Sept. 21, 1954 P. G. H. OHLSTRÖM 2,689,654

SUCTION DRUM STRAINER

Filed Jan. 31, 1951

2 Sheets-Sheet 1

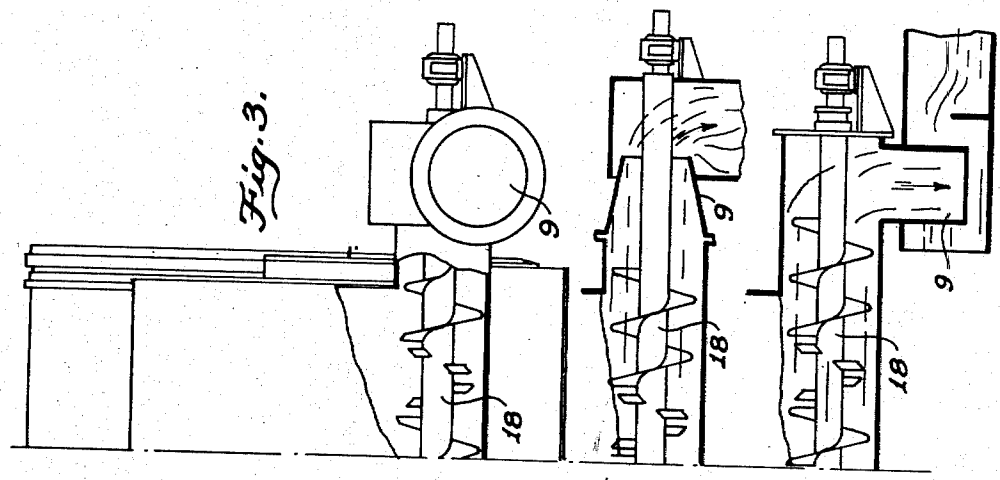


Fig. 3.

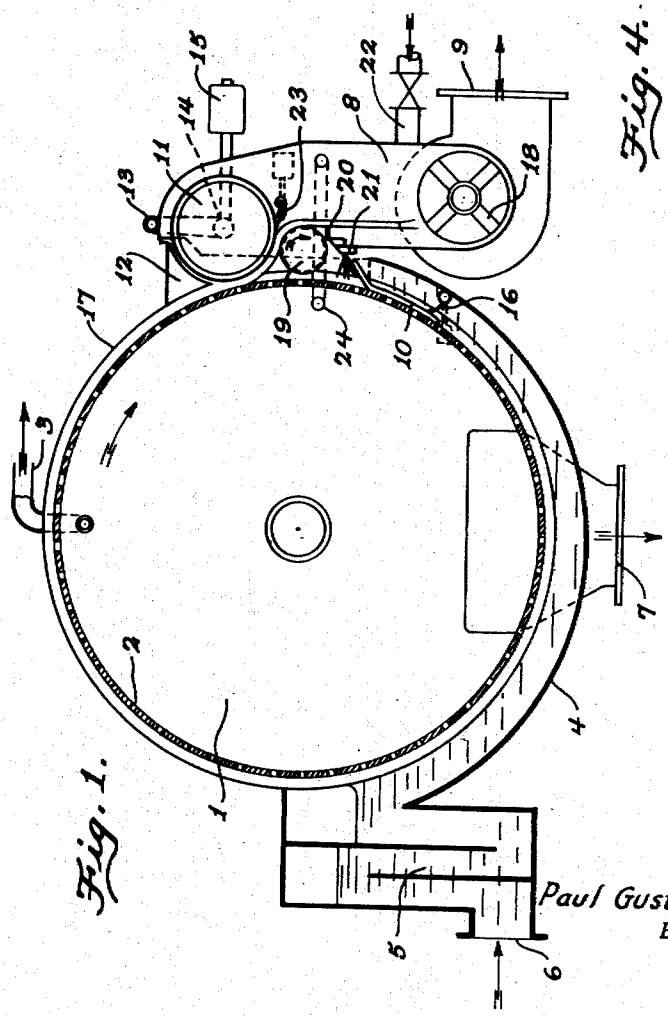


Fig. 1.

Fig. 4.

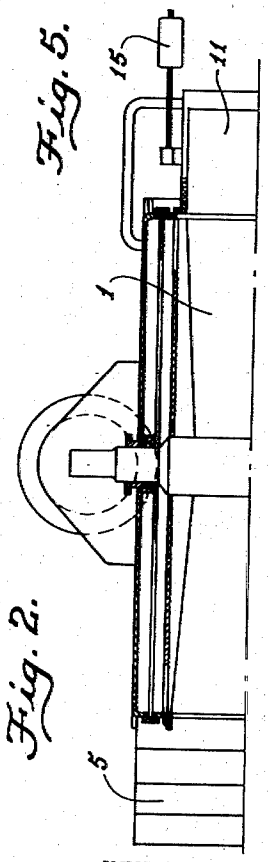


Fig. 5.

Fig. 2.

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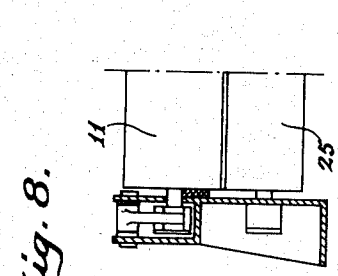


Fig. 8.

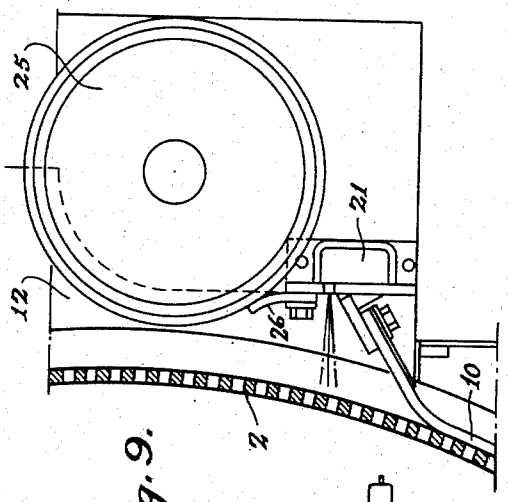


Fig. 9.

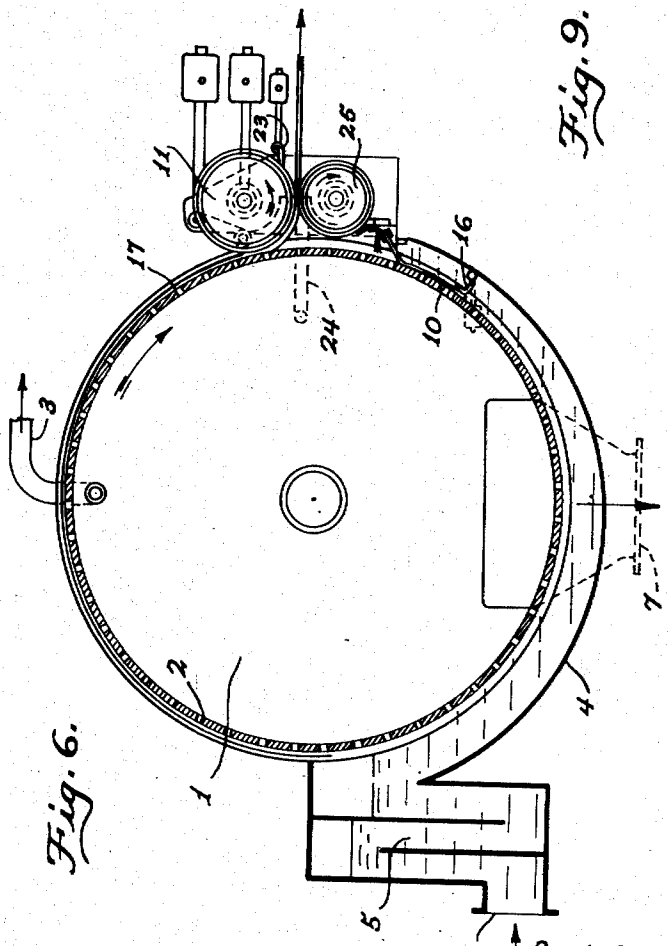


Fig. 6.

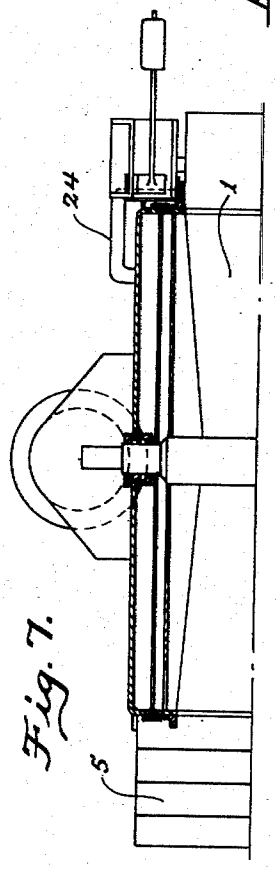


Fig. 7.

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SUCTION DRUM STRAINER

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5 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 packed against outside air. At the delivery section 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 preferably of a shaped delivery roller in combination with dragging packings or additionally one or more rollers co-operating with each other and with the straining drum. It has also been proposed that the delivery compartment in its entirety consist of a space limited on one side by the strainer surface, on the other side by two reciprocally operating rollers arranged to press against each other. The roller located highest up and arranged yieldably against the periphered surface of the strainer drum serves as a delivery roller and thus, with interposed stock layer, maintains a tight fit against the drum. The other roller located lower or a dragging packing co-operating therewith (and for which a third roller can be substituted) packs the compartment against the drum as also against the first mentioned roller and against the stock vat (Norwegian Patent No. 65,691). In the latter apparatus (Norwegian Patent No. 65,691) and former apparatuses (e. g. Swedish Patent No. 76,779 and the Norwegian Patents No. 57,153 and No. 65,851) the vacuum pipe is connected respectively to the strainer drum and delivery compartment 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 up on the peripheral surface of the rotating drum follows therewith and enters 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

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packing element or by means of a scraper or the two in combination with each other, either to be passed through the two rollers as a continuous stock sheet or 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.

It has now been established that in the above-described drum strainers the reduced pressure within the delivery compartment and the reduced pressure within the strainer drum are not equally great but are poorly proportioned to each other. On applying suction through the strainer drum the reduced pressure within the drum becomes much too great in proportion to the reduced pressure in the delivery compartment, in consequence of which removal of stock layer is incomplete and the strainer tends to clog up quickly. On applying suction through the delivery compartment the relationship between reduced pressures is reversed which means that the efficiency of the strainer becomes materially reduced, the stock layer on the strainer surface will only be incompletely dewatered and accumulates for the greater part before the packing means between drum and delivery compartment without entering therein even if the packing consists of a delivery roller.

It has now surprisingly been found that operational difficulties can be avoided when drum strainers of the kind hereinabove described are provided with means for the continuous adjustment of the reduced pressure within the strainer drum relative to the reduced pressure within the delivery compartment communicating with the strainer surface and limited by the delivery means.

In adjusting the reduced pressure within the strainer drum relative to the reduced pressure in the delivery compartment according to the invention means are provided for interconnecting the pressures in the drum and in the delivery compartment. For producing the reduced pres-

sure desired either the strainer drum or the delivery compartment or the two can be connected with a vacuum source, either through respective separators or through a common suction pipe communicating with the respective compartments. The reduced pressure can also be produced by utilizing the falling motion of the extracted water on discharging it from the drum. The pressure connection between the strainer drum and the delivery compartment can also be provided with adjusting means so as to be regulatable.

Generally, the only requisite to the satisfactory delivery in accordance with the present invention is the equalization of reduced pressures within the strainer drum and the discharge compartment, which is simply achieved by using a pressure pipe to interconnect the respective compartments. In certain instances, however, it may be advantageous to maintain within the delivery compartment, either during the whole straining operation or only in running risks for unsatisfactory stock delivery a reduced pressure slightly greater than that in the strainer drum.

Two embodiments of the invention are illustrated by way of example in the accompanying drawings, in which:

Fig. 1 shows a vertical sectional view of a strainer embodying the present invention.

Fig. 2 is a horizontal sectional elevation of the end portion of the same, and

Figs. 3, 4 and 5 show sectional views of various means for carrying away the strained pulp from the strainer.

Fig. 6 shows a vertical sectional view of another strainer embodying the invention,

Fig. 7 is a horizontal sectional elevation of the end portion of the same, while

Figs. 8 and 9 each show sectional views of two details of the delivery means.

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 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.

Referring now to the construction shown in Figs. 1–5, the drum 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 the 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 the dragging packing 10, partly by the 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. The weight-loaded spring 16 arranged to engage 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 indicated at 18, through the outlet 9 so 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 insure 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 insure the complete removal of stock from the delivery roller. To provide continuous satisfactory delivery there is arranged at the respective drum end faces the pressure equalizer pipe 24 which interconnects the interiors of the straining drum 1 and the delivery compartment 8 so as to constantly equalize the reduced pressure in the two compartments.—This pressure equalizing pipe can also be replaced by other means, e. g. means which connect the strainer drum and the delivery compartment to a suction pipe in common to both or to respective regulatable suction pipes.

Figs. 3, 4 and 5 show three different embodiments for discharging the stock under vacuum from the delivery compartment 8. According to Fig. 3, a construction is shown comprising a mixture feed pump arranged at the one end of a screw 18 for discharging the stock which in this case is diluted with water introduced through pipe 22. The abovementioned 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 directly be 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 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 which prevents air from entering into the delivery compartment.

In the strainer drum according to Figs. 6 and 7 the stock layer built up on the strainer surface is passed in the form of a continuous stock sheet between the delivery roller 11 and the roller 25 cooperating therewith, which latter is fitted with

prior known packing elements so as to provide an air tight compartment on that side of the two rollers which points towards the strainer drum. According to the invention this delivery compartment communicates with the strainer drum interior for the equalization of reduced pressure and the vacuum is designed to be produced by the utilization of the falling movement of water discharging through the outlet 7. Naturally other measures can be resorted to in adjusting the relationship between the reduced pressure in the strainer drum and the reduced pressure in the delivery compartment and vacuum can also be produced by coupling the drum and/or delivery compartment to a vacuum source.

Fig. 8 shows how the delivery roller 11 is turnably mounted and Fig. 9 shows the lower roller 25 with the dragging packing 26 set to bear thereon and also the shower pipe 21 and dragging packing 10 in larger scale.

It is to be understood that a plurality of constructional modifications can be made without deviating from the scope and spirit of the invention while mintaining the requisite that the reduced pressure in the strainer drum and the reduced pressure in the delivery compartment communicating with the strainer surface and limited by the delivery means can be adjusted or equalized. Naturally the delivery means and the delivery compartment can be formed so as to provide a unit detachably secured to the drum strainer or adjustable vertically.

I claim:

1. In suction drum strainer construction, a vat for receiving a suspension to be strained, a strainer drum mounted for rotation with a portion thereof within said vat, said drum having a substantially unobstructed interior, and being formed with a peripheral strainer surface, means for creating a suction in said drum and a delivery compartment mounted adjacent the periphery of said drum, said delivery compartment being formed with an opening therein in opposed relation with respect to said strainer surface of said drum for receiving the strained stock layer built up on said strainer surface, packing means for sealing the border of said opening against said strainer surface for preventing the entrance of outside air into said delivery compartment and into said drum said packing means including a packing element engaged with the strainer surface of said drum below said delivery compartment and extending into said vat for preventing the suspension in said vat from being drawn up into said delivery compartment whereby the reduced pressure created in said drum by said suction creating means is communicated to the interior of said delivery compartment through said strainer surface and through said opening, and an additional communicating element extending from said drum to said delivery compartment outside of said opening and communicating with the interior of said drum and said delivery compartment for assisting and equalizing the reduced pressures therein.

2. A construction as in claim 1 wherein said additional communicating element is a pipe and said pipe on one end thereof communicates with the interior of said drum, and on the other end thereof with the interior of said delivery compartment.

3. A construction as in claim 2 wherein adjusting means is provided in said pipe for adjusting the pressure between said drum and said delivery compartment.

4. In suction drum strainer construction, a vat for receiving a suspension to be strained, a strainer drum mounted for rotation with a portion thereof within said vat, said drum having a substantially unobstructed interior, and being formed with a peripheral strainer surface, a delivery compartment mounted adjacent the periphery of said drum, said delivery compartment being formed with an opening therein in opposed relation with respect to said strainer surface of said drum for receiving the strained stock layer built up on said strainer surface, packing means for sealing the border of said opening against said strainer surface for preventing the entrance of outside air into said delivery compartment and into said drum said packing means including a dragging packing engaging the surface of said strainer drum below said delivery compartment, said dragging packing extending into said vat to prevent suspension in said vat from being drawn up into said delivery compartment, and a common suction pipe in communication with said drum and said delivery compartment whereby the suction in the interior of said drum and in the interior of said delivery compartment can be equalized.

5. In suction drum strainer construction, a vat for receiving a suspension to be strained, a strainer drum mounted for rotation with a portion thereof within said vat, said drum having a substantially unobstructed interior and being formed with a peripheral strainer surface, means for creating a suction in said drum, and a delivery compartment mounted adjacent the periphery of said drum, said delivery compartment being formed with an opening therein in opposed relation with respect to said strainer surface of said drum, a pair of rollers mounted in said delivery compartment adjacent said opening, one of said rollers being in engagement with said strained stock on said strainer surface for delivering the same therefrom, and the other of said rollers being spaced from the first of said rollers, said spacing being sufficient for the passing of the strained stock therethrough and providing for the delivery of the same as a continuous sheet, packing means for sealing the border of said opening against said strainer surface for preventing the entrance of outside air into said delivery compartment and into said drum whereby the reduced pressure created in said drum by said suction creating means is communicated to the interior of said delivery compartment through said strainer surface and through said opening, and an additional communicating element extending from said drum to said delivery compartment outside of said opening and communicating with the interior of said drum and said delivery compartment for assisting and equalizing the reduced pressures therein.

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