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Malashenko et al.

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[54] **PAPER MACHINE SAVEALL WITH DE-AERATOR**

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[52] **U.S. Cl.** **162/202,** 162/203, 162/289, 162/300, 162/363, 162/DIG. 7

[51] **Int. Cl.** **D21f 7/00**

[58] **Field of Search** ..... 162/190, 203, 205, 232, 162/274, 289, 297, 300, 301, 305, 318, 319, 321, 335, 337, 348, 351, 357, 358, 359, 363, 367, 368, 369, 372, DIG. 7, 202

[56] **References Cited**

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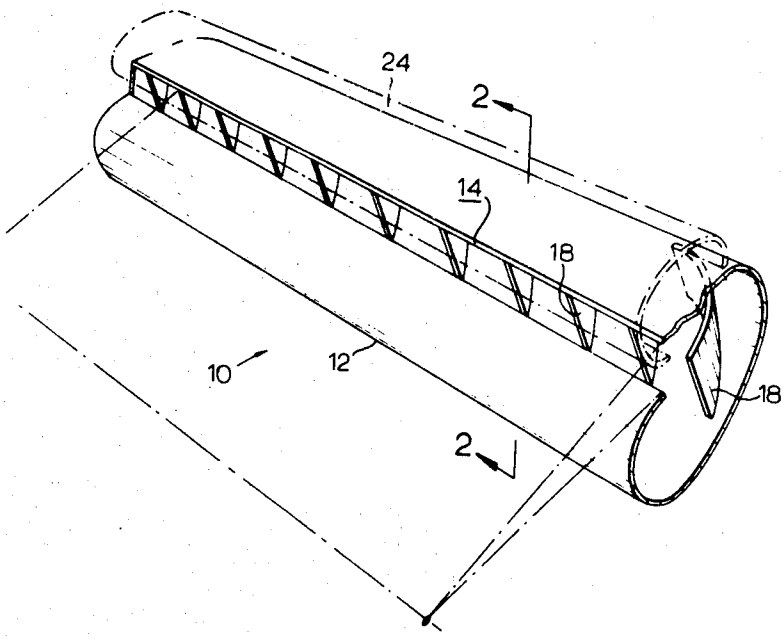
Assistant Examiner—Richard V. Fisher

[57] **ABSTRACT**

A jet deflector for use as a saveall in a paper machine having a wide cellular roll discharging water substantially tangentially therefrom as a high speed jet extending the full width of the machine and projected into a zone of restricted access which deflector has an entry to receive the jet, a plurality of inclined, curved and twisted deflector plates, and an egg shaped flow section to receive, divert and blend the discrete entering jets into a high velocity transversely flowing stream for passage from the machine.

5 Claims, 4 Drawing Figures



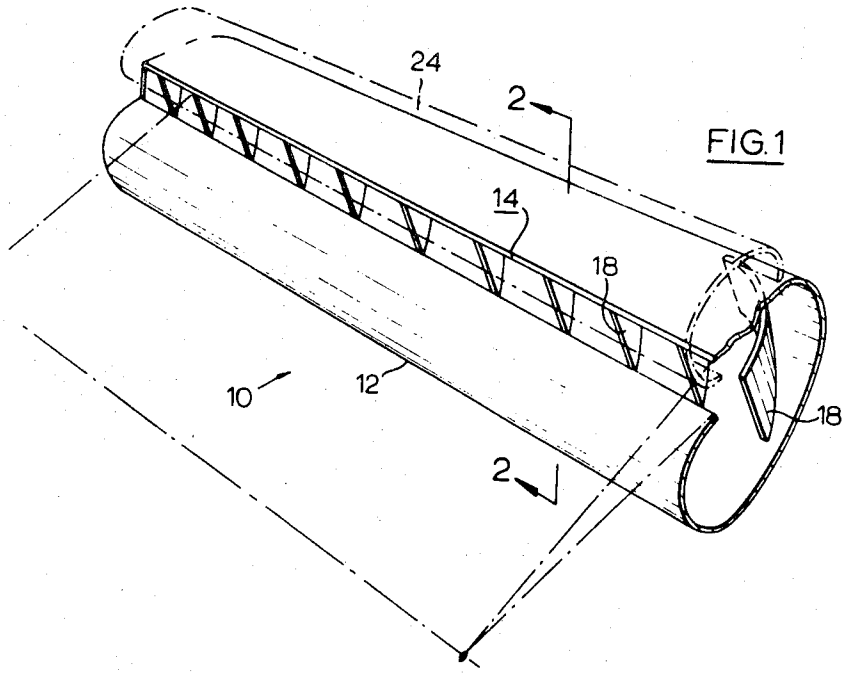


FIG. 1

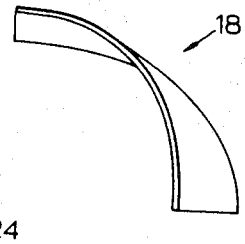


FIG. 4

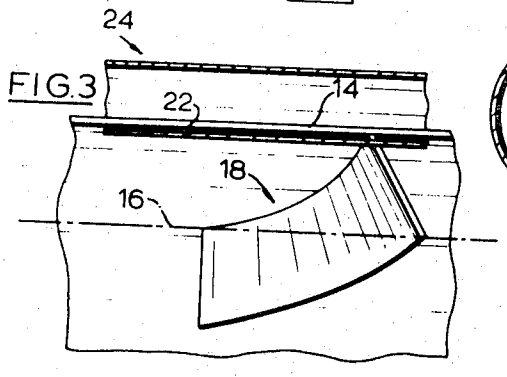


FIG. 3

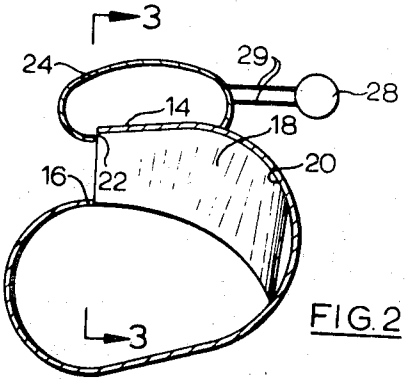


FIG. 2

PAPER MACHINE SAVEALL WITH DE-AERATOR

This invention is directed to a method of dewatering a paper machine, and to a saveall for a paper machine, and in particular to a saveall for a high speed jet to provide transverse discharge at high flow rates from a zone of limited accessibility.

Recent developments in high speed paper machines, particularly in the development of twin wire machines, having white water from the stock released from the periphery of a forming cylinder as a wide high velocity jet projecting substantially parallel with and in close proximity to one of the forming wires, have caused considerable problems in removing the white water in satisfactory fashion from the machine.

In earlier types of machine, particularly of the so-called Fourdrinier type, water passing through the wire has fallen under gravity into an inclined saveall pan, for drainage therefrom by suitable pipes into the pit.

In twin wire machines utilizing a suction forming roll about which the forming wires are wrapped and from which roll the white water is released as a high velocity coherent jet, such as the paper machine trade marked "Papriformer" developed by the Pulp and Paper Institute of Canada, realization of a full width machine, in widths exceeding 200 inches, leads to considerable problems in satisfactory water removal. While not being unduly "direction" sensitive, with reference to the orientation of the machine because of the high velocities involved, nevertheless the restricted space stemming from the geometry of the machine makes water handling a problem.

A method for disposing of a high speed jet extending the full width of the machine and issuing in the direction of wire travel from the surface of a roll, has been evolved wherein the jet is segregated into a plurality of discrete coherent jet portions of limited transverse dimension; a transverse deflection component is applied in the direction of discharge; a centrifugal deflection component is applied having the initial jet direction tangent thereto; and the resultant deflected jet portions are then blended into a high velocity smoothly flowing transversely directed flow for passage from the machine.

In order to carry out the invention there is provided a saveall comprising transversely elongated walls defining a jet receiving aperture extending the full width of the machine to be dewatered, the walls being spaced apart a sufficient distance to receive the full depth of the jet and extending initially in substantially the same direction as the incident jet; a curved blocking portion of one of the walls extending across the thickness of the path of the jet in deflecting relation therewith to provide a centrifugal component of motion to an entering jet; a plurality of deflector plates spaced across the width of the jet and sloping towards the curved wall portion in the direction of jet transverse discharge divide the jet into discrete jet portions; and a transversely extending flow passage receiving the deflected high velocity jet portions in blending flow therethrough.

In dividing up the machine width into a plurality of adjoining zones the transverse spacing of the deflector plates in the cross machine direction is selected so that the interval is sufficiently small to ensure effective transverse deflection across the full width of each zone, between adjacent plates. The transverse inclination or angle of outward slope of the deflector plates is limited to avoid choking in the triangular root portions thus

formed. An angle of inclination of about 35° between the edges of the jet entry has been found to be effective.

One effective curvature of the deflector plates has been found to be substantially cylindrical, the plates being made from steel sheet and given a slight warp to progressively increase the transverse deflection at the centrifugally outer edge thereof.

It has been found that a saveall having a substantially constant cross section that is transversely non-varying is effective, having an egg shaped recovery section in which the machine discharge takes place in the cross machine direction.

The achievement of effective transverse discharge by way of a catchall of limited depth, relative to the jet inlet dimension is of particular significance in relation to the space problems encountered in a machine of this type.

A particular result provided by the subject catchall is the centrifugal deaeration of the white water which may be achieved. In the operation of a paper machine of the type described, the white water, after passage through a forming wire, is initially held in the foraminous shell of the forming roll and subsequently released therefrom under centrifugal force, at a velocity approaching that of the high speed forming wire. The jet thus formed, which projects a distance up to as much as 4 feet through the air into the saveall is highly turbulent and aerated.

As a consequence of the centrifugal deflection component applied to the jet in the saveall, and also as a result of the arcuate transverse deflection of the component jets to the back of the machine, there is a considerable degree of air separation, tending to form an air core to the white water flowing transversely through the saveall. The provision of an air collection chamber on an outer wall of the catchall, having one or more apertures connecting with at least some of the air "chimneys" which bound the discontinuities of the white water flow, permits adequate ventilation of the interior of the catchall. This leads to improved quality by deaeration of the white water before returning it to the paper making process.

Certain embodiments of the invention are described with reference to the attached drawings, wherein

FIG. **1** is a general view of a catchall according to the present invention;

FIG. **2** is a cross sectional view at **2—2** of FIG. **1**;

FIG. **3** is a front or head-on sectional view at **3—3** of FIG. **2**; and

FIG. **4** is a plan view of a blade member of the catchall.

Referring first to FIGS. **1** and **2**, the catchall **10** has a casing **12** of wrapped section for extending transversely across the machine. Wall portions **14, 16** of the casing **12** define an entrance mouth of rectangular cross section having a plurality of deflector blades **18** spaced thereacross. The blades **18** at the mouth (see FIG. **3**) are inclined from their top edge adjoining the surface **14,** being twisted substantially uniformly along their respective lengths to exert a transverse deflection to incoming liquid. The form and arrangement of the blades **18,** as secured in the casing **12,** thus provides separation of the inflowing jet into discrete portions that are deflected downwardly by the combined form of the blades **18** and the downward curve of the casing **12.** The curve or transverse displacement of the blades

18 produces regulated transverse deflection of the discrete jets, while the twist of the blades **18** produces a wrap-over effect complementary to the downward curve of the back inner surface **20** of the casing **12.**

In operation, an incoming aerated jet is deflected downwardly and transversely into a contained high velocity liquid flow. The effect of this controlled deflection is to provide separation of air, from the entrapped air entering with the white water jet into the catchall. The entrapped air tends to separate by centrifugal action, and is bled-off by way of an air bleed aperture **22** that connects the interior of casing **12** with an air trunking **24** attached to the top wall of casing **12.** Direct entry of liquid into the aperture **22** is precluded by the fact that the aperture or slot **22** opens in a downstream-facing direction, adjacent the incoming jet.

A passage bounded by walls **29** or a series of pipes equivalent thereto connect the air trunking **24** with a suitable vacuum header **28.**

A suitable downcomer pipe (not shown) connected with the outlet end of the catchall permits transference of the white water to the pit or holding tank.

In the case of a machine having a catchall according to this invention extending the full width of the machine, it is possible to retrieve the white water solely from the rear of the machine, thus simplifying piping provisions and leaving the front or aisle side of the machine unencumbered, to facilitate wire changes.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A method of dewatering a high speed paper machine, wherein a wide jet of water of limited depth and extending laterally in the cross-machine direction is projected through the air as a substantially planar jet at high velocity in a direction normal to said cross-machine direction, comprising the steps of: directing the jet towards a save-all having a pair of opposed wall portions defining lips of an inlet mouth, which lips receive the jet therebetween, said mouth being surrounded by a curved casing, separating the jet into a plurality of discrete jet portions by a plurality of parallel deflection plates spaced across the mouth, said deflector plates being (1) curved along their respective lengths to produce a substantially uniform transverse deflection of the discrete jet portions from the mouth to the casing, and (2) twisted along their respective lengths to produce a wrap-over motion of the discrete jet portions, which motion being complimentary to the curve of the casing, whereby the curved and twisted parallel deflection plates promote centrifugal separation of the air from the water in said casing and promote flow displacement of the water through the casing in the cross-machine direction, and combining the respectively centrifuged water flows in the casing while substantially maintaining separation of the entrained air from the water flows during the discharge of the water in the cross-machine direction.

2. The method according to claim **1** including the step of removing said entrained air by suction.

3. A saveall for use in the dewatering of a high speed paper machine wherein a wide jet of water having a limited depth and extending laterally in the crossmachine direction is projected through the air as a substantially planar jet at high velocity in a direction normal to said cross-machine direction, said saveall comprising an inlet having a pair of opposed wall portions defining lips of an inlet mouth, which lips receive the jet therebetween, a curved casing having a portion adjoining said mouth but displaced therefrom out of the plane of the jet, and a plurality of parallel deflection plates spaced across the mouth to separate the jet into discrete jet portions, said deflector plates being (1) curved along their respective lengths to produce a substantially uniform transverse deflection of the discrete jet portions from said mouth to said casing, and (2) twisted along their respective lengths to produce a wrap-over motion of the discrete jet portions, which motion being complimentary to the curve of the casing, whereby the curved and twisted parallel deflection plates promote centrifugal separation of the air from the water in said casing and promote flow displacement of the water through the casing in the cross-machine direction.

4. The saveall as claimed in claim **3** having air removal means connected thereto in shrouded relation with the interior of said casing portion, to substantially preclude direct entry of water therein.

5. The saveall as claimed in claim **3** wherein said parallel plates are spaced transversely across said mouth, each being inclined to said wall portions to define an angle of about 35° with the plane of said jet.

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