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SUCTION DRUM STRAINER

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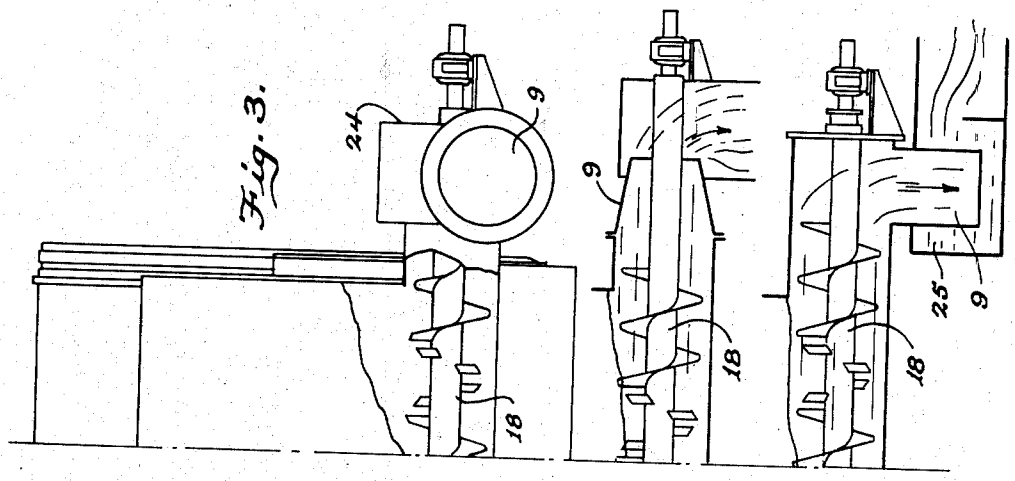


Fig. 3.

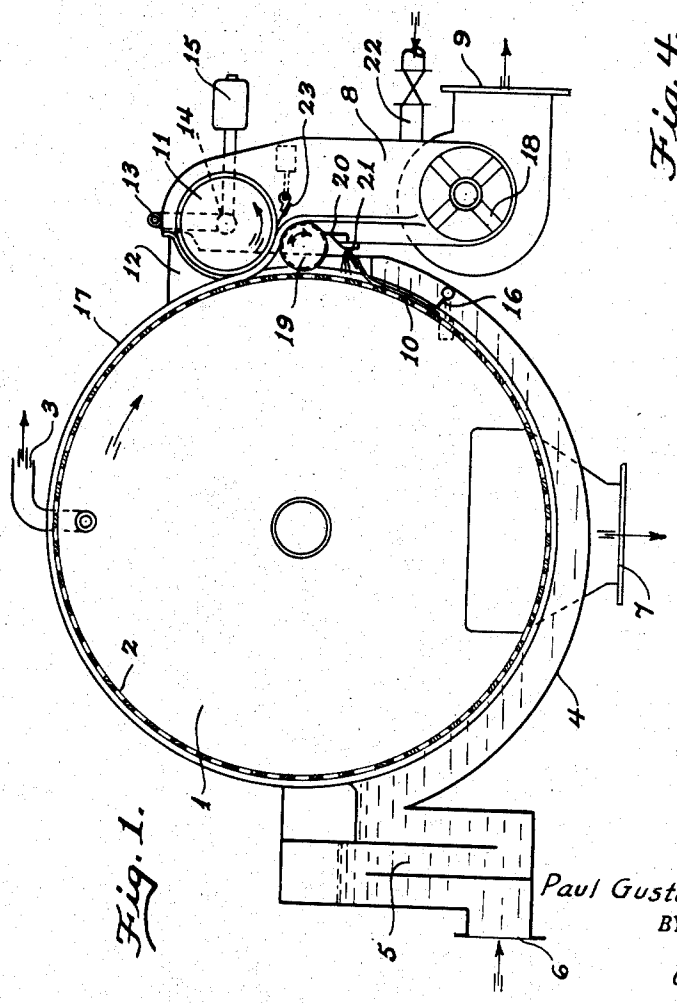


Fig. 1.

Fig. 4.

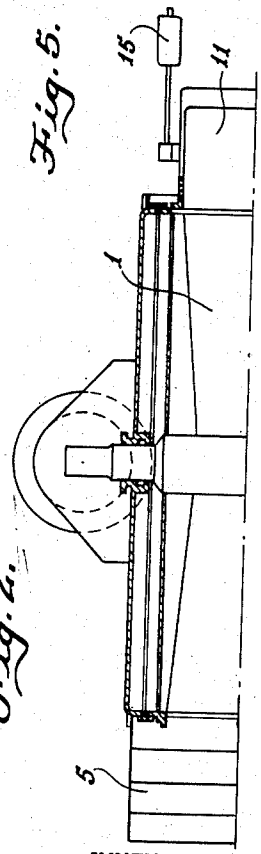


Fig. 5.

Fig. 2.

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SUCTION DRUM STRAINER

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7 Claims. (Cl. 210—201)

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For eliminating the drawbacks of high production costs and maintenance difficulties typical of drum strainers provided with internal so-called vacuum segments tightly fitted against the drum interior, it has been suggested to provide the drum with a delivery compartment located on the outer surface of the drum and sealed against outside air. At the position where the stock layer is removed from the strainer surface the delivery compartment follows the strainer surface along the whole breadth thereof and over a greater or shorter peripheral length thereof, is air-tightly packed against the same and against outside air at both ends thereof. These packings, which are of prior known construction as is the delivery compartment itself, consist of dragging packings or of preferably as a delivery roller shaped roller in combination with dragging packings or additionally one or more rollers co-operating with each other and with the straining drum. On the other hand, in drums of the kind described (e. g. Swedish Patent No. 76,779 and the Norwegian Patents No. 57,153 and No. 65,851) the delivery compartment is connected to a vacuum pipe for producing the desired reduced pressure in the strainer drum. The object is that the delivery compartment, which through the openings in the strainer surface communicates with the drum interior, be thereby maintained at reduced pressure equal to or slightly greater than the reduced pressure in the drum. The stock layer built upon the peripheral surface of the rotating drum follows therewith and is fed into the delivery compartment past the yieldable packing thereof fitted against the drum, whereby the tight fit against outside air is maintained. In consequence of the reduced pressure in the delivery compartment the stock layer can now be continuously removed from the strainer surface either by means of the delivery roller functioning simultaneously as packing element or by means of a scraper or the two in combination with each other, to drop into and be carried away from the lower part of the delivery compartment to a chamber impermeable to outside air and under reduced pressure equal to that in the delivery compartment. It is also possible to withdraw the strained pulp through a drain trap which prevents the entry of air into the delivery means.

As compared to the cell-provided-drum-strainers the above described drum strainers are simple in construction, in addition to which the packing means are accessible for inspection and repair. However, it has turned out that the drum described has no practical utility because of unsatisfactory operation in respect of stock delivery as has been ascertained in tests made in conjunction with the present invention.

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It has now surprisingly been found that the above described unsatisfactory disturbances in operation can be avoided if, in a drum strainer of the kind described, the strained pulp delivered from the strainer drum and fed into the delivery compartment is continuously and mechanically removed by means of a conveyor worm disposed in the bottom part of the delivery compartment, the outlet end of the said worm being advantageously so arranged to terminate outside the one end face of the delivery compartment as to prevent the entry of outside air into the said delivery compartment. Advantageously the conveyor worm can be arranged to extend over the whole breadth of the delivery compartment, in which case, it also serves as means for mixing the dilution water introduced when so desired into the pulp mass in the lower part of the delivery compartment.

The accompanying drawings show by way of example a drum strainer embodying the present invention. Fig. 1 shows a vertical sectional view of the strainer, Fig. 2 a horizontal sectional view of the same and Figs. 3, 4 and 5 show three different embodiments of the means for discharging the pulp mass from the delivery compartment while preventing the entry of air through the discharge opening.

In the drawing at 1 is indicated a strainer drum which rotates in the direction shown by the arrow. At 2 is indicated the strainer surface of the drum either of perforated plate or made of or provided with straining wire. At 3 is indicated a suction pipe from the straining drum to a vacuum source (not shown), at 4 a strainer vat into which the stock to be strained is introduced through the inlet 6 shaped as a drain trap 5. The extracted water, hence the backwater in chemical pulp strainers, is discharged from the drum interior through openings in the respective end faces thereof, said openings having communication with the common outlet 7. With sufficient fall height also the falling movement of the water discharging through the outlet 7 can be utilized for producing reduced pressure in the straining drum.

The drum 1 is provided with a prior known delivery compartment 8 located on the outside of the drum and oppositely to the stock inlet 6, and extending downwardly to open into a stock outlet 9. The otherwise closed delivery compartment 8 communicates with the strainer

surface and is fitted tightly against the same partly by means of a dragging packing 10, partly by a roller 11 shaped as a delivery roller. At the respective end faces of the drum the delivery compartment is tightly fitted, by prior known end packings 12, against the drum periphery so as to be impermeable to outside air. The delivery roller 11 is in prior known manner turnably mounted at 13. The shiftable weights 15 arranged at the respective ends of the delivery roller axle 14 keep the roller resiliently bearing against the strainer drum surface. A weight-loaded spring 16 arranged to the lower part of the dragging packing 10 serves to keep the packing 10 pressed against the strainer surface 2 especially at the outset of the straining operation, before the stock vat 4 is filled up with pulp. The stock layer 17 built up on the drum in rotary motion is removed by the delivery roller 11, from which it falls down and is so carried away, by means of a paddle wheel, worm or the like indicated at 18, through the outlet 9, that no outside air enters into the delivery compartment 8. Into the opening of the delivery compartment 8 communicating with the strainer surface and underneath the delivery roller 11 is advantageously arranged a roller 19 for receiving and dropping the stock from the delivery roller into the lower part of the delivery compartment 8. The roller 19 can be driven at a slightly greater peripheral speed than that of the delivery roller 11 rotating with the drum so as to exert a certain pull on the stock sheet to be carried by the roller 19 and thereby to ensure its removal from the delivery roller 11. Underneath the roller 19 is arranged the scraper 20 which removes the stock particles possibly still travelling with the said roller and the shower pipe 21 is so arranged as to direct a strong spray of water against the strainer surface 2 to clean it. Through the pipe 22 dilution water in regulated amounts can be introduced when desired into the stock in the bottom part of the delivery compartment 8. The weight-loaded scraper 23 is arranged as a safety measure, especially at the outset, to ensure the complete removal of stock from the delivery roller.

According to Fig. 3, a construction is shown comprising a mixture feed pump 24 arranged to the one end of a screw 18 for discharging the stock which in this case is diluted with water introduced through pipe 22. The above mentioned mixture pump overcomes the vacuum in the strainer. Therefore, if a plurality of strainers are placed one after another, as is the case in continuous sulfite and sulfate pulp washing, all the strainers can be arranged on the same level or above each other and the stock can be directly pumped to the inlet side of the following strainer.

According to Fig. 4, the undiluted stock is fed by the screw 18 through an outlet 9 constricted according to this embodiment and against which the stock is pressed, and therefore provides sufficiently tight fit against the entrance of air.

According to Fig. 5 diluted stock is fed by the screw 18 through a drain trap 25 which prevents air from entering into the delivery compartment.

It is to be understood that a plurality of constructional modifications can be made without deviating from the scope and spirit of the invention.

I claim:

1. In strainer mechanism of the character described, a vat for a suspension to be strained, a strainer drum partially immersed within said vat and rotatably mounted about its axis, an inlet for the suspension to be strained being formed on said vat at one side of said drum, and a closed delivery compartment mounted at substantially the opposite side of said drum from said inlet, said drum being formed with closed ends, with a peripheral wall formed with perforations therethrough to provide a strainer surface on the exterior thereof and with a substantially unobstructed interior, means for reducing the pressure within and throughout the interior of said drum, means for draining off extracted liquid from the interior of said drum, said delivery compartment being formed with an opening in the wall thereof in opposition to said strainer surface of said drum, and means for securing said delivery compartment about said opening in air-tight engagement with respect to the strainer periphery of said drum, said delivery compartment extending throughout the longitudinal extent of said drum and said securing means including, transverse end packing means extending from said delivery compartment into engagement with the periphery of said drum adjacent the ends thereof, a longitudinal packing member engaging the surface of said drum and isolating said delivery compartment from said vat, said longitudinal packing member extending between said end packing means, and a roller spaced from said longitudinal packing member, extending across the surface of said drum between said end packings and mounted for engagement in sealing relation with filtered material on said strainer surface, whereby pressure between said delivery compartment and the interior of said drum may be equalized through said strainer surface of said drum.

2. In strainer mechanism of the character described, a vat for a suspension to be strained, a strainer drum partially immersed within said vat and rotatably mounted about its axis, an inlet for the suspension to be strained being formed on said vat at one side of said drum, and a closed delivery compartment mounted at substantially the opposite side of said drum from said inlet, said drum being formed with closed ends, with a peripheral wall formed with perforations therethrough to provide a strainer surface on the exterior thereof and with a substantially unobstructed interior, a suction conduit in communication with the interior of said drum and acted upon by a suction pump for reducing the pressure throughout the interior of said drum, means for draining off extracted liquid from the interior of said drum, said delivery compartment being formed with an opening in the wall thereof in opposition to said strainer surface of said drum, and means for securing said delivery compartment about said opening in air-tight engagement with respect to the strainer periphery of said drum, said delivery compartment extending throughout the longitudinal extent of said drum and said securing means including transverse end packing means extending from said delivery compartment into engagement with the periphery of said drum adjacent the ends thereof, a longitudinal packing member engaging the surface of said drum and isolating said delivery compartment from said vat, said longitudinal pack-

ing member extending between said end packing means, and a roller spaced from said longitudinal packing member, extending across the surface of said drum between said end packings and mounted for engagement in sealing relation with filtered material on said strainer surface, whereby pressure between said delivery compartment and the interior of said drum may be equalized through said strainer surface of said drum.

3. In strainer mechanism of the character described, a vat for a suspension to be strained, a strainer drum partially immersed within said vat and rotatably mounted about its axis, an inlet for the suspension to be strained being formed on said vat at one side of said drum, and a closed delivery compartment mounted at substantially the opposite side of said drum from said inlet, said drum being formed with closed ends, with a peripheral wall formed with perforations therethrough to provide a strainer surface on the exterior thereof and with a substantially unobstructed interior, means for draining off extracted liquid from the interior of said drum, means for reducing the pressure within and throughout the interior of said drum, said pressure reducing means including a conduit of substantial length extending downwardly from said draining means to provide a reduction in pressure by the fall of extracted liquid, said delivery compartment being formed with an opening in the wall thereof in opposition to said strainer surface of said drum and means for securing said delivery compartment about said opening in air-tight engagement with respect to the strainer periphery of said drum, said delivery compartment extending throughout the longitudinal extent of said drum and said securing means including, transverse end packing means extending from said delivery compartment into engagement with the periphery of said drum adjacent the ends thereof, a longitudinal packing member engaging the surface of said drum and isolating said delivery compartment from said vat, said longitudinal packing member extending between said end packing means, and a roller spaced from said longitudinal packing member, extending across the surface of said drum between said end packings and mounted for engagement in sealing relation with filtered material on said strainer surface, whereby pressure between said delivery compartment and the interior of said drum may be equalized through said strainer surface of said drum.

4. In strainer mechanism of the character described, a vat for a suspension to be strained, a strainer drum partially immersed within said vat and rotatably mounted about its axis, an inlet for the suspension to be strained being formed on said vat at one side of said drum, and a closed delivery compartment mounted at substantially the opposite side of said drum from said inlet, said drum being formed with closed ends, with a peripheral wall formed with perforations therethrough to provide a strainer surface on the exterior thereof and with a substantially unobstructed interior, means for reducing the pressure within and throughout the interior of said drum, means for draining off extracted liquid from the interior of said drum, said delivery compartment being formed with an opening in the wall thereof in opposition to said strainer surface of said drum, and means for securing said delivery compartment about said

opening in air-tight engagement with respect to the strainer periphery of said drum, said delivery compartment extending throughout the longitudinal extent of said drum and said securing means including, transverse end packing means extending from said delivery compartment into engagement with the periphery of said drum adjacent the ends thereof, a longitudinal packing member engaging the surface of said drum, resilient means in engagement with said packing member for urging the same into tight engagement with the strainer surface of said drum below said delivery compartment to isolate liquid in said vat from said delivery compartment, said longitudinal packing member extending between said end packing means, and a roller spaced from said longitudinal packing member, extending across the surface of said drum between said end packings and mounted for engagement in sealing relation with filtered material on said strainer surface, whereby pressure between said delivery compartment and the interior of said drum may be equalized through said strainer surface of said drum.

5. In strainer mechanism of the character described, a vat for a suspension to be strained, a strainer drum partially immersed within said vat and rotatably mounted about its axis, an inlet for the suspension to be strained being formed on said vat at one side of said drum, and a closed delivery compartment mounted at substantially the opposite side of said drum from said inlet, said drum being formed with closed ends, with a peripheral wall formed with perforations therethrough to provide a strainer surface on the exterior thereof and with a substantially unobstructed interior, means for reducing the pressure within and throughout the interior of said drum, means for draining off extracted liquid from the interior of said drum, said delivery compartment being formed with an opening in the wall thereof in opposition to said strainer surface of said drum, and means for securing said delivery compartment about said opening in air-tight engagement with respect to the strainer periphery of said drum, said delivery compartment extending throughout the longitudinal extent of said drum and said securing means including transverse end packing means extending from said delivery compartment into engagement with the periphery of said drum adjacent the ends thereof and a longitudinal packing member engaging the surface of said drum, said packing member being formed with a main portion engaging a longitudinal strip of the strainer surface of said drum within said vat and with an upper portion extending from said main portion across said vat into engagement with the border of said opening in said delivery compartment and resilient loading means in engagement with said main portion to hold the same in tight sealing relation against said strainer surface, a substantial part of said main portion of said longitudinal strip being located below said delivery compartment, said longitudinal packing member extending between said end packing means.

6. In strainer mechanism of the character described, a vat for a suspension to be strained, a strainer drum partially immersed within said vat and rotatably mounted about its axis, an inlet for the suspension to be strained being formed on said vat at one side of said drum, and a closed delivery compartment mounted at substantially the opposite side of said drum

from said inlet, said drum being formed with closed ends, with a peripheral wall formed with perforations therethrough to provide a strainer surface on the exterior thereof and with a substantially unobstructed interior, means for reducing the pressure within and throughout the interior of said drum, means for draining off extracted liquid from the interior of said drum, said delivery compartment being formed with an opening in the wall thereof in opposition to said strainer surface of said drum, and means for securing said delivery compartment about said opening in air-tight engagement with respect to the strainer periphery of said drum, said delivery compartment extending throughout the longitudinal extent of said drum and said securing means including, transverse end packing means extending from said delivery compartment into engagement with the periphery of said drum adjacent the ends thereof, a longitudinal packing member engaging the surface of said drum and isolating said delivery compartment from said vat, said longitudinal packing member extending between said end packing means, and a roller spaced from said longitudinal packing member, extending across the surface of said drum between said end packings and mounted for engagement in sealing relation with filtered material on said strainer surface, whereby pressure between said delivery compartment and the interior of said drum may be equalized through said strainer surface of said drum, mechanical means for discharging the material from the bottom part of said delivery compartment and a material feed pump to discharge the material from said mechanical means and for overcoming the reduced pressure in said delivery compartment.

7. In strainer mechanism of the character described, a drum having a substantially unobstructed interior, having closed ends and having a strainer surface formed on its periphery, a vat in which said drum is partially submerged, said vat having an inlet at one end thereof, a closed delivery compartment formed with an opening therein mounted adjacent said drum at the opposite side thereof from the inlet end of said vat with said opening in registry with said strainer surface closely adjacent the upper end of said vat, said drum being mounted for rotation down past said opening, and a sealing and packing member engaging said strainer surface on a longitudinal strip thereof of substantial width, said packing member having a portion in fluid tight engagement with said delivery compartment below the opening therein and having another portion extending into said vat below said engaged portion into tight contact with said strainer surface, and lateral packing members extending downwardly along the ends of said longitudinal sealing and packing member in engagement therewith and with said drum whereby the suspension in said vat is isolated from said delivery compartment opening.

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