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(54) **APPARATUS AND METHOD FOR CONTROLLING THE CONSISTENCY OF A FLOW OF STOCK SOLUTION IN A PAPERMAKING MACHINE**

VORRICHTUNG UND VERFAHREN ZUR REGELUNG DER KONSISTENZ EINES
STOFFSUSPENSIONSSTROMS IN EINER PAPIERMASCHINE

APPAREIL ET PROCEDE POUR CONTROLER LA REGULARITE D'UN FLUX D'UNE SOLUTION
MERE DANS UNE MACHINE DE FABRICATION DE PAPIER

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Description

Background of the invention.

Field of the invention.

[0001] The present invention relates to an apparatus for controlling the consistency of a flow of stock solution flowing from a header to a slice lip of a headbox of a papermaking machine. More specifically, the present invention relates to an apparatus and a method for controlling the consistency of a flow of stock solution flowing from a header to a slice lip of a headbox of a papermaking machine so that the cross machine direction profile of a resultant web is controlled.

Background information.

[0002] In the papermaking industry, a solution of paper stock is supplied to a headbox of a papermaking machine. The pressurized stock is guided through a plurality of headbox flow channels into a slice chamber of the headbox. The stock is then ejected as a thin ribbon through a slice lip defined by the downstream end of the headbox. The ejected stock is received onto a moving Fourdrinier screen where water drains from the stock solution to provide a formed web.

[0003] One of the more important quality parameters in the paper making process is the evenness of the cross machine direction basis weight profile. Even if the cross machine profile of the concentration of the stock ejected from the headbox slice is fairly even, the final basis weight profile is normally altered due to several defects produced along the process in the machine. These defects include an uneven flow profile of the stock ejected from the headbox, uneven retention of the fibers on the fourdrinier, uneven pick up of solids in the size press or in the coating station. The usual way to control the aforementioned defects is to compensate for them by controlling the consistency profile of the stock before it is ejected from the headbox.

[0004] The headbox is divided into several discrete cross machine sections of a certain width and in each of these sections the consistency of the stock is individually controlled according to the measure of the basis weight of the final sheet in the corresponding cross machine section.

[0005] The present invention provides an apparatus and method for controlling the consistency profile in a headbox and for providing a web having a more uniform cross machine direction basis weight profile.

[0006] Many prior art arrangements have been devised in an attempt to provide a relatively uniform grammage or basis weight in a cross machine direction of the web. Early attempts at controlling the aforementioned characteristic of the web included the provision of a plurality of slice lip screw jacks spaced a few inches from each other in a cross machine direction. Such jacks were

connected to a movable slice lip of the slice opening. Controlled movement of the jacks would warp the slice lip in such a way that a relatively uniform ribbon of stock would be ejected through the slice opening. Nevertheless, such arrangements were complex. Also, the adjustment of one of the jacks had the tendency to alter the basis weight of stock flowing past an adjacent jack.

[0007] A further development included the provision of uniformly spaced slice lips while controlling the consistency or dilution of the stock in a cross machine direction upstream relative to the slice lips. More particularly, immediately upstream from the tube bank, a flow of diluting white water or the like was selectively introduced into one or more of the headbox tubes of the tube bank so that the consistency of the stock flowing through that particular tube would be changed or diluted relative to the consistency of stock flowing through an adjacent tube.

[0008] More particularly, in the prior art dilution arrangement, by controlling the injected suspension flow in the vicinity of the tube bank, it was possible to a large extent to control the concentration of the resultant suspension downstream from the injection point. Such an injection arrangement has the disadvantage that the correction of suspension concentration requires the adding of an extraneous means to the suspension itself which can generate technological problems into the paper making process. Such an arrangement also necessitates the provision of additional circuitry for the dilution water and the provision of additional pumping apparatus. The need of the addition of a secondary suspension to control the concentration of the main suspension makes it almost impossible to selectively change the suspended particles without interacting with the hosting liquid phase.

[0009] German patent No. DE4234940 by Steiner describes a process to control a density of slurry at a headbox of a paper machine, by removing that part thereof, which is not average. The higher or lower density material is separated at early stages and reintroduced gradually in the headbox. The separation and re-use of different concentrations is initiated by sound waves in the headbox. The separation and redirection may be attained by centrifugal action, for example by rotation or by turbulence.

[0010] U. S. patent No. US 5803270 to Brodeur discloses an apparatus and a method for acoustic fiber fractionation using a plane ultrasonic wave field interacting with water suspended fibers circulating in a channel flow using acoustic radiation forces to separate fibers into two or more fractions based on fiber radius, with applications of the separation concept in the pulp and paper industry. The continuous process relies on the use of a wall-mounted, rectangular cross-section piezoelectric ceramic transducer to selectively deflect flowing fibers as they penetrate the ultrasonic field. Depending upon the amount of dissolved gas in water, separation is obtained using a standing or a travelling wave field.

[0011] U. S. patent No. US 6432275 by Huovila et al. relates to a headbox for a paper/board machine by whose

means the basis weight of the web can be regulated. The headbox comprises a stock inlet header, which becomes narrower towards its end. Tubes in a tube bank open in the stock inlet header across the machine width and are connected with thickening elements across the machine width, in which connection a first flow is removed from the thickening element into the duct and the first flow to be removed is regulated by means of a valve. From the thickening element a tube for a second flow of higher consistency is provided, which flow is passed further in the headbox.

[0012] The present invention provides a unique means for achieving a uniform basis weight or grammage in a cross machine direction by the application of ultrasonic waves for controlling in a cross machine direction, the grammage of the resultant web.

[0013] According to the present invention, when ultrasonic waves are applied to a liquid suspension, such ultrasonic waves have the capability of moving the suspended particles. In particular, particles suspended in a stationary suspension and contained within a reservoir are located in between an ultrasound generator and a ultrasound absorber device. When ultrasonic waves are applied to the particles, such particles are moved by the ultrasound waves in a direction extending from the generator to the absorber.

[0014] Similarly, the same effect occurs when ultrasonic waves are applied to a moving suspension of particles. For example, when a flow of the suspension is moving in a generic direction at a generic speed and the suspension flow crosses a region between the ultrasound generator and the absorber, then the suspended particles will be deviated from the flow direction by a motion component which is parallel to the line going from the generator to the absorber.

[0015] The result is that downstream from the ultrasonic device, the suspension will not have the same homogeneity as the homogeneity of the suspension upstream relative to the ultrasonic device. This is so because the suspended particles will tend to migrate toward the absorber. As a consequence of such migration downstream from the ultrasonic device, the suspension flow will have been concentrated on the absorber side and diluted on the generator side.

[0016] The object of the present invention is the application of the aforementioned physical principle to control the concentration of a paper making fibrous material suspension or stock solution through a head box.

[0017] In a paper machine head box, according to the present invention, the control of fiber suspension concentration or consistency in any specific cross machine section of the headbox is used to control the final paper sheet cross machine grammage profile.

[0018] Applying the above-mentioned effect of ultrasonic waves on fluid suspensions in a specific cross machine section of the headbox by the use of an ultrasonic device dedicated that specific headbox cross machine section, it is possible to exert a force on any single solid

particle suspended in the region corresponding to the same specific cross machine section of the headbox and move it inside the liquid hosting phase. As a consequence, it is possible to locally concentrate or dilute the suspension. More specifically, by applying energy in the form of ultrasound waves, it is possible to create a degree of dis-homogeneity into the suspension. By controlling the amount of energy supplied to the generator, or the capacity of the absorber, it is possible to control the state of dis-homogeneity of the suspension in the specific section and as a consequence, to control local concentration of the suspension.

[0019] As an example, in the system of the present invention, the effect is applied to a suspension such as paper stock flowing into a channel from left to right.

[0020] Ultrasound waves cross the channel from the top to the bottom. Such waves push suspended particles or fibers toward the bottom side of the channel. Downstream from the ultrasonic device, the channel is split into secondary channels, that is a supply channel and a recirculation channel. It is evident that the average concentration of the suspension received by the supply channel is in this case lower than the average concentration of the suspension received by the recirculation channel.

The difference between the two concentrations is in some way related to the power delivered by the ultrasonic device. In particular, the higher the power, of the generator or the capacity of the absorber, the bigger is the difference in concentration between the supply channel and the recirculation channel. By controlling the ultrasonic device, it is possible to control the concentration in at least one of the two secondary channels.

[0021] By controlling the power delivered by the ultrasonic device, it is possible to control the concentration in at least one of the two secondary channels.

[0022] In a paper machine headbox according to the present invention, the fiber suspension of the stock solution enters the headbox from a supply header and is transferred to a tube bank through a bank of flow channels. The adjacent channels forming the flow channels can be either physically separated one from the other by sidewalls or not. The principle of two secondary channels is applied to each single flow channel. Each flow channel is equipped with its own ultrasonic device. Also, each ultrasonic device includes an independent control. Each flow channel is split into two secondary channels, one top channel and one bottom channel. One of the two secondary channels is a supply channel of a corresponding cross machine direction section of the headbox tube bank. The other secondary channel or recirculation channel of each flow channel permits recirculation to the supply system of the headbox. A recirculation header collects the flow from each of the recirculation channels of all the flow channels. The stock collected by the recirculation header is simply recirculated into the stock approach system with no need for any extra equipment.

[0023] Applying the principle of the present invention, it is evident that it is possible to individually control the

concentration of the suspension in any secondary supply channel covering a specific respective headbox cross machine section by controlling its respective ultrasonic generator. From previous knowledge of paper machine technology, it is known that if one is able to control independently the stock concentration into each specific cross machine section of a headbox, then it is possible to control the cross machine grammage profile of the finished paper.

[0024] Therefore, it is a primary feature of the present invention to provide an apparatus and method for controlling the cross machine consistency profile of a stock solution within a headbox of a papermaking machine that overcomes the problems associated with the prior art arrangements.

[0025] Another feature of the present invention is the provision of an apparatus for controlling the cross machine consistency profile of a stock solution within a headbox of a papermaking machine so that the grammage profile of the resultant web can be controlled.

[0026] Other features and advantages of the present invention will be readily apparent to those skilled in the art by a consideration of the detailed description of a preferred embodiment of the present invention contained herein.

Summary of the invention.

[0027] The present invention relates to an apparatus for controlling the cross machine consistency profile of a flow of stock solution flowing from a header to a slice lip of a headbox of a papermaking machine so that the cross machine direction consistency profile of a resultant web is controlled. The apparatus includes a flow channel which is disposed within the headbox between the header and the slice lip. The flow channel has an upstream and a downstream end such that the flow of the stock solution is in a flow direction from the upstream end towards the downstream end of the flow channel. The flow channel includes a primary channel having a first and a second extremity such that the flow of the stock solution is through the primary channel from the first extremity to the second extremity of the primary channel. A supply channel has a first and a second end and is disposed downstream relative to the primary channel for the flow therethrough of a supply portion of the flow of the stock solution. The second end of the supply channel is connected to the slice lip so that the supply portion of the flow of the stock solution flows to the slice lip. A recirculation channel has a first and a second termination, the recirculation channel being disposed downstream relative to the primary channel for the flow therethrough of a recirculation portion of the flow of the stock solution. The second termination of the recirculation channel is connected to the header so that the recirculation portion of the flow of the stock solution flows to the header. A generator is disposed adjacent to the primary channel for generating ultrasonic waves within the flow of the stock

solution flowing through the primary channel. The ultrasonic waves move fiber particles suspended within the stock solution for controlling the consistency of the stock solution flowing through the primary channel. Also, an ultrasound absorber is disposed adjacent to the primary channel such that the flow of the stock solution flows in the flow direction within a region disposed between the generator and the absorber so that in operation of the apparatus, when the stock solution is flowing within the region, the fiber particles suspended within the stock solution are deviated from the flow direction. The arrangement is such that the consistency of the stock solution flowing from the primary channel through the supply channel is different from the greater consistency of the stock solution flowing from the primary channel through the recirculation channel so that the consistency of the supply portion of the stock solution flowing through the slice lip is controlled thereby controlling the cross machine direction profile of the resultant web.

[0028] In a more specific embodiment of the present invention, the apparatus includes a further generator which is disposed adjacent to the primary channel and laterally relative to the generator for generating ultrasonic waves within the flow of the stock solution flowing through the primary channel. The ultrasonic waves move fiber particles suspended within the stock solution for controlling the consistency of the stock solution flowing through the primary channel.

[0029] Furthermore, a further ultrasound absorber is disposed adjacent to the primary channel and laterally relative to the absorber such that the flow of the stock solution flows in the flow direction within a further region disposed between the further generator and the further absorber such that in operation of the apparatus, when the stock solution is flowing within the further region, the fiber particles suspended within the stock solution are deviated from the flow direction so that the consistency of the stock solution flowing from the primary channel downstream from the further region through the supply channel is different from the greater consistency of the stock solution flowing from the primary channel downstream from the further region through the recirculation channel. The arrangement is such that the consistency of a further supply portion of the stock solution flowing through the slice lip downstream from the further region is controlled relative to the supply portion of the stock solution flowing downstream from the region through the slice lip thereby controlling the cross machine direction consistency profile of the resultant web.

[0030] In a preferred embodiment of the present invention, the flow direction is approximately parallel to a direction from the header to the slice lip.

[0031] Also, the primary channel defines a primary conduit of rectangular cross sectional configuration, the primary conduit extending from the first extremity to the second extremity of the primary channel.

[0032] More particularly, the first end of the supply channel extends from the second extremity of the primary

channel and the supply channel is disposed above the recirculation channel.

[0033] However, in another embodiment of the present invention, the supply channel is disposed below the recirculation channel.

[0034] Additionally, the first termination of the recirculation channel extends from the second extremity of the primary channel such that the flow of the stock solution flowing through the primary channel is split into the supply portion and the recirculation portion adjacent to the second extremity of the primary channel.

[0035] In one embodiment of the present invention, the apparatus further includes a control device which is electrically connected to the generator for controllably altering the generation of the ultrasonic waves by the generator.

[0036] However, in an alternative embodiment of the present invention, a device is mechanically connected to the generator for controllably altering a location of the generator relative to the primary channel so that generation of the ultrasonic waves within the region by the generator is altered.

[0037] In another embodiment of the present invention, a controller is electrically connected to the ultrasound absorber for controllably altering absorption of the ultrasonic waves by the absorber.

[0038] Alternatively, a control device is mechanically connected to the absorber for controllably altering a disposition of the absorber relative to the primary channel so that absorption of the ultrasonic waves by the absorber is altered.

[0039] In each of the alternative embodiments of the present invention, the flow direction within the region is disposed non parallel to a direction from the generator to the absorber.

[0040] However, more specifically, the flow direction within the region is disposed substantially normal to a direction from the generator to the absorber.

[0041] Moreover, the direction from the generator to the absorber is substantially normal to the flow direction within the region such that in use of the apparatus, the ultrasonic waves deviate movement of the fiber particles in a component direction which is disposed angularly between the flow direction and the direction from the generator to the absorber.

[0042] The present invention also includes a method for controlling the consistency of a flow of stock solution flowing from a header to a slice lip of a headbox of a papermaking machine so that the cross machine direction consistency profile of a resultant web is controlled. The method includes the steps of guiding the flow of the stock solution through a flow channel which is disposed within the headbox between the header and the slice lip. The flow channel includes a primary channel which has a first and a second extremity. A supply channel has a first and a second end, the supply channel being disposed downstream relative to the primary channel for the flow therethrough of a supply portion of the flow of the stock solution. The second end of the supply channel is

connected to the slice lip so that the supply portion of the flow of the stock solution flows to the slice lip. A recirculation channel has a first and a second termination, the recirculation channel being disposed downstream relative to the primary channel for the flow therethrough of a recirculation portion of the flow of the stock solution. The second termination of the recirculation channel is connected to the header so that the recirculation portion of the flow of the stock solution flows to the header.

[0043] The method also includes the steps of generating ultrasonic waves within the flow of the stock solution flowing through the primary channel by an ultrasonic generator. The ultrasonic waves move fiber particles suspended within the stock solution for controlling the consistency of the stock solution flowing through the primary channel.

[0044] Additionally, the method includes absorbing the ultrasonic waves by an ultrasound absorber disposed adjacent to the primary channel such that the flow of the stock solution flows in the flow direction within a region which is disposed between the generator and the absorber. The arrangement is such that when the stock solution is flowing within the region, the fiber particles suspended within the stock solution are deviated from the flow direction so that the consistency of the stock solution flowing from the primary channel through the supply channel is different from the greater consistency of the stock solution flowing from the primary channel through the recirculation channel. The method is such that that the consistency of the supply portion of the stock solution flowing through the slice lip is controlled thereby controlling the cross machine direction consistency profile of the resultant web.

[0045] Many modifications and variations of the present invention will be readily apparent to those skilled in the art by a consideration of the detailed description contained hereinafter taken in conjunction with the annexed drawings which show a preferred embodiment of the present invention.

[0046] The scope of the present invention is defined by the appended claims.

Brief description of the drawings.

[0047]

Fig. 1 is a schematic to demonstrate the effect of the application of ultrasonic waves on a stock solution according to the present invention;

Fig. 2 is a similar view to that shown in Fig. 1 but shows the generator energized;

Fig. 3 is a similar view to that shown in Fig. 2 but shows the fiber suspension or stock solution in motion;

Fig. 4 is a diagrammatic representation of an apparatus according to the present invention for controlling the consistency of stock solution within a headbox of a papermaking machine;

Fig. 5 a side elevational view of an apparatus for controlling the consistency of a flow of stock solution flowing from a header to a slice lip of a headbox of a papermaking machine;

Fig. 6 is a sectional view taken on the line 6-6 of Fig. 5; Fig. 7 is a similar view to that shown in Fig. 6 but shows another embodiment of the present invention; Fig. 8 is a sectional view taken on the line 8-8 of Fig. 7; Fig. 9 is a side elevational view of another embodiment of the present invention;

Fig. 10 is a similar view to that shown in Fig. 6 but shows a further embodiment of the present invention;

Fig. 11 is a similar view to that shown in Fig. 10 but shows a further embodiment of the present invention;

Fig. 12 is a similar view to that shown in Fig. 10 but shows another embodiment of the present invention; and

Fig. 13 is a similar view to that shown in Fig. 11 but shows a further embodiment of the present invention.

[0048] Similar reference characters refer to similar parts throughout the various views and embodiments of the drawings.

Detailed description of the drawings.

[0049] Fig. 1 is a schematic to demonstrate the effect of the application of ultrasonic waves on a stock solution according to the present invention. As shown in Fig. 1, a generator 10 is disposed adjacent to a first side of a container 16 and an absorber 24 is disposed on the opposite side of the container 16. The container 16 is filled with a suspension of fiber particles 18, 19 and 20 randomly dispersed throughout the host liquid such as water.

[0050] Fig. 2 is a similar view to that shown in Fig. 1. However, as shown in Fig. 2, the generator 10 is energized so that the generator 10 emits ultrasonic waves 12, 13 and 14 through the container 16 containing the fiber particles 18, 19 and 20 suspended in water. Accordingly, the ultrasonic waves 12-14 cause the particles 18-20 to move through the water in a direction as indicated by the arrow 22 from the generator 10 towards the absorber 24.

[0051] Fig. 3 is a similar view to that shown in Fig. 2 but shows the fiber suspension or stock solution in motion. As shown in Fig. 3, the stock solution which includes the fibers 18-20 is moving through the container 16 in a flow direction as indicated by the arrow 26. As shown in Fig. 3, the flow direction 26 is normal to the direction 22. In this case, the fiber particles 18-20 will move in a component direction which is indicated by the arrow 28. The component direction 28 is disposed angularly between the directions 22 and 26. Consequently, in a downstream location relative to the generator 10, the suspension or stock solution will be more concentrated or will have a

higher consistency on the side 30 of the container 16 nearest to the absorber 24. Similarly, the stock solution will be diluted or will be of a lower consistency on a further side 32 of the container 16 nearest to the generator 10 as shown in Fig. 3.

[0052] Fig. 4 is a diagrammatic representation of an apparatus according to the present invention for controlling the consistency of the stock solution 34 which includes the fibers 18-20, within a headbox generally designated 36 of a papermaking machine. As shown in Fig. 4, when the generator 10 is activated, ultrasonic waves 12-14 are emitted through the stock solution 34 flowing in the flow direction 26 through the headbox 36. The ultrasonic waves 12-14 move in the direction 22 from the generator 10 across the flow direction 26 of the stock solution 34 towards the absorber 24. Consequently, the consistency or concentration of the fibers within the stock solution 34 is greater on the side 30 of the headbox 36 which is nearest to the absorber 24. Such concentrated stock is diverted through a downstream recirculation channel 38. However, on the further side 32 of the headbox 36 nearest to the generator 10, the stock solution 34 is diluted because many of the fibers 18-20 have migrated towards the side 30 under the influence of the applied ultrasonic waves 12-14. Such diluted stock is guided through a downstream supply channel 40.

[0053] Fig. 5 a side elevational view of an apparatus generally designated 42 according to the present invention for controlling the consistency of a flow of stock solution flowing from a header 44 to a slice lip 46 of a headbox generally designated 36 of a papermaking machine so that the cross machine direction consistency profile of a resultant web is controlled. The apparatus 42 includes a flow channel generally designated 48 which is disposed within the headbox 36 between the header 44 and the slice lip 46. The flow channel 48 has an upstream and a downstream end 50 and 52 respectively such that the flow of the stock solution is in a flow direction 26 from the upstream end 50 towards the downstream end 52 of the flow channel 48. The flow channel 48 includes a primary channel 56 having a first and a second extremity 58 and 60 respectively such that the flow of the stock solution is through the primary channel 56 from the first extremity 58 to the second extremity 60 of the primary channel 56. A supply channel 40 has a first and a second end 64 and 66 respectively and is disposed downstream relative to the primary channel 56 for the flow there-through of a supply portion as indicated by the arrow 68 of the flow of the stock solution. The second end 66 of the supply channel 40 is connected to the slice lip 46 so that the supply portion 68 of the flow of the stock solution flows to the slice lip 46. A recirculation channel 38 has a first and a second termination 72 and 74 respectively, the recirculation channel 38 being disposed downstream relative to the primary channel 56 for the flow there-through of a recirculation portion as indicated by the arrow 76 of the flow of the stock solution. The second termination 74 of the recirculation channel 38 is connected

to the header 44 so that the recirculation portion 76 of the flow of the stock solution flows to the header 44. A generator 10 is disposed adjacent to the primary channel 56 for generating ultrasonic waves 12-14 within the flow of the stock solution flowing through the primary channel 56. The ultrasonic waves 12-14 move fiber particles 18-20 suspended within the stock solution for controlling the consistency of the stock solution flowing through the primary channel 56. Also, an ultrasound absorber 24 is disposed adjacent to the primary channel 56 such that the flow of the stock solution flows in the flow direction 26 within a region R disposed between the generator 10 and the absorber 24 so that in operation of the apparatus 42, when the stock solution is flowing within the region R, the fiber particles 18-20 suspended within the stock solution are deviated as indicated by the arrow 28 from the flow direction 26. The arrangement is such that the consistency of the stock solution flowing from the primary channel 56 through the supply channel 40 is different from the consistency of the stock solution flowing from the primary channel 56 through the recirculation channel 38 so that the consistency of the supply portion 68 of the stock solution flowing through the slice lip 46 is controlled thereby controlling the cross machine direction consistency profile of the resultant web.

[0054] Fig. 6 is a sectional view taken on the line 6-6 of Fig. 5. As shown in Fig. 6, the flow channel 48 extends across most of the cross machine width of the headbox 36. Also, the supply channel 40 is shown leading to the slice lip. Furthermore, the recirculation channel 38 is shown for returning concentrated stock solution to the header.

[0055] Fig 7 is a similar view to that shown in Fig. 6 but shows another embodiment of the present invention. As shown in Fig. 7, an apparatus 42a includes a further generator 84 disposed adjacent to the primary channel 56 for generating ultrasonic waves within the flow of the stock solution flowing through the primary channel 56. The ultrasonic waves move fiber particles suspended within the stock solution for controlling the consistency of the stock solution flowing through the primary channel 56.

[0056] Fig. 8 is a sectional view taken on the line 8-8 of Fig. 7. As shown in Figs. 7 and 8, a further ultrasound absorber 86 is disposed adjacent to the primary channel 56 such that the flow of the stock solution flows in the flow direction 26 within a further region r disposed between the further generator 84 and the further absorber 86. The arrangements is structured such that in operation of the apparatus 42a, when the stock solution is flowing within the further region r, the fiber particles suspended within the stock solution are deviated from the flow direction 26 so that the consistency of the stock solution flowing from the primary channel 56 through the supply channel 62 downstream from the region r is different from the consistency of the stock solution flowing from the primary channel 56 downstream from the region r through the recirculation channel 38. The arrangement is such that

the consistency of a further supply portion 88 of the stock solution flowing downstream from the region r through the slice lip 46 is controlled relative to the supply portion 68 of the stock solution as shown in Fig. 5, flowing downstream from the region R through the slice lip 46 thereby controlling the cross machine direction consistency profile of the resultant web.

[0057] In a preferred embodiment of the present invention, the flow direction 26 is approximately parallel to a direction as indicated by the arrow 116 from the header 44 to the slice lip 46.

[0058] Also, as shown in Fig. 5, the primary channel 56 defines a primary conduit 118 of rectangular cross sectional configuration. As shown in Fig. 6, the primary conduit 118 extends from the first extremity 58 to the second extremity 60 of the primary channel 56.

[0059] More particularly, as shown in Fig. 5, the first end of the supply channel 40 extends from the second extremity 60 of the primary channel 56 and the supply channel 40 is disposed above the recirculation channel 38.

[0060] Fig. 9 is a side elevational view of another embodiment of the present invention. As shown in Fig. 9, the supply channel 40b is disposed below the recirculation channel 38b.

[0061] Additionally, as shown in Fig. 5, the first termination 72 of the recirculation channel 38 extends from the second extremity 60 of the primary channel 56 such that the flow of the stock solution flowing through the primary channel 56 is split into the supply portion 68 and the recirculation portion 76 adjacent to the second extremity 60 of the primary channel 56.

[0062] Fig. 10 is a similar view to that shown in Fig. 6 but shows a further embodiment of the present invention. As shown in Fig. 10, the apparatus further includes a control device 120 which is electrically connected to the generator 10c for controllably altering the generation of the ultrasonic waves by the generator 10c.

[0063] Fig. 11 is a similar view to that shown in Fig. 10 but shows a further embodiment of the present invention. As shown in Fig. 11, a device 122 such as a hydraulic or a pneumatic ram is mechanically connected to the generator 10d for controllably altering a location of the generator 10d relative to the primary channel 56 as indicated by the arrow 123 so that generation of the ultrasonic waves within the region R by the generator 10d is altered.

[0064] Fig. 12 is a similar view to that shown in Fig. 10 but shows a further embodiment of the present invention. As shown in Fig. 12, a controller 124 is electrically connected to the ultrasound absorber 24e for controllably altering absorption of the ultrasonic waves by the absorber 24e.

[0065] Fig. 13 is a similar view to that shown in Fig. 11 but shows a further embodiment of the present invention. As shown in Fig. 13, a control device 126 such as a hydraulic or pneumatic ram is mechanically connected to the absorber 24f for controllably altering a disposition of the absorber 24f relative to the primary channel 56 as

indicated by the arrow 127 so that absorption of the ultrasonic waves by the absorber 24f is altered.

[0066] In each of the alternative embodiments of the present invention, the flow direction 26 within the region R and r is disposed non parallel to a direction 22 from the generator 10 to the absorber 24.

[0067] However, more specifically, the flow direction 26 within the region R is disposed substantially normal to the direction 22 from the generator 10 to the absorber 24.

[0068] Moreover, the direction 22 from the generator 10 to the absorber 24 is substantially normal to the flow direction 26 within the region R such that in use of the apparatus, the ultrasonic waves deviate movement of the fiber particles in a component direction 28 shown in Fig. 5 which is disposed angularly between the flow direction 26 and the direction 22 from the generator 10 to the absorber 24.

[0069] The present invention also includes a method for controlling the cross machine consistency profile of a flow of stock solution flowing from a header 44 to a slice lip 46 of a headbox 36 of a papermaking machine so that the cross machine direction profile of a resultant web is controlled. The method includes the steps of guiding the flow of the stock solution through a flow channel 48 which is disposed within the headbox 36 between the header 44 and the slice lip 46. The flow channel 48 includes a primary channel 56 which has a first and a second extremity 58 and 60. A supply channel 40 has a first and a second end 64 and 66, the supply channel 40 being disposed downstream relative to the primary channel 56 for the flow therethrough of a supply portion 68 of the flow of the stock solution. The second end 66 of the supply channel 40 is connected to the slice lip 46 so that the supply portion 68 of the flow of the stock solution flows to the slice lip 46. A recirculation channel 38 has a first and a second termination 72 and 74, the recirculation channel 38 being disposed downstream relative to the primary channel 56 for the flow therethrough of a recirculation portion 76 of the flow of the stock solution. The second termination 74 of the recirculation channel 38 is connected to the header 44 so that the recirculation portion 76 of the flow of the stock solution flows to the header 44.

[0070] The method also includes the steps of generating ultrasonic waves within the flow of the stock solution flowing through the primary channel 56 by an ultrasonic generator 10. The ultrasonic waves move fiber particles suspended within the stock solution for controlling the consistency of the stock solution flowing through the primary channel 56.

[0071] Additionally, the method includes absorbing the ultrasonic waves by an ultrasound absorber 24 disposed adjacent to the primary channel 56 such that the flow of the stock solution flows in the flow direction 26 within a region R which is disposed between the generator 10 and the absorber 24. The arrangement is such that when the stock solution is flowing within the region R, the fiber

particles suspended within the stock solution are deviated from the flow direction 26 so that the consistency of the stock solution flowing from the primary channel 56 through the supply channel 40 is different from the consistency of the stock solution flowing from the primary channel 56 through the recirculation channel 38. The method is such that the consistency of the supply portion 68 of the stock solution flowing through the slice lip 46 is controlled thereby controlling the cross machine direction consistency profile of the resultant web.

[0072] In operation of the apparatus according to the present invention, a stock solution is supplied to the header under pressure. The stock flows through the flow channel 48 so that when the generator and absorber 10 and 24 respectively are activated, diluted stock flows from the region R through the downstream supply channel 40 to the slice lip 46. However, in a lateral disposition in a cross machine direction as shown in Fig. 8, the further generator and further absorber 84 and 86 respectively act upon the region r which is disposed laterally relative to the region R as shown in Fig. 7. Consequently, the dilution of the stock flowing downstream from the region r through the supply channel 40 can be controlled or altered relative to the dilution of the laterally disposed flow of stock flowing downstream from the region R. In this manner, by the provision a number of generators and corresponding absorbers, the cross machine directional consistency profile of the resultant web can be controlled. Such control can be achieved as shown in Figs. 10-13 by either controlling the electrical supply to the generator or to the absorber or by mechanically moving the disposition of the generator or the absorber or both the generator and the absorber relative to the primary channels 56.

[0073] According to the present invention, the generation capacity of the generator can be changed by increasing or decreasing the electrical input or by moving the generator towards or away from the primary channel.

[0074] Similarly, the absorption factor of the absorber can be changed by increasing or decreasing the electrical input to the absorber or by moving the absorber towards or away from the primary channel. Any combination of the above can be used for controlling the ultrasonic waves within the primary channel.

[0075] By altering the power to all of the generators such as 10 and 84 and/or the corresponding absorbers 24 and 86 to the same power level would have a similar effect to altering the grammage valve on a conventional headbox. Typically, in a conventional headbox, when the grammage valve is altered, there would be a delay of two minutes before such change would take effect downstream on the grammage of the resultant web.

[0076] One of the advantages of the arrangement according to the present invention when using an electrical control for the generator and/or absorber is that the consistency control is accomplished by entirely an electrical device rather than a mechanical device in the case of slice lip control.

[0077] Although the present invention describes the recirculation portion of the stock as returning to the header, it will be apparent to those skilled in the art that in fact, the recirculation portion will usually be returned to the header via the stock supply silo.

[0078] The present invention provides a unique apparatus and method for controlling the cross machine direction profile of a web.

Claims

1. An apparatus (42, 42a) for controlling the consistency of a flow of stock solution (34) flowing from a header (44) to a slice lip (46) of a headbox (36) of a papermaking machine so that the cross machine direction consistency profile of a resultant web is controlled, said apparatus comprising:

a flow channel (48) disposed within the headbox (36) between the header (44) and the slice lip (46), said flow channel (48) having an upstream and a downstream end (50, 52) such that the flow of the stock solution (34) is in a flow direction (26) from said upstream end (50) towards said downstream end (52) of said flow channel (48); said flow channel (48) including:

a primary channel (56) having a first and a second extremity (58, 60) such that the flow of the stock solution (34) is through said primary channel (56) from said first extremity (58) to said second extremity (60) of said primary channel (56); a supply channel (40, 40b) having a first and a second end (64, 66), said supply channel (40, 40b) being disposed downstream relative to said primary channel (56) for the flow therethrough of a supply portion (68) of the flow of the stock solution (34);

said second end (66) of said supply channel (40, 40b) being connected to the slice lip (46) so that said supply portion (68) of the flow of the stock solution (34) flows to the slice lip (46);

a recirculation channel (38, 38b) having a first and a second termination (72, 74), said recirculation channel (38, 38b) being disposed downstream relative to said primary channel (56) for the flow therethrough of a recirculation portion (76) of the flow of the stock solution (34);

said second termination (74) of said recirculation channel (38, 38b) being connected to the header (44) so that said recirculation portion (76) of the flow of the stock solution (34) flows to the header (44);

a generator (10, 10c, 10d) disposed adjacent to said primary channel (56) for generating ultrasonic waves (12 - 14) within the flow of the stock solution (34) flowing through said primary channel (56), said ultrasonic waves (12 - 14) moving

fiber particles (18 - 20) suspended within the stock solution (34) for controlling the consistency of the stock solution (34) flowing through said primary channel (56); and

an ultrasound absorber (24, 24e, 24f) disposed adjacent to said primary channel (56) such that the flow of the stock solution (34) flows in said flow direction (26) within a region (R) disposed between said generator (10, 10c, 10d) and said absorber (24, 24e, 24f) so that in operation of said apparatus (42, 42a), when the stock solution (34) is flowing within said region (R), said fiber particles (18 - 20) suspended within the stock solution (34) are deviated from said flow direction (26) so that the consistency of the stock solution (34) flowing from said primary channel (56) through said supply channel (40, 40b) is different from the greater consistency of the stock solution (34) flowing from said primary channel (56) through said recirculation channel (38, 38b) so that the consistency of said supply portion (68) of the stock solution (34) flowing through the slice lip (46) is controlled thereby controlling the cross machine direction consistency profile of the resultant web.

2. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 including:

a further generator (84) disposed adjacent to said primary channel (56) and laterally relative to said generator (10, 10c, 10d) for generating ultrasonic waves (12 - 14) within the flow of the stock solution (34) flowing through said primary channel (56), said ultrasonic waves (12 - 14) moving fiber particles (18 - 20) suspended within the stock solution (34) for controlling the cross machine direction consistency profile of the stock solution (34) flowing through said primary channel (56);

a further ultrasound absorber (86) disposed adjacent to said primary channel (56) such that the flow of the stock solution (34) flows in said flow direction (26) within a further region (r) disposed between said further generator (84) and said further absorber (86) such that in operation of said apparatus (42, 42a), when the stock solution (34) is flowing within said further region (r), said fiber particles (18 - 20) suspended within the stock solution (34) are deviated from said flow direction (26) so that the consistency of the stock solution (34) flowing from said primary channel (56) downstream from said further region (r) through said supply channel (40, 40b) is different from the greater consistency of the stock solution (34) flowing from said primary channel (56) downstream from said further region (r) through said recirculation channel (38, 38b) so

- that the consistency of a further supply portion (88) of the stock solution (34) flowing through the slice lip (46) downstream from said further region (r) is controlled relative to said supply portion (68) of the stock solution (34) flowing downstream from said region through the slice lip (46) thereby controlling the cross machine direction profile of the resultant web.
3. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 wherein said flow direction (26) is approximately parallel to a direction (116) from the header (44) to the slice lip (46).
 4. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 wherein said primary channel (56) defines a primary conduit (118) of rectangular cross sectional configuration, said primary conduit (118) extending from said first extremity (58) to said second extremity (60) of said primary channel (56).
 5. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 wherein said first end (64) of said supply channel (40, 40b) extends from said second extremity (60) of said primary channel (56).
 6. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 wherein said supply channel (40) is disposed above said recirculation channel (38).
 7. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 wherein said supply channel (40b) is disposed below said recirculation channel (38b).
 8. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 wherein said first termination (72) of said recirculation channel (38, 38b) extends from said second extremity (60) of said primary channel (56) such that the flow of the stock solution (34) flowing through said primary channel (56) is split into said supply portion (68) and said recirculation portion (76) adjacent to said second extremity (60) of said primary channel (56).
 9. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 further including:

a control device (120) electrically connected to said generator (10c) for controllably altering generation of said ultrasonic waves (12 - 14) by said generator (10c).
 10. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 further including:

a device (122) mechanically connected to said generator (10d) for controllably altering a location of said generator (10d) relative to said primary channel (56) so that generation of said ultrasonic waves (12 - 14) within said region (R) by said generator (10d) is altered.
 11. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 further including:

a controller (124) electrically connected to said ultrasound absorber (24e) for controllably altering absorption of said ultrasonic waves (12 - 14) by said absorber (24e).
 12. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 further including:

a control device (126) mechanically connected to said absorber (24f) for controllably altering a disposition of said absorber (24f) relative to said primary channel (56) so that absorption of said ultrasonic waves (12 - 14) by said absorber (24f) is altered.
 13. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 wherein said flow direction (26) within said region (R) is disposed non parallel to a direction (22) from said generator (10, 10c, 10d) to said absorber (24, 24e, 24f).
 14. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 wherein said flow direction (26) within said region (R) is disposed substantially normal to a direction (22) from said generator (10, 10c, 10d) to said absorber (24, 24e, 24f).
 15. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 14 wherein said direction (22) from said generator (10, 10c, 10d) to said absorber (24, 24e, 24f) is substantially normal to said flow direction (26) within said region (R) such that in use of said apparatus (42, 42a), said ultrasonic waves (12 - 14) deviate movement of said fiber particles (18 - 20) in a component direction (28) which is disposed angularly between said flow direction (26) and said direction (22) from said generator (10, 10c, 10d) to said absorber (24, 24e, 24f).
 16. An apparatus for controlling the consistency of a flow of stock solution as set forth in claim 1 including:

a further generator (84) disposed adjacent to said primary channel (56) and laterally relative to said generator (10, 10c, 10d) for generating ultrasonic waves (12 - 14) within the flow of the stock solution (34) flowing through said primary channel (56), said ultrasonic waves (12 - 14) moving fiber particles (18 - 20) suspended within the stock solution (34) for controlling the consistency of the stock solution (34) flowing through said primary channel (56);

a further ultrasound absorber (86) disposed adjacent to said primary channel (56) and laterally relative to said absorber (24, 24e, 24f) such that the flow of the stock solution (34) flows in said flow direction (26) within a further region (r) disposed between said further generator (84) and said further absorber (86) such that in operation of said apparatus (42a), when the stock solution (34) is flowing within said further region (r), said fiber particles (18 - 20) suspended within the stock solution (34) are deviated from said flow direction (26) so that the consistency of the stock solution (34) flowing from said primary channel (56) downstream from said further region (r) through said supply channel (40) is different from the greater consistency of the stock solution (34) flowing from said primary channel (56) downstream from said further region (r) through said recirculation channel (38) so that the consistency of a further supply portion (88) of the stock solution (34) flowing through the slice lip (46) downstream from said further region (r) is controlled relative to said supply portion (68) of the stock solution (34) flowing downstream from said region through the slice lip (46) thereby controlling the cross machine direction consistency profile of the resultant web;

said flow direction (26) being approximately parallel to a direction (116) from the header (44) to the slice lip (46);

said primary channel (56) defining a primary conduit (118) of rectangular cross sectional configuration, said primary conduit (118) extending from said first extremity (58) to said second extremity (60) of said primary channel (56);

said first end (64) of said supply channel (40) extending from said second extremity (60) of said primary channel (56);

said supply channel (40) being disposed above said recirculation channel (38);

said first termination (72) of said recirculation channel (38) extending from said second extremity (60) of said primary channel (56) such that the flow of the stock solution (34) flowing through said primary channel (56) is split into said supply portion (68) and said recirculation portion (76) adjacent to said second extremity (60) of said primary channel (56); and

said direction (22) from said generator (10, 10c, 10d) to said absorber (24, 24e, 24f) being substantially normal to said flow direction (26) within said region (R) and said further region (r) such that in use of said apparatus (42a), said ultrasonic waves (12 - 14) deviate movement of said fiber particles (18 - 20) in a component direction (28) which is disposed angularly between said flow direction (26) and said direction (22) from said generator (10, 10c, 10d) to said absorber (24, 24e, 24f).

17. A method for controlling the consistency of a flow of stock solution (34) flowing from a header (44) to a slice lip (46) of a headbox (36) of a papermaking machine so that the cross machine direction consistency profile of a resultant web is controlled, said method comprising the steps of:

guiding the flow of the stock solution (34) through a flow channel (48) which is disposed within the headbox (36) between the header (44) and the slice lip (46), the flow channel (48) including:

a primary channel (56) having a first and a second extremity (58, 60);

a supply channel (40, 40b) having a first and a second end (64, 66), the supply channel (40, 40b) being disposed downstream relative to the primary channel (56) for the flow therethrough of a supply portion (68) of the flow of the stock solution (34), the second end (66) of the supply channel (40, 40b) being connected to the slice lip (46) so that the supply portion (68) of the flow of the stock solution (34) flows to the slice lip (46);

a recirculation channel (38, 38b) having a first and a second termination (72, 74), the recirculation channel (38, 38b) being disposed downstream relative to the primary channel (56) for the flow therethrough of a recirculation portion (76) of the flow of the stock solution (34), the second termination (74) of the recirculation channel (38, 38b) being connected to the header (44) so that the recirculation portion (76) of the flow of the stock solution (34) flows to the header (44);

generating ultrasonic waves (12 - 14) within the flow of the stock solution (34) flowing through the primary channel (56) by an ultrasonic generator (10, 10c, 10d), the ultrasonic waves (12 - 14) moving fiber particles (18 - 20) suspended within the stock solution (34) for controlling the consistency of the stock solution (34) flowing through the primary channel (56); and
absorbing the ultrasonic waves (12 - 14) by an ultrasound absorber (24, 24e, 24f) disposed adjacent to the primary channel (56) such that the

flow of the stock solution (34) flows in the flow direction (26) within a region (R) disposed between the generator (10, 10c, 10d) and the absorber (24, 24e, 24f) such that when the stock solution (34) is flowing within the region (R), the fiber particles (18 - 20) suspended within the stock solution (34) are deviated from the flow direction (26) so that the consistency of the stock solution (34) flowing from the primary channel (56) through the supply channel (40, 40b) is different from the greater consistency of the stock solution (34) flowing from the primary channel (56) through the recirculation channel (38, 38b) so that the consistency of the supply portion (68) of the stock solution (34) flowing through the slice lip (46) is controlled thereby controlling the cross machine direction consistency profile of the resultant web.

Patentansprüche

1. Ein Gerät (42, 42a) zum Regulieren der Konsistenz eines Flusses einer Stammlösung (34), die von einem Header (Streichkopt) (44) zu einer Stauvorrichtungslippe (46) eines Stoffauflaufs (36) einer Papierherstellungsmaschine so fließt, dass das Quermaschinenrichtung-Konsistenzprofil einer sich ergebenden Papierrolle reguliert wird, wobei dieses Gerät sich zusammensetzt aus:

einem Strömungskanal (48), der innerhalb des Stoffauflaufs (36) angeordnet ist zwischen dem Header (44) und der Stauvorrichtungslippe (46), wobei der Strömungskanal (48) ein Upstream (aufwärts)- und ein Downstream (abwärts)-Ende (50, 52) aufweist, so dass der Strom der Stammlösung (34) in eine Strömungsrichtung (26) von dem genannten Upstreamende (50) auf das genannte Downstreamende (52) des besagten Strömungskanals (48) gerichtet ist; wobei besagter Strömungskanal (48) einschließt:

einen Primärkanal (56) mit einer ersten und einer zweiten Extremität (58, 60) aufweist, so dass sich der Strom der Stammlösung (34) durch besagten Primärkanal (56) von der besagten ersten Extremität (58) zur besagten zweiten Extremität (60) des besagten Primärkanals (56) befindet,

einen Zufuhrkanal (40, 40b) mit einem ersten und einem zweiten Ende (64, 66), wobei der besagte Zufuhrkanal (40, 40b) Downstream angeordnet ist relativ zu besagten Primärkanal (56), um durch selben einen Zufuhranteil (68) des Stroms der Stammlösung (34) fließen zu lassen; besagtes zweites Ende (66) des besagten Zufuhrkanals (40, 40b) ist derweil mit der Stauvor-

richtungslippe (46) verbunden, so dass der besagte Zufuhranteil (68) des Stroms der Stammlösung (34) zur Stauvorrichtungslippe (46) fließt; ein Umlaufkanal (38, 38b) mit einem ersten und einem zweiten Abschluss (72, 74), wobei besagter Umlaufkanal (38, 38b) Downstream angeordnet relativ zu besagten Primärkanal (56), um durch selben einen Umlaufteil (76) des Stroms der Stammlösung (34) fließen zu lassen;

das besagte zweite Abschlussende (74) des besagten Umlaufkanals (38, 38b) ist derweil mit dem Header (44) verbunden, so dass besagter Umlaufteil (76) des Stroms der Stammlösung (34) zum Header (44) fließt,

ein Generator (10, 10c, 10d), der neben genannten Primärkanal (56) angeordnet ist zur Erzeugung von Ultraschallwellen (12-14) innerhalb des Stroms der Stammlösung (34), der durch besagten Primärkanal (56) fließt, derweil besagte Ultraschallwellen (12 - 14) Faserpartikel (18 - 20) bewegt, die in der Stammlösung (34) suspendieren, um die Konsistenz der Stammlösung (34), die durch besagten Primärkanal (56) fließt, zu kontrollieren; und

einen Ultraschallabsorber (24, 24e, 24f), der neben genannten Primärkanal (56) angeordnet ist, so dass der Strom der Stammlösung (34) in genannter Strömungsrichtung (26) fließt innerhalb einer Region (R), die zwischen Generator (10, 10C, 10D) und besagten Absorber (24, 24e, 24f) angeordnet ist, so dass bei Betrieb des Gerätes (42, 42a), wenn die Stammlösung (34) innerhalb der besagten Region (R) fließt, besagte Faserpartikel (18 - 20), die innerhalb der Stammlösung (34) suspendieren (34) abgelenkt werden von besagter Strömungsrichtung (26), so dass die Konsistenz der Stammlösung (34), die von besagtem Primärkanal (56) durch besagten Umlaufkanal 40, 40b) fließt, von der größeren Konsistenz der Stammlösung (34) abweicht, die von dem genannten Umlaufkanal (56) durch den besagten Umlaufkanal (38, 38b) fließt, so dass die Konsistenz des besagten Zufuhranteils (68) der Stammlösung (34), der durch die Stauvorrichtungslippe (46) fließt, reguliert ist und **dadurch** das Quermaschinenrichtung-Konsistenzprofil des sich ergebenden Papierrolle regelt.

2. Ein Gerät zum Regulieren einer Stammlösung, nach Anspruch 1, einschließlich:

Einen weiteren Generator (84), der neben besagten Primärkanal (56) und lateral relativ zu besagten Generator (10, 10c, 10d) angeordnet ist, um Ultraschallwellen (12 - 14) zu erzeugen innerhalb des Stroms der Stammlösung (34), die durch den besagten Primärkanal (56) fließt, wobei die Ultraschallwellen (12 - 14) Faserpar-

- tikel (18 - 20), die in der Stammlösung (34) suspendieren, bewegen, um das Quermaschinenrichtung-Konsistenzprofil der Stammlösung (34), das durch genannten Primärkanal (56) fließt zu regulieren;
 einen weiteren Ultraschallabsorber (86), der neben genannten Primärkanal (56) angeordnet ist, so dass der Strom der Stammlösung (34) in die besagte Strömungsrichtung (26) fließt innerhalb einer weiteren Region (r), die zwischen besagtem weiteren Generator (84) und besagtem weiteren Absorber (86) angeordnet ist, so dass bei Betrieb des genannten Gerätes (42, 42a), wenn die Stammlösung (34) in besagter Region (r) fließt, die besagten Faserpartikel (18 - 20), die innerhalb der Stammlösung (34) suspendieren, von besagter Strömungsrichtung (26) abgewendet werden, so dass die Konsistenz der Stammlösung (34), die von besagtem Primärkanal (56) Downstream von besagter weiteren Region (r) durch besagten Zufuhrkanal (40, 40b) fließt von der größeren Konsistenz der Stammlösung (34) abweicht, die von besagten Primärkanal (56) Downstream von der besagten weiteren Region (r) durch besagten Umlaufkanal (38, 38b) fließt, so dass die Konsistenz eines weiteren Zufuhranteils (88) der Stammlösung (34), die durch die Stauvorrichtungslippe (46) Downstream von der besagten weiteren Region (r) fließt, reguliert wird relativ zu dem genannten Zufuhranteil (68) der Stammlösung (34), die Downstream von der genannten Region (r) durch die Stauvorrichtungslippe (46) fließt, und dabei das Quermaschinen-Richtungsprofil des sich ergebenden Papierrolle reguliert.
3. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, wobei besagte Strömungsrichtung (26) sich ungefähr parallel zu einer Richtung (116) vom Header (44) zur Stauvorrichtungslippe (46) befindet.
 4. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, wobei besagter Primärkanal (56) kennzeichnet eine Primärleitung (118), die sich von besagter ersten Extremität (58) zur zweiten Extremität (6) des genannten Primärkanals (56) erstreckt.
 5. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, wobei besagtes erstes Ende (64) des genannten Zufuhrkanals (40, 40b) sich von besagter zweiten Extremität (60) des Primärkanals (56) erstreckt.
 6. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, wobei besagter Zufuhrkanal (40) oberhalb des besagten Umlaufkanals (38) angeordnet ist.
 7. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, wobei besagter Zufuhrkanal (40b) unterhalb des besagten Umlaufkanals (38b) angeordnet ist.
 8. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, wobei besagtes erstes Abschliessende (72) des besagten Umlaufkanals (38, 38b) sich von besagter zweiten Extremität (60) des besagten Primärkanals (56) erstreckt, so dass der Fluss der Stammlösung (34), der durch besagten Primärkanal (56) fließt, aufgespalten wird in besagtes Zufuhranteil (68) und besagtes Umlaufanteil (76) neben besagte zweite Extremität (6) des besagten Primärkanals (56).
 9. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, das ferner einschließt:
 ein Kontrollgerät (120), das elektrisch mit besagtem Generator (10c) verbunden ist, um die Erzeugung besagter Ultraschallwellen (12-14) durch besagten Generator (10c) regulierend zu verändern.
 10. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, das ferner einschließt:
 ein Gerät (122), das automatisch mit besagtem Generator (10d) verbunden ist, um die Lage des besagten Generators (10d) regulierend zu verändern relativ zu besagtem Primärkanal (56), so dass die Erzeugung der besagten Ultraschallwellen (12-14) innerhalb der besagten Region (R) durch besagten Generator (10d) verändert wird.
 11. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, das ferner einschließt:
 einen Controller (124), der elektrisch mit besagtem Ultraschallabsorber (24e) verbunden ist, zur regulierenden Veränderung der Absorption der besagten Ultraschallwellen (12-14) durch besagten Absorber (24e).
 12. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, das ferner einschließt:
 ein Kontrollgerät (126), das automatisch mit besagtem Absorber (24f) verbunden ist zur regulierenden Veränderung einer Anordnung des besagten Absorbers (24f) relativ zu besagtem Primärkanal (56), so

dass die Absorption der besagten Ultraschallwellen (12-14) durch besagten Absorber (24f) verändert wird.

13. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, wobei besagte Strömungsrichtung (26) innerhalb der besagten Region (R) nicht parallel zu einer Richtung (22) von dem besagten Generator (10, 10c, 10d) zu besagtem Absorber (24, 24e, 24f) angeordnet ist 5
14. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, wobei besagte Strömungsrichtung (26) innerhalb der besagten Region (R) im Wesentlichen normal zu einer Richtung (22) von dem besagten Generator (10, 10c, 10d) zu besagtem Absorber (24, 24e, 24f) angeordnet ist 10
15. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, wobei besagte Richtung (22) von dem besagten Generator (10, 10c, 10d) zu dem besagten Absorber (24, 24e, 24f) im Wesentlichen normal zu besagter Strömungsrichtung (26) innerhalb besagter Region (R) angeordnet ist, so dass beim Benutzen des besagten Gerätes (42, 42a), die besagten Ultraschallwellen (12-14) die Bewegung der besagten Faserpartikel (18-20) ablenken in eine Komponentenrichtung (28), die winkelig zwischen besagter Strömungsrichtung (26) und besagter Richtung (22) von besagtem Generator (10, 10c, 10d) zu besagtem Absorber (24, 24e, 24f) angeordnet ist 15
16. Ein Gerät zum Regulieren der Konsistenz eines Flusses einer Stammlösung nach Anspruch 1, das ferner einschließt:
einen weiteren Generator (84), der neben besagtem Primärkanal (56) angeordnet ist und lateral relativ zu besagtem Generator (10, 10c, 10d), zum Erzeugen von Ultraschallwellen (12-14) innerhalb des Stromes der Stammlösung (34), die durch besagten Primärkanal (56) fließt, wobei Ultraschallwellen (12-14) Faserpartikel (18-20) bewegt, die innerhalb der Stammlösung (34) suspendieren zum Regulieren der Konsistenz einer Stammlösung (34), die durch besagten Primärkanal (56) fließt;
einen weiteren Ultraschallabsorber (86), der neben besagtem Primärkanal (56) und lateral relativ zu besagten Absorber (24, 24e, 24f) angeordnet ist, so dass der Strom der Stammlösung (34) in besagte Richtung (26) fließt innerhalb einer weiteren Region (r), die angeordnet ist zwischen besagtem weiteren Generator (84) und besagtem weiteren Absorber (86), so dass bei Betrieb des besagten Gerätes (42a), wenn die Stammlösung (34) innerhalb besagter weiteren Region (r) fließt, die besagte Faserpartikel (18-20), die innerhalb der Stammlösung (34) 20
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suspendieren, abgelenkt sind von der besagten Richtung (26), so dass die Konsistenz der Stammlösung (34), die von besagtem Primärkanal (56) Downstream von besagter weiteren Region (r) durch besagten Zufuhrkanal (40) fließt, von der größeren Konsistenz der Stammlösung (34) abweicht, die von besagtem Primärkanal (56) Downstream von besagter weiteren Region (r) durch besagten Umlaufkanal (38) fließt, so dass die Konsistenz eines weiteren Zufuhranteils (88) der Stammlösung (34), die durch die Stauvorrichtungslippe (46) Downstream von der besagten weiteren Region (r) fließt, reguliert wird relativ zu dem Zufuhranteil (68) der Stammlösung (34), die Downstream von der besagten Region durch die Stauvorrichtungslippe (46) fließt, und dabei das Quermaschinenrichtung-Konsistenzprofil der sich ergebenden Papierrolle reguliert;
wobei besagte Strömungsrichtung (26) annähernd parallel zu einer Richtung (116) vom Header (44) zur Stauvorrichtungslippe (46) ist;
wobei besagter Primärkanal (56) eine Primärleitung (118) kennzeichnet, die sich von besagter erster Extremität (58) zur zweiten Extremität (6) des genannten Primärkanals (56) erstreckt;
wobei das erste Ende (64) des besagten Zufuhrkanals (40) sich von besagter zweiten Extremität (60) des besagten Primärkanals (56) erstreckt;
besagter Zufuhrkanal (4) oberhalb des besagten Umlaufkanals (38) angeordnet ist;
besagtes erstes Abschlussende (72) des besagten Umlaufkanals (38), sich von der besagten zweiten Extremität (6) des besagten Primärkanals (56) erstreckt, so dass der Strom der Stammlösung (34), der durch besagten Primärkanal (56) fließt, aufgespalten wird in besagtes Zufuhranteil (68) und besagtes Umlaufanteil (76) neben besagter zweiten Extremität (6) des besagten Primärkanals (56); und
besagte Richtung (22) von besagtem Generator (10, 10c, 10d) des besagten Absorbers (24, 24e, 24f) im Wesentlichen normal zu besagter Strömungsrichtung (26) in der besagten Region (R) und besagter weiteren Region (r) ist, so dass bei Benutzung des besagten Gerätes (42a), die besagten Ultraschallwellen (12-14) die Bewegung der besagten Faserpartikel (18-20) ablenken in eine Komponentenrichtung (28), die winkelig zwischen besagter Strömungsrichtung (26) und besagter Richtung (22) von besagtem Generator (10, 10c, 10d) zu besagtem Absorber (24, 24c, 24f) angeordnet ist.

17. Eine Methode zum Regulieren der Konsistenz eines Flusses einer Stammlösung (34) von einem Header (44) zu einer Stauvorrichtungslippe (46) eines Stoffauflaufs (36) einer Papierherstellungsmaschine, so dass das Quermaschinenrichtung-Konsistenzprofil einer sich ergebenden Papierrolle reguliert wird, wobei die besagte Methode sich aus folgenden Stufen zusammensetzt:

Führung des Stroms der Stammlösung (34) durch einen Strömungskanal (48), der innerhalb des Stoffauflaufs (36) angeordnet ist zwischen dem Header (44) und der Stauvorrichtungslippe (46), wobei der Strömungskanal (48) einschließt:

einen Primärkanal (56), der eine erste und eine zweite Extremität (58, 60) hat;
einen Zufuhrkanal (40, 40b), der ein erstes und ein zweites Ende (4, 66) hat, wobei der Zufuhrkanal (40, 40b) Downstream relativ zu dem Primärkanal (56) angeordnet ist für den Durchfluss durch denselben von einem Zufuhranteil (68) des Stroms der Stammlösung (34), wobei das zweite Ende (66) des Zufuhrkanals (40, 40b) mit der Stauvorrichtungslippe (46) verbunden ist, so dass der Zufuhranteil (68) des Stroms der Stammlösung (34) zu der Stauvorrichtungslippe (46) fließt;

ein Umlaufkanal (38, 38b), der ein erstes und ein zweites Abschlusende (72, 74) des Umlaufkanals (38, 38b) hat, der Downstream relativ zu dem Primärkanal (56) angeordnet ist für den Durchfluss durch denselben von einem Umlaufanteil (76) des Stroms der Stammlösung (34), wobei das zweite Ende (74) des Umlaufkanals (38, 38b) verbunden ist mit dem Header (44), so dass der Umlaufanteil (76) des Stroms der Stammlösung (34) zu dem Header (44) fließt; Erzeugung durch einen Ultraschallgenerator (10, 10e, 10d) von Ultraschallwellen (12-14) innerhalb des Stroms der Stammlösung (34), der durch den Primärkanal (56) fließt, wobei die Ultraschallwellen (12-14) die Faserpartikel (18-20) bewegen, die innerhalb der Stammlösung (34) suspendieren zum Regulieren der Konsistenz der Stammlösung (34), die durch den Primärkanal (56) fließt; und

Absorption der Ultraschallwellen (12-14) durch einen Ultraschallabsorber (24, 24e, 24f), der neben dem Primärkanal (56) so angeordnet ist, so dass der Strom der Stammlösung (34) in die Strömungsrichtung (26) fließt innerhalb einer Region (R), die zwischen dem Generator (10, 10c, 10d) und dem Absorber (24, 24c, 24f) so angeordnet ist, dass, wenn die Stammlösung (34) innerhalb der Region (R) fließt, die Faserpartikel (18-20), die innerhalb der Stammlösung (34) suspendieren, von der Strömungsrichtung (26) so abgelenkt werden, dass die Konsistenz der Stammlösung (34), die vom Primärkanal (56) durch den Zufuhrkanal (40, 40b) fließt, so von der größeren Konsistenz der Stammlösung (34), die vom Primärkanal (56) durch den Umlaufkanal (38, 38b) fließt, abweicht, dass die Konsistenz des Zufuhranteils (68) der Stammlösung (34), der durch die Stauvorrichtungslippe (46) fließt, reguliert ist und **dadurch** das Quer-

maschinenrichtung-Konsistenzprofil der sich ergebenden Papierrolle reguliert.

5 Revendications

1. Un appareil (**42, 42a**) pour contrôler la consistance du flux de pâte à papier (**34**) s'écoulant d'un pulpeur (**44**) vers le bec de la vanne (**46**) de versement du pulpeur (**36**) d'une machine à papier de façon à ce que la consistance du sens de déroulement de la toile résultante puisse être contrôlée, ledit appareil comprenant :

un canal d'écoulement (**48**) installé dans le pulpeur (**36**) entre le collecteur (**44**) et le bec de la vanne (**46**), ledit canal d'écoulement (**48**) ayant une extrémité en aval et en amont (**50, 52**) de façon à ce que l'écoulement de la pulpe (**34**) se fasse dans le sens (**26**) allant de la dite extrémité en amont (**50**) vers l'extrémité en aval (**52**) du dit canal d'écoulement (**48**);

ledit canal d'écoulement (**48**) comprenant :

un canal principal (**56**) ayant une première et une seconde extrémité (**58, 60**) de sorte que le flux d'écoulement de la pâte (**34**) se fasse par ledit canal principal (**56**) depuis la première extrémité (**58**) vers la seconde extrémité (**60**) du dit canal principal (**56**);

un canal d'alimentation (**40, 40b**) ayant une première et une seconde extrémité (**64, 66**) ledit canal d'alimentation (**40, 40b**) se situant en aval du dit canal principal (**56**) permettant l'écoulement d'une portion (**68**) du flux de pâte (**34**);

la dite seconde extrémité (**66**) du dit canal d'alimentation (**40, 40b**) étant raccordée au bec de la vanne (**46**) de sorte que la dite portion (**68**) du flux de pâte (**34**) s'écoule vers le bec de la vanne (**46**);

un canal de recirculation (**38, 38b**) ayant une première et une seconde extrémité (**72, 74**), ledit canal de recirculation (**38, 38b**) se situant en aval du canal principal (**56**) permettant la remise en circulation d'une portion (**76**) du flux de pâte (**34**),

la dite seconde extrémité (**74**) du dit canal de recirculation (**38, 38b**) étant raccordée au pulpeur (**44**) de sorte que la portion remise en circulation (**76**) du flux de pâte (**34**) s'écoule vers le pulpeur (**44**);

un générateur (**10, 10c, 10d**) contigu au canal principal (**56**) pour la production d'ultrasons (**12 - 14**) dans le flux de pâte (**34**) s'écoulant par ledit canal principal (**56**), les dits ultrasons (**12 - 14**) déplaçant des particules de fibres (**18 - 20**) en suspension dans la pâte (**34**) afin de contrôler la consistance de la pâte (**34**) s'écoulant par le canal principal (**56**); et

un absorbeur d'ultrasons (24, 24e, 24f) contigu audit canal principal (56) de sorte que le flux de pâte (34) s'écoule dans ledit sens d'écoulement (26) dans une zone (R) située entre ledit générateur (10, 10c, 10d) et ledit absorbeur (24, 24e, 24f) afin que lors du fonctionnement du dit appareil (42, 42a), lorsque la pâte s'écoule (34) dans cette zone (R), les dites particules fibreuses (18 - 20) en suspension dans la pâte (34) soient déviées dudit sens d'écoulement (26) pour que la consistance de la pâte (34) qui s'écoule par le canal principal (56) par ledit canal d'alimentation (40, 40b) soit différente de la consistance la plus importante de la pâte (34) qui s'écoule dudit canal principal (56) par le canal de recirculation (38, 38b) pour que la consistance de ladite portion (68) du flux de pâte (34) qui s'écoule du bec de la vanne (46) soit ainsi contrôlée par la consistance de déroulement de la toile résultante.

2. Un appareil de contrôle de la consistance du flux de pâte comme indiqué au fait 1, comprenant :

Un générateur supplémentaire (84) placé contigu au canal principal (56) et relié latéralement audit générateur (10, 10c, 10d) pour la production d'ultrasons (12 - 14) dans le flux de pâte (34) s'écoulant par ledit canal principal (56), les dits ultrasons (12 - 14) déplaçant des particules de fibres (18 - 20) en suspension dans la pâte (34) afin de contrôler le profil de consistance de sens contraire de la machine de la pâte (34) s'écoulant par le canal principal (56) ;

Un absorbeur d'ultrasons supplémentaire (86) contigu au dit canal principal (56) de sorte que le flux de pâte (34) s'écoule dans ledit sens d'écoulement (26) dans une zone supplémentaire (r) située entre ledit générateur supplémentaire (84) et ledit absorbeur supplémentaire (86) afin que lors du fonctionnement dudit appareil (42, 42a), lorsque la pâte (34) s'écoule dans cette zone supplémentaire (r), les dites particules fibreuses (18 - 20) en suspension dans la pâte (34) soient déviées du sens d'écoulement (26) pour que la consistance de la pâte (34) s'écoule par ledit canal principal (56) en aval de ladite zone supplémentaire (r) par ledit canal principal (56) soit différente de la consistance la plus importante de la pâte (34) qui s'écoule dudit canal principal (56) en aval de ladite zone supplémentaire (r) par ledit canal de recirculation (38, 38b) pour que la consistance d'une portion d'alimentation supplémentaire (88) de la pâte (34) s'écoulant par le bec de la vanne (46) en aval de ladite zone supplémentaire (r) soit contrôlée par rapport à ladite portion d'alimentation (68) de la pâte (34) qui s'écoule en aval de ladite zone par le bec de la vanne (46) contrôlant ainsi la consistance du sens de

déroulement de la toile résultante.

3. Un appareil destiné à contrôler la consistance du flux de pâte, comme indiqué au fait 1
Ledit sens d'écoulement (26) est approximativement parallèle à un sens (116) allant du pulpeur (44) au bec de la vanne (46).
4. Un appareil destiné à contrôler la consistance d'un flux de pâte, comme indiqué au fait 1.
Ledit canal principal (56) définit un conduit principal (118) de configuration transversale rectangulaire, ledit conduit principal (118) s'étend de ladite première extrémité (58) à ladite seconde extrémité (60) dudit canal principal (56).
5. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1.
Cette première extrémité (64) dudit canal d'alimentation (40, 40b) s'étend de ladite seconde extrémité (60) au canal principal (56).
6. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1.
Ledit canal d'alimentation (40) est situé au-dessus dudit canal de recirculation (38).
7. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1.
Le canal d'alimentation (40b) est situé sous ledit canal de recirculation (38b).
8. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1.
Ladite première extrémité (72) dudit canal de recirculation (38, 38b) s'étend de ladite seconde extrémité (60) dudit canal principal (56) pour que le flux de pâte (34) qui s'écoule dudit canal principal (56) soit divisé en une portion d'alimentation (68) et en une portion de recirculation (76) contigüe à ladite extrémité (60) dudit canal principal (56).
9. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1.
Un dispositif de contrôle (120) connecté électriquement audit générateur (10e) pour modifier de manière contrôlable la production d'ultrasons (12 - 14) par ledit générateur (10d).
10. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1.
Un dispositif (122) connecté mécaniquement audit générateur (10e) pour modifier de manière contrôlable la position dudit générateur (10d) par rapport audit canal principal (56) pour que la production d'ultrasons (12 - 14) dans ladite zone (R) par ledit générateur (10d) soit modifiée.

11. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1.
Un régulateur (124) connecté électriquement audit absorbeur d'ultrasons (24 e) pour modifier de manière contrôlable l'absorption desdits ultrasons (12 - 14) par ledit absorbeur (24 e). 5
12. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1 comprenant en outre : 10
Un dispositif de contrôle (126) connecté mécaniquement audit absorbeur (24 f) pour modifier de manière contrôlable une disposition dudit absorbeur (24 f) par rapport audit canal principal (56) pour que l'absorption desdits ultrasons (12 - 14) par ledit absorbeur (24 f) soit modifiée. 15
13. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1. 20
Ledit sens d'écoulement (26) dans ladite zone (R) est situé de manière non parallèle à un sens (22) dudit générateur (10, 10c, 10d) vers ledit absorbeur (24, 24 e, 24 f).
14. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1. 25
Ledit sens d'écoulement (26) dans ladite zone (R) est situé de manière relativement normale par rapport au sens (22) dudit générateur (10, 10c, 10d) vers ledit absorbeur (24, 24 e, 24 f). 30
15. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1. 35
Ledit sens (22) dudit générateur (10, 10c, 10d) vers ledit absorbeur (24, 24 e, 24 f) est situé de manière relativement normale par rapport audit sens d'écoulement (26) dans la zone (R) pour que lors du fonctionnement dudit appareil (42, 42a), lesdits ultrasons (12 - 14) dévient le mouvement desdites particules de fibres (18 - 20) dans un sens du composant (28) situé de manière angulaire entre ledit sens d'écoulement (26) et ledit sens (22) dudit générateur (10, 10c, 10d) vers ledit absorbeur (24, 24 e, 24 f). 40
16. Un appareil destiné au contrôle de la consistance du flux de pâte comme indiqué au fait 1. 45
Un générateur supplémentaire (84) situé contigu audit canal principal (56) et latéralement audit générateur (10, 10c, 10d) pour produire des ultrasons (12 - 14) dans le flux de pâte (34) qui s'écoule canal principal (56), lesdits ultrasons (12 - 14) déplaçant des particules de fibres (18 - 20) en suspension dans la pâte (34) afin de contrôler la consistance de la pâte (34) s'écoulant par le canal principal (56) ; 50
Un absorbeur d'ultrasons supplémentaire (86) situé contigu audit canal principal (56) ou latéralement audit absorbeur (24, 24 e, 24 f) de sorte que le flux 55

de pâte (34) s'écoule dans ledit sens d'écoulement (26) dans une zone supplémentaire (r) située entre ledit générateur supplémentaire (84) et ledit absorbeur supplémentaire (86) afin que lors du fonctionnement dudit appareil (42, 42a), lorsque la pâte (34) s'écoule dans cette zone supplémentaire (r), les dites particules fibreuses (18 - 20) en suspension dans la pâte (34) soient déviées du sens d'écoulement (26) pour que la consistance de la pâte (34) s'écoulant par ledit canal principal (56) en aval de ladite zone supplémentaire (r) par ledit canal principal (56) en aval de ladite zone supplémentaire (r) par ledit canal d'alimentation (40) soit différente de la consistance la plus importante de la pâte (34) s'écoulant dudit canal principal (56) en aval de ladite zone supplémentaire (r) par ledit canal de recirculation (38) afin que la consistance d'une portion d'alimentation supplémentaire (88) de pâte (34) s'écoulant par le bec de la vanne (46) en aval de ladite zone supplémentaire (r) soit contrôlée par rapport à ladite portion d'alimentation (68) de la pâte (34) s'écoulant en aval de ladite zone par le bec de la vanne (46) contrôlant ainsi la consistance du sens de déroulement de la toile résultante

Ledit sens d'écoulement (26) est approximativement parallèle au sens d'écoulement (116) entre le collecteur (44) et le bec de la vanne (46) ;

Ledit canal principal (56) définit un conduit principal (118) de configuration transversale rectangulaire, ledit conduit principal (118) s'étend de ladite première extrémité (58) à ladite seconde extrémité (60) dudit canal principal (56) ;

Ladite première extrémité (64) dudit canal d'alimentation (40) s'étend de ladite seconde extrémité (60) dudit canal principal (56) ;

Ledit canal d'alimentation (40) est situé sous ledit canal de recirculation (38) ; Ladite première extrémité (72) dudit canal de recirculation (38) s'étend de ladite seconde extrémité (38) dudit canal principal (56) pour que le flux de pâte (34) s'écoulant par ledit canal principal (56) soit divisé en une portion d'alimentation (68) et en une portion de recirculation (76) contigüe à ladite seconde extrémité (60) dudit canal principal (56) ; et

Ledit sens (22) dudit générateur (10, 10c, 10d) vers ledit absorbeur (24, 24 e, 24 f) étant substantiellement normal par rapport audit sens d'écoulement (26) dans ladite zone (R) et ladite zone supplémentaire (r) afin que lors du fonctionnement dudit appareil (42a), lesdits ultrasons (12 - 14) dévient le mouvement desdites particules de fibres (18 - 20) dans le sens du composant (28) qui est situé de manière angulaire entre ledit sens d'écoulement (26) et ledit sens d'écoulement (22° dudit générateur (10, 10c, 10d) vers ledit absorbeur (24, 24 e, 24 f).

17. Une méthode de contrôle de la consistance du flux de pâte (34) s'écoulant du collecteur (44) vers le bec

de la vanne (46) de versement du pulpeur (36) d'une machine à papier de façon à ce que la consistance du sens de déroulement de la toile résultante puisse être contrôlée, ladite méthode comportant les étapes suivantes :

tante.

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Guide du flux de pâte (34) par un canal d'écoulement (48) installé dans le pulpeur (36) situé entre le collecteur (44) et le bec de la vanne (46), le canal d'écoulement (48) comprenant :

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Un canal principal (56) ayant une première et une seconde extrémité (58, 60) ;

Un canal d'alimentation (40, 40b) ayant une première et une seconde extrémité (64, 66), le canal d'alimentation (40, 40b) étant disposé en aval par rapport au canal principal (56) pour l'écoulement d'une portion d'alimentation (68) du flux de pâte (34), la seconde extrémité (66) du canal d'alimentation (40, 40b) étant connecté au bec de la vanne (46) afin que la portion d'alimentation (68) du flux de pâte (34) s'écoule vers le bec de la vanne (46).

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Un canal de recirculation (38, 38b) disposant d'une première et d'une seconde extrémité (72, 74), le canal de recirculation (38, 38b) étant disposé en aval par rapport au canal principal (56) pour l'écoulement d'une portion de recirculation (76) du flux de pâte (34), la seconde extrémité (74) du canal de recirculation (38, 38b) étant connecté au collecteur (44) afin que la portion de recirculation (76) du flux de pâte (34) s'écoule vers le collecteur (44) ;

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La production d'ultrasons (12 - 14) dans le flux de la pâte (34) s'écoulant par le canal principal (56) par un générateur ultrasonique (10, 10c, 10d), les ultrasons (12 - 14) déplaçant les particules de fibres (18 - 20) en suspension dans la pâte (34) afin de contrôler la consistance de la pâte (34) s'écoulant par le canal principal (56) ; et

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L'absorption des ultrasons (12 - 14) par un absorbeur d'ultrasons (24, 24e, 24f) contigu au canal principal (56) de sorte que le flux de pâte (34) s'écoule dans ledit sens d'écoulement (26) dans une zone (r) située entre le générateur (10, 10c, 10d) et l'absorbeur (24, 24e, 24f) afin que lorsque la pâte (34) s'écoule dans la zone (R), les particules de fibres (18 - 20) en suspension dans la pâte (34) soient déviées du sens d'écoulement (26) pour que la consistance de la pâte (34) s'écoulant du canal principal (56) par le canal d'alimentation (40, 40b) soit différente de la consistance la plus importante de la pâte (34) s'écoulant du canal principal (56) par le canal de recirculation (38, 38b) de manière à ce que la consistance de la portion d'alimentation (68) de pâte (34) s'écoulant par le bec de la vanne (46) soit ainsi contrôlée par la consistance du sens de déroulement de la toile résultante.

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Fig. 1.

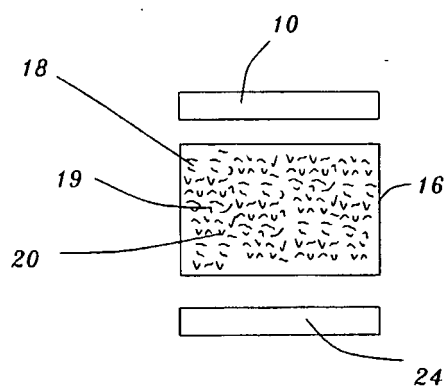


Fig. 2.

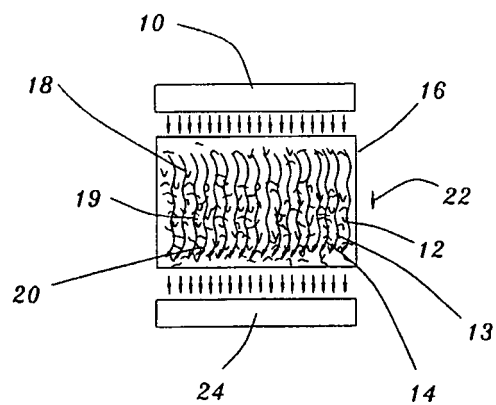


Fig. 3.

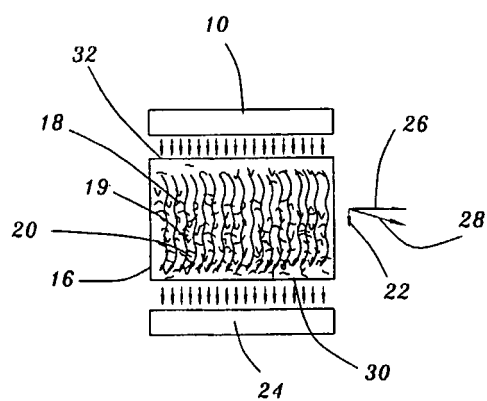
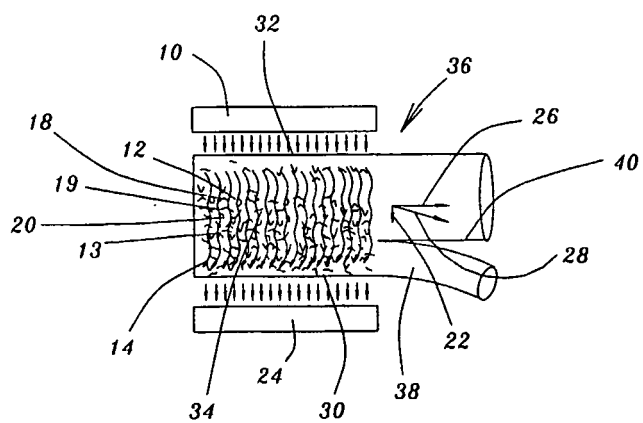


Fig. 4.



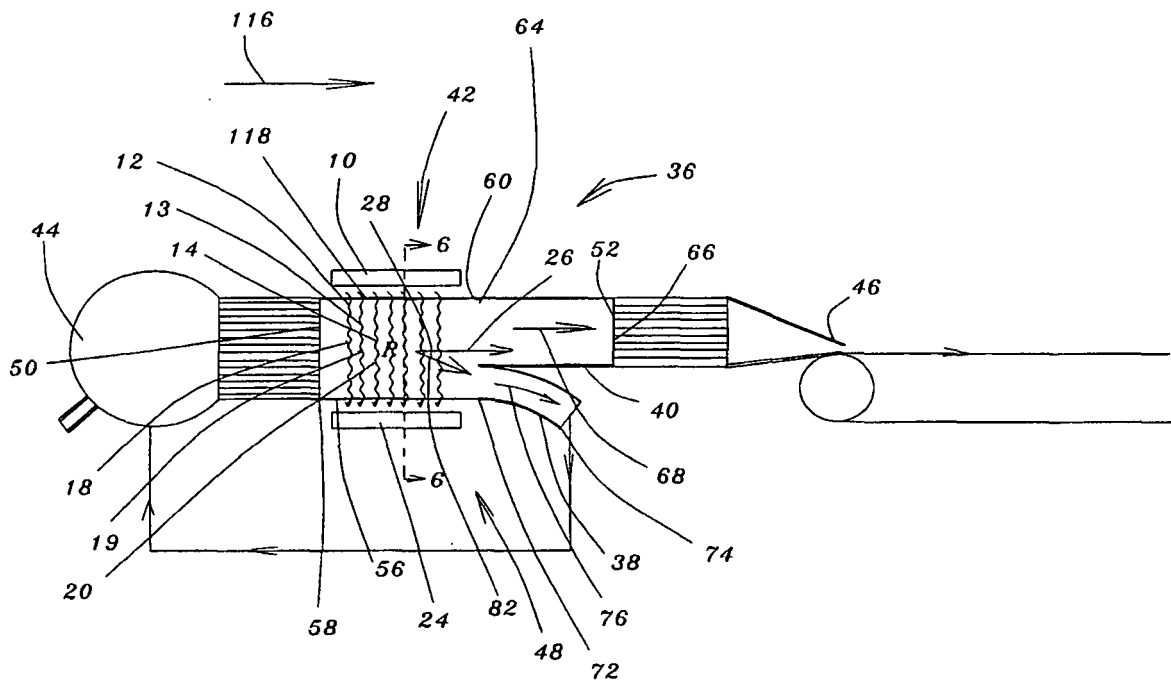


Fig. 5.

Fig. 6.

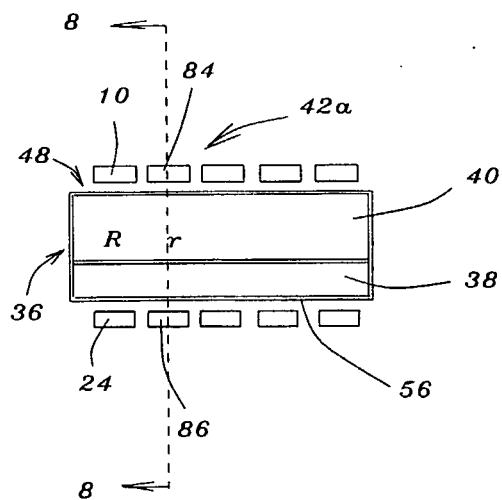
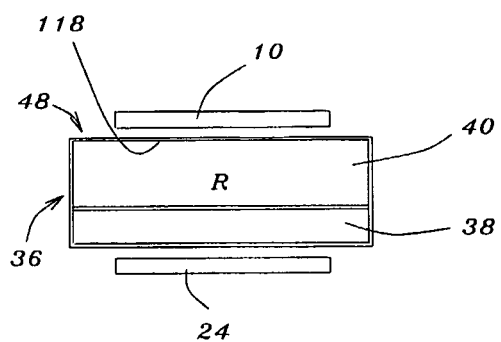


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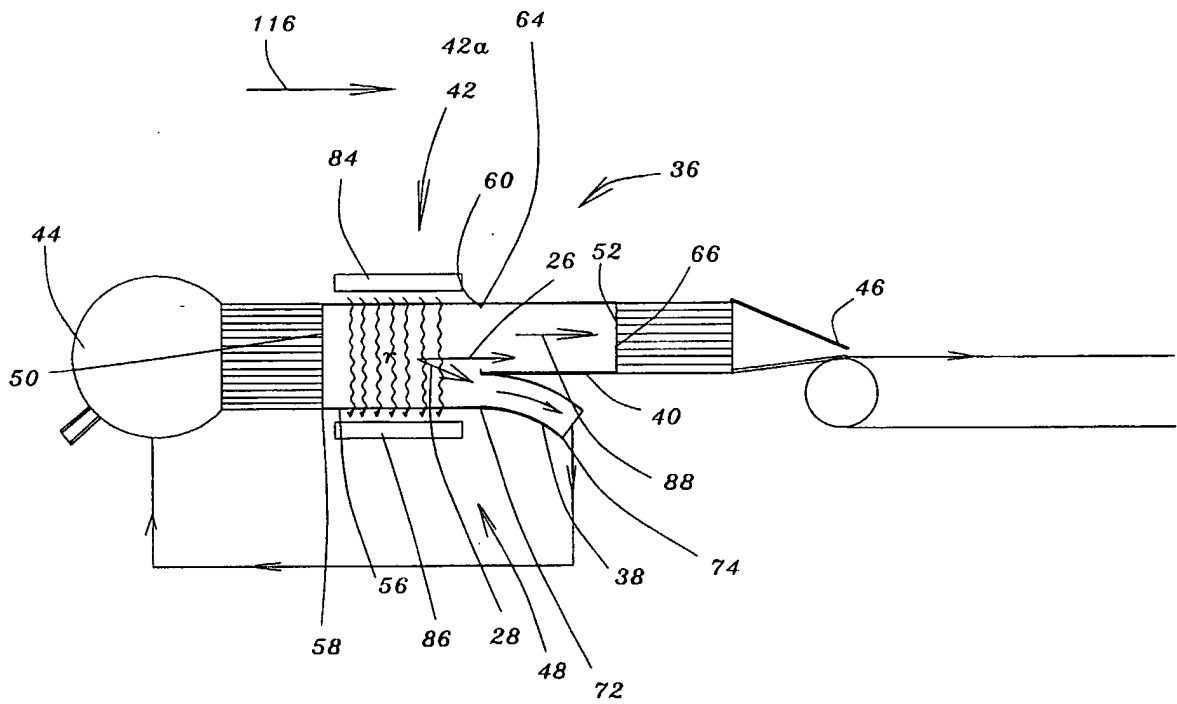


Fig. 8.

Fig. 9.

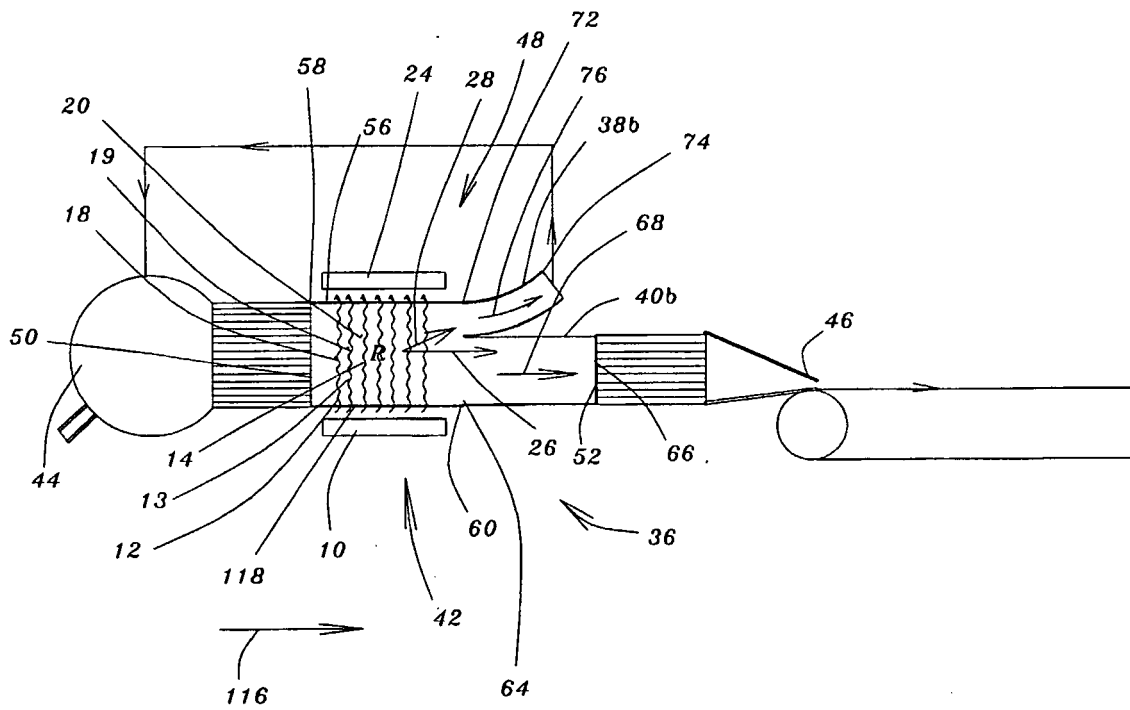


Fig. 10.

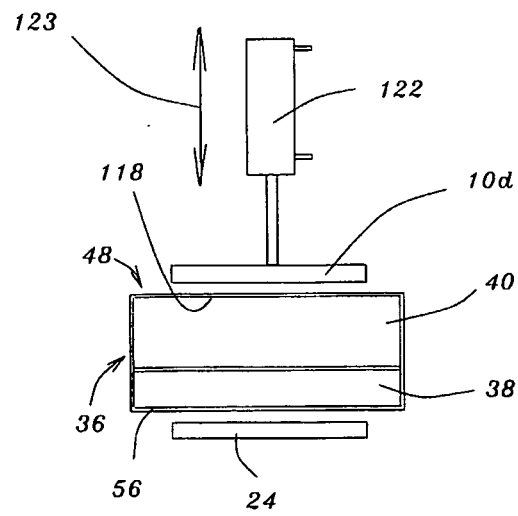
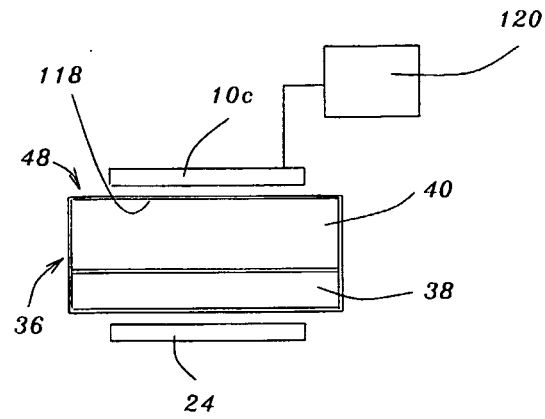


Fig. 11.

Fig. 12.

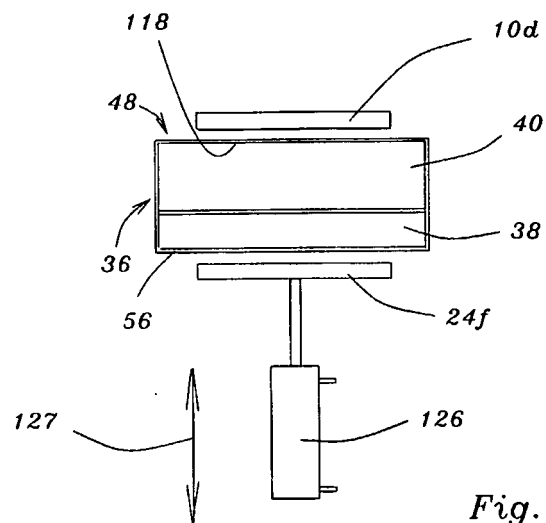
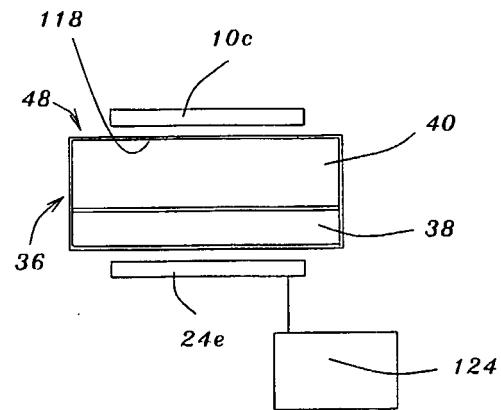


Fig. 13.

REFERENCES CITED IN THE DESCRIPTION

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