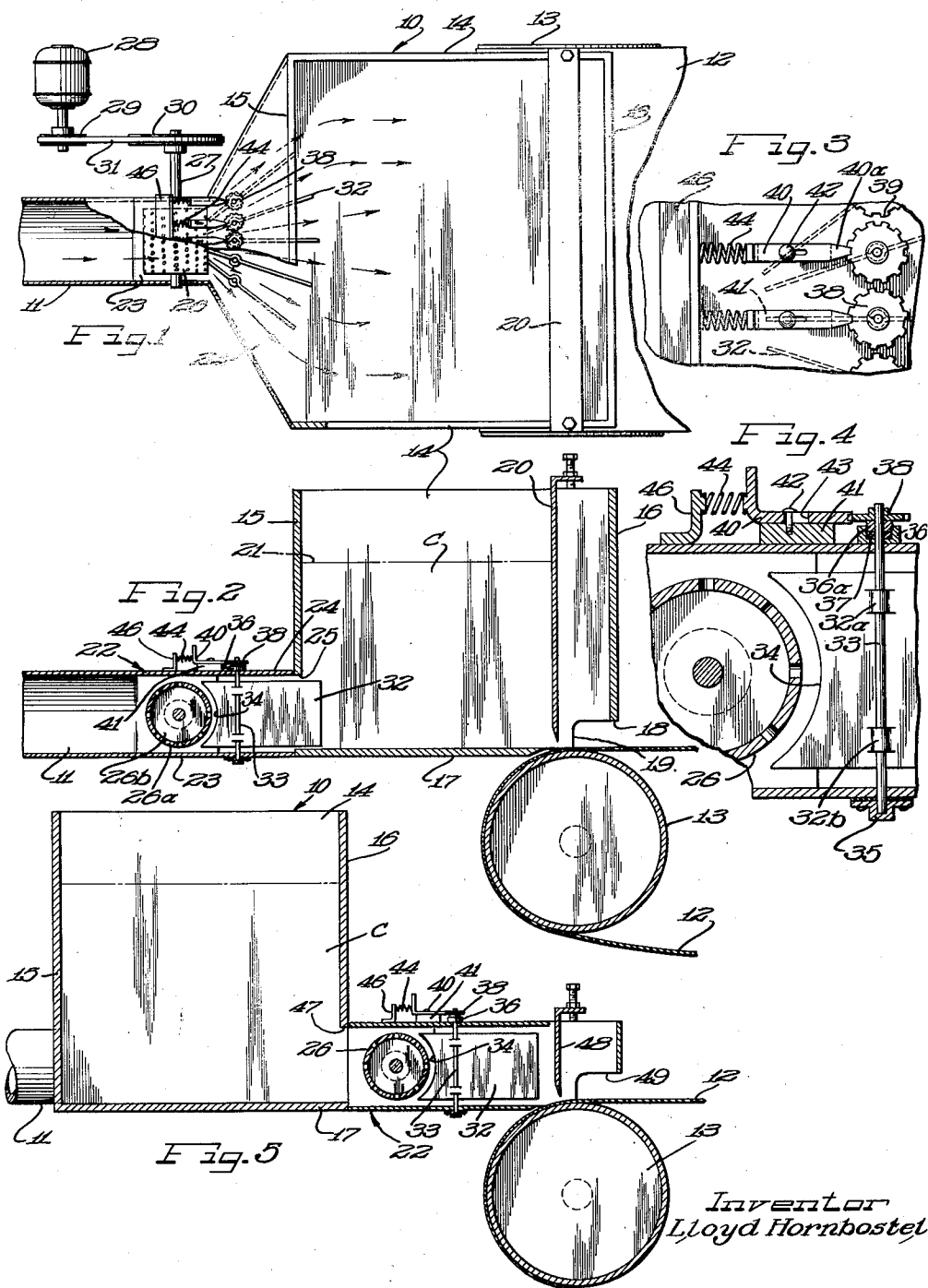


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L. HORNBOSTEL  
RECTIFIER ROLL CLEANED VANE TYPE  
FLOW SPREADER FOR PAPER MACHINES  
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RECTIFIER ROLL CLEANED VANE TYPE  
FLOW SPREADER FOR PAPER MA-  
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The present invention relates to a flow spreader for use with paper making machines and more particularly to a vane type flow spreader for insuring an even deposition of paper stock from a paper making machine across the entire forming surface of the machine.

In the art of paper making, the even deposition of stock fibers across the entire width of the forming surface of a paper making machine has long presented a problem. The present invention now provides simple, relatively inexpensive, and effective means for spreading stock flow so that uniform fiber deposition occurs upon the machine forming surface.

The means provided by the present invention comprises generally a plurality of vanes extending along the path of flow of stock through the machine and presenting narrow edges to the stock flow to prevent hindrance of the flow of stock. The fins are elongated in that direction extending along the path of flow of the stock and are laterally adjustable to accommodate the spreading of stock to the particular machine in which the vanes are employed and to the particular conditions under which the machine is being operated. Novel means are provided for lateral adjustment of the vanes for maintaining the vanes in relatively adjusted angular position with respect to the path of stock flow, so that the flow of stock may be accurately and readily controlled.

It has been found when such vanes are employed alone and are interposed in the stock stream that fibers of the stock stream tend to wrap about the leading edges of the fins and eventually to form clots which in breaking loose are carried out to the forming wire surface of the machine. These clots, when present upon the forming surface, disturb the formation of the fibers deposited upon the forming surface and also cause undesirable lumps or bulges in the paper which is subsequently stripped from the forming surface for further processing.

In view of the necessity for preventing the formation of clots upon the leading edges of the vanes, novel means are provided by the present invention for preventing the formation of clots. The novel means for preventing clot formation includes the provision of moving jets of relatively high velocity stock which are played against the vane leading edges to dislodge any fibers deposited thereon before they have a chance to form into large clots. Such means may desirably take the form of a rectifier roll which is positioned in the path of stock flow ahead of and

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closely adjacent to the leading edges of the vanes. Such a rectifier roll, by virtue of its apertured periphery, will form relatively small high velocity jets of stock which are ejected from the roll directly against the adjacent leading edges of the vanes. In this manner, the dislodging of fibers is carried out and the formation of clots upon the vanes is effectively prevented.

The exact position of the vanes and means for preventing fiber deposition upon the vanes along the path of stock flow through the machine may be varied to suit the particular paper making machine being employed and the conditions under which the machine is being operated. For example, the vanes and fiber deposition preventing means may be positioned in the stock flow conduit serving to introduce stock flow into an inlet box for a paper making machine. Thus, stock flow is effectively spread across the entire width of the stock inlet box so that later deposition of fibers from the box upon the forming wire surface will be uniform across the entire width of the forming surface. Alternatively, the vanes and stock deposition preventing means may be positioned in the machine just prior to the introduction of stock upon the paper making machine forming surface. In this manner, the lateral spreading of the stock across the entire width of the machine is carried out immediately prior to the introduction of stock onto the forming surface.

It is, therefore, an important object of the present invention to provide an improved stock flow spreader for insuring the uniform lateral deposition of stock upon a paper making machine forming wire surface.

Another important object of the present invention is to provide an improved flow spreader for laterally distributing stock flow across the width of a paper making machine, including a plurality of adjustable vanes disposed in the path of stock flow and means for preventing fiber deposition upon the vanes.

It is a further important object of the present invention to provide an improved flow spreader for laterally distributing stock flow through a paper making machine including a plurality of laterally adjustable vanes and a rectifier roll disposed in the path of stock flow into the paper machine stock inlet box.

Still another important object of the present invention is to provide a flow spreader for laterally distributing stock flow through a paper making machine including a plurality of vanes individually movable to a number of relatively ad-

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justed angular positions and a rectifier roll for preventing stock deposition upon the vanes, the vanes and roll being disposed in the path of stock flow from a stock inlet box to the forming wire surface of a paper making machine.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

On the drawings:

Figure 1 is a fragmentary, elevational plan view, with parts broken away, of the inlet end of a paper making machine equipped with a flow spreader of the present invention;

Figure 2 is a vertical sectional view, with parts shown in elevation, of the machine of Figure 1;

Figure 3 is an enlarged, fragmentary plan view of the vane adjusting mechanism of the present invention;

Figure 4 is a vertical sectional view, with parts shown in elevation, of the vane adjusting mechanism; and

Figure 5 is a vertical sectional view similar to Figure 2 illustrating a modified form of the flow spreader of the present invention.

As shown on the drawings:

In Figure 1, reference numeral 10 refers generally to a stock flow inlet box for a Fourdrinier type paper making machine receiving stock flow from a suitable source, as from a conventional fan pump or screen boxes (not shown), through a stock inlet conduit 11. The stock inlet box 10 delivers stock from the inlet conduit 11 to a forming wire 12 lapped about a conventional breast roll 13 of the paper making machine.

The stock flow inlet box 10 is defined by parallel, upstanding side walls 14 and parallel upstanding rear end wall 15 and front end wall 16 cooperating with a bottom end closure wall 17. The front inlet box wall 16 terminates above the forming wire 12, as at 18, and the bottom forward end of side walls 14 is recessed, as at 19, to provide an outlet for stock flowing from the inlet box 10. An adjustable slice 20 is carried by side walls 14 and serves to regulate the size of the outlet orifice of the box 10. The interior of box 10 defines a pond chamber C with the level of stock being maintained in the chamber to a suitable height, as indicated by line 21.

As best shown in Figures 1 and 2, the inlet conduit 11 does not communicate directly with the pond chamber C but rather with a housing 22 of rectangular cross-section. That portion of housing or expansion joint 22 directly adjoining conduit 11, as at 23, has substantially the same outside dimensions as the diameter of conduit 11 while the forward portion of the housing 22, as indicated at 24, flares outwardly into communication with the entire width of the inlet box 10, full communication between the housing 22 and stock chamber C being provided by a rectangular aperture 25 formed in the lower portion of rear closure wall 15.

A rectifier roll 26 is mounted in the housing portion 23 for rotation therein upon a shaft 27 journaled in the side walls of the housing portion 23. An electric motor 28 or other suitable power source serves to drive shaft 27 through a motor pulley 29 and a shaft pulley 30 drivingly connected by suitable means, as by a V-belt 31. The rectifier roll 26 thus rotatably disposed within the housing 23 is provided with an apertured periphery 26a and a hollow interior 26b.

A plurality of generally rectangular, sheet metal vanes 32 are disposed in the housing portion 24

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providing communication from the rectifier roll 26 to the stock pond chamber C. The vanes 32 are slotted and deformed as at 32a and 32b (Figure 4) to receive mounting rods 33 extending vertically through the upper and lower walls of the housing portion 24. The vanes 32 are provided with a curved edge 34 of substantially the same curvature as the periphery 26a of roll 26, the edge 34 being closely spaced from the periphery of roll 26.

The vertical supporting rods 33 are journaled for pivoting movement within a lower cap 35 secured to the bottom wall of housing portion 24 and an upper collar 36 secured to the upper wall of housing portion 24. Packing material 37 is provided in the collar 36, between the collar 36 and a plug 36a threadedly secured therein, to prevent the leakage of stock flowing through the housing 22 about the rods 33. That portion of each rod 33 extending above collar 36 carries a ratchet wheel or gear 38 keyed thereto for pivotal movement therewith, the ratchet wheel 38 having spaced, radially extending peripheral teeth 39 (Figure 3).

A stop arm 40 is provided for each of the vanes 32, each arm being slidably mounted upon a block 41 secured to the upper wall of housing 22, the block carrying an upstanding stop pin 42. Each of the stop arms 40 is longitudinally slit as at 43 to receive stop pins 42 therethrough. Each member 40 is provided with a forward tapered end portion 40a sized to extend between the teeth 39 of the associated gear 38 to prevent rotation of the gear 38, the supporting rods 33 and the vanes 32. Each of the stop arms 40 is urged into contact with its associated gear 38 by means of a coil spring 44 confined between the upstanding terminal portion of the arm 40 and a flanged upstanding stop 46 secured to housing 22 in spaced relation to the arm.

It will readily be seen that individual pivoted movement of each of the vanes 32 may be accomplished by withdrawing the stop arm 40 from engagement with its associated gear 38 against the action of spring 44, turning gear 38 manually, or mechanically if desired, and then releasing the arm 40 so that spring 44 resiliently urges the arm into engagement with its associated gear. The novel means thus provided not only makes possible the angular adjustment of the vanes 32 but also retains the vanes resiliently in laterally adjusted position.

In the operation of the device hereinbefore described, it will be seen that stock flow of conduit 11 will pass through rectifier roll 26, the stock flow issuing from the roll in the form of high velocity stock jets which impinge directly upon the adjacent curved edges 34 of vanes 32. This high velocity stock flow against the leading edges 34 of the vanes 32 will prevent the formation of clots of stock thereon by dislodging any fibers which may be deposited on the vane leading edge by the stock flowing through conduit 11 and housing 22 without passing through the rectifier roll 26. The vanes 32 may then efficiently function to laterally distribute stock flow across the entire width of the paper making machine, actually across the entire width of the stock flow inlet box 10, without the possibility of clots forming as in the prior art devices. Inasmuch as stock flow across the entire width of the stock flow inlet box 10 is thus assured, the even deposition of stock fibers across the entire width of the forming wire 12 will result in the desired uniform deposition of stock.

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In the modification illustrated in Figure 5, the portions of the apparatus which are identical with that of Figures 1-4, inclusive, are indicated by identical reference numerals. In this modification it will be noted that conduit 11 communicates directly with pond chamber C in the interior of flow inlet box 10 through the rear inlet box wall 15. The stock flow housing 22 communicates with the stock pond C through aperture 47 formed in front inlet box wall 16. The rectifier roll 26 and the plurality of vanes 32 are disposed within the housing 22 in the manner hereinbefore described and the position of the vanes 32 may be laterally adjusted by means of stop arm 40 and gear 38 as hereinbefore described. It is to be noted that in this instance the housing 22 carries at its forward portion an adjustable slice 48 similar to the slice 20 hereinbefore described and that the extreme forward portion of the housing 22 is provided with an outlet orifice 49 through which stock flows onto the forming wire surface 12.

The only essential difference between the modified apparatus of Figure 5 and that hereinbefore described is the passage of stock flow through the housing 22 from the stock pond chamber C onto the forming wire 12. By this modification, it is not necessary that flow inlet box 10 be of the same width as the forming wire 12 as in the modification of Figures 1-4, inclusive, inasmuch as the vanes 32 will effectively laterally distribute stock flow across the entire width of the forming wire 12.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In a paper machine, a conduit of small cross sectional area for directing a high velocity stream of stock, a stock inlet box of relatively larger cross sectional area for accommodating a relatively slower flow of stock and an expansion joint interposed communicatingly therebetween, said expansion joint having at its end communicating with said conduit a generally rectangularly-shaped inlet having positioned therein a rectifier roll and directly thereafter a duct portion expanding in width from that of the inlet to the width of said stock inlet box for communication therewith, and said expansion joint having positioned in the duct portion a plurality of adjustable vanes for directing stock flow from the roll laterally outward across the width of the stock inlet box, each of said vanes having its leading edge closely adjacent and generally conforming with the curved surface of said roll and said vanes extending angularly from said roll to said stock inlet box.

2. In a paper machine, a conduit of small cross-sectional area for directing a high velocity stream of stock, a stock inlet box having a generally horizontal floor and aligned therewith an expansion joint for communicating with the conduit, said expansion joint having at its end communicating with said conduit a generally rectangularly-shaped inlet having positioned therein a rectifier roll and directly thereafter a horizontally extending duct portion expanding in width from that of the inlet to the width of said stock inlet box for communication therewith, and said expansion joint having positioned in the duct

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portion a plurality of vertically extending adjustable vanes for directing stock flow from the roll laterally outward across the width of the stock inlet box, each of said vanes having its leading edge closely adjacent and generally conforming with the curved surface of said roll and extending therefrom substantially the length of the duct portion of said expansion joint.

3. In a paper machine, a conduit of small cross-sectional area for diverting a high velocity stream of stock, a stock inlet box of relatively larger cross-sectional area for accommodating a relatively slower flow of stock, an expansion joint interposed communicatingly therebetween, said expansion joint having at its end communicating with said conduit a generally rectangularly shaped inlet and directly thereafter a duct portion expanding in width from that of the inlet to the width of said stock inlet box for communication therewith, a rectifier roll mounted in said expansion joint inlet, and a plurality of vertically extending adjustable vanes positioned in said duct portion for directing stock flow from the roll laterally outward across the width of the stock inlet box, each of said vanes having its leading edge closely adjacent and generally conforming with the curved surface of said roll and said vanes extending angularly from said roll to said stock inlet box.

4. In a paper machine, a conduit of small cross sectional area for directing a high velocity stream of stock, a stock inlet box of relatively larger cross sectional area for accommodating a relatively slower flow of stock and an expansion joint interposed communicatingly therebetween, said expansion joint having at its end communicating with said conduit a generally rectangularly-shaped inlet having positioned therein a rectifier roll and directly thereafter a duct portion expanding in width from that of the inlet to the width of said stock inlet box for communication therewith, and said expansion joint having positioned in the duct portion a plurality of adjustable vanes for directing stock flow from the roll laterally outward across the width of the stock inlet box, each of said vanes being an elongated vane disposed vertically in the path of stock flow and having its longer dimension extending along the path of stock flow and having its leading edge closely adjacent and generally conforming with the curved surface of said roll and said vanes extending angularly from said roll to said stock inlet box.

5. In a paper machine, a conduit of small cross sectional area for directing a high velocity stream of stock, a stock inlet box of relatively larger cross sectional area for accommodating a relatively slower flow of stock and an expansion joint interposed communicatingly therebetween, said expansion joint having at its end communicating with said conduit a generally rectangularly-shaped inlet having positioned therein a rectifier roll and directly thereafter a duct portion expanding in width from that of the inlet to the width of said stock inlet box for communication therewith, and said expansion joint having positioned in the duct portion a plurality of adjustable vanes for directing stock flow from the roll laterally outward across the width of the stock inlet box, each of said vanes having a vertical dimension substantially identical with the diameter of said roll having its leading edge closely adjacent and generally conforming with the curved surface of said roll and said vanes

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extending angularly from said roll to said stock inlet box.

6. In a paper machine, a conduit of small cross sectional area for directing a high velocity stream of stock, a stock inlet box of relatively larger cross sectional area for accommodating a relatively slower flow of stock and an expansion joint interposed communicatingly therebetween, said expansion joint having at its end communicating with said conduit a generally rectangularly-shaped inlet having positioned therein a rectifier roll and directly thereafter a duct portion expanding in width from that of the inlet to the width of said stock inlet box for communication therewith, and said expansion joint having positioned in the duct portion a plurality of adjustable vanes for directing stock flow from the roll laterally outward across the width of the stock inlet box, each of said vanes having its leading edge closely adjacent and generally conforming with the curved surface of said roll and said vanes extending angularly from said roll to said stock inlet box and said expansion joint having mounted thereon independent and separate means each connected to one of said vanes to adjustably fix the angular position of the vane.

7. In a paper machine, a conduit of small cross sectional area for directing a high velocity stream of stock, a stock inlet box of relatively larger cross sectional area for accommodating a relatively slower flow of stock and an expansion joint interposed communicatingly therebetween, said expansion joint having at its end communicating with said conduit a generally rectangularly-shaped inlet having positioned therein a rectifier roll and directly thereafter a duct portion expanding in width from that of the inlet to the width of said stock inlet box for

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communication therewith, and said expansion joint having positioned in the duct portion a plurality of adjustable vanes for directing stock flow from the roll laterally outward across the width of the stock inlet box, each of said vanes being an elongated vane disposed vertically in the path of the stock flow and having its longer dimension extending along the path of stock flow and having a vertical dimension substantially identical with the diameter of said roll and having its leading edge closely adjacent and generally conforming with the curved surface of said roll and said vanes extending angularly from said roll to said stock inlet box and said expansion joint having individual rods journaled therein for pivotal movement each carrying one of said vanes for angular adjustment thereof.

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