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UPRIGHT CYLINDRICAL CONTAINER FOR SEPARATING LIQUOR AND/OR WASHING CELLULOSIC PULP

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Fig. 1

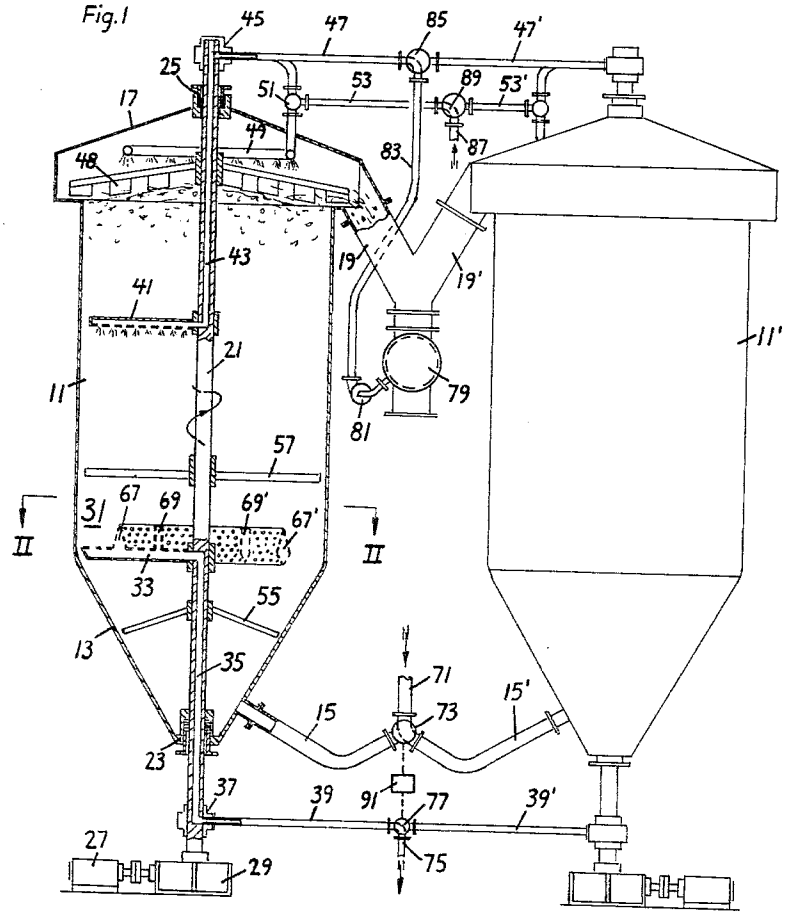


Fig. 2

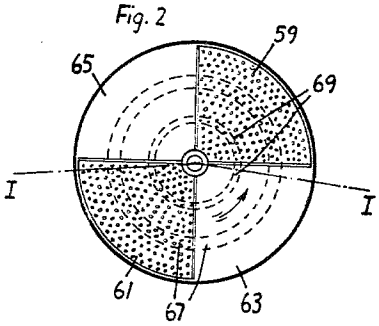
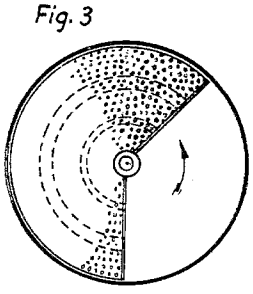


Fig. 3



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UPRIGHT CYLINDRICAL CONTAINER FOR SEPARATING LIQUOR AND/OR WASHING CELLULOSIC PULP

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4 Claims. (Cl. 210—189)

The present invention relates to an upright cylindrical container for separating liquor from and/or washing cellulosic pulp which is supplied continuously or batchwise at the bottom of the container and is fed upwardly through the container.

The object of the invention is, in such a container to create a sieving device which makes it possible to sieve off liquid in counter-current to the pulp and in a distribution as even as possible over the cross-section of the container in such a manner that the sieving operation does not appreciably obstruct the feed of the pulp past the sieving device. Another object is to create a sieving device in which the tendency of clogging of the sieve apertures, and of formation on the sieve surface of a pulp layer hard to penetrate, is diminished.

The essential characterizing feature of the invention consists in the provision of a rotary sieve body carried by a shaft concentric to the container, said sieve body having an interior cavity through which said shaft communicates with an outlet for liquid sieved off, said sieve body being essentially disc-shaped and having one or more flat and horizontal sectors which extend to the neighborhood of the wall of the container and the radial edges of which between themselves leave one or more sector-shaped spaces, whereby the sieve body during its rotation sweeps over and sieves off liquid from essentially the entire cross-section of the container, and also allows an axially directed flow of pulp up through or past the sieve body in an even distribution over the cross-section of the container. The rotation of the sieve body—which can take place with a speed having no relation of the feed of the pulp—involves that the pulp layer close to the sieve surfaces is steadily renewed and therefore is held rather loose simultaneously as the relative movement in the horizontal direction, of the sieve faces and the pulp provides self-cleaning of the sieve apertures.

The invention will be closer described hereinbelow with reference to the accompanying drawings. FIG. 1 shows two connected containers equipped with sieve devices according to the invention, one of which being shown in an elevational view and the other one being shown in a vertical sectional view which, as regards the sieve body, is taken along the line I—I in FIG. 2. FIG. 2 is a top plan view of the sieve body taken from the line II—II in FIG. 1, and FIG. 3 is a similar view of a modified embodiment of the sieve body.

Referring to FIG. 1, 11 designates an upright cylindrical container, the lower end of which merges into a conical part 13 forming a spreading hopper for cellulosic pulp which is supplied through a conduit 15 connected near to the point of said conical part. At its upper end the container is covered by an overhanging hood 17. Connected to the side of said hood is an obliquely downwardly directed outlet conduit 19 for pulp which in the container has been liberated from lye and/or washed. Arranged on the vertical center line of the container is a shaft 21 which extends through stuffing boxes 23 and 25 at the point of the conical bottom 13 and at the center of the hood 17, respectively, and which is turned by a motor 27 via a gear 29. Attached to the shaft 21 approximately at the level of the merging of the conical part with the cylindrical part of the container is a double-walled sieve body 31 of a design to be closer described below. The interior space 33 of said sieve body communicates through a bore 35 in the shaft 21 and a stuffing box 37 outside the container with a drain conduit 39 for liquid sieved-off through the sieve body. Connected to the shaft 21 at a higher level of the container is one or more radially directed spray tubes 41 which through a bore 43 in the upper part of the shaft 21 and a stuffing box 45 at the upper end of the shaft communicate with a conduit 47 for the supply of a suitable washing liquid meant to displace and replace the lye or other treating liquid which accompanies the pulp supplied through the conduit 15. The tube 41 has outlet orifices which are suitably distributed for spreading the supplied washing liquid uniformly over the cross-section of the container when the shaft 21 rotates. Attached to the shaft 21 is also a rotary discharging device 48 consisting of radial arms having obliquely set scraper blades which act upon the upper face of the pulp column rising at the top of the container and which gradually move the pulp down into the outlet 19. Attached to the hood 17 is an annular spray tube 49 which via a valve 51 is connected to a conduit 53 carrying clean water. Said valve 51 is so constructed that the conduit 53 can be connected also to the conduit 47, in order, when desired, to supply thereto clean water, replacing or increasing the wash water quantity supplied by the conduit 83 to the spray tube 41. Attached to the rotary shaft 21 are stirring rods 55, 57 located below and above the sieve body 31.

In the embodiments of FIGS. 1 and 2 the sieve body consists of two double-walled disc sectors 59, 61 each of a center angle of about 90°, separated by sector-shaped spaces 63, 65 each also of an angle of about 90°. The disc sectors are located truly in a horizontal plane, whereby they can easily be turned in the pulp without exerting any feeding action upon the same. The edges of the sectors are preferably radial essentially along their entire lengths but close to the shaft 21 they may merge into each other along a rounded curve. The upper wall of the disc sector is foraminous and has a number of close sieve apertures, whereas the lower wall is solid. The arcuate outer edges of the sectors are situated close to the wall of the container. When the sieve body turns, the entire cross-section of the container is swept over thereby, so that the sieving action will take place uniformly at the various radial distances from the center shaft. The sector shape of the sieve body assures a correct distribution of the sieve apertures. In order to increase the size of the sieve face there is provided a number of concentric ridges 67, 69 having perforation apertures and projecting from the upper side of the sectors. The surfaces of these ridges thus form a part of the continuous sieve face of the sieve body. As shown said ridges may be of a triangular or rectangular cross-section but, if desired, they may be replaced by projections of some other shape. The ridges 67, 69 as shown in FIGS. 1 and 2 are preferably of generally circular configuration, thus forming bridges extending across the open space defined by sectors 63, 65 of the container cross-section. In this case the sieve body can be said to consist of a combination of flat sector-shaped sieve discs and concentric sieve rings.

In the modified embodiment of FIG. 3 the sieve body consists of a single disc sector having a center angle of approximately 240°. Projecting from the perforated upper side of the disc are concentric ridges which increase the sieve face and which in this case extend merely over the same center angle as the disc sector, thus leaving the space of 120° located between its radial edges completely free. According to a further modification, the sieve body may consist of three or still more disc sectors

separated by as many sector-shaped spaces. The total angle taken up by the spaces may be less than, but should be at least 25 percent of, the total center angle taken up by the disc sector.

The second container **11'** is made identical to the first container **11** described above.

The containers are alternately connectible to the various conduits for supplied and discharged pulp, sieved-off liquid and supplied wash water. Thus the conduit **71** which is assumed to supply pulp from a continuous cellulose digester, by means of a 3-way valve **73** can be connected either to the pulp supply conduit **15** connected to the container **11**, or to a corresponding conduit **15'** connected to the container **11'**. Similarly the conduit **75** which preferably leads to a plant for recovery of chemicals, is connectible by the 3-way valve **77** either to the conduit **39** or to the conduit **39'**. The pulp outlets **19** and **19'** of the two containers are connected in common to a pressing device **79** where the discharged washed pulp is concentrated. The diluted wash water pressed-off in said device is pumped by means of the pump **81** into a conduit **83** in order to be returned to the spray tubes **41**. A 3-way valve **85** connects the conduit **83** either to the conduit **47** or to the conduit **47'**. In the same manner the clean water supplied through the conduit **87** can be directed by means of the valve **89** either to the conduit **53** or **53'**.

Due to said connection the two containers can be used for periodic and alternate lye extraction and/or washing of the pulp continuously supplied through the conduit **71**. In each container there alternately takes place the same two steps, viz. washing and feeding, but with a mutual time difference so that when washing takes place in one container, feeding takes place in the other, and vice versa. When the 3-way valves **73, 77, 85, 89** takes the positions shown in FIG. 1, washing takes place in the left-hand container **11**. Then the conduit **15** is shut off and the pulp in the container **11** is at rest. Wash water is ejected through the stationary spray tube **49** and also through the rotary spray tube **41**. The shaft **21** is turned so that the wash water supplied through the last-mentioned spray tube is evenly distributed over the cross-section of the container. The treating liquid accompanying the pulp is separated-off through the sieve body **31** and is let out through the conduit **39**. The quantity thereof essentially corresponds to the quantity of spray water supplied, and therefore the consistency of the pulp is not changed during its passage through the wash container. The sieve body is held in a steady rotation and therefore the sieving action by the disc sectors **59, 61** is shifted all around and is distributed evenly over the cross-section of the container. The result thereof is that washing liquid will move downwardly in the container with a motion directed essentially axially and will displace the lye or other treating liquid contained in the pulp and push the same before itself into and out through the sieve body. Before the border layer between washing liquid and treating liquid has reached down to the sieve body **31**, the washing operation is interrupted by shifting of the said 3-way valves. This can take place automatically and by control of a central controlling apparatus **91**. As regards the container **11**, then there follows a feeding period without washing. Pulp is fed through the conduit **15** and is spread in the hopper-shaped container part **13** over the cross-section and passes through the open sectors **63, 65** upwardly past the sieve body **31**. The latter is still held in rotation and pulp is therefore pushed upwardly at sectors of the cross-section of shifting positions so that the distribution of pulp gets uniform over the entire cross-section. At the upper end of the container the discharging device **48** acts against the rising pulp column and scrapes the pulp down into the outlet **19**. The spray water conduits **47, 53** are shut off, and the

wash water extracted from the pulp in the press device **79** is led through the conduit **47'** to the right-hand container **11'**. Also the conduit **39** is shut off during the feeding period of the container **11**.

If by some reason one of the containers needs to be taken out of operation, the other container can in the meantime be driven continuously, so that washing takes place therein simultaneously with a steady even feed of pulp. Then all of said valves **73, 75, 85, 89** must be open towards the container used. If desired, the containers **11, 11'** may be connected directly in parallel, so that either one performs a continuous washing of half of the pulp quantity supplied through the conduit **71**.

Within this scope of the invention set forth in the following claims, the above described embodiment may be modified as to its details. For instance, the sieve body may be provided with sieve apertures even on the lower side and, in order to increase the sieve surface said lower side may also be provided with concentric ridges which preferably lie at the same radial distances as the ridges of the upper side and which form together therewith concentric sieve rings extending all around the circumference.

I claim:

1. An upright cylindrical container for uniform extraction of liquid from a moving column of cellulosic pulp comprising means for supplying pulp to the lower end of said container, means for discharging pulp from the upper end of said container, a rotary shaft extending coaxially into the container, means for rotating said shaft, a sieve body of substantially disc-shaped transverse configuration attached to said shaft in generally perpendicular relationship thereto, said sieve body having a peripheral edge adjacent the wall of said container and radial edges extending from said shaft to the ends of the peripheral edge, said radial edges defining a substantially sector-shaped space allowing axial flow of pulp past said sieve body during rotation of said sieve body, said sieve body having two surfaces defining an interior chamber, at least the upper surface of said interior chamber is apertured for receiving liquid into said chamber, and passage means in said shaft communicating with said sieve body chamber to provide an outlet for liquid drawn off through said sieve body.

2. The container according to claim **1** including at least one radially projecting hollow arm attached to said shaft and having outlet apertures for washing liquid.

3. The container according to claim **2** further comprising a second passage means in said shaft communicating with said hollow arm for passage of the washing liquid into said container.

4. The container according to claim **1** wherein the apertured surface of said sieve body having at least one annular sieve ring located thereon, said sieve ring being concentric to said shaft and extending across said sector-shaped space, said sieve ring communicating with said sieve body chamber to provide additional surfaces for extracting liquid.

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