

UNITED STATES PATENT OFFICE

2,108,098

FEED FOR CENTRIFUGAL SEPARATORS

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Application December 21, 1934, Serial No. 758,689
In Sweden December 22, 1933

6 Claims. (Cl. 233—45)

In studying the problem of feeding a liquid into a separator bowl through a hollow spindle, it must be kept in mind that the space available in radial direction is very limited. If it is not desired to provide a machine of this type with packings or other elements for obtaining a tight joint between the spindle and the fixed pipe line, it is necessary to arrange the supply of liquid in such a way that back-flow of the liquid from the channel of the spindle cannot take place. Especially in connection with centrifugal constructions in which the liquid is fed into the spindle from below in an upward direction, attention must be paid to this difficulty.

In the last named arrangement, it is possible to prevent leakage by causing the inflowing liquid to be rapidly brought into rotation with the spindle, so that it is thrown out against the wall of the channel, and to impart to such liquid an increased upwardly directed speed. The latter action is of importance especially when the pressure in the inlet nozzle is small, for instance, corresponding to a water column of one metre or less. The preferred specific construction which is found to efficiently effectuate the specified mode of operation comprises a number of conveyor wings, rotating with the spindle and extending inward from the spindle wall to the center of the spindle, or to a centrally located conical core having a lower pointed end which is directed towards the flow of the liquid. The preferred specific construction also includes a conical deflector, the generating line of which is approximately parallel with the generating line of the conical end of the core and which is so arranged that the liquid hits the said deflector, after it has been driven outward by the wings and the conical end, and, due to the obliquity of the screen, is accelerated in axial direction.

In the accompanying drawing:

Fig. 1 is a vertical sectional view through the lower end of the hollow bowl spindle and through the surrounding stationary frame and the member, applied to the frame, having the stationary feed channel communicating with the hollow spindle.

Fig. 2 is an enlarged elevational view of the appliances contained within the bowl spindle, namely, the wings for rotating the liquid, the screen for accelerating the vertical movement of the liquid, and the central core for spreading the liquid.

Fig. 3 is a cross-section through the core and wings.

The hollow bowl spindle 1, which rotates with,

and communicates with the interior of, the bowl (not shown) is supported by means of a ball bearing 2, from an annular member 30 secured to, or forming part of, a stationary frame 3. The spindle 1 has a contracted lower neck through which extends a fixed feed tube 4, whose external diameter is slightly smaller than the internal diameter of the spindle neck, so as to allow the necessary narrow play between the rotating spindle and the fixed feed tube.

A member 5, for directly supporting the feed tube 4, is itself detachably supported on the stationary frame 3 by means of a lock arm 6, which is secured against the member 5 by means of a screw 7, which is provided with a manually turnable wheel 8. Secured to or integral with the member 5 is a ring 9, which is in direct contact with the member 30 of frame 3. Member 5 is provided with a feed channel 10, the thick-walled upper vertically extending end of which receives the lower end of the thin-walled feed tube 4. The lower part of channel 10 curves downward and outward and is of gradually increasing diameter and communicates with a tube (not shown) for the supply of liquid to be separated.

Extending within, and axially along, the hollow spindle 1 is a core 13. Wings 11, extending vertically and radially, and to which the core preferably is secured, span the annular space between core 13 and the inner wall of the hollow spindle and have at their lower ends projections resting on the shoulder formed by the contracted neck of the bowl spindle 1. Secured to the lower ends of the wings 11 and projecting upwardly from such lower ends are one or more frusto-conical sheet deflectors 12. The lower end 14 of the core 13 has a conical shape and terminates above the lower ends of the wings 11 and should extend below the level of the upper edges of the deflector 12. The upper end of the core 13 is prolonged to form a spindle 15 that extends to the upper end of the hollow bowl spindle 1 and is there provided with a lid 16, which may also be used as a handle by means of which the core and the wings fixed thereto and the deflectors 12 may be removed for cleaning.

The liquid being fed through channel 10 and tube 4 into the hollow bowl spindle 1 is hit by the wings 11, which put the liquid into rotation, thereby forcing it toward the conical sheet deflector 12. By the pressure of the liquid against the deflector its axial velocity is increased. The core 13 with its conical lower end 14 diverts the inflowing liquid from the axis of the spindle 1, where the centrifugal force is zero, toward its

periphery. The diameter of the core should be sufficiently great (not less than the diameter of the smaller outlet from the bowl) to insure that its periphery is submerged in the upflowing liquid, so that air cannot be drawn past the core into the bowl.

To conduct to the outside any liquid that may leak between channel 10 and tube 4 and to prevent oil from leaking from the interior of the frame, I secure, to the member 30, an upstanding collar 19; and to a ring 20 (secured outside the lower end of the spindle neck and below the ball bearing 2) skirts 17 and 18 extending on opposite sides of the collar, one skirt 18 extending into the annular groove formed between the body of member 30 and collar 19 and the other skirt 17 extending down into the annular space between said collar and the upper channelled end of member 5.

What I claim and desire to protect by Letters Patent is:

1. A bowl feed for centrifugal separators comprising a rotatable hollow member whose lower end is adapted to receive the liquid to be treated, wings extending along the path of flow of the liquid, a conically shaped deflector, adjacent the lower ends of the wings and the wall of which diverges upwardly, and a core body extending along the axis of rotation inside the wings and having a tapered lower end terminating above the lower end of the deflector.

2. A bowl feed for centrifugal separators comprising a rotatable hollow bowl spindle, having a contracted lower neck, a stationary member provided with a channel through which liquid is adapted to flow into the bowl spindle, a tube extending into said channel and thereby supported by said member and also extending into but spaced from the inner wall of the lower neck of the spindle, and wings within and extending longitudinally of the spindle above said neck and terminating at their lower ends adjacent the upper outlet end of said tube, said wings extending inward from the wall of the spindle to substantially within the space directly above the flow space enclosed by the tube.

3. A bowl feed for centrifugal separators comprising a rotatable hollow spindle, means to supply liquid to the lower end thereof, a core body extending within and axially of the spindle and having a conically shaped lower end, wings between the core body and the inner wall of the hollow spindle and extending below the core body, and a deflector comprising arcuate sections of a

cone and extending between the wings and positioned between and spaced from the inner wall of the hollow spindle and the conical lower end of the core body; said wings, core body and deflector cooperating to impart rotation to and increase the axial velocity of the liquid flowing toward the bowl.

4. A bowl feed for centrifugal separators comprising a rotatable hollow bowl spindle of a length multiple times its width and whose lower end is adapted to receive the liquid to be treated, a core body whose length is multiple times its width extending along the axis of rotation of said hollow spindle to near the lower inlet end thereof, wings of a length multiple times their width and extending along the annular flow path between the spindle and said core and extending approximately to the lower inlet end of the hollow spindle and at their lower ends extending also toward the rotation axis of the hollow spindle, and upwardly and outwardly inclined arcuate sheet deflectors extending across the spaces between opposing faces of the lower ends of the wings and adapted to increase the axial velocity of the flowing liquid.

5. A bowl feed for centrifugal separators comprising a rotatable hollow bowl spindle, means to supply liquid to the lower end thereof, wings rotating with the spindle and extending along the interior of the hollow spindle and inward from its inner wall toward the axis of the spindle, and upwardly and outwardly inclined arcuate sheet deflectors extending across the spaces between the lower ends of the wings and together forming a conical deflector adapted to be hit by the liquid driven outward by the wings and to accelerate the flow of the liquid in an axial direction.

6. A bowl feed for centrifugal separators comprising a rotatable bowl spindle having an axial liquid passage of a length multiple times its diameter, means for supplying liquid to the lower end of said passage, axially elongated wings rotating with the spindle within said passage extending from the walls of the passage inwardly towards the axis and approximately to its inlet end and arranged to impart rotation to the entering liquid, and upwardly and outwardly inclined sheet deflectors extending across the spaces between adjacent wings at the receiving end of the passage to deflect upwardly the liquid moving radially due to its rotation by the wings.

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