

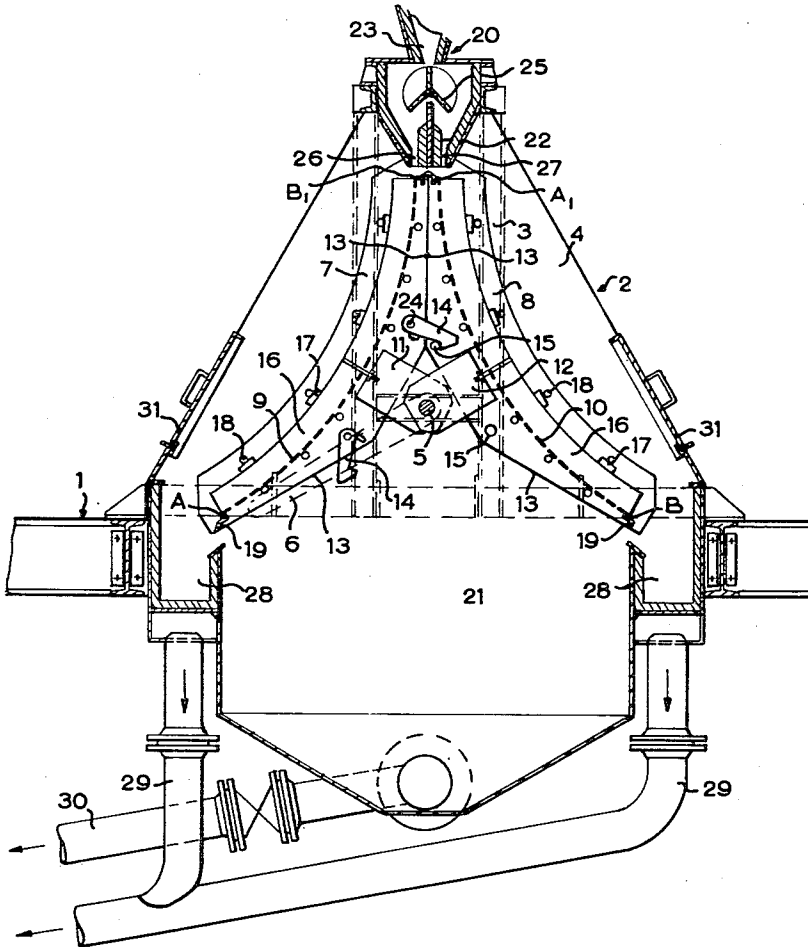
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APPARATUS FOR SEPARATING PARTICLES ACCORDING TO SIZE

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APPARATUS FOR SEPARATING PARTICLES ACCORDING TO SIZE

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This invention relates to particle separation and more particularly to improvements in apparatus for separating particles.

In U.S. Patent No. 2,748,941, there is disclosed a screening device provided with a screening deck having the shape of a segment of a cylindrically curved surface, feed means having at least one opening for tangentially feeding a liquid and a mixture of particles to be separated over the full width and onto the concave side of the screening deck, perpendicularly to the generatrices thereof, and means for collecting the separated fractions. The screening deck is fitted in a holder which can turn on a horizontal shaft parallel to the generatrices of the screening deck so that in one position the one end of the screening deck connects with the feed means, and in the other position the other end of the screening deck connects with the feed means.

With this device, by periodically interchanging the feed end and the discharge end of the screening deck, the stream of the material along the screening deck can be periodically made to change its direction, as a result of which a uniform wear of the screening deck and a separation at a constant particle size can be insured.

The space required for this device depends on the size of the screening deck and the space occupied by the holder and the screening deck during turning. The dimensions of the screening deck depend on the amount of material to be treated.

An object of the present invention is the provision of an apparatus of the type described which is capable of treating approximately twice the amount of material as the prior art device while at the same time requiring substantially the same space for reversibility.

Another object of the present invention is the provision of apparatus of the type described including a pair of screening decks and means mounting said screening decks for rotation about a common horizontal axis between a first operative position wherein the screening decks are symmetrical about a vertical plane passing through the axis of rotation and one end of each screening deck is arranged to have the suspension fed thereto at fixed feeding positions and a second position wherein the screening decks are also symmetrical about the same vertical plane but the opposite ends thereof are arranged to have the suspension fed thereto at the fixed feeding positions.

These and other objects of the present invention will become more apparent during the course of the following detailed description and appended claims.

The invention may best be understood with reference to the accompanying drawing wherein an illustrative embodiment is shown in a vertical cross-sectional view.

Referring now more particularly to the drawing, the apparatus of the present invention includes a frame, generally indicated at 1, which has a casing, generally indicated at 2, mounted therein. The casing includes a skeletonized structure made up of rigidly interconnected members 3 of conventional cross-sectional configuration having side plates 4 fixed thereto. A shaft 5 is journaled in the casing and extends between the side plates. Fixed to the shaft outward of one side plate is a handle 6, indicated by dotted lines, by which the shaft can be turned. Disposed in the casing, symmetrical with respect

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to a vertical plane passing through the center of the shaft 5, there are two holders 7 and 8 which fixedly receive screening decks 9 and 10, respectively. One of these holders, such as holder 7, is fixed to the shaft 5, by any suitable means such as plates 11, and the other holder 8 is rotatably mounted on the shaft 5 by any suitable means such as plates 12.

As shown in the drawing, the holders are bounded, at least near the feed and discharge ends of the screening decks, by flat surfaces 13 and, when the screening decks are in the operative position, two of these surfaces are in the vertical plane of symmetry through the center of the shaft 5. The holder 7 is provided, on at least one side, with two pawls 14, each of which can turn on a shaft 24 and one of which engages, in the operative position, a pin 15 on the holder 8. The screening decks 9 and 10 are kept in place by means of clamping strips 16, wedges 17 and check rods 18.

At the ends of the screening decks there are oblique plates 19 which prevent liquid and solid particles to be separated, supplied by a feeding device 20, from falling into the space bounded by the convex parts of the screening decks, and thus getting into a collecting means 21 for the underflow fractions from the screening decks. The feeding device 20 consists of a funnel-shaped body which is divided into two equal compartments, as by a wall 22, and into which a feeder mouth-piece 23 opens. If necessary, a distribution element 25 may be mounted in the top of the feeding device. The feeding device has two slot-shaped mouth-pieces 26 and 27, the front and back walls of which are positioned between the walls of the holders 7 and 8, and through which liquid and solid particles are fed tangentially onto the concave sides of the screening decks.

On either side of the vertical axis of symmetry through the center of the shaft 5, the screening device has trough-shaped collecting means 28 for the overflow fractions from the screening decks 9 and 10, each of which is provided with a discharge pipe 29. The collector 21 for the underflow fractions is funnel-shaped and provided with a discharge pipe 30. If necessary, detachable splash plates 31 may cover the bottom part of the casing 2. If desired, the feeding device 20 and the discharge devices 28 may be lined with wear-resistant material. The handle 6 is provided with a locking device (not shown), through which it can be fixed to the casing 2, to prevent the shaft 5 from turning at undesired moments.

It can thus be seen that the apparatus of the present invention provides a pair of screening decks 9 and 10 which can be moved by operation of the handle 6 and pawls 14 into two operative positions wherein the screening decks are disposed in symmetrical relation with respect to a vertical plane passing through the axis of rotation of the screening decks. In a first of the two operative positions, one end of each of the screening decks is disposed adjacent an associated feed slot to receive the suspended mixture fed therefrom. In a second operative position, the opposite ends of the screening decks are disposed adjacent the feed slots to receive the suspended mixture fed therefrom. To turn the screening decks from one operative position to the other, the upper pawl 14 is disengaged. This causes the right-hand holder 8 in the drawing to rotate on the shaft 5, and the surfaces 13 of the holders 7 and 8 which were previously at an angle to each other, to come to rest against each other. In its new position, the holder 8 is attached by means of the lower pawl 14 to the holder 7. Subsequently, the lock of the handle 6 is disengaged and the two holders are turned, by turning handle 6, until the discharge end A of the screening deck 7 has taken up the position A₁, and the discharge end B of the screening deck 8 has taken up the position B₁.

It thus will be seen that the objects of this invention have been fully and effectively accomplished. It will be realized, however, that the foregoing specific embodiment has been shown and described only for the purpose of illustrating the principles of this invention and is subject to extensive change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

I claim:

1. Apparatus for separating particles according to size comprising a pair of substantially identical screening decks each having the shape of a segment of a cylindrically curved surface, feed means for each of said screening decks for feeding a mixture of particles and a suspending liquid at one end over the full width of the associated screening deck onto the concave side thereof in a direction perpendicular to the generatrices thereof, said feed means being fixedly disposed in adjacent parallel relation on opposite sides of a vertical plane, and means mounting said screening decks for rotational movement about a common axis disposed in said vertical plane between a first operative position wherein said screening decks are disposed in symmetrical relation with respect to said vertical plane and one end of each of said screening decks is positioned adjacent the associated feed means to receive the mixture fed thereby, and a second operative position wherein said screening decks are disposed in symmetrical relation with respect to said vertical plane and the opposite ends of said screening decks are positioned adjacent said feed means to receive the mixture fed thereby.

2. Apparatus as defined in claim 1 wherein said screening deck mounting means comprises a holder fixedly receiving each of said screening decks, said holders having cooperating means for fixedly securing the same together when said screening decks are disposed in said operative positions.

3. Apparatus as defined in claim 2 wherein said screening deck mounting means further comprises a shaft fixed to one of said holders and the other of said holders rotatably received on said shaft.

4. Apparatus as defined in claim 2 wherein said holders are provided with flat surfaces extending along opposite end portions of the associated screening decks in planes passing through the axis of rotation thereof, the flat surfaces of both holders at the end portions of the screening decks adjacent said feed means being disposed in abutting relation along said vertical plane when said screening decks are in their operative positions.

5. Apparatus as defined in claim 1 including means for collecting and discharging an undersize fraction passing through both of said screening decks when disposed in either of said operative positions and means for collecting and discharging an oversize fraction issuing from the end of each screening deck remote from the associated feed means when said screening decks are disposed in either of said operative positions.

6. Apparatus for separating particles according to size comprising a plurality of substantially identical screening decks each having the shape of a segment of a cylindrically curved surface, feed means for at least two of said plurality of said screening decks for feeding a mixture of particles and a suspending liquid at one end over the full width of the associated screening deck onto the concave side thereof in a direction perpendicular to the generatrices thereof, said feed means being fixedly disposed in adjacent relation on opposite sides of a vertical plane, and means mounting said plurality of screening decks for rotational movement about a common axis disposed in said vertical plane into at least two positions in which a different one of said plurality of screening decks is disposed in each of the following two positions: (1) a first operative position with one end adjacent said feed means to receive particles and a suspending liquid fed therefrom; and (2) a second operative position with the opposite end adjacent said feed means to receive particles and a suspending liquid fed therefrom.

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