S. H. BOYLAN.

CLASSIFIER.

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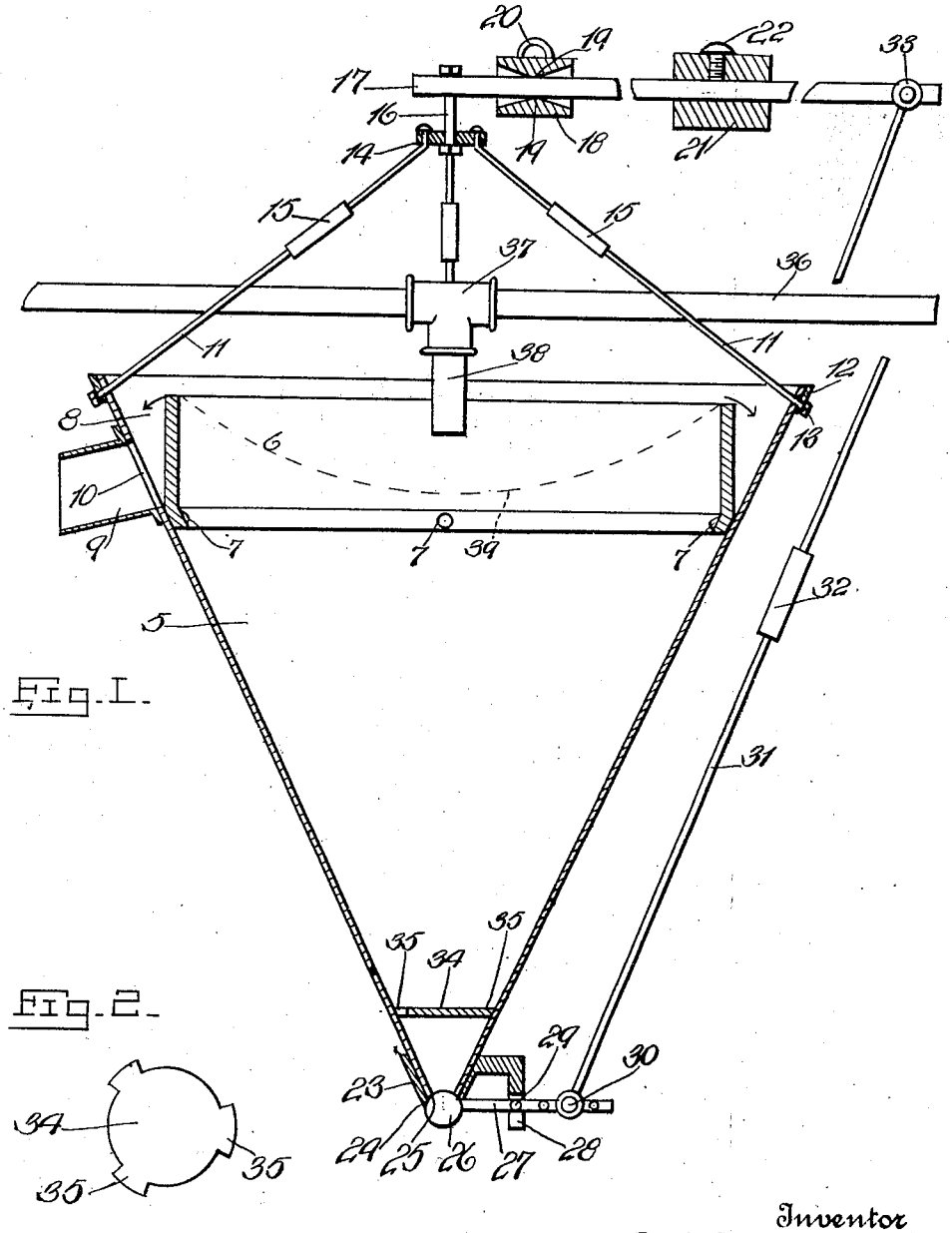


Fig. 1.

Fig. 2.

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CLASSIFIER.

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To all whom it may concern:

Be it known that I, SAMUEL H. BOYLAN, a citizen of the United States, residing at Joplin, in the county of Jasper and State of Missouri, have invented certain new and useful Improvements in Classifiers, of which the following is a specification.

My invention relates to an automatically operated classifier, for use in treating crushed ore bearing rock in the presence of water, while not necessarily restricted to this use.

An important object of the invention is to provide reliable and simple means to maintain the level of the bed of crushed rock or sand, at a selected height, within the apparatus, such means being operated by the weight of the bed.

A further object of the invention is to provide means for supporting the weight of the bed of sand or rock, thereby relieving the outlet valve of this load, which might tend to improperly open or clog the same.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a central vertical longitudinal sectional view through apparatus embodying my invention, parts being shown in elevation, and,

Fig. 2 is a plan view of a supporting plate.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 5 designates a conical casing, decreasing in diameter downwardly. Arranged within the upper large end of the conical casing 5 is a vertical ring 6, concentric with relation thereto. The outer end of this ring is spaced beneath the top of the conical casing 5 and the lower end of the same is rigidly secured to the conical casing 5, as shown at 7. The ring 6 forms with the conical casing 5 an annular overflow space 8, for catching the fine sand, water, or slime, the same discharging into an outlet spout or pipe 9, through an opening 10.

The conical casing 5 is supported by a number of upwardly converging rods 11, preferably four in number, the lower ends of which pass through the upper ends of the casing 5 and a reinforcing ring 12, secured thereto, and carry nuts 13, as shown. The upper ends of these rods 11 are attached to a plate 14, supported by means to be described. The rods 11 are equipped with turn buckles 15, whereby the rods may be longitudinally adjusted, so that the conical casing 5 may be supported with its top horizontal.

The plate 14 is provided centrally thereof with an opening for the reception of a suspension bolt 16, and the upper end of this suspension bolt passes through an opening in a vertically swinging lever 17. This lever passes through a suspension block 18, and pivots upon edges 19, as shown. The suspension block 18 is provided with an eye or slot 20, for connection with a cable or other supporting means. The lever 17 has a weight 21 longitudinally adjustably mounted thereon and this weight may be clamped to the lever in any desired position by means of a clamping screw 22.

Surrounding the lower end of the conical casing 5 is a conical sleeve 23, rigidly attached thereto, and having an outlet opening 24, in communication with an outlet opening 25, these two outlet openings serving as a valve seat, for engagement with a ball valve 26. The ball valve is screwed to a vertically swinging lever 27, pivoted to a stationary support 28, as shown at 29. This support 28 is carried by the sleeve 23. Pivotally connected with the lever 27, as shown at 30, is a rod 31, having a turn buckle 32 connected therein. This rod is pivotally connected, as shown at 33, with the outer end of the lever 17.

Arranged within the lower end of the conical casing 5 near and above the ball valve 26 is a bed supporting plate 34, of smaller diameter than the adjacent portion of the casing 5, but carrying radially extending lugs 35, contacting with the wall of the casing 5. The function of this plate is to support the bed or body of sand or ground ore bearing rock, thereby taking the weight of the same from the valve 26.

Arranged above the conical casing 5 is a feed pipe 36, through which the ground ore bearing rock and water is fed. There may be any suitable number of the conical casings 5 arranged in a row, and the pipe 36 may be employed to feed all of these casings. Arranged above and centrally of the upper

end of each casing 5 is a T-coupling 37, having connection with a depending discharge spout 38, leading into the upper end of the conical casing 5, in concentric relation thereto.

The operation of the apparatus is as follows:

The crushed ore bearing rock or sand with water is fed through the pipe 36 and discharges into the upper end of the conical casing 5. A bed of the sand or crushed rock accumulates within the casing 5 and the downward discharge of the sand or crushed rock and water, through the downwardly projecting nozzle 38, creates a basin or crater 39 at the top of the bed. As the sand or crushed rock and water discharge into this crater at a substantial speed, violent agitation or boiling action occurs. During this agitating or boiling action the classification of the different sizes of solid particles occurs. The heavier particles descend, while the smaller or lighter particles ascend and discharge with the water over the edge of the ring 6 into the overflow space 8, and then into the outlet 9. As the amount of larger solid particles collected in the casing 5 increases, the weight of the bed accordingly increases and when this weight exceeds a selected limit, which may be determined by the adjustment of the weight 21 longitudinally upon the lever 11, the casing 5 descends slightly. This downward movement of the casing 5 causes the opposite end of the lever 11 to rise and for a greater distance, thereby causing the link 31 to be elevated. This link swings the lever 27 upon its pivot and moves the ball valve 28 from its seat. When the valve is unseated the lower portion of the bed of sand or crushed rock discharges from the casing 5. This discharge is automatically stopped when the weight of the bed is restored to the selected point, at which time the weight 21 will overbalance the casing 5, thereby restoring the valve 26 to the closed position, as is obvious. It is thus seen that by the adjustment of the weight 21 the weight of the bed may be controlled which corresponds with its height. By varying the height of the bed or the depth of the crater 39 the finer particles are made to travel a greater or lesser distance to reach the overflow space 8 and it is obvious that by varying the depth of the crater, the size of the solid particles discharging into the space 8 may be controlled, at will, as the larger particles will be retained within the ring 6. When the apparatus stops operating, the valve 26 is closed, but when it is in operation, this valve is partly or wholly open, according to the amount of feed and the amount of coarser material in the feed, for the purpose of maintaining a constant level at the crater. The coarser product discharging through the outlet valve, passes to one set of tables, while the slime from the overflow space 8 passes to other tables. The discharge of both products is continuous during the operation of the machine.

It is to be understood that the form of my invention, herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. An automatic classifier of the character described, comprising a casing provided at its lower end with an outlet opening, a single vertically swinging lever arranged above the casing, means for pivotally supporting the single lever at a point arranged near and spaced from the forward end thereof, suspension means connecting the forward end of the lever with the casing, a weight longitudinally adjustably mounted upon the rear portion of the lever, means for supplying material to be classified into the upper end of the casing, a valve to cover and uncover the outlet opening from the exterior of the casing, a vertically swinging lever carrying the valve and pivoted to the lower end of the casing to be supported thereby, and a rod pivotally connected with the two levers, said levers and rod lying entirely outside of said casing.

2. An automatic classifier of the character described, comprising a conical casing provided at its lower end with an outlet opening, a single vertically swinging lever arranged above the casing, means for pivotally supporting the single lever at a point arranged near and spaced from the forward end thereof, suspension means connecting the forward end of the lever with the upper end of the casing and serving to entirely support the casing, an upstanding ring held within the upper end of the conical casing and forming an overflow space, an outlet for the overflow space, a feed nozzle projecting downwardly into the top of the casing in concentric relation thereto, a valve to cover and uncover the outlet opening from the exterior of the casing, a vertically swinging lever carrying the valve, and pivotally connected with the lower end of the casing to be supported thereby, a rod pivotally connected with the two levers, and a weight adjustably mounted upon the first named lever, said levers and said connecting rod lying entirely outside of said casing.

3. In a device of the type described, a pivotally supported lever, a conical casing, a plate arranged coaxially with said casing, a plurality of rods connecting the upper edge of said casing and said plate, means for securing said plate to one end of said lever,

means for adjusting said rods to maintain the top of said casing in a horizontal position, an aperture formed in the lower end of said casing, a valve for closing said aperture from the exterior of the casing, a lever pivotally secured to said casing and having one end thereof secured to said valve, means for adjustably connecting the other end of said lever with the free end of said pivotally supported lever, and means for preventing the pressure of the weight of the contents of said casing from bearing on said valve.

In testimony whereof I affix my signature.

SAMUEL H. BOYLAN.