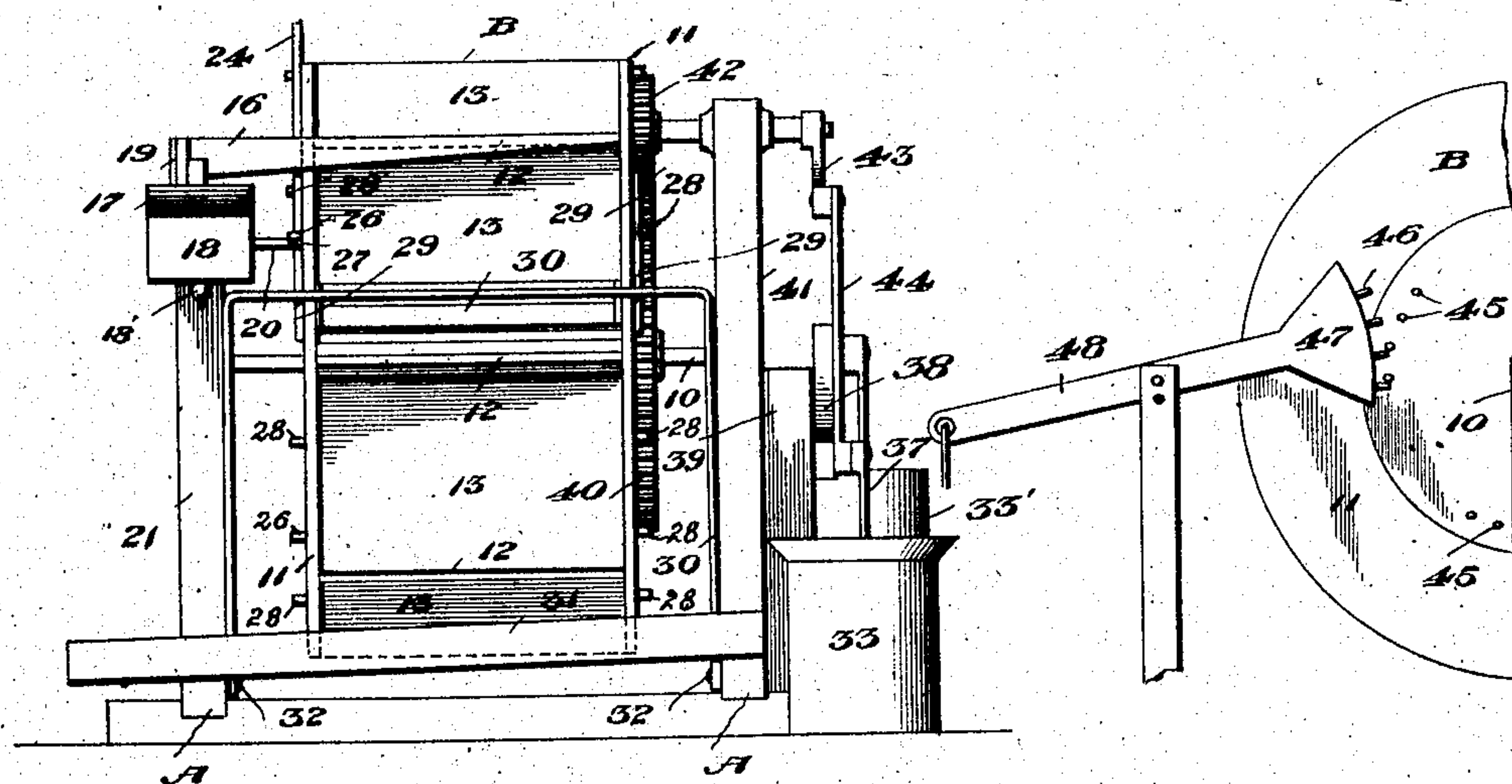
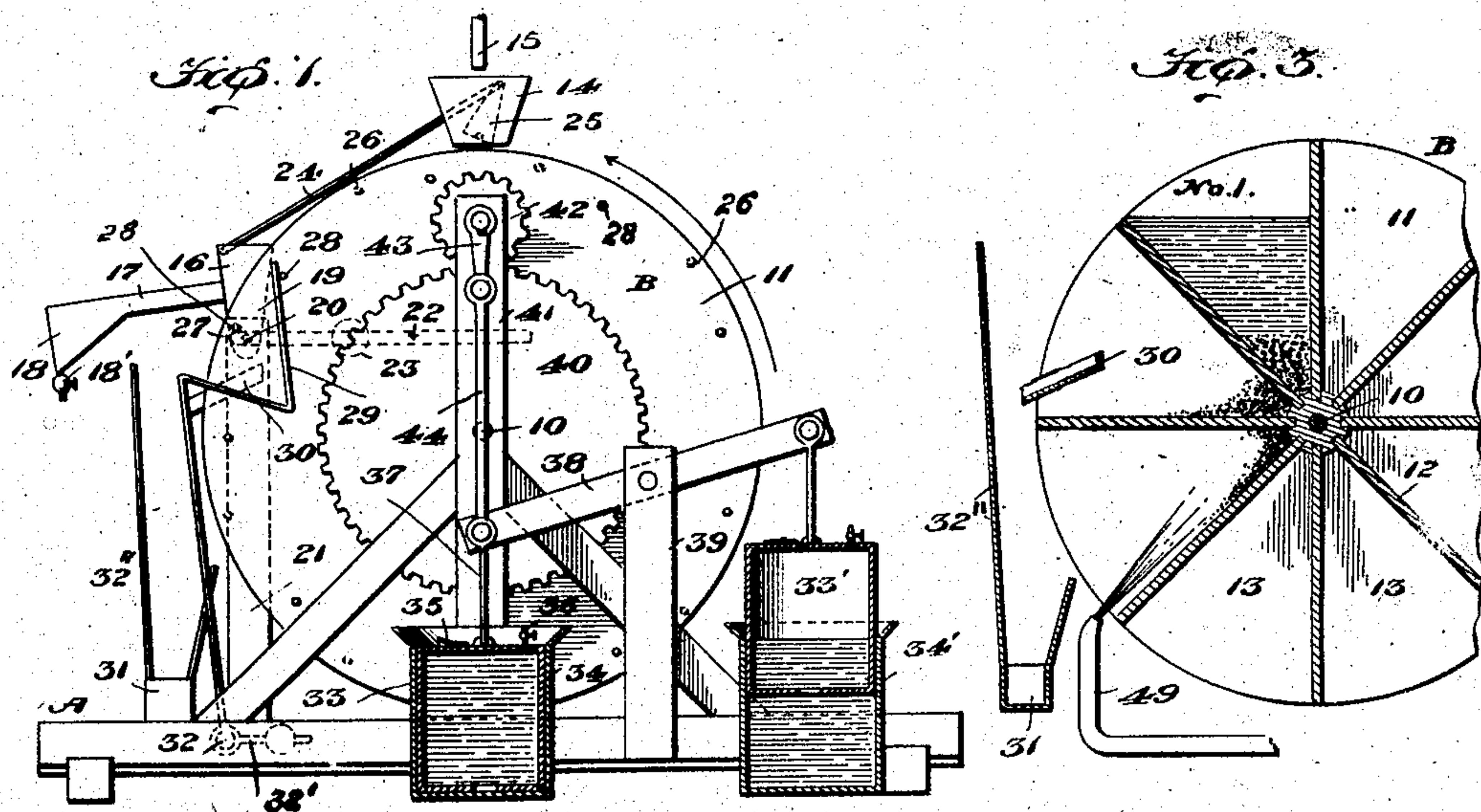


No. 815,095.

PATENTED MAR. 13, 1906.

D. J. KELLY.
SAND AND SLIME SEPARATOR.
APPLICATION FILED MAR. 28, 1905.



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SAND AND SLIME SEPARATOR.

No. 812,095.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, DAVID J. KELLY, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented new and useful Improvements in Sand and Slime Separators, of which the following is a specification.

My invention relates to certain new and useful improvements in separating-machines designed, essentially, for working materials containing precious metals and wherein the separation of the sand and slime is effected automatically; and my invention consists of the parts and the constructions and combinations of parts, which I will hereinafter describe and claim.

An essential characteristic of my present invention is the provision of a wheel or revolvable member having pockets or compartments into which agitated pulp is delivered through a pipe or launder, said wheel being periodically rotated, whereby when a compartment of the bucket is filled the overflow will automatically trip a releasing mechanism and allow the wheel to turn a distance sufficient to bring a succeeding empty compartment beneath the supply and to allow the material in suspension in the preceding compartment to be poured off, the heavier material remaining at the bottom of the compartment and being discharged therefrom when the compartment is substantially inverted.

In the accompanying drawings, forming part of this specification, and in which similar reference characters indicate corresponding parts in the several views, Figure 1 is a side elevation of a sand and slime separator embodying my invention. Fig. 2 is an end view. Fig. 3 is a sectional view of the revolvable wheel. Fig. 4 is a modification, which I will hereinafter describe.

In carrying out my invention I construct a suitable base-frame or support A of such dimensions, design, and strength as will be suitable for the objects I have in view. In Fig. 1 I illustrate one form of such frame and which frame is provided with vertical standards, in the upper portions of which a horizontal shaft 10 is appropriately mounted. Upon this shaft is mounted or supported the separating-wheel B, comprising end disks 11 and radially-arranged partitions 12, which divide the wheel into a series of separate compartments 13 with closed bottoms, and which compartments successively receive charges of the material to be separated.

Suitably located above the wheel is a launder 14, of any well-known and approved type, which receives the pulp from a suitable source through a pipe 15.

Arranged transversely across the upper portion of the compartment-wheel B and in advance of and in such relative arrangement to the partition of the compartment being filled that the overflow from the said compartment over the edge of the partition may be received directly into it is an inclined launder 16, having a discharge-outlet connecting by a spout or trough 17 with a tank or box 18; whereby the said overflow is delivered into said tank or box and from which it may be drained when desired by means of a draw-off or cock 18'.

The inclined launder 16 is mounted to have a slight oscillatory movement toward and from the lip of the partition between the compartment being filled, and provision is made for utilizing the outward oscillatory movement of the launder to automatically release certain locking means which hold the wheel against movement about its axis during the filling of any of its compartments. Accordingly I prefer to form the launder with an arm extension 19, in which is fixed a shaft or rod 20, which is journaled in a suitable bearing in a standard 21, rising from the main frame. The rod or shaft is rigid, with an arm 22, which extends horizontally at right angles to the rod or shaft, said arm 22 being provided with a shiftable weight or counterpoise 23, which is intended to be overbalanced by the weight of the overflow in the box or vessel 18 and is also designed to return the launder and its adjuncts to normal position when the volume of overflow in the box or vessel is reduced and the combined weight of this box or vessel and the launder falls below the weight of the counterpoise on the lever-arm 22. In other words, the launder is, in effect, mounted upon substantially a counterbalanced lever whose fulcrum is the shaft or rod.

The swinging launder is connected above its axis with one end of a rod 24, whose opposite end is connected with a pivoted plate 25, located in the launder 14 and by which when the launder 16 begins to swing outward the flow of the pulp from the launder is diverted from the compartment of the wheel just filled into the succeeding compartment.

Projecting from one of the end disks of the compartment-wheel are a number of pins 26,

one for each compartment and located relative thereto, so that one of these pins will contact with the bent end 27 of the shaft or rod 22, and thus stop the revoluble movement of the wheel at such a point that the uppermost empty compartment will be in line with the discharge of pulp from the launder 14, in which position the parts are normally held and until the overflow from this compartment overcomes the counterweighted launder and its adjuncts and moves the shaft or rod to permit the engaged pin to escape past the bent end of the shaft, and thus allow the wheel to make its partial revolution. Another series of pins 28 is provided, also projecting from the end disks of the wheel, and these pins are designed to successively engage exterior bent arms 29, which form a part of a suitable inclined apron 30, so placed that it normally enters the compartment of the wheel next below the compartment being filled, whereby the overflow from said last-named compartment is prevented from falling upon the partition next below it, but is directed upon the apron and by the latter is in turn directed into an appropriate trough or launder 31, arranged below it. The apron is pivotally mounted at 32 in the base of the main frame and has a lever-arm 32', upon which a weight is adjustably mounted, thereby counterweighting the apron and automatically returning it to normal position after it has been pushed forward by the partial rotation of the wheel and the pushing action of the pins 28, before mentioned.

In connection with the trough or launder 31 I prefer to employ a splash-plate 32'', Fig. 3, for receiving the splash from the apron and conducting the slime to the trough 31.

In a separator of the character described it will be found useful to provide means for governing the movement of the wheel, and while various forms of governors may be used in connection with the wheel and other parts heretofore described and two forms of governors are shown in the drawings I prefer to use a governor of the general type of a dash-pot. Accordingly in Fig. 1 I illustrate a governor which comprises an exterior cylinder or vessel 33, adapted to contain water or other fluid. Within this cylinder and operating somewhat on the order of a piston is a hollow cylinder or vessel 34, closed at the top and having a relatively small opening in its bottom, said inner cylinder or vessel having an opening in its closed top controlled by an outwardly-opening valve 35. An air-cock 36 is also fixed in the top of the inner cylinder or vessel and controls the rate of movement of said vessel.

The inner vessel 34 is connected by a rod or link 37 with one end of a lever 38, fulcrumed at or about its center to a standard 39, rising from the base-frame, and the opposite end of

the lever is likewise attached to a second governing device comprising inner and outer cylinders 33' 34' and connections similar to those before described. These two sets of cylinders form an alternately-acting governor, and when the inner cylinder of one is elevated the corresponding cylinder of the other is lowered, as I will presently describe.

To communicate the partial rotation of the wheel to the governor mechanism, I show fixed upon the axis of the wheel a large gear-wheel 40, and in a standard 41 I journal above the gear-wheel 40 a pinion 42 of such size relative to its engaging gear-wheel that a one-half revolution is effected while the separator-wheel B moves from one position to any other desired position or in the eight-compartment wheel (represented in Fig. 3) while the separator-wheel makes a one-eighth revolution. If this wheel consists of more or fewer compartments than shown, the gearing is arranged accordingly. The shaft of the pinion or smaller gear-wheel 42 is provided with a crank 43, which connects, through the medium of the rod or link 44, with the centrally-fulcrumed lever, whereby as the separator begins its movement to unload a filled compartment and bring an empty compartment in position beneath the sand and slime supply the described governor connections result in rocking the lever 38 to elevate the then lower and filled inner cylinder of one governing device and at the same time lower the like cylinder of the other and companion governor. When the filled cylinder is thus being raised, the contained water or fluid will pass out of it through the bottom opening and into the outer cylinder and air will enter the inner cylinder through the valve 36, and when the inner cylinder of the other governor is being lowered the water or fluid in the outer cylinder with which it is connected will be displaced and will enter said inner vessel and relieve any sudden shock or movement which might be given the compartment-wheel. The amount of air-cushion and the consequent speed at which the inner cylinder may lower is controlled by the air-cock 36 before mentioned.

In Fig. 4 I illustrate a modified form of governor employing the alternately-acting cylinders before mentioned; but in this case the actuating devices are somewhat modified. For instance, instead of the toothed gears of Fig. 1 I show in said Fig. 4 groups of pins 45, located relative to each compartment of the separator-wheel and adapted to engage pins or teeth 46 on the enlarged head 47 of a fulcrumed lever 48, there being in practice two levers and two groups of pins and two pairs of governor-cylinders and the parts being so arranged in practice at opposite ends of the separator-wheel that one set is operating when other set is idle. Thus in both forms

of governor the inner cylinders act alternately, and thus control the movement of the separator-wheel.

If necessary, a pipe 49 may be employed to inject from below a jet of water or solution to facilitate the ejection of the sands from the compartments of the wheel.

The operation of the device will be understood from the foregoing, but may be generally reviewed as follows: Any compartment in position marked "No. 1" in Fig. 3 is filled with agitated pulp delivered from the launder 14 or supply-pipe immediately above it. When this compartment is filled, the overflow automatically releases the wheel by overbalancing the launder and its attachments, thus allowing the engaged pin 26 to escape the stop end of the shaft 20. The wheel now slowly revolves, and as it does so the material in suspension is poured off into the trough 31, the heavier material remaining at the bottom of the compartment. This brings a succeeding empty compartment into position, and the operation is repeated. The heavy material remains in the place until the compartment is nearly or quite upside down in relation to its first position, when it is discharged by gravity, or its discharge may be accelerated by the water-jet before mentioned. The overflow from any compartment in position No. 1 passes into the tank or box 18 and accumulates therein until the counterweighted launder 16 is overbalanced and the wheel released, as before explained, this operation resulting also in the supply being diverted from the filled compartment to the one succeeding it. The wheel being released, the weight of the material in the filled compartment will turn the wheel about its axis, the speed of the wheel being controlled by the governing mechanism described, and when the weight of the overflow in the tank 18 is reduced (by opening the cock) below that of the weight 23 the launder and its adjuncts are returned to normal position and the bent end of the shaft 20 comes into position to serve as a stop for the next pin 26, thereby locking the wheel against further rotation.

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

1. In a sand and slime separator, the combination with a pulp-supply, of a revolubly-mounted member having side-delivery settling-compartments adapted to be successively alined with said supply.

2. In a sand and slime separator, the combination with a pulp-supply, of a revolubly-mounted wheel divided into separate compartments said compartments having a side delivery and adapted to be successively alined with said supply.

3. In a sand and slime separator the combination with a pulp-supply, of a revolubly-

mounted wheel having side-delivery settling-compartments into which the pulp is successively delivered, means for holding the wheel against movement, means for automatically releasing the wheel, and means for imparting to the wheel a step-by-step movement.

4. A sand and slime separator comprising a revoluble member having partitions dividing it into settling-compartments having a side delivery, and means for giving a partial rotation to said member to allow the slime to separate from the same and discharge over the edge of the partition.

5. In a sand and slime separator, the combination with a source of pulp-supply, of a side-delivery, settling-compartment member revolubly mounted, and means whereby the member is given a step-by-step movement in one direction to bring its compartments successively into the range of action of the pulp-supply.

6. In a sand and slime separator the combination with a source of pulp-supply, of a normally locked revolubly-mounted member having side-delivery settling-compartments, and means controlled by the overflow from one compartment for automatically releasing the member from its locked position whereby the weight of the contained material in a filled compartment produces a partial rotation of the member and brings a successive empty compartment in the range of action of the pulp-supply.

7. In a sand and slime separator, the combination with a source of pulp-supply, of a revolubly-mounted wheel having partitions dividing it into side-delivery settling-compartments, said wheel capable of a step-by-step movement in one direction to bring the compartments successively into the range of action of the pulp-supply.

8. In a sand and slime separator, the combination with a pulp-supply, of a revolubly-mounted wheel having side-delivery settling-compartments, means whereby said wheel is given a step-by-step movement, and shiftable means for diverting the pulp-supply from a filled compartment into an empty compartment coördinately with the movement of the wheel from one position to another.

9. In a sand and slime separator, the combination with a pulp-supply, of a revolubly-mounted wheel having compartments, means whereby said wheel is given a step-by-step movement, and tilting means automatically controlled by the overflow from a filled compartment for diverting the pulp-supply from said compartment into a succeeding compartment coördinately with the movement of the wheel from one position to another.

10. In a sand and slime separator the combination with a pulp-supply, of a revolubly-mounted wheel having compartments, means whereby said wheel is given a step-by-step

movement, a tilting launder normally receiving the overflow from one compartment of the wheel, means whereby said overflow tilts the launder out of its normal position, and means connected with the launder for diverting the pulp-supply from a filled compartment of the wheel into a succeeding empty pocket thereof coordinately with the movement of the wheel.

11. In a sand and slime separator, the combination with a pulp-supply, of a revolubly-mounted wheel having compartments, means for imparting to the wheel a step-by-step movement, a tiltable launder normally receiving the overflow from a filled compartment, an overflow-receiving vessel connected to and movable with the launder, and means connected with the launder for diverting the pulp-supply from one compartment of the wheel to another coordinately with the movement of the wheel.

12. In a sand and slime separator, the combination with a pulp-supply, of a revoluble wheel having compartments, projections on the wheel corresponding to each of the compartments, a tiltable-mounted launder normally positioned to receive the overflow from a filled compartment, a vessel connected with the launder and receiving said overflow, a counterweighted lever connected with the launder, and means including a stop movable with the lever and normally disposed in the range of action of one of said projections for locking the wheel against discharging movement, said launder automatically tilting to release the stop from the engaged projection when the overflow overbalances the counterweighted lever.

13. In a sand and slime separator, the combination with a pulp-supply, of a revoluble wheel having compartments, projections on the wheel corresponding to each of the compartments, a tiltable-mounted launder normally positioned to receive the overflow from a filled compartment, a vessel connected with the launder and receiving said overflow, a counterweighted lever connected with the launder, and means including a stop movable with the lever and normally disposed in the range of action of one of said projections for locking the wheel against discharging movement, said launder automatically tilting to release the stop from the engaged projection when the overflow overbalances the counterweighted lever, and means controlled by the tilting of the launder for diverting the pulp-supply from the filled compartment of the wheel into a succeeding empty compartment.

14. In a sand and slime separator, the combination with a pulp-supply, a revolubly-mounted wheel having side-delivery, settling-compartments, and means whereby said

wheel is given a step-by-step movement, to bring the compartments successively into the range of action of the pulp-supply, of a mechanism for governing the rate of travel of the wheel.

15. In a sand and slime separator, the combination with a pulp-supply, a revolubly-mounted wheel having compartments, means for giving said wheel a step-by-step movement to bring the compartments successively into the range of action of pulp-supply, and a governing mechanism including a fluid-containing vessel, a rising and falling vessel operable therein, and connections between said movable vessel and said wheel whereby the vessel is operated by the wheel to control the rate of movement of the latter.

16. In a sand and slime separator, the combination with a revolubly-mounted wheel having compartments, means for giving said wheel a step-by-step movement, and mechanism for governing the rate of movement of the wheel said mechanism including a pair of fluid-containing vessels, hollow vessels operable therein and adapted to receive the fluid displaced therefrom, and means whereby the hollow vessels are alternately moved in opposite directions.

17. In a sand and slime separator, the combination with a pulp-supply, a revolubly-mounted wheel having compartments, and means for giving the wheel a step-by-step movement, of a tiltable-mounted apron normally disposed in the range of action of the wheel and adapted to receive the overflow from a filled compartment thereof, and means carried by the apron and wheel respectively for moving the apron out of the range of action of the wheel as the latter is moving from one position to another.

18. In a sand and slime separator, the combination with a pulp-supply, a revolubly-mounted wheel having compartments, and means for giving the wheel a step-by-step movement, of a tiltable-mounted apron normally disposed in the range of action of the wheel and adapted to receive the overflow from a filled compartment thereof, and means carried by the apron and wheel respectively for moving the apron out of the range of action of the wheel as the latter is moving from one position to another, a launder into which the apron discharges, and a splash-plate opposing the apron.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

DAVID J. KELLY.

Witnesses:

FRED. A. BULL,
H. H. JOHNSTONE.