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M. S. HACHITA

GRAVITY SEPARATOR

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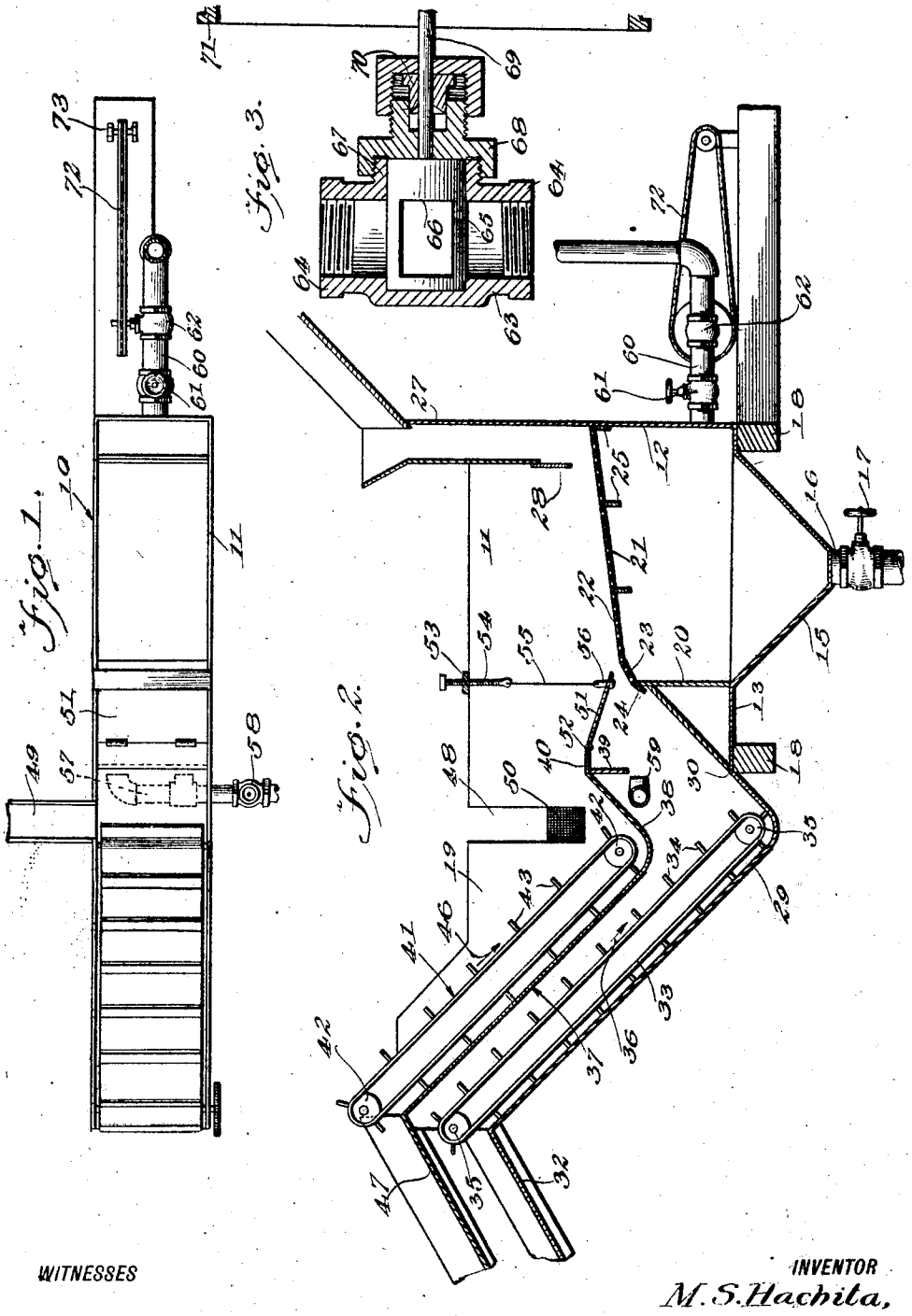

WITNESSES

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GRAVITY SEPARATOR.

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To all whom it may concern:

Be it known that I, MAXIMILIAN S. HACHITA, a citizen of the Empire of Japan, and a resident of Wilkes-Barre, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Gravity Separators, of which the following is a specification.

This invention relates to improvements in gravity separators.

The object of the invention is to provide a separator of the above character adapted to be used in classifying and separating materials comprising particles of various specific gravities.

It is also an important object of the invention that the separator be adapted to efficiently operate for separating material into two different grades, that is, all objects in the material having a specific gravity above a certain degree being separated from the particles having a lesser specific gravity.

Other objects, and objects relating to details of construction, combination and arrangement of parts will hereinafter appear in the detailed description to follow.

In carrying out the present invention, it is contemplated to employ two separate currents of water, one of which is a constant current while the other is a pulsating current. The constant current of water and the pulsating current are so arranged that the pulsating current serves to initially separate the lighter particles from the heavier particles in the material being operated upon and the constant current maintains this separation a sufficient period so that the heavier material may be mechanically removed from the lighter material.

The invention is illustrated by way of example in the accompanying drawings, in which:—

Figure 1 is a top plan view of the separator.

Figure 2 is a vertical longitudinal sectional view of the same.

Figure 3 is a detailed view of the pulsating valve employed in connection with the apparatus.

Referring to the drawings more particularly, 10 indicates generally a tank which consists in the two side walls 11, a forward end wall 12 and a bottom 13 which is formed with a conical shaped formation 15 terminating at its lower end in a suitable opening which communicates with a drain pipe 16, said pipe being equipped with a suitable valve 17 for closing the same. The tank may be supported by sills as at 18. The rear end of the tank is open and each side wall 11 is extended as at 19, the purpose of which will later become apparent. At a point adjacent the rear end of the tank there is positioned a transverse partition wall 20 which is substantially of the height shown in Figure 2 and upon which there rests the one end of an inclined grating 21. The grating 21 may consist in a plurality of bars 22 which extend transversely of the tank and preferably the one end portion of the grating is sloped as at 23, and also the grating should overlap the partition wall 20 as at 24 and extend downwardly as shown. The grating 21 is supported by bars 25, said bars extending between sides 11 of the tank. A hopper 27 is positioned at the forward end of the tank, its lower end being adapted to deposit material upon the grating 21. An adjustable valve member 28 is provided at the lower end of the hopper whereby to regulate the material passing from said hopper upon the grating 21.

Between the extended portions 19 of the side walls 11 there is positioned an inclined bottom generally indicated by the reference numeral 29, said bottom terminating at its lower end in an upwardly extending portion 30 which extends to a point immediately beneath the rear end of the grating 21. This bottom may be provided at its rear end with a chute as indicated at 32 and above this bottom there is positioned an endless belt 33 carrying blades 34. The belt is passed about a pair of rollers 35. When the belt is rotated in the direction of the arrow 36 any material at the lower end of the bottom 29 will be carried to the chute 32.

Above the belt or conveyor 33 there is positioned a partition wall 37 which is adapted to form a trough thereabove and said partition wall terminating at its lower end in an upwardly extending portion 38 which may be supported at its rear end by a cross member 39 and which may have a portion extending beyond the cross member as at 40, and said portion being horizontally disposed as shown. A conveyor belt 41 is provided, said conveyor belt being extended about suitable rollers 42 and having blades 43 extending therefrom whereby upon the belt being moved in the direction of the arrow 46 any material at the

lower end of the partition 37 will be carried upwardly and deposited in the associated chute 47.

One of the side walls 11 is provided with an outlet 48 which may be referred to as an "overflow" and which communicates with a trough 49. A reticulated closure 50 is provided for the lower end of the opening 48 thereby to eliminate any possibility of particles passing through this opening.

To the free end portion 40 of the division wall 37 there is hinged a gate 51. This gate is in the form of a board and hinged as at 52, said hinges being adapted to permit free upward and downward swinging movement of the gate. A cross member 53 is supported by the walls 11 upon the upper edges thereof, and through this cross member there is threaded an elongated screw 54 which has attached to its lower end a cable 55 and said cable being in turn connected at its lower end to a swivel 56, said swivel being attached to the outer end of the gate member 51. This screw 54 may be manipulated for adjustably raising and lowering the outer end of the gate 51. It should be here stated that the cross member 39 also serves the function of a baffle member to currents of water proceeding forwardly from the grating 21. Immediately rearward of this baffle member and in a plane therebeneath there is positioned an inlet pipe 57 which may be controlled by a valve 58 and which terminates in a plurality of nozzles 59 adapted to direct the water being discharged from said pipe forwardly.

An induction pipe 60 extends through the forward wall 12 of the tank 10 and communicates with the interior of said tank adjacent the bottom thereof. A valve 61 is interposed in the pipe to control the flow of liquid therethrough. The pipe may communicate with any source of water supply under pressure and also interposed in this pipe is a pulsating valve generally indicated by the reference character 62. The pulsating valve 62 comprises a T-fitting 63, Figure 3, and its alined ends 64 threadedly connected with the pipe 60. Within the T-fitting there is turnably mounted a cylindrical member 65 in which there is provided an opening 66 and when said opening is brought into register with the passage of the pipe 60 water may flow through said valve. The valve member 66 is journaled at one end by the portion 67 of the T-fitting and this portion 67 has threaded thereon a cap 68 through which a stem 69 of the member 66 extends. A suitable packing gland 70 may be provided for the stem 69 and carried by the cap 68, and this stem may also carry a pulley 71 about which a belt 72 may pass for operating the same and said belt being driven from a suitable motor or the like as at 73.

In the operation of the present apparatus, the material to be separated is deposited in the hopper 27 and the gate 28 is adjusted to permit the material to run upon the grating 21 at the desired rate of discharge. The motor 73 is started and water is injected into the lower end of the tank 10 intermittently, that is, in pulsations. This water moves upwardly and through the grating 21 and in doing so will lift the material deposited upon this grating from the hopper 27. The material in settling during the interval between pulsations will separate, that is, the particles having the greatest specific gravity of weight will first settle, while the lighter particles will be in suspension in the water. The pulsations of water entering through the pipe 60 will cause these lighter particles to move rearwardly in the tank and with the result that the same will move over the gate 51 and into the trough provided by the division wall 37. It is of course assumed that suitable power means are provided whereby the conveyors 33 and 41 are operated in the direction heretofore described and with this occurring the conveyor 41 will deposit the fine particles separated from the material being operated upon into the chute 47 from which it may be delivered into a bin.

The baffle member 39 cooperates with the gate 51 which vibrates vertically due to the action thereon of the intermittently upwardly flowing stream of water through the screen 21. Such vibration of the gate 51 facilitates the passage through the opening underneath the forward edge thereof of the heavy particles which may have accumulated at the gate.

Also during the operation of this apparatus, water is permitted to constantly flow through the pipe 57 and this water representing a constant element which serves to further prevent particles of certain specific gravity from passing beneath the gate 51 and insure that only heavier particles will pass beneath this gate. These heavier particles proceed downwardly and are carried rearwardly by the conveyor 33 and deposited in the chute 32. It also should be noted that the opening 48 in the side wall of the tank 10 serves to maintain the water at a certain level within said tank.

It further should be noted that by providing a bottom 15, as shown, that any fine particles may collect therein and then be drained from the tank through the pipe 16. By utilizing the pipe 58, the tank can be thoroughly washed, that is, by opening the pipe 58 and the pipe 16.

It should also be here noted that the gate 51 may be closely adjusted and thus to regulate the particular specific gravity of the particles which pass thereover.

While I have shown and described the

preferred form of my invention, I wish it to be understood, that I am aware of the fact that the construction, combination and arrangement of parts may be changed by those skilled in the art without departing from the spirit of the invention, as indicated by the appended claims.

I claim:—

1. In an apparatus of the character described, a tank, a reticulated platform within the tank, means whereby a material to be separated may be deposited upon said platform, means whereby a pulsating current of liquid may be directed upwardly and beneath said material and also rearwardly with relation to the tank, said pulsations of liquid being adapted to lift the material and whereby during the settling thereof and between pulsations the lighter particles of material may separate from the heavier particles, a partition rearward of the reticulated platform adapted to maintain the separation of the lighter particles from the heavier particles, and means whereby a counter-current of liquid may be established at the rear of the reticulated platform and thereby to insure the separation of said particles.

2. In an apparatus of the character described, a tank, a reticulated platform within the tank, means whereby a material to be separated may be deposited upon said platform, means whereby a pulsating current of liquid may be directed upwardly and beneath said material and also rearwardly with relation to the tank, said pulsations of liquid being adapted to lift the material and whereby during the settling thereof and between pulsations the lighter particles of material may separate from the heavier particles, a partition rearward of the reticulated platform adapted to maintain the separation of the lighter particles from the heavier particles, and an adjustable baffle plate hingedly secured to the forward end of said partition and adapted for transverse swinging movement with respect to said tank.

3. In an apparatus of the character described, a tank, a recticulated platform within the tank, means whereby a materal to be separated may be deposited upon said platform, means whereby a pulsating current of liquid may be directed upwardly and beneath said material, a partition rearward of the reticulated platform adapted to maintain the separation of lighter particles from the heavier particles, and means at the rear of said partition whereby a counterflow of liquid may be established, for the purpose described.

4. In an apparatus of the character described, a tank, a reticulated platform within the tank, means whereby material to be separated may be deposited upon said platform, means whereby a pulsating current of liquid may be directed upwardly and beneath said material and also rearwardly with relation to the tank, said pulsations of liquid being adapted to lift the material upon the platform and during the settling of said material between the pulsations the lighter particles of material may separate from the heavier particles, a partition rearward of the reticulated platform adapted to maintain the separation of said material, a baffle hingedly secured to the forward end of said partition, a supporting member above said baffle plate, a screw carried by said supporting member, and a connection between the free end of said baffle member and screw whereby said baffle member may be adjusted, for the purpose described.

MAXIMILIAN S. HACHITA.