column; and driving connections between said power unit and hollow shaft arranged to accommodate wobbling of the latter.

5. In sedimentation apparatus, a chamber having a sludge outlet in its bottom; a bearing member surrounding said outlet; sludge collecting mechanism journalled on said bearing member, including sludge conduits communicating with said outlet and arranged for rotation in a hori-

zontal plane adjacent the chamber floor; a shaft extending from said mechanism to above the liquid level; a power unit and a support therefor, above said liquid level; and driving connections between said power unit and shaft, including a wheel journalled on said support, a coupling member carried by said shaft, and a floating power transmitting member between said wheel and coupling member.

6. In sedimentation apparatus, a chamber having a sludge outlet in its floor; sludge collecting mechanism arranged for rotation about, and discharge to, said outlet, said mechanism including an upwardly extending driving shaft; a power unit and a support therefor above the liquid level; a pinion journalled on said support; a universal coupling and a shear pin connection between said pinion and the driving member of said power unit; a gear journalled on said support and meshing with said pinion; and a universal coupling between said gear and said sludge collector shaft.

7. A liquid feeding apparatus for sedimentation chambers and the like, comprising an inner tubular member; an outer tubular member eccentrically surrounding said inner member; a plate closing one end of the eccentric annular space between said members; and a feed conduit discharging into said space at substantially its point of greatest width.

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