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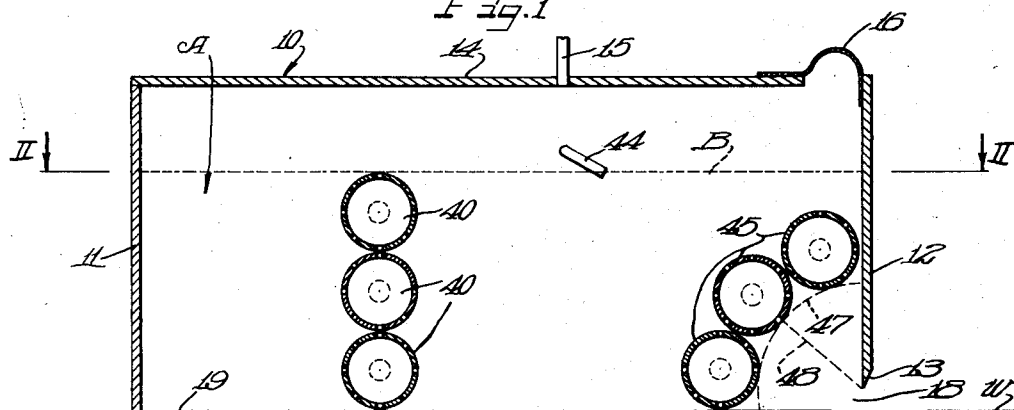
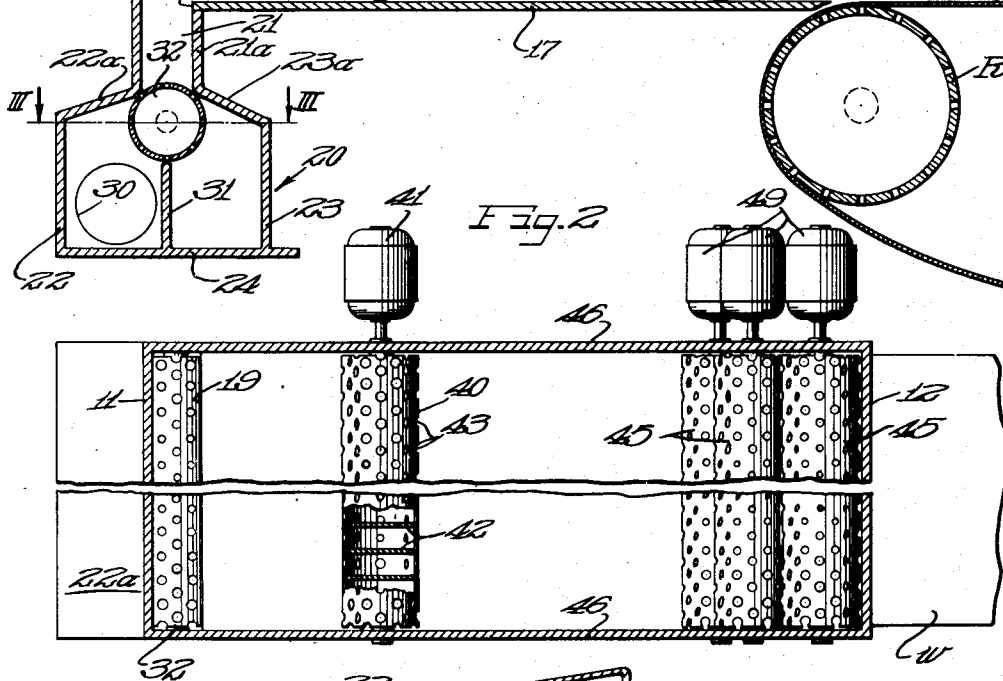
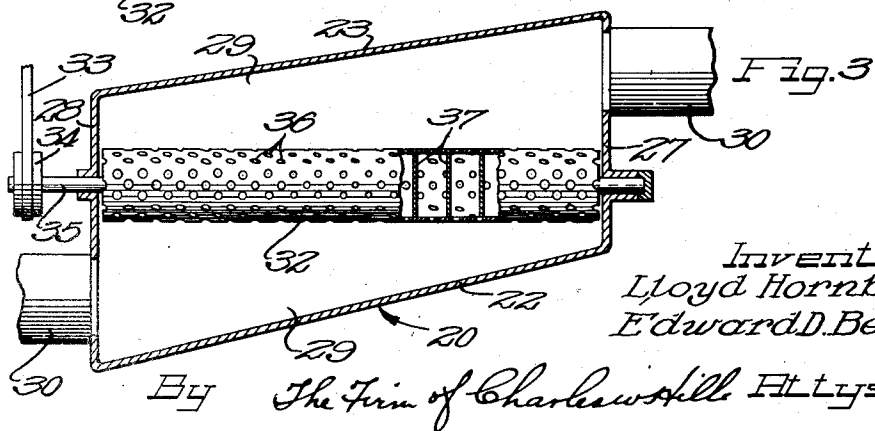
L. HORNBOSTEL ET AL

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STOCK INLET

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Fig. 1



Inventors
Lloyd Hornbostel
Edward D. Beachler

The Firm of Charlesworth & Hillys

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STOCK INLET

Lloyd Hornbostel and Edward D. Beachler, Beloit,
Wis., assignors to Beloit Iron Works, Beloit,
Wis., a corporation of Wisconsin

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Transversely extending baffles or walls within stock inlet boxes are used in the paper making art in an attempt to quiet stock flow through the box and to prevent the occurrence of eddy currents within the stock flowing therethrough. However, such baffles serve to divide the box into a plurality of stock compartments, and it is known that "dead areas" are formed within the separate compartments and that stock "rolling" can occur within the compartments. The paper stock within such dead areas tends to flack and form lumps detrimental to paper quality when later introduced onto the forming wire, while the rolling of stock within the separate compartments interferes with the uniform flow of stock through the inlet, thus aiding in the formation of dead areas. A dead area is particularly liable to be formed in that region of the inlet box lying between the front baffles and the slice beneath which stock is discharged onto the forming wire.

The present invention now provides an improved rectifier roll arrangement for employment within the stock inlet box for a paper making machine, the rectifier roll arrangement obviating the necessity of employing transversely extending baffles with the attendant operational difficulties heretofore encountered.

In general, the stock inlet of the present invention includes a head box for a paper making machine provided with means for introducing stock into the interior of the box and a stock outlet immediately adjacent the forming wire of the paper making machine. A rectifier roll or a stack of superimposed rolls extends transversely across the interior of the inlet to replace the baffle arrangements heretofore employed, while a second rectifier roll or group of rolls is disposed adjacent the box outlet opening to control the flow of stock through the opening onto the paper machine forming wire.

Since the depth of the stock pond in the head box is calculated to give a definite velocity of stock flow in a horizontal path through the box into the forming wire, the number of rectifier rolls in the stack and the size of the rolls will be determined by the desired velocity of stock flow. Preferably, the depth of stock of the box is held constant by regulated air pressure, the depth being controlled so that an appreciable amount of stock cannot flow over the top rectifier roll in the stack. The rolls of the stack are spaced apart only sufficiently for operating clearance and should not provide a flow gap therebetween. A gap of from $\frac{1}{8}$ to $\frac{1}{2}$ inch between roll peripheries is satisfactory. Thus, the only restriction to the flow of stock through the box is presented by the rectifier roll stack, and this resistance to flow is uniform throughout the entire depth of the stock pond. In this manner, the rolling of the stock, the occurrence of dead spots, and the creation of eddy currents is prevented.

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The rectifier rolls at the outlet end of the stock inlet are arranged in spaced relation from the outlet opening to form any desired roll pattern, such as the illustrated arcuate arrangement, which will provide a uniform restriction to the flow stock toward the outlet. The rolls are grouped so that the stock must flow therethrough, and each of the rolls extends transversely to the path of stock flow. By spacing the rectifier rolls of this group from the stock outlet, any eddy currents generated by the flow of stock through the rolls are dissipated prior to introduction of the stock onto the forming wire, and the group arrangement of rolls also prevents the by-passing of stock around the rolls onto the forming wire.

It is, therefore, an important object of the present invention to provide an improved stock inlet for a paper making machine in which a uniform flow of stock through the inlet is obtained without the employment of solid baffles, walls, or the like.

Another important object of the present invention is to provide an improved stock inlet for a paper making machine employing a rectifier roll extending transversely to the flow of stock through the inlet to prevent the rolling of stock and the creation of dead areas within the inlet box.

It is a further important object of the present invention to provide an improved stock inlet box having a plurality of rectifier rolls arranged in spaced relation from the outlet end of the box to present a uniform restriction to the flow of stock through the outlet, the restriction being transverse to the path of stock flow through the outlet.

Still another important object of the present invention is to provide an improved stock inlet for a paper making machine having no solid transverse partitions or baffles therein and presenting a uniform restriction to the flow of stock therethrough by means of a plurality of superimposed rectifier rolls disposed transversely to the flow of stock through the box.

Other objects, features and advantages of this invention will become apparent to one skilled in the art from the following description of the embodiments illustrated in the accompanying drawings, in which:

Figure 1 is a vertical sectional view taken through a stock inlet box of the present invention;

Figure 2 is a sectional view, with parts shown in elevation, taken along the plane II-II of Figure 1; and

Figure 3 is a sectional view taken along the plane III-III of Figure 1.

As shown on the drawings:

In Figure 1 reference numeral 10 refers generally to a stock inlet box having a rear vertical wall 11 and a front vertical wall 12 terminating in a beveled slice tip 13. A top closure wall 14,

apertured to receive an air supply line 15, extends between the front and rear walls 11 and 12, respectively, the top wall 14 being joined to the front wall 12 by means of a flexible seal 16. A bottom wall 17 is provided to underlie the top wall 14 in spaced relation thereto, the bottom wall terminating in spaced relation to the sliced tip 13 to provide an outlet opening 18 immediately adjacent a paper machine forming wire W lapped about a breast roll R and terminating short of the rear wall 11 to provide an inlet opening 19. The walls 11, 12, 14 and 17, together with a pair of spaced side closure walls 48, cooperate to define an enclosed space A which may be subjected to air pressure through the air supply pipe 15 connected to a suitable source of air under pressure.

Stock may be introduced into the space A through the inlet opening 19 by any desirable means, preferably by means of a flow evenner 20 through a sump portion 21 underlying the opening 19 and defined by the backwall 11 of the box 10 and spaced parallel wall 21a depending from the bottom wall 17. The flow evenner 20 includes a box defined by side walls 22 and 23 joined to the sump 21 by sloping upper closure walls 22a and 23a, respectively, and a lower closure wall 24 joining the side walls 22 and 23. End closure walls 27 and 28 (Figure 3) are provided to form the closed box 20. The front and rear side walls 22 and 23 slope diagonally across the width of the box 20 to define tapered flow conduits 29 communicating through the inlet pipes 30, carried by end closure walls 27 and 28, with a source of stock. The conduits 30 thus supply stock under pressure to the conduits 29 which are divided by an upstanding partition wall 31 carried by the bottom closure wall 24 of the box 20.

A rectifier roll 32 is journaled in the opposing end walls 27 and 28 to extend across the box 20 in closely spaced position overlying the partition wall 31. The rectifier roll is driven by suitable means, such as an electric motor (not shown), a driving belt or band 33 and a pulley 34 mounted on one end of the shaft 35 of the roll. The rectifier roll is provided with a plurality of graduated perforations 36 which diminish in capacity inwardly from the ends of the roll, the ends of the rolls being scalloped or perforated with semi-apertures formed by the intersection of the terminal apertures with the ends of the roll. The aperture arrangement is such that a uniform flow rate along the entire length of the roll is maintained, and frictional drag or a skin effect on the flow of the flowing stock normally imparted by the stationary side walls 27 and 28 of the box 20 is compensated for by the reduced capacity holes of the mid-section of the roll. The roll is also provided with a plurality of axially spaced interior baffles 37 extending radially across the interior of the roll, the baffles 37 serving to direct stock flow radially through the roll.

In accordance with the present invention, the space A of the inlet box 10 is not provided with transversely extending solid partition walls or baffles as is customary in the art. Rather, the space A is provided with a plurality of superimposed axially aligned rectifier rolls 40 rotatably journaled in opposing side walls of the box 10 and adapted to be rotated by suitable means, as by means of individual variable speed, reversible electric motors 41.

The stack of superimposed rectifier rolls 40 presents a uniform restriction to the flow of stock entering the space A through the aperture 19

and introduced onto the forming wire W wrapped about the press roll R through the outlet orifice 18.

The rolls 40 are spaced apart through the height of the stack, the peripheries of the rolls preferably being about $\frac{1}{4}$ to $\frac{1}{2}$ inch apart. This distance is not sufficient to open a flow path between the rolls, while the rolls are maintained out of peripheral contact to prevent the formation of pressure nips therebetween which might interfere with uniform stock flow through the box. The direction of drive of the rolls relative to one another is selective to suit conditions and the rolls are preferably rotated at very low speeds with rotation serving merely to clean the holes. The speed of rotation may be as low as from about 5 to 10 R. P. M., with the holes being cleaned by the reversed flow through the rolls as they are rotated. Thus, flow through the box is caused by the introduction of stock under pressure into the box and not by any pumping action exerted by the rolls.

It is preferred that the stack of rolls 40 be of such height that the uppermost roll 40 is substantially submerged within stock flowing through the inlet box 10. In Figure 1 it may be seen that the level B of stock is tangent to the periphery of the uppermost roll 40. In order that the flow characteristics of stock passing through the box 10 may be controlled by the rolls 40, it is highly undesirable to have any appreciable amount of stock by-passing the rolls, either by having the stock level above the uppermost roll of the stock or by any other method or manner of stock flow.

The rolls 40 are substantially identical with the roll 32 herein before described and are provided with apertures 42 of inwardly decreasing diameter and interior radial baffles 43.

In order to maintain stock level B at a desired height within the space A, the box 10 is provided with a stock level control comprising a pipe 44 providing a vent to atmospheric pressure. The operation of the automatic level control will be obvious to those skilled in the art inasmuch as when the stock level within the chamber A drops below the opening of the pipe 44, chamber A is vented to atmospheric pressure, and by this lessening of pressure the stock level in the chamber will be raised by flow from the stock distributor or flow evenner 20 as hereinbefore described. When the stock level covers the end of the pipe 44, pressure within the box increases and the flow of stock into the chamber A from the stock distributor is resisted by this increased pressure. It will be appreciated that a vacuum pump arrangement may also be employed to maintain a constant level of stock within the space A, particularly in connection with the deposition of low level, heavy stock on the forming wire.

Although in the specific embodiment of Figure 1 a stack consisting of three rectifier rolls has been shown, it will be appreciated that the number of rolls in the stack and the relative sizes of the rolls may be varied in accordance with the level of stock within the chamber. Under some conditions it is possible to use only one rectifier roll with the height of the stack and the number of rolls in the stack generally increasing in accordance with an increase in desired depth for the pond of stock in the box. Also, it is desired that the height of stock be maintained at a level sufficiently low to avoid the free flowing of stock above the top rectifier roll but sufficiently high to prevent localized whirling agitations of the

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stock by the exposed portion of the top roll. A preferred level is tangent to the periphery of the top roll.

In Figure 1 it will also be noted that a plurality of rectifier rolls 45 are mounted adjacent the front wall 12 of the box 10. The rolls 45 are peripherally apertured and are substantially identical in construction to the rolls 40. The rolls 45 are each provided with a separate, variable speed, reversible motor 49 to provide individual control for the direction and speed of rotation of each roll. It is preferred that adjacent rolls of the group of rolls 45, which are spaced as hereinbefore explained, be driven in opposite directions to flow stock uniformly and at a given rate onto the forming wire. The rolls 45 may be so arranged as illustrated so that the portion of the peripheries nearest the slice tip 13 falls on an arc 47 subtended by a radius 48 having its center at the stock tip 13. The rolls 45 are preferably mounted in a bridging arrangement adjacent the outlet opening 18 to control the flow of stock from the space A onto the forming wire W. It has been found that one roll positioned adjacent a slice, as heretofore conventionally employed in the art, results in the streaking of stock deposited on the wire and the formation of "fingers" on the wire or a "broom effect" in the deposited stock.

By the employment of a plurality of rolls, each spaced from the outlet opening 18, any turbulence induced in the stock by its passage through the rolls 45 is dissipated prior to introduction of the stock onto the forming wire, an even flow through the opening 18 is obtained, and the development of a dead area of the slice is prevented. To obtain the optimum results, the uppermost roll of the group of rolls 45 should be beneath the stock level B sufficiently to prevent air being pulled into the stock passing through the roll, while the distance from the roll to the stock level should be less than that at which a dead area could be formed above the roll. Preferably the roll 45 should be from 3 to 6 inches below the stock level B or below the upper roll 40.

The bridging arrangement of the rolls 45 also gives an increased outlet hole area when compared with the single roll previously employed. The increased exit area thus afforded aids in reducing the roll exit velocity necessary to accommodate a given stock flow rate, thus effectively eliminating the "squirting" effect obtained in the use of a single roll.

By this arrangement of rectifier rolls, the rolls are uniformly distributed between the front wall 12 and the bottom wall 17 of the box. The length of the radius 48 is preferably about 10 to 14 inches, depending upon the quantity and type of stock fed through the stock inlet box and the quantity and number of rolls 42. The plurality of adjacent rolls 45 prevent stock from bypassing the rolls while allowing the dissipation of any eddy currents which might be caused in the stock by their passage through the rectifier rolls.

It will be noted that each of the rolls 45 is disposed transversely to the flow of stock there-through from the stock pond onto the forming wire, and that the group of rolls 45 presents a uniform rectifying area, thus preventing any rolling of stock such as would occur by the provision of a baffle cooperating with a single rectifier roll as is conventional in the art.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the prin-

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ciples of this invention, and it is, therefore, not the purpose to limit the patent granted hereon otherwise than is necessitated by the scope of the appended claims.

We claim as our invention:

1. A stock inlet box for a paper machine comprising a head box having an inlet opening at one end for receiving stock from a source and having an outlet opening at the other end for flowing stock onto the forming wire of a paper making machine, transversely extending rotatable rectifying means mounted within the box in spaced relation from the inlet and outlet to present a uniform restriction to the flow of stock through the box while preventing rolling of stock and the formation of dead stock areas within the box, and vent means for maintaining a level of stock in the box that will submerge the rectifying means, said rectifier means presenting the sole restriction to stock flow through the box.
2. A stock inlet for a paper making machine comprising a head box having an inlet opening at one end thereof for receiving stock from a suitable source and an outlet opening at the other end for flowing stock onto a paper making machine, and a plurality of superimposed rectifier rolls mounted in said box and extending transversely to the flow of stock therethrough to present a uniform and sole restriction to the flow passage of stock through the box.
3. In a stock inlet box adapted for the flow of stock therethrough, the improvement which comprises a vertically extending stack of axially aligned peripherally spaced rectifier rolls mounted within said box, each roll extending transversely to the path of stock flow through the box and the stack presenting a uniform and sole restriction to the flow of stock therethrough.
4. In a stock inlet box having an inlet at one end and one outlet at the other end and defining a path adapted for the flow of paper stock therethrough, the improvement of rotatable rectifier roll means extending transversely of the path of stock flow to present the sole restriction to stock flow through the box, and a stock level control for maintaining a stock level within the box barely sufficient to completely submerge the rectifier roll means to prevent rolling of stock and the creation of dead areas above the roll means and the drawing of air into the stock by rotation of the roll means.
5. A stock inlet box comprising a stock inlet for a paper making machine comprising a head box having a stock inlet opening at one end thereof for receiving stock from a suitable source and a stock outlet opening adjacent the other end thereof for flowing stock therefrom onto a forming wire, and a plurality of closely adjacent rectifier rolls extending transversely across the interior of said box adjacent said outlet opening and spaced uniformly therefrom to provide a uniform restriction to the flow of stock through said outlet opening.
6. A stock inlet for a paper making machine comprising a head box having an inlet opening at one end thereof for receiving stock from a suitable source and an outlet opening adjacent the other end thereof for introducing stock onto a forming wire, and a plurality of closely adjacent rectifier rolls mounted in a bridging arrangement about said outlet opening and in uniformly spaced relation thereto to present a uniform restriction to the flow of stock from said box through said outlet opening.

7. A stock inlet for a paper making machine comprising a head box having an inlet opening adjacent one end thereof for receiving stock from a source and an outlet opening at the other end for flowing stock onto a forming wire, a slice controlling said stock outlet opening, and a plurality of arcuately aligned, transversely extending, closely adjacent rectifier rolls mounted adjacent said outlet end with their peripheries defining an arc having its center at the tip of said slice, said rolls defining a uniform restriction to substantially the total flow of stock through said stock outlet opening while being spaced from said opening to accommodate dissipation of any turbulence in the stock after passage through the rolls and prior to passage through the outlet opening.

8. A stock inlet for a paper making machine comprising a head box having an inlet opening for receiving stock flow from a suitable source and an outlet opening at the other end thereof for flowing stock onto a forming wire, a stack of vertically aligned rectifier rolls positioned intermediate said inlet opening and said outlet opening, and a rectifier roll extending transversely of said box adjacent said outlet opening and spaced therefrom for presenting a uniform restriction to the flow of stock from said box through said outlet opening while accommodating dissipation of any turbulence in the stock after stock passage through the rolls and prior to stock passage through the outlet opening by virtue of the spacing of the last mentioned rectifier roll from the outlet opening, and said rectifier rolls cooperating to define the sole restriction to the flow of stock through said box.

9. In a stock inlet for a paper making machine having an inlet opening for receiving stock from a source and an outlet opening for flowing stock from the box onto a forming wire surface, a rectifier roll intermediate said inlet and outlet openings and presenting a uniform restriction to flow of stock along the length of the box, and a plurality of axially aligned rectifier rolls mounted adjacent said outlet opening and having their outer peripheries spaced equally from said opening to permit the uniform dissipation of turbulence in the stock prior to its exit through said opening, said rectifier rolls cooperating to define the sole restriction to the flow of stock through said box.

10. A stock inlet box having an inlet opening for receiving stock from a source and an outlet opening for flowing stock from the box onto a forming wire surface, a vertical stack of transversely extending rectifier rolls presenting a uniform restriction to the flow of stock to the box, and a plurality of additional rectifier rolls mounted in arcuate alignment adjacent the outlet opening of said box, said additional rolls having their peripheries falling on an arc having its center of curvature at said outlet opening said rolls defining a uniform restriction to substantially the total flow of stock through said stock outlet opening while being spaced from said opening to accommodate dissipation of any turbulence in the stock after stock passage through the rolls and prior to stock passage through the outlet opening.

11. In a stock inlet box for a paper making machine having an inlet opening at one end thereof for receiving stock from a suitable source, and an outlet opening in the other end thereof for flowing stock onto a forming wire, the improvement which comprises a vertically extending stack of

rectifier rolls extending transversely to the flow of stock through the box to present a controlled restriction to stock flow, and means for maintaining stock within the box at a level substantially tangential to the periphery of the uppermost roll of said stack of rectifier rolls, the stock level at the uppermost roll of said stack of rectifier rolls being sufficient to completely submerge said stack, thereby preventing rolling of stock and the creation of dead spots above the stock and the drawing of air into the stock by the rotation of the uppermost of said rectifier roll.

12. A stock inlet box for a paper machine comprising a head box having a generally horizontal floor with an inlet opening in one end of the floor and an outlet opening for the box at the end opposite the inlet for flowing stock onto a paper machine forming wire, transversely extending rotatable stacked rectifier rolls mounted within the box in spaced relation from the inlet and outlet to present a uniform restriction to the flow of stock through the box while preventing rolling of the stock and formation of dead stock areas within the box, and bleed-off level control means suitably mounted at an aperture in the head box aligned with the top of the uppermost stacked roll for maintaining a level of stock in the box that will submerge all the stacked rolls, said stacked rolls presenting the sole restriction to stock flow longitudinally through the box.

13. A stock inlet for a paper making machine comprising a baffle-less, horizontally-floored head box having an inlet opening at one end of the floor for receiving the stock from a suitable source and an outlet opening in the box at the opposite end thereof for flowing stock onto a paper making machine forming wire, a plurality of superimposed rectifier rolls mounted in said box and extending transversely to the flow of stock there-through to present a uniform and sole restriction to the flow passage of stock through the box and a vertically extending apertured side wall for said head box, being suitably apertured to afford bleed off means for maintaining a level of stock in the box that will submerge the roll.

LLOYD HORNBOSTEL,
EDWARD D. BEACHLER.

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