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H. BANNING

PURIFICATION OF PULP

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Serial No.
194,265
6 Sheets-Sheet 1

Fig. 1

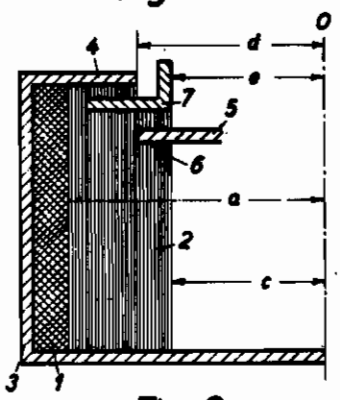

Fig. 2

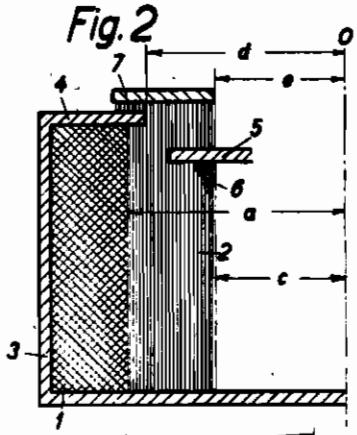

Fig. 3

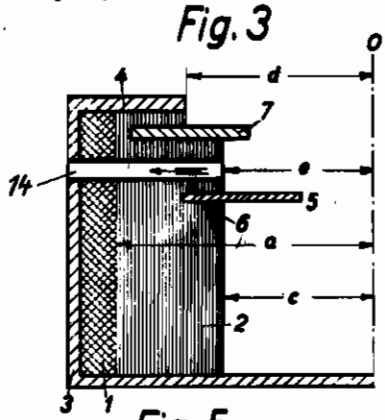

Fig. 4

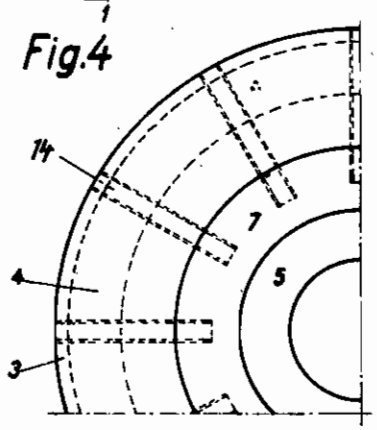

Fig. 5

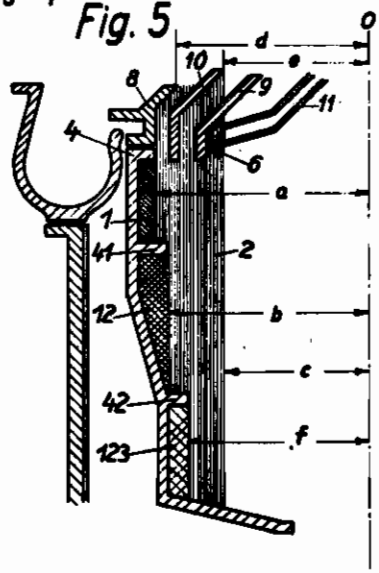

Fig. 6

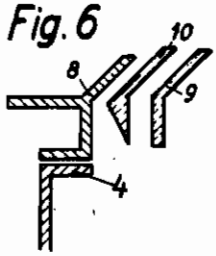

Fig. 7

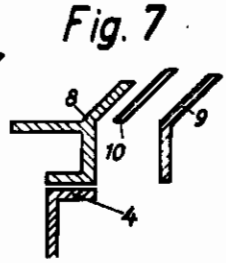

Fig. 8

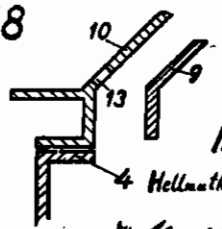

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Fig. 9

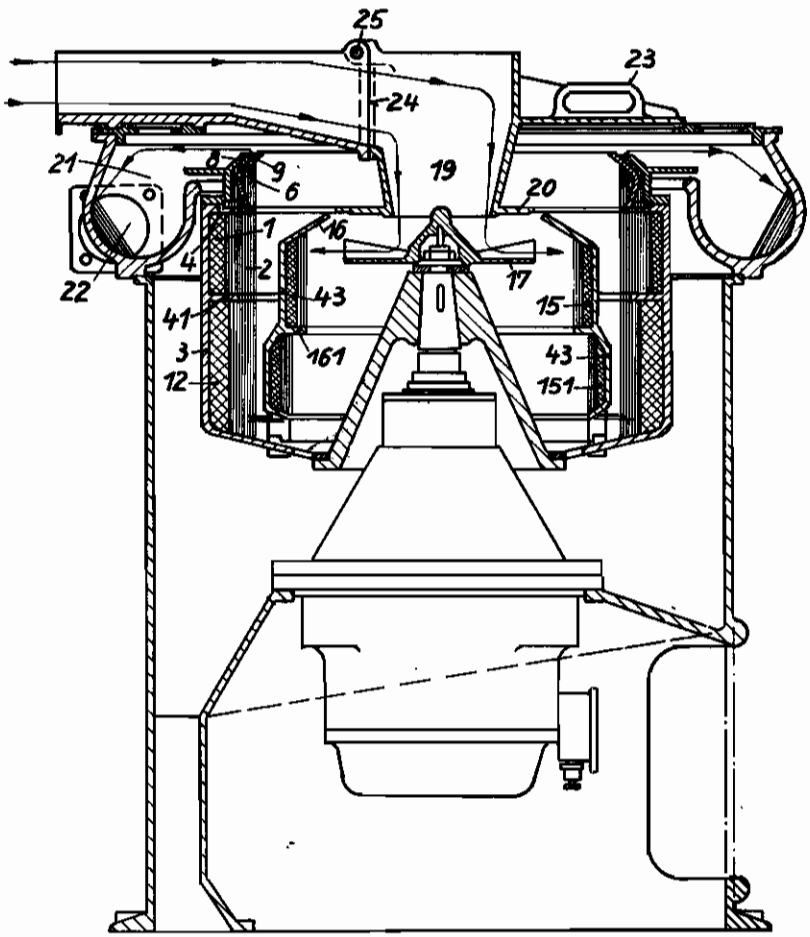

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Fig. 10

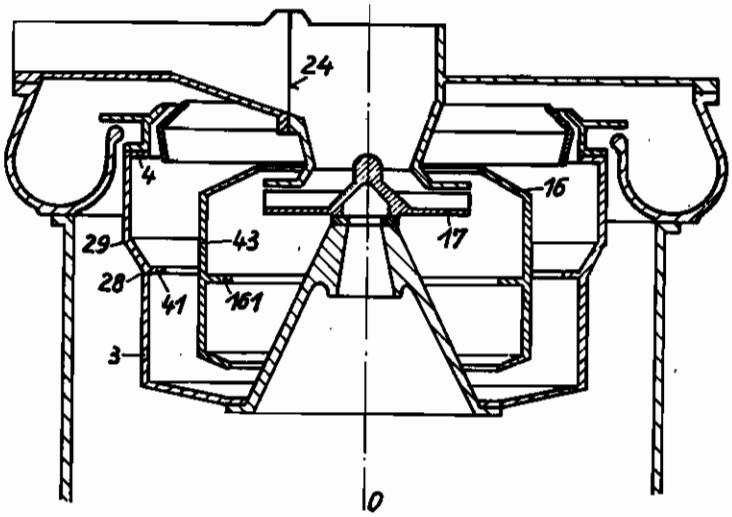

Fig. 11

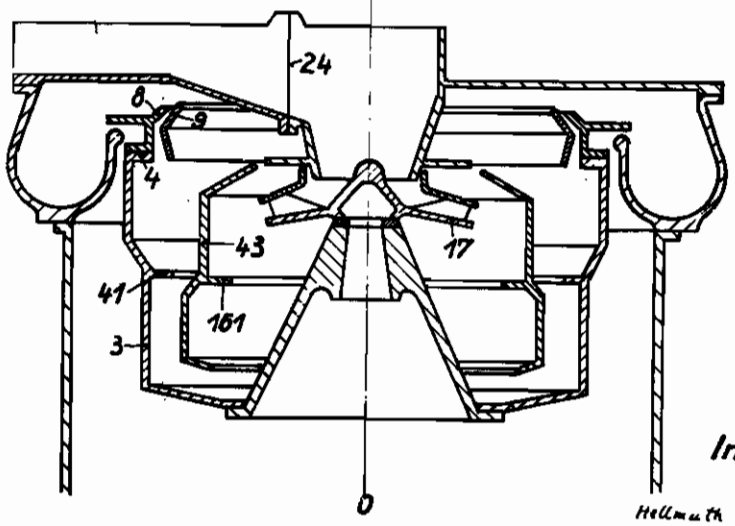

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Fig. 12

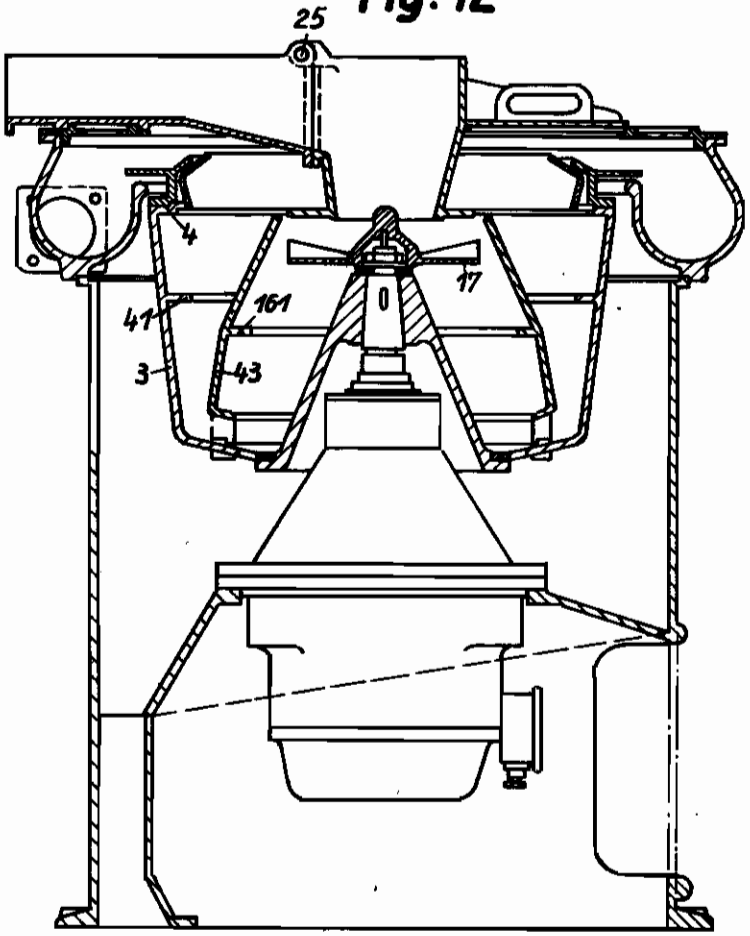

Fig. 13

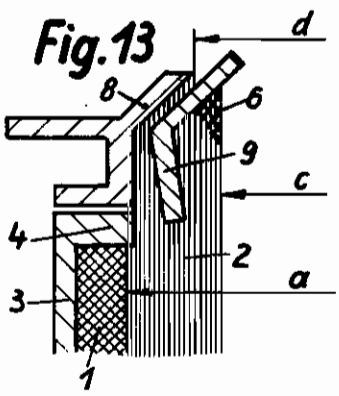

Fig. 14

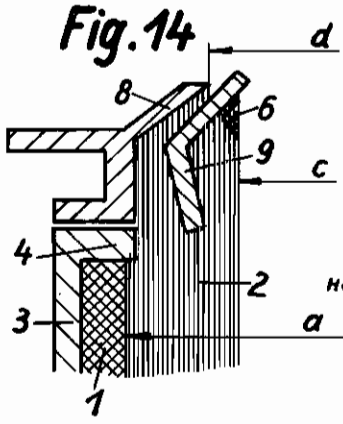

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Fig. 15

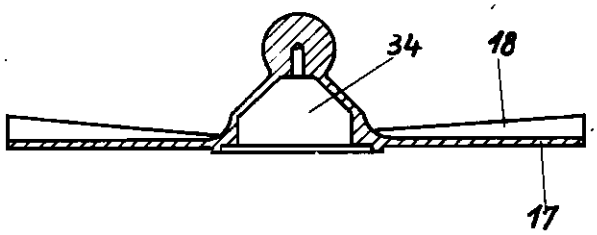

Fig. 16

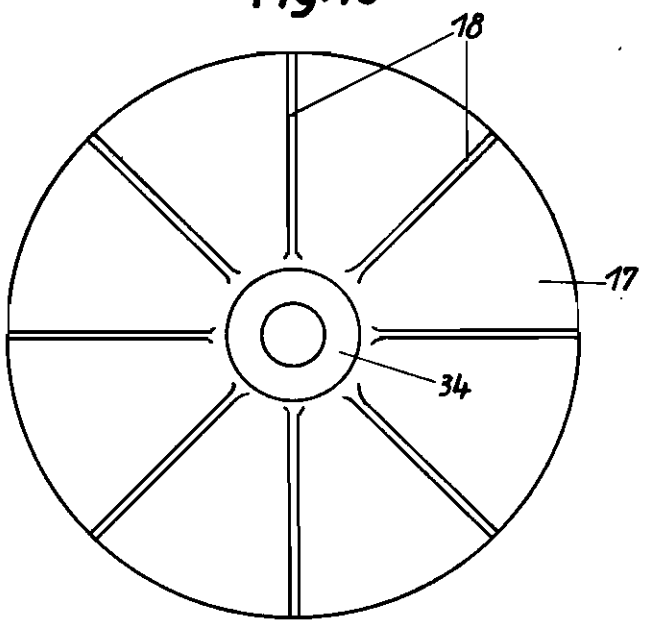

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Fig.17

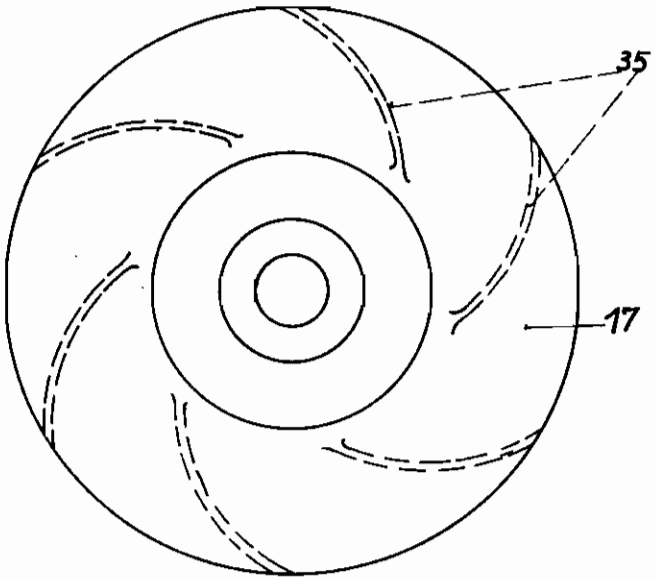


Fig.18

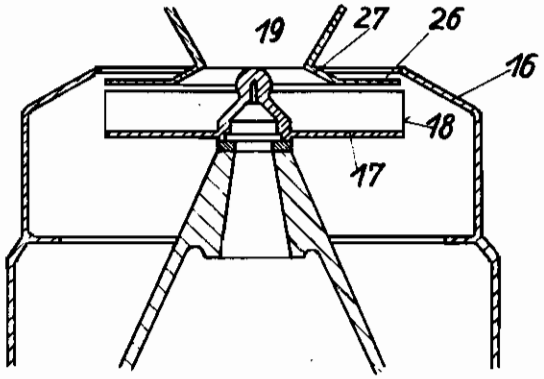
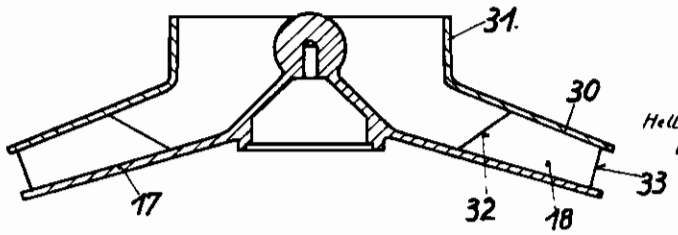


Fig.19



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ALIEN PROPERTY CUSTODIAN

PURIFICATION OF PULP

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vested in the Alien Property Custodian

Application filed March 7, 1938

The present invention relates to improvements in the purification of paper-cellulose- or wood pulp in centrifuges.

Centrifuges for the purification of cellulose-, paper- or wood-pulp are known in which the drum or the outer drum of a concentrically mounted plurality of drums is provided with one or more annular parts or rings projecting radially inwards. While the centrifuge is in rotation cellulose fibres separate out from the vertical fluid stream and deposit as a cushion or cushions of fibres against the wall of the drum beneath the ring or rings, and become more compact the longer the centrifuge is in operation. The specifically heavier impurities are thrown against and embedded in this cushion. The specifically lighter impurities, if present, separate during rotation of the centrifuge, collect on the inner vertical surface of the fluid stream and are driven by the rise of the latter to the highest possible point, where they are obstructed by a ring or like obstructing device. This obstruction is known as a damming and skimming ring and forms together with another ring or annular part, an outlet channel for discharging the purified pulp. This channel further has a throttling action on the speed at which the fluid stream climbs within the drum.

In order that the maximum purification effect of the centrifuge shall be obtained, it is desirable that each particle of the fluid stream should remain as long as possible in the centrifuge, thus being submitted for as long as possible to the centrifugal force set up. A low stream velocity for each particle favours the easy deposition of attached impurities. On the other hand it is desirable that the output shall be high, which means that as great a quantity of material as possible should pass through the centrifuge in unit time.

It has now been ascertained that in order to obtain a high speed of output with a low stream velocity, the fluid stream should be as wide radially as possible. The wider the fluid stream is relatively to the thickness of the corresponding compact cushion, the lower is the stream velocity. Thus a doubling of the width of the fluid stream means that a particle thereof remains twice as long in the centrifuge, subjected to the purifying centrifugal force. The speed of feeding the material to be purified to the centrifuge has an influence on the width of the fluid stream, in that with increasing speed of feed the stream width increases. It is also of economic advantage to provide for a decrease in the power consumption of the centrifuge and further it is desirable to reduce to a minimum the whirling of deposited or separated impurities.

It is known that the throttling action of a discharge channel may be increased by decreasing the cross-sectional area. It has been found that the positioning of the inner vertical surface of the fluid stream by damming and throttling may be effected by extending the length of the channel inwards towards the axis. This has the effect of discharging the purified pulp at a position nearer to the axis of the centrifuge, where there is a smaller circumferential velocity so that the power consumption of the centrifuge is reduced.

It is further of importance that the distance between the inner vertical surface of the fluid stream and the axis of the centrifuge be kept constant during the operation of the centrifuge and any horizontal movement of the fluid stream avoided. This constancy is desirable in particular for the correct operation of a skimming pipe or like device to remove the lighter impurities. If it were possible to fix the position of the skimming device so that it remained constant in relation to the surface of the fluid stream throughout the operating period of the centrifuge, unprofitable supervision work could be avoided. Further it would be possible to immerse the skimming pipe horizontallly into the fluid stream to a position where the lighter impurities would be removed without removing any of the purified pulp, thus effecting considerable saving in loss of good material.

Therefore in accordance with the present invention in a centrifuge for the purification of cellulose-, paper- or wood-pulp there are provided for the purified pulp at least two outlets whereby the inlet end of one of the outlets is situated farther from the axis of the centrifuge than the inlet end of the second or other outlet and whereby the one outlet, the outer one, has a substantially damming and throttling action and the second or other, the inner one, acts substantially as a discharging channel, for the purpose of maintaining the distance between the axis of the centrifuge and the inner vertical surface of the fluid stream constant, the conditions being such that there is a minimum of feed, which minimum should be equal to or greater than the output of the outer channel.

In order that the outer channel shall have a throttling action preferably the cross-sectional area thereof should not be greater than that of the inner channel.

In order that these results may be obtained, it

is of importance that discharge outlets for the purified pulp be constructed in a particular manner.

If desired according to the invention a skimming ring is provided for the lighter impurities, part of which is situated horizontally below the outlets in such a manner that the ring obstructs the lighter impurities which may collect during the rotation of the centrifuge on the inner vertical surface of the fluid stream, being forced by the latter to rise upwards. Furthermore according to the invention one or more outlets are formed by socket pipes which extend from the inner vertical surface of the fluid stream and penetrate the wall of the centrifuge. Thereby, according to the invention, means may be provided to move the socket pipes in a horizontal direction in order to adjust its position in respect to the inner vertical surface of the fluid stream. Further, according to the invention a bounding surface is provided which is arranged in such a manner as to be partly or totally common to a subdivided or double outlet, i. e. for two outlets.

Further, according to the invention, a centrifuge is provided for the purification of cellulose-, paper- or wood-pulp characterized in that one discharge outlet for the purified pulp comprises at least two bounding surfaces its inlet end being situated further from the axis of the centrifuge than its outlet end and the bounding surfaces being so shaped that they each possess at least one point of inflection above which the pulp is directed inwards towards the axis of the centrifuge and wherein the outermost bounding surface below the first or only point of inflection rises parallel to the axis of the centrifuge.

According to a further embodiment of the invention there is provided a centrifuge for the purification of cellulose-, paper- or wood-pulp, characterized in that the outer discharge channel is contained between a skimming or damming ring and an annular member attached to and above the, or the uppermost of a plurality of, annular inwardly projecting parts or rings, provided to build up one or more compact cushions of fibres in which the heavier impurities are embedded, said member being of such shape that it first rises substantially parallel with the axis of the centrifuge and then is inclined inwards, the skimming or damming ring being of such shape that it first rises in a direction inclined towards the said outer member and then is inclined inwards, at least the lower part of the discharge channel thus being formed with a conical cross-section which diminishes progressively towards the point where the said member and the skimming or damming ring are inclined inwards.

If desired the inwardly inclined portions above the point of inflection of the outer member and the skimming or damming ring forming the outer discharge channel are made parallel to one another, or incline towards one another providing a channel of conical cross-section.

Centrifuges are known which have one drum or have two or three drums concentrically mounted one within the other and consecutive or parallel feeds. The one drum centrifuge even when operating in conditions which give the maximum purification has an insufficient yield, even if constructed with relatively very large parts. Centrifuges with two or more drums give an increased yield of purified material, but access to the interior walls has hitherto been difficult on account of the construction, so that there has been difficulty in removing the cushions of fibres containing the heavier impurities which are found adhering to the walls at the end of the centrifuging operation, and performing other cleaning operations by hand, scraping or sluicing with water.

If sufficient space is left between the drum walls to render accessibility easy, the centrifuge becomes too wide to operate with mechanical efficiency.

It has already been proposed to feed centrifuges from the bottom, but it is desirable from the point of view of convenient lay-out of the plant that they be fed from the top for the reason that the pulp to be purified can thus reach the centrifuge in uncovered gutters or channels instead of pipes. Thus the inlet has to be arranged on top. Again, the outlet should not be elsewhere in view of the fact that the purified pulp has to flow downwards from the centrifuge to the level of the sieve of the Foudrinier Machine (the stage of manufacture in a papermaking plant which follows the pulp purification stage is generally that of forming the paper sheets on the sieve of the papermaking or Foudrinier Machine) and it would not be desirable from the point of view of space economy to arrange the main body of the centrifuge higher than the sieve level. As both inlet and outlet have to be on top of the centrifuge they must be arranged nearly on the same level each to the other, the centrifuge itself being below the level of the papermaking machine. This arrangement permits of the various machines being placed economically near together and for the pulp stream to flow from one stage to the next by the shortest and most convenient route.

Centrifuges with two drums operating with a low power consumption and yet having drums which are readily accessible for cleaning purposes may be constructed according to this invention which provides a centrifuge for the purification of cellulose-, paper- or wood-pulp wherein two drums mounted one within the other are provided with a consecutive feed, and the wall of one or of each drum is or are provided on the interior with one or more inwardly projecting annular parts or rings for the purpose of promoting the building up of a cushion or cushions of fibres in which the heavier impurities are embedded, and wherein the distance between the two walls against which the cushions build up increase either regularly or irregularly from the bottom upwards, the uppermost point of the cushion covered part of the outer wall being approximately on the same horizontal level as the uppermost point of the inner wall.

According to the present invention there is further provided a centrifuge for the purification of cellulose-, paper- or wood-pulp comprising one or more drums and provided with a consecutive feed, and wherein the material to be purified is introduced so that it impinges on to an accelerating device in the form of a disc or impeller attached at or near the top of the main spindle driving the centrifuge and located beneath a stationary inlet, so that the material is accelerated and thrown off radially in a direction parallel or substantially parallel to that of the centrifugal force, towards the upper part of the drum or inner drum, where more than one drum is provided.

The disc or impeller may be removable and may be provided with radial or scoop-shaped ribs or baffles or the like. Further a spray protect-

ing cover may be provided either attached to the ribs or baffles or to a stationary inlet forming part of the cover of the centrifuge. Further this stationary inlet may be constructed to pivot vertically so that the interior of the centrifuge may be rendered accessible for cleaning.

It is further of importance that the discharge channel or outlet be constructed in such a shape that accumulations of fibres on the walls or the outlet may be easily removed.

The invention will now be described with reference to the following diagrammatic drawings in which:

Figures 1 and 2 show diagrammatically the mechanism of the action of a subdivided or double outlet, i. e. two outlets as applied in the case of the normal type of horizontal outlets.

Figures 3 and 4 show diagrammatically another application of the action of a subdivided or double outlet, i. e. two outlets wherein Figure 3 is a longitudinal cross-section of the centrifuge and Figure 4 a part of the plan view thereof.

Figure 5 shows a section through part of the barrel of a centrifuge in which the discharge channel is provided with a subsidiary subdividing intermediate ring, and the outer portion of the resulting double channel is shaped in accordance with the invention.

Figures 6, 7 and 8 show modifications of the discharge channel shown in Figure 5.

The Figures 9 and 12 illustrate in sectional views and diagrammatically different shapes of centrifuges with double drums provided with a feed accelerating device and discharge channels in accordance with the invention.

Figure 10 shows a sectional view through a two-drum centrifuge wherein a cover is provided attached to the stationary inlet above the feed accelerating disc.

Figure 11 shows a sectional view through a two-drum centrifuge wherein a cover is provided which is attached to baffles on the feed accelerating discs.

Figures 13 and 14 illustrate on a larger scale the discharge channels shown in Figures 9–12.

Figure 15 is a section through a feed accelerating disc as shown in Figures 9 and 12.

Figure 16 is a plan view of the feed accelerating disc shown in Figure 13.

Figure 17 is a plan view of the feed accelerating disc shown in Figure 15 with a different arrangement of baffles.

Figure 18 shows an enlarged sectional view of the feed accelerating disc shown in Figure 10, and

Figure 19 shows an enlarged sectional view of the feed accelerating disc shown in Figure 11.

In all the figures like parts are represented by like reference figures or letters.

a, *b* and *f* represent the distance between the cushions of fibres 1, 12 and 123 respectively and the axis 0 of the centrifuge. *c* represents the distance between the inner unbroken vertical surface of the fluid stream 2 and the axis of the centrifuge and *d* the distance between the inner circumference of the outermost ring and the axis of the centrifuge. The lighter impurities collect at 6 if present.

The conditions, such as speed of rotation, rate of feed and dimensions of the rings 8 and 8 and the cross-sectional area of the discharge channel are arranged so that *c* is always less than *a* or *b* or *f*. The distance *c* is principally controlled by the distance *d*, and *c* is always less than *d* on account of the throttling action set up by the discharge channel.

Figure 1 shows diagrammatically the mechanism of the action of a subdivided discharging outlet. Between the rings 4 and 5 an intermediate ring 7 is provided. This ring has a damming function. The outer channel between the rings 4 and 7 as well as the inner channel between the rings 7 and 5 both, discharge the pulp, but the outer channel in addition provides for a throttling action, whilst the inner channel has no such effect. Consequently, the distance from the vertical portion of the ring 7 to the axis of the centrifuge, which is indicated by *e*, controls the distance indicated by c between the inner vertical surface of the fluid stream 2 and the axis in that *c* becomes equal to *e*. Naturally a condition for this constant distance of the inner vertical surface is that the amount of pulp supplied into the machine should be at least as great as the amount discharged by the outer channel. The rate of discharge of the outer channel between the rings 4 and 7 is reduced to a definite maximum depending on its cross-section and on the cushion forming action of the ring 4. This cushion forming is limited in principle by the length of the ring 4, but in practice the immerging depth of the ring 7 controls the thickness of the cushion. If the thickness of the cushion were to increase so that it reached the outer point of the ring 7, the fibres would be driven out by the liquid and discharged through the channel. As a matter of fact the cushion never reaches the outermost point of the ring 7.

The reason why a congestion in the channel between 4 and 7 cannot occur viz. the cushion cannot overlap the outermost point of the ring 7, is due to the pressure of the centrifugal force, which increases with the radius of the centrifuge. As the cross-section of the inlet of the outer channel is smaller than the cross-section of the inlet of the inner channel, the outer channel is not able to discharge the same amount per time unit as the inner channel, notwithstanding the greater centrifugal pressure the outer channel is subjected to. These circumstances provoke a reaction resulting in a throttling or damming effect within and beneath the outer channel whilst the inner channel is free from such influence and any pulp which has reached the innermost point of the ring 7 must discharge, there being therefore no possibility of forming a vertical inner surface closer to the axis. On the other hand, provided the amount of pulp fed into the centrifuge is as great as the amount discharged by the outer channel—no vacillating of the liquid vertical surface in the direction of the wall of the centrifuge is possible, since the throttling or damming effect of the outer channel would balance such a tendency.

Thus an outlet which is subdivided into two parts divides as well the functions of a simple outlet. A simple outlet has a discharging and throttling effect. The double-outlet charges the outer division with a throttling and partly discharging action, whilst the inner division is entirely discharging. The throttling action of the outer channel is used as a valve for the inner channel thus enabling a constant distance between the inner vertical surface of the pulp cylinder and the axis.

Figure 2 again shows the mechanism of a subdivided outlet. Here the ring 7 is located above the ring 4. In this case the ring 7 has no influence on the thickness of the cushion 1 which is

governed by the width of the ring 4. As the inner vertical surface of the cushion 1 approaches the inner circumference of the ring 4 the velocity of the fluid stream 2 drives the oncoming fibres out of the centrifuge. As has been shown in Figure 1 the throttling action of the outer channel increases with the diminution of its cross-section. On the other hand the velocity of the fluid stream which is discharged through the outer channel increases with the throttling action. Thus—in order to avoid a whirling which could affect embedding of the heavier impurities in the cushion part near the outlet—it is advisable not to exaggerate the throttling effect of the channel contained between the rings 4 and 7 as shown in Figure 4.

Figures 3 and 4 show another embodiment of a subdivided or double outlet for the purified pulp. A flat circular ring 7 is arranged deeper in the centrifuge than a ring or top edge 4 of the drum, so that the outer part of the ring 7 is located below the ring 4. A plurality of short pipes 14 penetrating the outer wall of the drum are provided, their free ends projecting horizontally and radially into the space between the circular flat ring 7 and a skimming ring 5 arranged beneath the latter. In this particular case the inner ends of the pipes 14 are all located at a distance *e* from the axis which distance is smaller than the outer diameter of the skimming ring 5 and greater than the inner diameter of the ring 7.

That part of purified pulp which does not discharge through the slit between the top edge 4 and the annular ring 7 becomes dammed in the drum inwardly towards the axis and enters the pipes 14 and thus discharges outwards. The distance *c* between the axis and the inner vertical surface of the fluid stream thus becomes equal to the distance between the innermost entrance end of the pipes and the axis. The embodiment of the invention according to Figures 3 and 4 provides for a plurality of outlets for the purified pulp whereby the inlet end of one, namely the outlet between the rings 4 and 7 is situated further from the axis than the inlet end of the group of outlets formed by the socket pipes. Obviously in order to provide for a maximum of efficiency it is advisable to locate the innermost inlet ends of all pipes—in the case where a plurality is used—on the same circumferential distance from the axis.

In Figure 5 a drum is shown with a different kind of outlet. Thereby the function of the ring 9 is divided by means of a ring 10 placed intermediate between rings 8 and 9, and performing the damming function, rings 8 and 10 form a throttling and discharging channel and rings 9 and 10 form a discharging channel, the lighter impurities collecting under the ring 8 and being removed by the skimming pipe 11. The distance *e* controls the distance *c*. The channel between the rings 8 and 10 has principally a throttling function.

Further Figure 5 shows the outer portion of a discharge channel constructed in accordance with the invention. The uppermost cushion of fibres 1 is retained by the ring 4 on which an annular part or ring 8 is mounted forming with an annular part or ring 9 a discharge channel. The surface of the ring 8 in contact with the fluid stream is shaped as shown in the figures so that it first rises vertically and is then inclined inwards towards the axis of the centrifuge. The outer face of the ring 9 first rises at an angle inclined to the inner face of the ring 8 and then inclines inwards parallel to the ring 8 from a point at a corresponding height to that of the point of inflection of the ring 8. If desired the upper part of the ring 8 may incline towards the upper part of the ring 9. Thus any point on the ring 8 is always at a greater distance from the axis of the centrifuge than any corresponding point on the ring 9. The lower part of the discharge channel thus is of conical cross-section diminishing in size in the upward direction. The lighter impurities 6 collect beneath the ring 9 as shown in the figures. In this case the distance *d* in connection with the cross-sectional area of the discharge channel controls the distance *c*. The shorter *d* is, the shorter *c* will be. The wall of the drum, may be the outer drum of a plurality of concentric drums, and may have a plurality of cushion-promoting rings.

The throttling action can be increased by increasing the inclination of the rings 8 and 9 towards one another.

Discharge channels having the above-mentioned characteristics provide in particular for a decrease in the speed of the fluid stream. Furthermore the throttling effect taking place principally in the upper part of the channel, i. e., in a position remote from the uppermost part of the cushion in which the heavier impurities collect and remote from the uppermost part of the fluid stream where the lighter impurities, if present, collect. Thus, any whirling of deposited heavy impurities, or of lighter impurities which may have collected, is avoided. Again the discharging purified pulp leaves the centrifuge at a minimum distance radially from the axis, the inclination towards the axis of the upper part of the channel causing a decrease in the circumferential speed and consequently providing for a decrease in the power consumption of the centrifuge.

In Figure 6 is shown another embodiment of the double discharge channel of Figure 5 in which the outer face of the lower part of the ring 10 is inclined towards the inner face of the ring 8. The channel formed thus resembles that shown in Figures 13 and 14. The upper part of the ring 10 may, however, be parallel with or inclined towards either rings 8 or 9.

In Figure 7 the lower part of the intermediate ring 10 below the point of inflection of the ring 10 shown in Figure 6 is missing. Here again the ring 10 need not necessarily be parallel to rings 8 and 9.

In Figure 8 the outer channel is suppressed. A slit 13 is provided in the ring 10 and this slit performs the function of the outer, principally throttling channel formed between the rings 9 and 10 of Figures 5, 6 and 7. Instead of one or more slits, a plurality of perforations may be arranged circumferentially in the ring 10. These slits or perforations may also be provided on the vertical part of the ring 8.

In case that the pulp does not contain lighter impurities or the removal of lighter impurities should not be desirable or worth while the innermost or skimming ring 5 or 8 in Figs. 1 to 8 can be suppressed. By increasing the feed of material to be purified the stock will discharge over the innermost point or points of the now inner ring and the output will exceed normal or calculated one.

The centrifuges shown in Figures 9 to 12 comprise two drums one inside the other attached together and rotating on a common axis.

Referring now to Figure 9, 3 is the wall of the

outer drum and 43 the wall of the inner drum, 161, 4 and 41 are annular parts or rings projecting radially inwards beneath which cushions of fibres containing the heavy impurities deposit against the drum walls. The space between the drum walls increases in accordance with the invention, the point of inflection of the inner drum wall being shown at the ring 161. The inner drum has a wall shaped into two portions of which one has the greater diameter and is provided with rings 16 and 161 for promoting the formation of cushions 15 and 151. The outer drum has a straight wall 3 and is provided with two rings 4 and 41 for promoting the formation of cushions 1 and 12. A discharge opening is formed by rings 8 and 9, the lighter impurities collecting at 6 under the ring 9. In accordance with the invention the lower part of the ring 8 first rises parallel with the axis of the centrifuge and is then inclined inwards. The skimming and damming ring 9 first rises at an angle inclined towards the ring 8 and then is inclined inwards parallel to the upper portion of the ring 8.

Further Figures 9 to 12 illustrate two-drum centrifuges which contain a feed accelerating device. Further details of this feed accelerating device are shown in Figures 15 to 19. The accelerating device comprises a disc 17 mounted on the top of the main shaft of the centrifuge by which it is rotated with the drums. Radial ribs 18 are provided on the disc 17. The pulp to be purified enters the centrifuge and passes through the stationary inlet 19 and impinges on the rotating disc 17 from which it is thrown by centrifugal force against the wall 43 of the inner drum. The lower end of the inlet 19 is provided with a flange 20 to prevent the pulp stream from splashing or spraying over the top of the inner drum. The stream passes down the inner drum building up the cushions 15 and 151, and is then thrown radially outwards into the outer drum where it climbs, forming cushions 1 and 12 and the purified pulp leaves by the discharge channel formed between rings 8 and 9 and falls into the stationary trough 21 and leaves the centrifuge through the outlet 22. The lighter impurities 6 may be removed by a skimming pipe.

In order to clean the centrifuge and remove the cushions which have formed against the walls, the cover of the centrifuge is lifted by the handle 23 and the inlet 19 together with the flange 20 is swung vertically along the line 24 of the hinge 25. The disc 17 thus becomes exposed and can be removed. The walls of the drums are now readily accessible for hand scraping or spray washing, the cleansing operation being performed in shorter time than usual due to the afore-described construction. The shape of the inner drum wall renders access to the outer drum wall easy for the removal of the fibre cushions.

In Figure 10 the inner drum wall 43 remains straight whilst the outer drum wall 3 inclines outwards from the point where a ring 41 is located. The functions of the ring 41 are the same as that of rings 4 and 161.

Figure 10 shows a modified form of the centrifuge shown in Figure 9 wherein the feed accelerating disc is provided with a cover attached to the feed inlet as shown in detail in an enlarged scale in Figure 18. The cover 26 is attached to the end of the feeding inlet 19 by an annular part 27. The cover is situated very close to the top of the baffles or fins 18 on the disc 17 so that only a fine slit separates them. The cover 26 and the inwardly inclined ring 16 retain within the inner drum any spray which may emanate from the impingement on the disc 17. The baffles 18 have a rectangular cross-section to prevent congestion of the formation of lumps of pulp. The inner drum has a straight vertical wall topped by the inwardly inclined ring 16 whereas the wall of the outer drum has two points of inflection 28 and 29 whereby the drum increases in diameter in an upward direction.

Figure 11 shows a further construction of a two-drum centrifuge in which the inner drum wall inclined inwards at the ring 161, and the outer drum wall inclines outwards at the ring 41. The upper part of the skimming ring 9 (Figures 11 and 14) is here shown inclined towards the upper part of the ring 9 so that the upper part of the discharge channel thus formed is conical. The upper part of the ring 9 may also be inclined away from the upper part of the ring 8. Further Figure 11 shows a modification of the construction of centrifuge shown in Figures 9 and 10 illustrating a further possible construction for the feed accelerating disc. The shape of the disc 17 may be seen from the enlarged drawing Figure 19, a cover 30 which is provided with an upturned portion 31 being affixed either to baffles or fins or to supporting members 32 and 33. The disc and cover thus form a detached prolongation of the stationary inlet 19. Congestion and the formation of lumps of pulp is prevented by placing the supports 32 and 33 away from the inlet and towards the circumference of the disc 17, where the maximum centrifugal force reigns. The downward tilt of the disc 17 increases the centrifugal action and promotes the breaking up of pulp accumulations.

Fig. 12 shows a further construction in which both drums have a conical cross-section and discharge progressively from one another.

Figures 15 and 16 show in sectional elevation and in plan a feed accelerating disc 17 provided with baffles or fins 19. The hub 34 is rigidly attached to the top of the shaft of the motor driving the centrifuge.

Figure 17 shows a plan view of a feed accelerating disc 17 provided with scoop-shaped baffles 35.

It will be understood that the invention is not limited to the details of construction and procedure herein illustrated and described, but that departures may be made therefrom within the scope of the invention and without sacrificing its chief advantages.

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