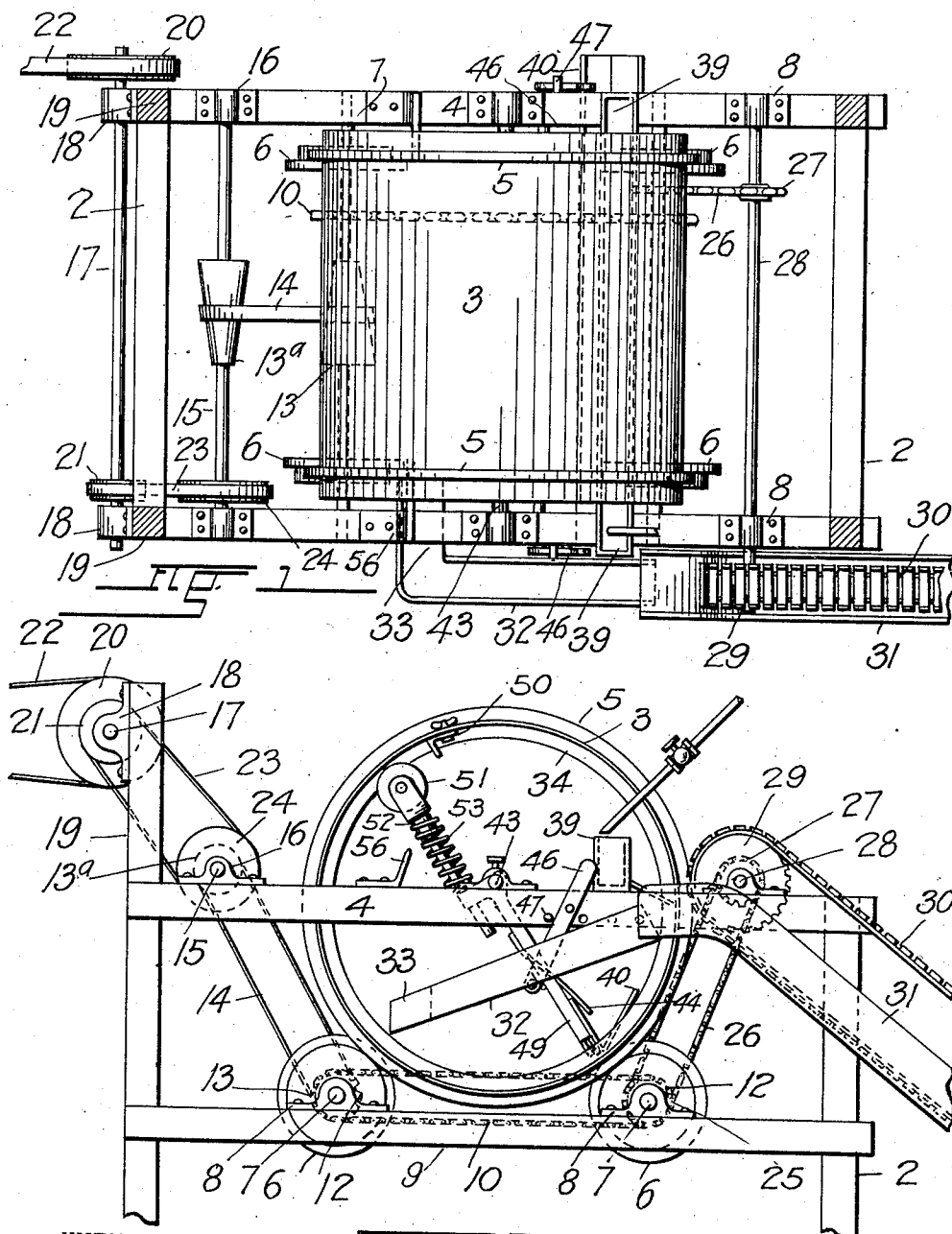


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APPLICATION FILED AUG. 24, 1910.

986,581.

Patented Mar. 14, 1911.

3 SHEETS—SHEET 1.



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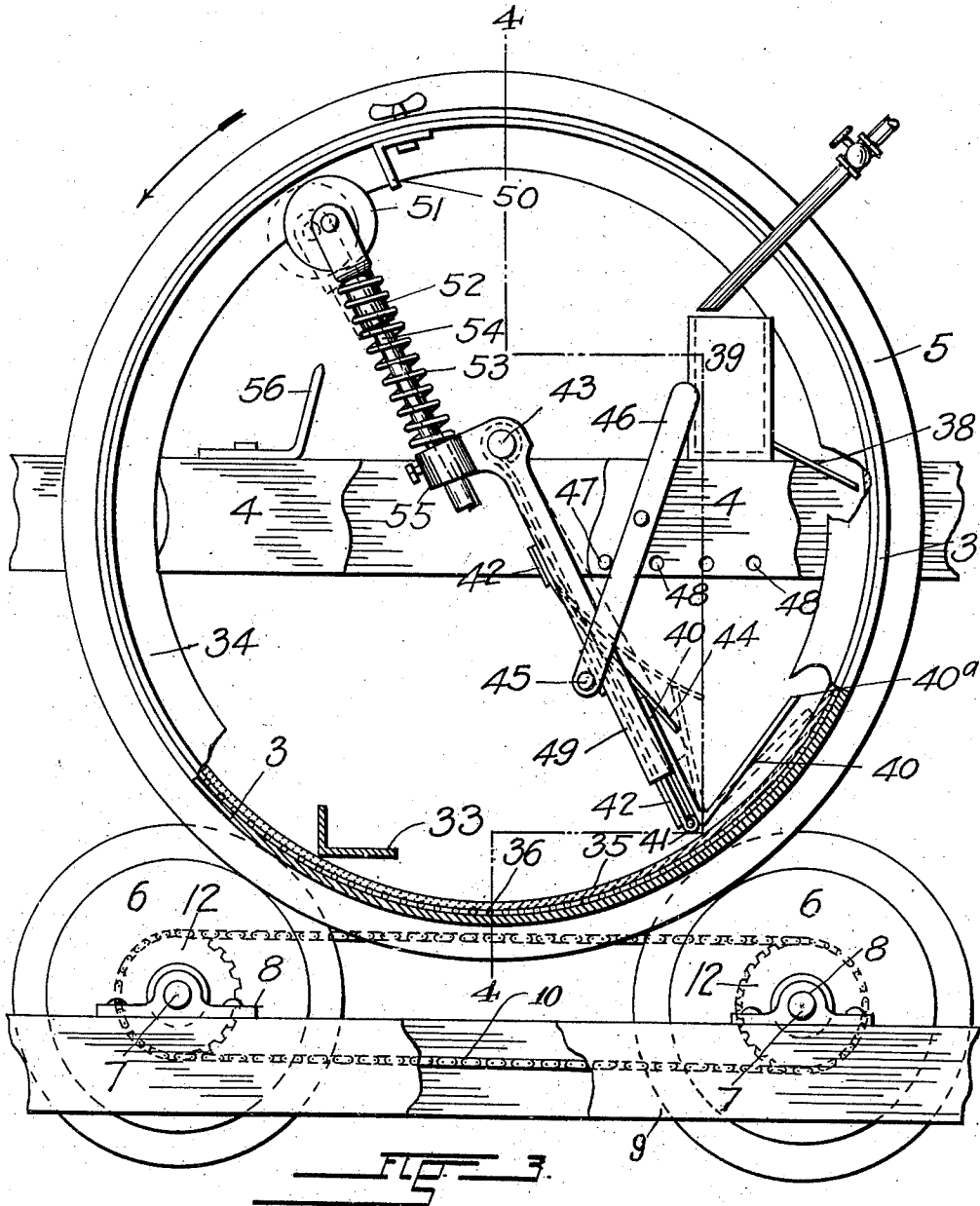
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3 SHEETS—SHEET 2.



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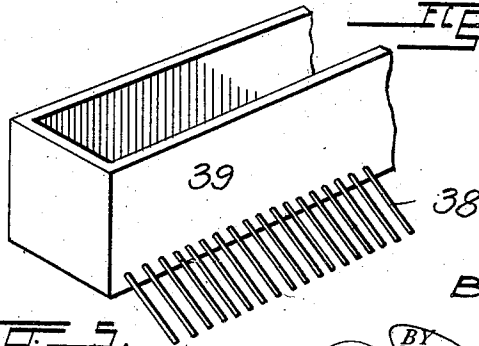
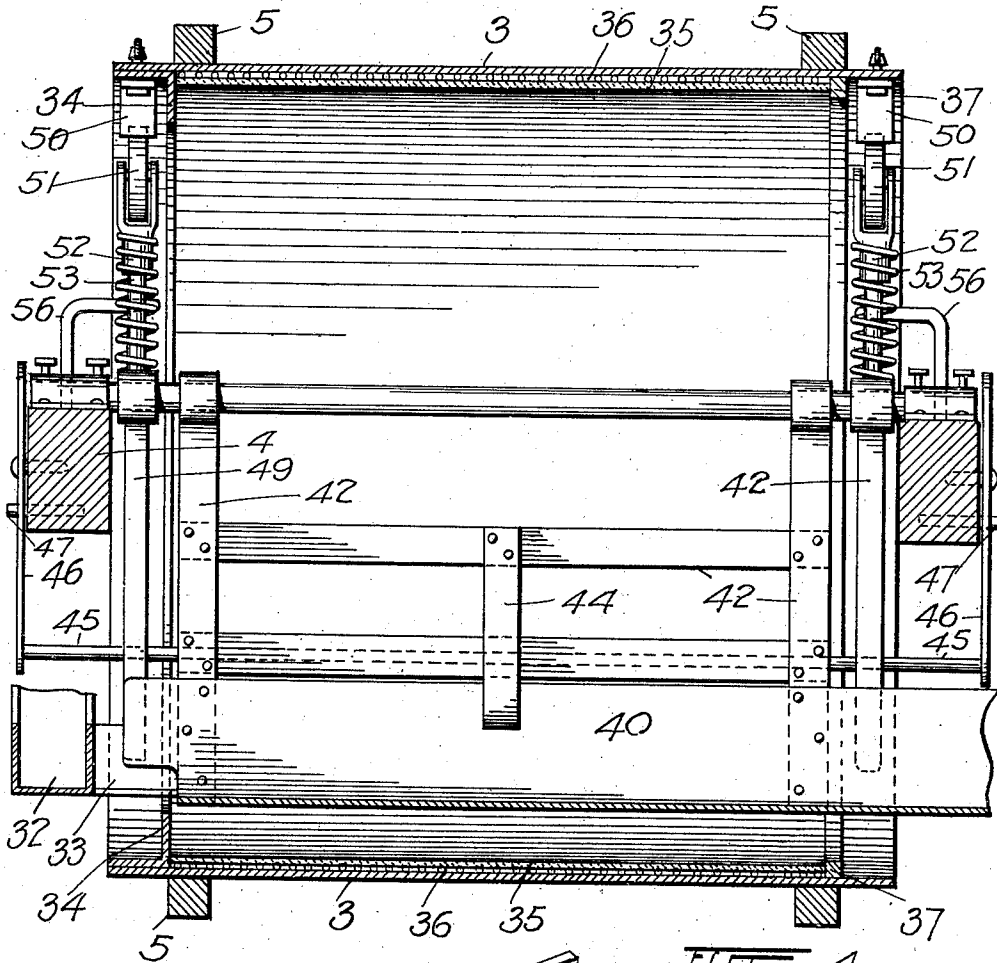
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3 SHEETS-SHEET 3.



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986,581.

Specification of Letters Patent.

Patented Mar. 14, 1911.

Application filed August 24, 1910. Serial No. 578,651.

To all whom it may concern:

Be it known that I, BENJAMIN LONG, a citizen of the United States of America, residing at Boulder, in the county of Boulder and State of Colorado, have invented certain new and useful Improvements in Separators, of which the following is a specification.

My invention relates to new and useful improvements in ore separators and its object resides in the provision of a mechanism of simple construction by which the value-bearing particles of pulverized ores or placer sand are speedily and cleanly separated from the non-metalliferous matter with which they are associated. I attain this object by the mechanism illustrated in the accompanying drawings in the various views of which like parts are similarly designated and in which—

Figure 1 represents a plan view of the apparatus, Fig. 2, a side elevation of the same, Fig. 3, an enlarged end view of the drum in which the ore is treated, Fig. 4, a vertical section through the drum taken along the line 4—4, Fig. 3, and Fig. 5, a fragmentary perspective view of the launder by which the wash water is introduced into the drum.

Referring to the drawings by numerical reference characters, 2 designates a rectangular frame upon which the various parts comprised in the improved separator, are supported. A hollow, cylindrical drum 3 disposed between the side-beams 4 of the frame, is, by means of two circular rails 5 which are secured upon its circumferential surface, revolubly supported upon four flanged wheels 6 which are mounted in pairs upon parallel axles 7. The axles 7 are rotatably supported in bearing boxes 8 on the side sills 9 of the frame 2 and they are connected to rotate in unison, by means of an endless chain 10 which engages with sprocket wheels 12 on the respective axles.

In the operation of the apparatus a rotatory movement is imparted to one of the axles 7 through the instrumentality of a cone pulley 13 which being secured upon said axle, connects by means of an endless belt 14 with a corresponding pulley 13^a, which is reversely mounted upon a line shaft 15 supported in boxes 16 upon the side beams 4 of the frame. A second shaft 17, which is mounted in boxes 18 on the up-

rights 19 of the frame, carries two pulleys 20 and 21, one of which is connected by means of a belt 22 with a conveniently located motor while the other connects by means of a belt 23 with a pulley 24 on the shaft 15.

The axle 7, opposite to the one which carries the cone pulley 13, is provided with a sprocket wheel 25 which connects by means of an endless chain 26, with a corresponding wheel 27 on a shaft 28, which is mounted in boxes on the beams 4. This shaft 28 carries near one of its extremities, a toothed wheel 29 for the operation of an inclined, endless conveyer 30 through a trough 31, which at its upper extremity, connects with an oppositely inclined chute 32.

The material to be treated is elevated by the conveyer to the upper end of the chute 32 which, by means of an angularly directed spout 33 at its lower extremity, discharges it into the interior of the drum at a point in its bottom portion, rearward with relation to the direction in which the drum revolves.

The drum 3 is provided at its feed-end, with an inwardly extending circular flange 34 which prevents the material from spilling over its edge and it is lined with a sheet of rubber 35, secured upon a backing of wire netting 36 which is fastened upon the interior surface of the drum, between the flange 34 and a ring 37 at the discharge end.

During the operation of the apparatus, wash-water is continuously introduced into the interior of the drum at its forward side, by means of a plurality of horizontally alined nozzles 38 on a launder 39 which extends transversely through the drum. The jets of water emitted through the nozzles 38 impinge upon the inner surface of the drum along a line somewhat above the horizontal plane extending through its axis, and the water flowing downwardly along said surface, meets the mass of ore which, during the movement of the drum in the direction of the arrow in Fig. 3, adheres to the rubber lining and moves upwardly toward the line along which the water impinges upon the same.

While the downwardly flowing water washes the light, worthless matter contained in the ore toward the bottom of the drum, the heavier valuable constituents thereof, adhere to the rubber at the forward side

of the same from where they are subsequently removed through the instrumentality of an appliance which, at a predetermined point in the revolution of the drum, intercepts the flow of water along a line between the bottom of the drum where the tailings are collected and the portion of its surface to which the values adhere.

The appliance above referred to which after it has dammed the flow of water, receives the values precipitated thereby, and conveys them to a point beyond the discharge end of the drum, consists of a V-shaped trough 40, articulately secured by means of hinges 41, at the lower end of an inclined frame 42, which at its upper extremity is pivotally mounted upon an axle 43, which is rigidly secured upon the side beams 4 of the supporting structure 2, above and in vertical alinement with the axis of the drum.

The trough 40 is resiliently held in its normal position in which its forward edge 40^a is spaced from the interior surface of the drum, by means of a leaf spring 44, the upper end of which is secured to one of the cross-straps of the skeleton frame 42, and the normal angle of inclination of the latter is determined by means of a stop-rod 45 at the lower ends of two hangers 46 which are pivotally secured upon the outer surfaces of the beams 4 and which engage with pins 47 inserted into one of a series of horizontally alined apertures 48 in the outer surfaces of said beams.

By transposing the pins 47 from one of the apertures 48 to another, the angle of inclination of the frame 42 and in consequence the position of the trough relative to the horizontal plane passing through the axis of the drum, may be varied to adapt the apparatus for the treatment of different kinds of ores.

Two levers 49, which are fulcrumed upon the axle 43 near its extremities, are, like the frame 42, normally supported upon the stop-rod 45 and their lower extremities engage the rearmost surface of the trough 40 for the purpose of moving the latter about its axis of articulation, when it is desired to bring its forward edge 40^a in engagement with the interior surface of the drum.

The above described action is automatically effected during the rotary movement of the drum, by the engagement of tappets 50 fastened upon the inner surface of the latter near its ends, with anti-friction rollers 51 which are connected with the respective levers 49. The rollers 51 are rotatably mounted in the bifurcated extremities of sleeves 52 which are longitudinally movably supported upon coiled springs 53 wound around stems 54, whose lower extremities are adjustably secured in sockets 55 on the respective levers 49 and whose upper ends

extend loosely into the respective sleeves. Stops 56, adjustably fastened upon the beams 4, serve to prevent excessive movement of the levers 49.

As the operation of my improved ore separator has been referred to at intervals in the course of the foregoing description, it will only be necessary to outline it briefly at this point.

When the drum is rotated in the direction of the arrow in Fig. 3, by the movement of the wheels 6 upon which it is supported, the water flowing downwardly along its interior surface in the opposite direction, separates, as hereinbefore explained, the valuable particles from the worthless constituents of the upwardly moving mass of material which was introduced into the drum through the spout at the end of the chute 32. Once during each revolution of the drum 2, the levers 49 are moved about their fulcrum, by the engagement of the tappets 50 with the rollers 51 at their upper ends, and the savings-trough 40 is in consequence moved about its hinges on the frame 42, until its forward edge 40^a frictionally engages the rubber lining of the drum to intercept the downward flow of the wash-water introduced into the drum through the nozzles 38 of the launder 39. During the continued movement of the drum, the trough 40 is, by reason of its frictional engagement with the rubber lining and the yielding connection between the rollers 51 and the respective levers 49, moved upwardly toward the line along which the jets of wash-water impinge upon the interior surface of the drum, until the tappets 50 disengage the rollers, when the spring 44 returns the trough to its normal position and the frame 42 descends by force of gravity upon the stop rod 45.

The valuable particles of the ore collected upon the surface of the drum above the trough 40, are during the above described operation washed into the latter and discharged into a receptacle placed below the end of the trough which protrudes beyond the discharge end of the drum as shown in Fig. 1 of the drawings.

It will be understood that by the proper adjustment of the stop 45, and the application of more than one tappet at each end of the drum, the position of the trough 40, the extent of its movement, and the number of its operations during each revolution of the drum, may be varied in accordance with the character of the material to be treated.

The upwardly moving conveyer 30, separates the muddy water from the material before it is fed into the drum, and the material is consequently treated only with clear water which greatly facilitates the process of separating the values contained therein from the gangue.

Having thus described my invention what I

I claim and desire to secure by Letters-Patent is:—

1. A separator comprising a rotating drum, means for feeding material thereinto, means to effect a flow of water along the interior surface of the drum opposite to its direction of rotation, a receptive appliance adapted to intercept said flow by engagement with said surface and to move with the drum when thus in contact, and means to intermittently actuate said appliance by the movement of the drum.

2. A separator comprising a rotating drum, means for feeding material thereinto, means to effect a flow of water along the interior surface of the drum opposite to its direction of rotation, a trough normally spaced from the interior surface of the drum and adapted to move into contact with its interior surface to intercept said flow, and means to intermittently move said trough during the operation of the drum.

3. A separator comprising a rotating drum, means for feeding material thereinto, means to effect a flow of water along the interior surface of the drum opposite to its direction of rotation, a receptive appliance adapted to intercept said flow by engagement with said surface and means to automatically actuate said appliance at a predetermined point in the rotation of the drum.

4. A separator comprising a rotating drum, means for feeding material thereinto, means to effect a flow of water along the interior surface of the drum opposite to its direction of rotation, a trough normally spaced from the interior surface of the drum and adapted to move into contact with said surface to intercept said flow, a lever adapted to actuate said trough, and a tappet on the drum to actuate the lever during its rotatory movement.

5. A separator comprising a rotating drum, means for feeding material thereinto, means to effect a flow of water along the interior surface of the drum opposite to its direction of rotation, a trough normally spaced from the interior surface of the drum and adapted to move into contact with said surface to intercept said flow, and means on said drum to intermittently actuate said trough, during its rotatory movement.

6. A separator comprising a rotating drum, means for feeding material thereinto, means to effect a flow of water along the interior surface of the drum opposite to its direction of rotation, a trough normally spaced from the interior surface of the drum and adapted to move into contact with said surface to intercept said flow, and to move with said drum when in contact therewith, and means to intermittently move said trough during the operation of the drum.

7. A separator comprising a rotating drum, means for feeding material thereinto,

means to effect a flow of water along the interior surface of the drum opposite to its direction of rotation, an articulately supported trough adapted to engage with its forward edge the interior surface of the drum when moved about its axis of articulation, and means to intermittently effect said movement during the rotation of the drum.

8. A separator comprising a rotating drum, means for feeding material thereinto, means to effect a flow of water along the interior surface of the drum opposite to its direction of rotation, a pivoted frame, a trough articulately attached at one end thereof and adapted to engage with one of its edges, the interior surface of the drum, when moved about its axis of articulation, and means to intermittently move said drum into contact with said surface, and to subsequently move said frame about its pivotal axis, during the rotation of the drum.

9. A separator comprising a rotating drum, means for feeding material thereinto, means to effect a flow of water along the interior surface of the drum opposite to its direction of rotation, a trough normally spaced from the interior surface of the drum and adapted to move into contact with said surface to intercept said flow, a lever engaging said trough with one of its arms, an extension yieldingly connected with its opposite arm and a tappet on the drum to intermittently engage said extension during the rotatory movement of said drum.

10. A separator comprising a rotating drum, means for feeding material thereinto, means to effect a downward flow of water along the interior surface of the drum opposite to the direction in which it rotates, an axle extending transversely through said drum, a frame pivotally mounted on said axle, a trough articulately attached at the end of said frame, normally in spaced relation to the interior surface of the drum, means to yieldingly maintain said trough in its normal position, a lever fulcrumed on said axle in operative engagement with said trough and a tappet disposed on said drum, to periodically move the said lever about its fulcrum whereby the trough is intermittently brought in contact with the interior surface of the drum.

11. A separator comprising a rotating drum, means for feeding material thereinto, means to effect a downward flow of water along the interior surface of the drum opposite to the direction in which it rotates, a swinging frame, a trough articulately attached at the free end thereof, normally in spaced relation to the interior surface of the drum, a spring to yieldingly maintain said trough in its normal position, a lever in operative engagement with said trough, and a tappet disposed on said drum to periodically

move the said lever about its fulcrum whereby the trough is intermittently brought in contact with the interior surface of the drum.

5 12. A separator comprising a rotating drum, means for feeding material there-into, means to effect a downward flow of water along the interior surface of the drum opposite to the direction in which it
10 rotates, a swinging frame, a trough articulately attached at the free end thereof, normally in spaced relation to the interior surface of the drum, a spring to yieldingly maintain said trough in its normal position,
15 a lever in operative engagement with said trough, a tappet on the drum, to periodically move the said lever about its fulcrum, whereby the trough is intermittently brought in contact with the interior surface
20 of the drum, and an adjustable stop to support said frame and said lever in their positions of rest.

13. A separator comprising a rotating drum, means for feeding material into the
25 lower portion thereof, a water supply disposed to effect a downward flow of water along the interior surface of said drum at

its upwardly moving side, a receptive appliance normally spaced from the said surface below said supply, and a mechanism to
30 bring the said appliance intermittently into contact with the said surface to intercept said flow.

14. A separator comprising a rotating drum, means for feeding material into the
35 lower portion thereof, a water supply disposed to effect a downward flow of water along the interior surface of said drum at its upwardly moving side, a receptive appliance normally spaced from the said sur-
40 face below said supply, a mechanism to bring the said appliance intermittently into contact with the said surface to intercept said flow, and means for adjusting the normal position of the said appliance whereby
45 the position of the line along which it engages the drum, may be varied.

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

BENJAMIN LONG.

Witnesses:

G. J. ROLLANDET,
F. H. CUNO.