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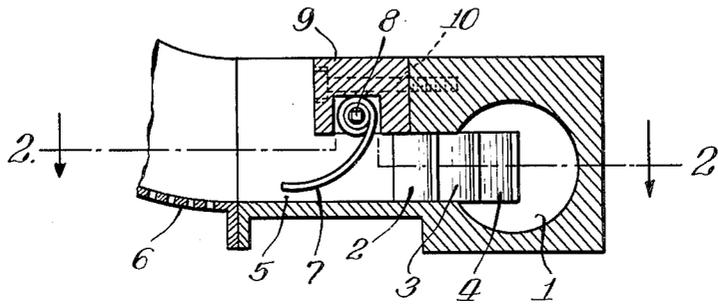
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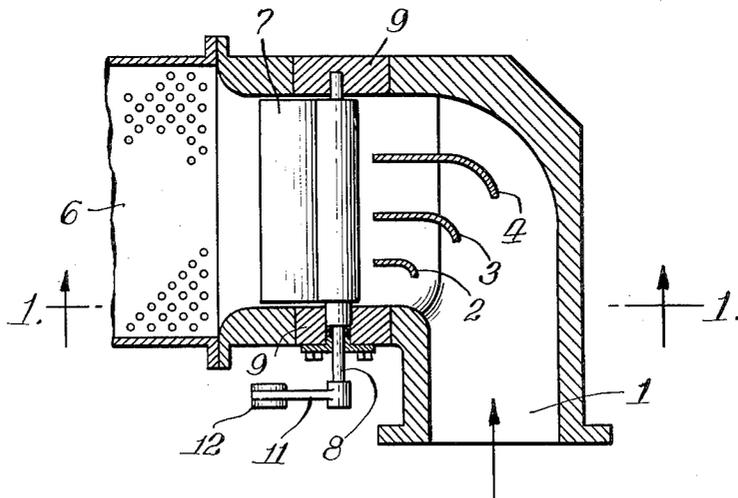
SEPARATOR FEEDING MEANS

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*Fig. 1.*



*Fig. 2.*



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**SEPARATOR FEEDING MEANS**

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4 Claims. (Cl. 209—254)

The present invention relates to separators, and more particularly to means for feeding a suspension or slurry onto a screen. The separator feeding means herein disclosed as an embodiment of the invention is utilized for feeding a screen for separating starch from fibrous material when both are contained or conveyed in a slurry or water suspension. While this is the preferred application of the invention, separation of other materials may be carried out by means of the invention, the true scope of which is to be ascertained from the appended claims.

In the recovery of starch from vegetable material containing starch granules, for instance, soaked corn, from which the germs have been removed, a slurry or other suspension containing starch granules and fibers is obtained by grinding the vegetable product, from which slurry the starch granules are washed out on screens. These screens may be of various constructions. According to the classical method flat shaking sieves are used, but of late years also screening apparatus with curved screening surfaces along which the slurry is propelled under pressure have been suggested. In those screening apparatuses, the slurry containing the starch granules and fibers is supplied to the screens through a supply slot intended to produce a uniform spreading of the slurry over the entire width of the screen. In practice, the difficulty now appears that the supply slot supplied from the side or sides is clogged up by fibrous material owing to which the screening process must be interrupted rather often to clean the supply slot of the screen.

It has now been found that this drawback can be substantially completely overcome by having the upper side of the supply slot consist of the lower side of a pivoted or swinging control valve, exerting a back pressure on the slurry supplied.

Such a control valve not only is important in a supply slot for screens on which fibrous material is washed out, but in general, in conduits through which suspensions of fibrous material are transported and which are provided with a narrowed passage opening. Here also trouble is encountered in that the passage opening becomes clogged up from the walls of the conduit, for instance at the location of a valve. Surprisingly, it has appeared that when applying a control valve exerting a back pressure on the suspension transported substantially no deposits of fibrous material occur.

The invention provides a method of transporting suspensions of fibrous material through a conduit having a narrowed passage opening in which the narrowed passage opening is provided with a freely pivoted control valve exerting a back pressure on the flow of fibrous material, the magnitude of the back pressure being adjustable, if desired.

The magnitude of the back pressure exerted may be adjusted in various manners, e.g., with the aid of an adjustable spring connected with the control valve. According to the invention, however, preferably use is made of a control valve which is freely pivoted through its mounting on a rockable shaft provided with a lever with an adjustable counterweight. Such adjustable spring or counterweight constitutes adjustable loading means for the valve.

The invention further includes the combination of such back pressure retaining means with a screening apparatus

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to which the material to be screened can be uniformly supplied via a supply slot the upper side of which consists of the lower side of a freely pivoted control valve. Here also the back pressure exerted by the control valve, if desired, can be varied by various means, but preferably a control valve is used which is arranged on a rockable shaft provided with a lever with an adjustable counterweight.

A further and additional feature of the invention involves the use of means for distribution of flow lengthwise of the slot. This may be done by the use of a supply conduit disposed generally lengthwise of the slot opening laterally into the slot. Since this in effect forms an elbow with a tendency for uneven flow along the length of the slot, a series of guide blades may be employed to distribute the flow along the length of the slot.

Now in order to acquaint those skilled in the art how to make and use my invention, I shall describe a specific embodiment of the same in conjunction with the accompanying drawings in which:

FIGURE 1 is a vertical section along the line 1—1 in FIGURE 2 of that part of the screening apparatus according to the invention where the suspension of fibrous material to be screened is supplied to the screen;

FIGURE 2 is a horizontal section along the line 2—2 in FIGURE 1 of that part of the screening apparatus according to the invention.

In the supply according to FIGURES 1 and 2, the suspension of fibrous material is supplied through conduit 1. Via the stationarily arranged guide blades 2, 3 and 4, which control distribution lengthwise of the slot, the material arrives in the supply slot 5 of screen 6 which may be either flat or curved, and which comprises a bottom wall of sheet screen and imperforate side walls. The upper side of the supply slot is formed by the lower side of the control valve 7. This control valve is pivoted because it is mounted on the rotatable or rockable shaft 8 which is provided with a lever 11 with a counterweight 12. The shaft 8 reposes in a prolongation 9 of the casing connected to the conduit by bolts 10, said prolongation 9 of the casing constitutes a nozzle member directing the flow of slurry substantially tangentially onto the screen 6.

Besides that it prevents the clogging up of the supply slot, the control valve has the advantage that when, for instance, foreign matter, such as pieces of corn cob, or pieces of stone, are present in the material supplied, it can turn upward to let them through. Furthermore, it will automatically leave a larger passage for a greater volume of liquid delivered by the supply pump, the back pressure exerted by the valve 7 upon the flow of liquid remaining substantially constant.

The invention provides the dual function of maintaining a substantially uniform back pressure, the valve 7 being suitably curved substantially in the form of an involute, and of rising to pass objects, such as pieces of corn cob or stones, which are carried by the current of fluid to prevent their lodging and forming stationary obstructions.

The device may be used with any desired supply means.

It is useful in conjunction with the delivery of a centrifugal pump or the like which has the characteristic of decrease of pressure with increasing volume of delivery and vice versa. It is useful also to compensate for variations of delivery pressure from whatever cause by tending to keep the back pressure approximately uniform, and hence the delivery velocity approximately uniform.

The device above disclosed is particularly useful in the separation of starch from fibers in the wet milling of corn (maize). In that service, the starch-fiber slurry is delivered by a centrifugal pump (not shown) through a delivery pipe connected to conduit 1. The flow of slurry

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which occurs longitudinally of the conduit 1 is to be delivered at substantially uniform depth and substantially the same rate of flow over the full width of the screen 6. The total flow may obviously be greater or less. The flow of slurry is to be conducted longitudinally of the screen. Hence, in the structure shown in the drawings, the flowing stream of slurry is required to change its direction of flow from that indicated by the arrow in FIGURE 2 to a direction at right angles thereto. At the same time, the flow is to be distributed substantially evenly along the length of the slot or opening 5 which is served by the valve 7. The vanes 2, 3 and 4 assist in distribution of the flow longitudinally of the slot and in bringing about the change in direction of the flow above referred to.

The pressure of the slurry against the valve 7 will tend to swing it in a clockwise direction as viewed in FIGURE 1 against the loading of the weighted lever 11. The yieldable resistance of the weighted lever upon the valve tends to maintain a back pressure which serves to equalize the flow of slurry along the length of the slot or opening. There must be a difference in pressure upon its opposite sides for it to move in the direction to widen the slot opening. A predetermined back pressure is exerted by the said weighted lever for various degrees of opening of the valve. In the event of a tendency to lodge a deposit of fibers or other non-fluid matter at this point, the difference in pressure exerted on opposite sides of the valve 7 will tend to force the material through the opening of the slot, thereby moving the valve 7 farther towards open position and thus permitting passage of the blocking material.

I claim:

1. In a device of the class described having a longitudinally extending screen having imperforate sidewalls and a bottom stationary screen wall, the improvement which comprises a nozzle member having an inlet and an outlet, the outlet being in the form of a narrow nozzle outlet the lower wall of which is substantially flush with the screen wall, and the upper wall of which is adjustable to vary the vertical size of the outlet opening, a valve pivoted along one transverse edge in the nozzle member the other being movable to vary the size of said nozzle opening, loading means for said valve tending to move the movable edge of the valve towards the lower wall of the nozzle opening, and a supply connection for said nozzle member.

2. In combination, a stationary screen having imperforate side walls extending longitudinally of the screen for guiding a flow of slurry longitudinally of the screen, a closed conduit for delivering a stream of slurry of starch

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and fibrous material onto said screen in a direction longitudinally of the screen, said conduit being disposed with its longitudinal axis lying transversely of the screen and extending for approximately the full width of said screen between said side walls, said conduit having a slot extending lengthwise of the conduit and substantially parallel of the surface of the screen, the bottom of said slot lying substantially level with the surface of the screen whereby the stream of slurry is directed onto the screen substantially tangentially thereof, a flap valve hinged at its upper edge along the upper edge of the slot and opening towards the screen, and means for adjustably loading the flap valve to bias it towards closed position, said flap valve affording a yieldable resistance to the flow of slurry through said slot and onto the screen whereby a back pressure is produced behind the valve.

3. The combination of claim 2 with flow directing vanes disposed in said slot transversely of the longitudinal axis of the conduit.

4. In a starch separator having a longitudinally extending stationary screen having imperforate side walls and a bottom screen wall, the improvement which comprises a nozzle member having a narrow discharge opening extending substantially for the full width of the screen for discharging a slurry of starch and fibre longitudinally of the screen substantially tangential to said bottom wall of said screen, a horizontally disposed rockable shaft pivoted in said nozzle member adjacent the upper edge of said opening and having a weighted lever externally of said member, a valve connected at its rear end to said rockable shaft and having its front end forming the upper wall of said nozzle for defining a narrow but adjustable slot extending substantially the full width of said nozzle member, a supply connection for said nozzle member comprising a laterally extending stationary tubular fitting having an oblong outlet opening along its side communicating with the rear end of said nozzle member, said weighted lever tending to turn said shaft in valve closing direction, and a plurality of flow dividing guide blades in said oblong outlet opening to distribute the flow of slurry lengthwise of said valve.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 2,995,245

August 8, 1961

Marcel L. E. van Tittelboom

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 42, after "other" insert -- edge --.

Signed and sealed this 12th day of December 1961.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

DAVID L. LADD

Commissioner of Patents

USCOMM-DC

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