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Proceedings of the Technical Association of the Pulp and Paper Industry (TAPPI Press) of the 1981 Annual Meeting held in Illinois, USA on the 2nd to 5th March 1981

(73) Proprietor: **BELOIT WALMSLEY LIMITED**
Wood Street
Bury Lancashire BL8 2QT (GB)

(72) Inventor: **Arav, Ronnie Abraham**
13 Thorneyholme Close
Lostock Bolton, BL6 4BZ (GB)

(74) Representative: **Ranson, Arthur Terence et al**
W.P. Thompson & Co. Coopers Building Church Street
Liverpool L1 3AB (GB)

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Description

The present invention relates to apparatus for dewatering fibrous suspensions on a paper forming machine.

In a known paper forming machine the fibrous suspension passes between top and bottom forming wires and water is extracted from the suspension in an upward direction by use of an auto-slice and a curved inverted suction box which contacts the top wire. The two wires trap the stock over a lead-in-foil and water flows in an upward direction into the auto-slice and afterwards, due to the continuing pressure of the two wires, the dewatering action is continued in an upward direction into the apertures of the inverted suction box (FR—A—2350422).

A transfer suction box is disposed downstream of the inverted suction box on the side of the bottom wire and vacuum applied to the suction box reverses the direction of flow and a downward dewatering action takes place together with the transfer of stock to the bottom wire. The cover has a typical radius of five metres and its contacting surface with the top wire is open to vacuum. The openings in the cover are in the form of slots or drilled holes. The arrangement is such as to produce upward dewatering throughout its whole length.

A similar arrangement is disclosed on page 16 and in Fig. 4 thereon of the proceedings of the Techical Association of the Pulp & Paper Industry (TAPPI Press) of the 1981 Annual Meeting held in Illinois, U.S.A., on 2nd to 5th March 1981. Here, in an article entitled "The Bel Bond Former Concept & Experience", a curved, inverted vacuum box is shown with a twin-wire forming run trained therebeneath. A vacuum is applied over the whole length of the box to draw water upwardly from the web throughout the box length, although downward dewatering is allowed over the second part of the box.

Stock dewatering using the existing arrangements requires vacuum to be applied to the cover or active surface throughout its whole length and this in turn increases the power required to drive the top wire. It is an aim of the present invention to provide apparatus for dewatering which is more economical in terms of capital and running costs than the present arrangements and which gives improved retention of the stock on the bottom wire, and which gives a longer suction transfer box cover life.

According to one aspect of the present invention there is provided apparatus for dewatering a fibrous suspension on a paper forming machine comprising a suction housing having an active surface or cover adapted to co-operate with a top wire to urge that wire towards a forming wire, the fibrous suspension being trapped between the top wire and the forming wire, and the cover having a first open area by means of which the water is removed upwardly and a second solid part downstream of the first open area which urges the water downwardly.

The first open area comprises a plurality of slots or foils defining slots or a plurality of of drilled holes. The open area in the first part of the cover may be reduced in the downstream direction.

The solid part of the cover will not permit any dewatering to take place through the cover and, consequently, the pressure of the two wires will force the dewatering action to reverse its direction and go downwards.

According to another aspect of the present invention there is provided a method of dewatering a fibrous suspension on a paper forming machine in which a fibrous suspension trapped between a top wire and a bottom forming wire is moved past an active surface or cover of a suction housing with the top wire contacting the cover for the purpose of removing water from the fibrous suspension, wherein the water is extracted in an upward direction as the fibrous suspension moves past a first open area of the cover, and wherein the water is directed downwardly as the fibrous suspension moves past a second solid part of the cover disposed downstream of the first area.

The present invention will now be described further, by way of example only, with reference to the accompanying drawing which is a diagrammatic end view of dewatering apparatus on a paper forming machine.

The machine comprises an endless top-wire 1 which is entrained around rolls 3. Dewatering apparatus in the form of a curved inverted vacuum box having a suction housing 7 is disposed within the top-wire 1 and has an active surface or cover 9 which co-operates with the top-wire 1. The cover 9 urges the top-wire 1 towards a forming wire 5. The fibrous suspension is trapped between the top-wire 1 and the forming wire 5.

The wires 1, 5 move in the direction indicated by arrows A. The forming wire 5 passes over a lead-in foil 11 which urges water upwardly. An auto-slice 13 immediately downstream of the lead-in-foil removes a proportion of the water in the upward direction. A further portion of the water is removed upwardly by a first part of the cover 9 which has an open area and to which suction is applied from the suction housing. The open area extends over the region shown at 15 and is formed by a plurality of foils defining slots or by drilled holes. The open area may have a compound curvature with a radius which decreases in the downstream direction in order to generate a progressively higher dewatering pressure.

A second part of the cover, generally indicated at 17, is solid. Thus, no dewatering can take place through the cover in this part and, consequently, the pressure of the two wires will force the dewatering action to reverse its direction and go downwards.

Thus, downward dewatering will start before a transverse suction box 19 disposed downstream of the inverted vacuum box 7. The water, dewatered due to the downward action, will be doctored away from the bottom wire 5 by the leading

edge of the transfer suction box and through the open area of the transfer suction box cover 21.

The dewatering apparatus of the present invention has the following disadvantages:—

The downward dewatering of the second part of the curved inverted vacuum box will drain downwardly due to gravity, and will not require any vacuum assistance (as is presently required). Thus, a saving is achieved on Capital and Running costs in respect of:—

the vacuum pump and its installation,

an upward stainless steel compartment with its inlet and discharge equipment is no longer necessary,

and the running cost of energy required to maintain VACUUM.

Due to not having VACUUM on the second part of the shoe, the power required to drive the top wire is reduced and while presently the last part of the vacuum box can have a tendency to plug due to the low flow of water in it, the new solid cover will not plug.

The retention of the Bel Bond will improve. The water, which goes downward, passes through the formed sheet and the bottom wire, and will be of lower consistency than the water presently drained upwards.

The water coming down from the second part of the vacuum box will lubricate the transverse box cover and contribute to a longer suction box cover life.

Claims

1. Apparatus for dewatering a fibrous suspension on a paper forming machine comprising a suction housing (7) having an active surface or cover (9) adapted to cooperate with the top wire (1) to urge that wire towards a forming wire (5), the fibrous suspension being trapped between the top wire and the forming wire, characterised in that the cover (9) has a first open area (15) by means of which the water is removed upwardly, and a solid second part (17) downstream of the first open area which urges the water downwardly.

2. Apparatus as claimed in claim 1, in which the first open area (15) comprises a plurality of slots, or foils defining slots, or a plurality of drilled holes.

3. Apparatus as claimed in any of claims 1 or 2 in which the open area in the first part of the cover (9) is reduced in area in the downstream direction.

4. Apparatus as claimed in any preceding claim in which the open area (15) has a compound curvature with a radius which decreases in the downstream direction.

5. Apparatus as claimed in any preceding claim further comprising a lead-in-foil (11) located upstream of the suction housing cover (9) and adapted to engage the forming wire (5), and a transfer suction box (19) downstream of the suction housing cover (9) and adapted to engage the forming wire (5).

6. Apparatus as claimed in claim 5 in which the lead-in foil (11) has a solid surface to direct water upwardly, and the transfer suction box (19) has an open area with applied suction to draw the fibrous suspension onto the forming wire (5).

7. A method of dewatering a fibrous suspension on a paper forming machine in which a fibrous suspension trapped between a top wire (1) and a bottom forming wire (5) is moved past an active surface or cover (9) of a suction housing with the top wire (1) contacting the cover for the purpose of removing water from the fibrous suspension, characterised in that the water is extracted in an upward direction as the fibrous suspension moves past a first open area (15) of the cover (9) and that the water is directed downwardly as the fibrous suspension moves past a second solid part (17) of the cover disposed downstream of the first area (15).

8. A method as claimed in claim 7 in which pressure is applied to the fibrous suspension as it passes over the active surface (9) and in which the pressure increases in the downstream direction over the first open area of the active surface in proportion to the radius of the active surface.

9. A method as claimed in claim 7 or 8 in which water is urged upwardly upstream of the cover (9) by contacting the bottom forming wire (5) with a solid lead-in-foil (11), and in which further water is extracted downwardly downstream of the cover (9) by passing the bottom forming wire (5) over a transverse suction box cover (21).

Patentansprüche

1. Vorrichtung zum Entwässern einer Fasersuspension auf einer Papiermaschine mit einem Sauggehäuse (7), welches eine aktive Oberfläche oder Abdeckung (9) für das Zusammenwirken mit einem Obersieb (1) aufweist, um jenes Sieb gegen ein formendes Sieb (5) zu drücken, wobei die Fasersuspension zwischen dem Obersieb und dem formenden Sieb eingeschlossen ist, dadurch gekennzeichnet, daß die Abdeckung (9) einen ersten offenen Bereich (15), über den das Wasser nach oben entfernt wird, und einen massiven zweiten Teil (17) stromab von dem ersten offenen Bereich aufweist, an welchem das Wasser nach unten gedrückt wird.

2. Vorrichtung nach Anspruch 1, bei welcher der erste offene Bereich (15) eine Vielzahl von Schlitzen oder Schlitze begrenzenden Blättern oder eine Vielzahl von gebohrten Löchern aufweist.

3. Vorrichtung nach einem der Ansprüche 1 oder 2, bei welcher der offene Bereich in dem ersten Teil der Abdeckung (9) in dem Bereich in Stromabrichtung reduziert ist.

4. Vorrichtung nach einem der vorhergehenden Ansprüche, bei welcher der offene Bereich (15) eine zusammengesetzte Krümmung mit einem Radius hat, der in Stromabrichtung abnimmt.

5. Vorrichtung nach einem der vorhergehenden Ansprüche, welche weiterhin eine Einleitfolie (11), die stromauf von der Sauggehäuseabdeckung (9) angeordnet und für den Eingriff mit dem formen-

den Sieb (5) geeignet ist, und einen querverlaufenden Saugkasten (19) stromab von der Sauggehäuseabdeckung (9) für den Eingriff mit dem formenden Sieb (5) aufweist.

6. Vorrichtung nach Anspruch 5, bei welcher die Einführfolie (11) eine massive Oberfläche aufweist, um das Wasser nach oben zu richten, und der querverlaufende Saugkasten (19) einen offenen Bereich mit angelegter Saugwirkung aufweist, um die Fasersuspension auf das formende Sieb (5) zu ziehen.

7. Verfahren zum Entwässern einer Fasersuspension auf einer Papiermaschine, bei welchem eine Fasersuspension, die zwischen einem Obersieb (1) und einem formenden Untersieb (5) angeordnet ist, an einer aktiven Oberfläche oder Abdeckung (9) eines Sauggehäuses vorbeibewegt wird, wobei das Obersieb (1) die Abdeckung berührt, um Wasser aus der Fasersuspension zu entfernen, dadurch gekennzeichnet, daß das Wasser nach oben gerichtet abgezogen wird, wenn die Fasersuspension an einem ersten offenen Bereich (15) der Abdeckung (9) vorbeibewegt wird, und daß das Wasser nach unten gerichtet wird, wenn die Fasersuspension an einem zweiten massiven Teil (17) der Abdeckung vorbeibewegt wird, die stromab von dem ersten Bereich (15) liegt.

8. Verfahren nach Anspruch 7, bei welchem ein Druck auf die Fasersuspension ausgeübt wird, wenn sie über die aktive Oberfläche (9) geführt wird, und der Druck in Stromabrichtung über dem ersten offenen Bereich der kative Oberfläche proportional zum Radius der aktiven Oberfläche gesteigert wird.

9. Verfahren nach Anspruch 7 oder 8, bei welchem Wasser stromauf von der Abdeckung (9) dadurch nach oben gedrückt wird, daß das formende Untersieb (5) mit einer massiven Einführfolie (11) in Berührung gebracht wird, und weiterhin stromab von der Abdeckung (9) Wasser nach unten abgezogen wird, indem das formende Untersieb (5) über eine querverlaufende Saugkastenabdeckung (21) geführt wird.

Revendications

1. Appareillage d'élimination de l'eau d'une suspension fibreuse sur une machine de fabrication de papier, comprenant un caisson aspirant (7) comportant une surface active ou surface de recouvrement (9) agencée pour coopérer avec une toile supérieure (1) de façon à repousser cette toile en direction d'une toile de formage (5), la suspension fibreuse étant emprisonné entre la toile supérieure et la toile de formage, caractérisé par le fait que la surface de recouvrement (9) comporte une première zone munie d'ouvertures (15) au moyen de laquelle l'eau est évacuée vers le haut, et une seconde partie (17) pleine située en aval de la première zone à ouvertures et qui refoule l'eau vers le bas.

2. Appareillage tel que revendiqué dans la revendication 1, dans lequel la première zone à ouvertures (15) comprend une pluralité de fentes, ou de lames définissant des fentes, ou une pluralité de perforations.

3. Appareillage tel que revendiqué dans l'une des revendications 1 ou 2, dans lequel la zone à ouvertures prévue dans la première partie de la surface de recouvrement (9) est réduite en étendue vers l'aval.

4. Appareillage tel que revendiqué dans une des revendications précédentes, dans lequel la zone à ouvertures (15) comporte une courbure composite ayant un rayon qui diminue vers l'aval.

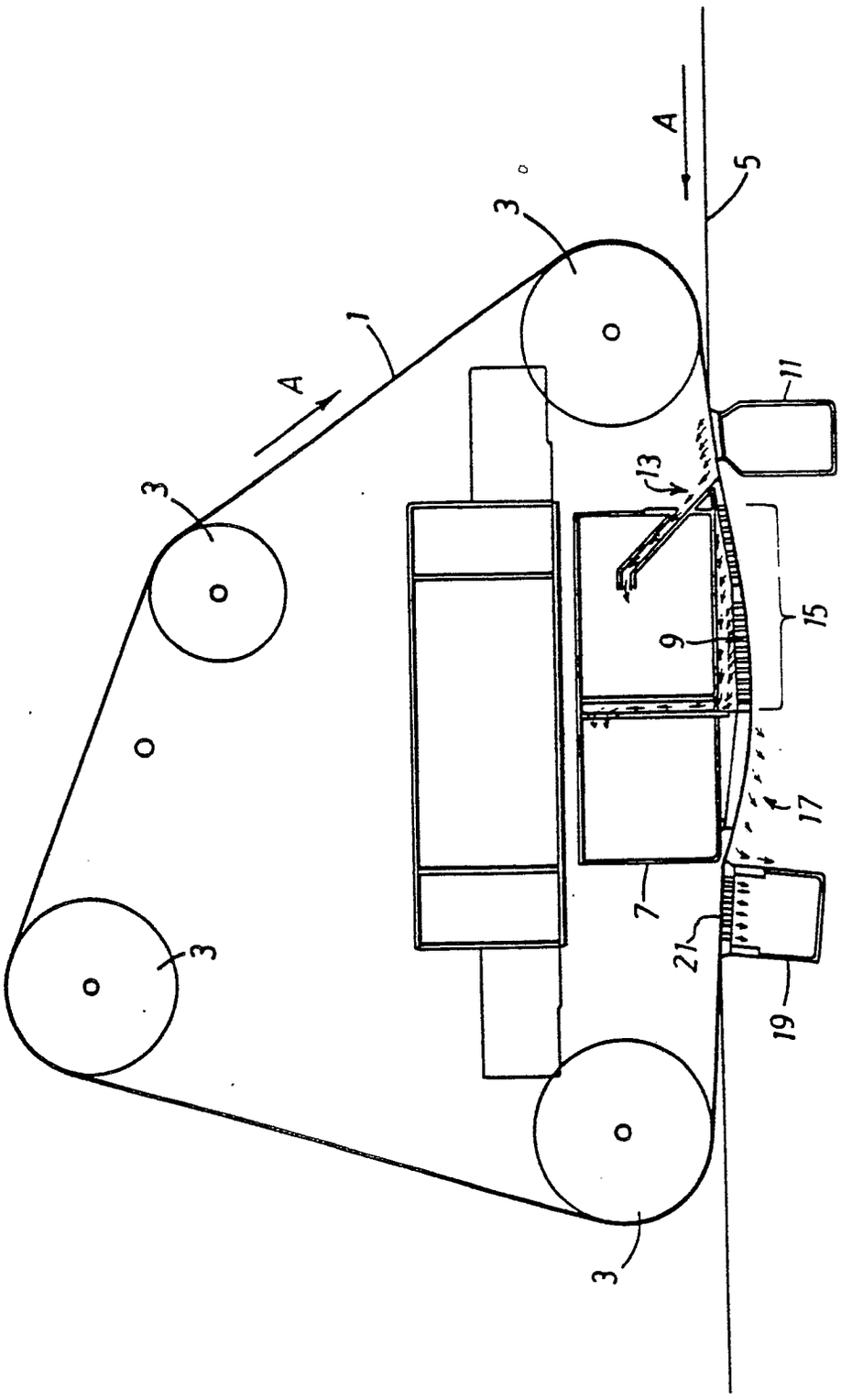
5. Appareillage tel que revendiqué dans une quelconque des revendications précédentes, comprenant en outre une lame d'entrée (11) disposée en amont de la surface de recouvrement (9) du caisson aspirant et agencée pour être en contact avec la toile de formage (5), et un caisson d'aspiration transversale (19) situé en aval de la surface de recouvrement (9) du caisson aspirant et agencé pour être en contact avec la toile de formage (5).

6. Appareillage tel que revendiqué dans la revendication 5, dans lequel la lame d'entrée (11) comporte une surface pleine pour diriger l'eau vers le haut, et le caisson d'aspiration transversale (19) comporte une surface munie d'ouvertures à laquelle est appliquée une aspiration pour attirer la suspension fibreuse contre la toile de formage (5).

7. Procédé d'élimination de l'eau d'une suspension fibreuse sur une machine de fabrication de papier dans lequel une suspension fibreuse emprisonnée entre une toile supérieure et une toile inférieure de formage est déplacée devant une surface active ou surface de recouvrement, d'un caisson aspirant, la toile supérieure étant en contact avec ladite surface en vue d'enlever l'eau de la suspension fibreuse, caractérisé par le fait que l'eau est extraite vers le haut lorsque la suspension fibreuse se déplace devant une première zone munie d'ouvertures de la surface de recouvrement et l'eau est dirigée vers le bas lorsque la suspension fibreuse se déplace devant une seconde partie pleine de la surface de recouvrement (17) placée en aval de la première zone (15).

8. Procédé tel que revendiqué dans la revendication 7, dans lequel une pression est exercée sur la suspension fibreuse quand elle passe sur ladite surface active (9) et la pression augmente vers l'aval sur la première zone munie d'ouvertures de la surface active proportionnellement au rayon de la surface active.

9. Procédé tel que revendiqué dans la revendication 7 ou 8, dans lequel de l'eau est refoulée vers le haut en amont de la surface de recouvrement (9) par contact de la toile inférieure de formage (5) avec une lame d'entrée à face pleine et l'eau addiitonnelle est extraite vers le bas et en aval de la surface de recouvrement (9) en faisant passer la toile inférieure de formage (5) sur une surface de recouvrement (21) du caisson d'aspiration transversale.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