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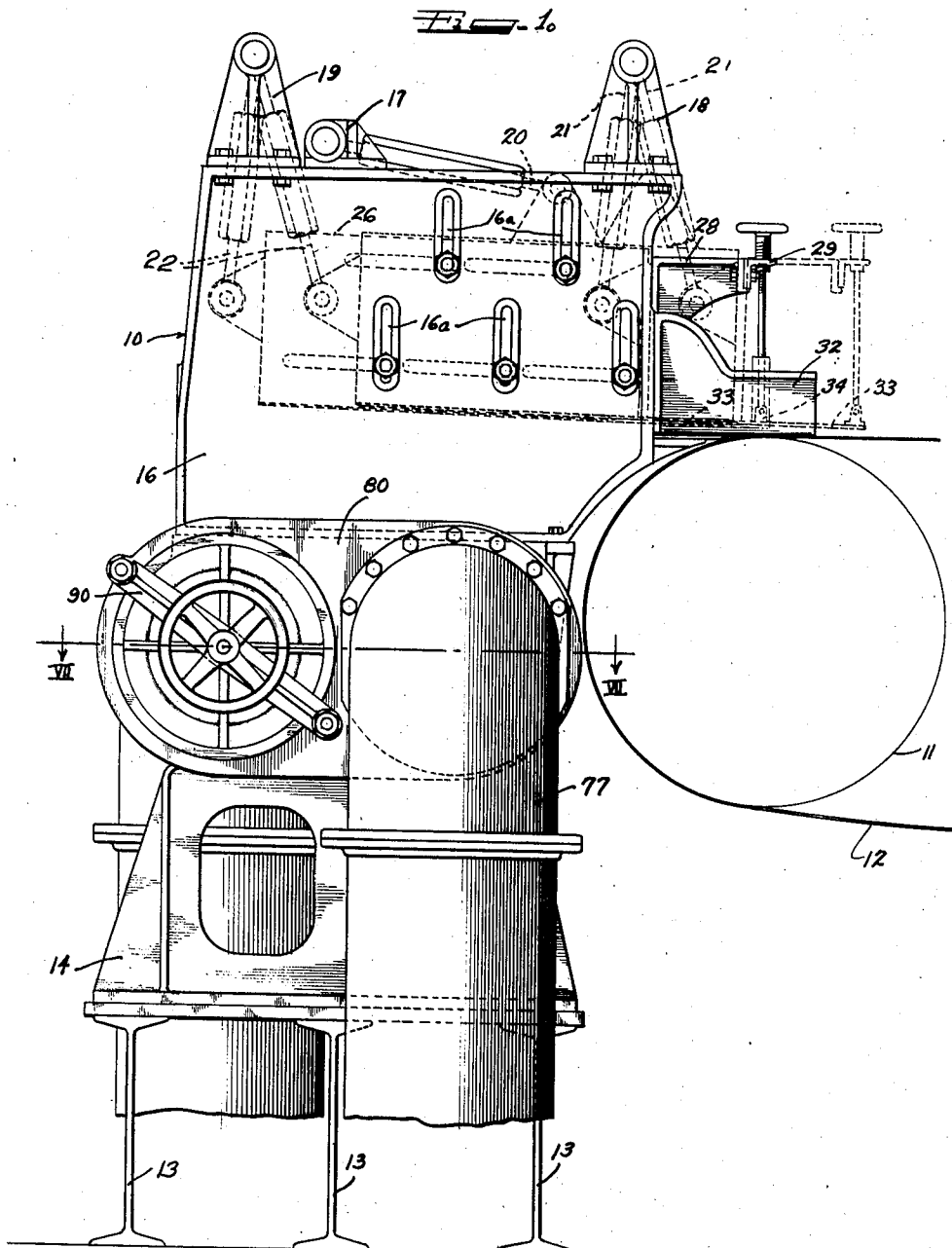
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STOCK INLET FOR PAPER MAKING MACHINES

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12 Sheets-Sheet 1



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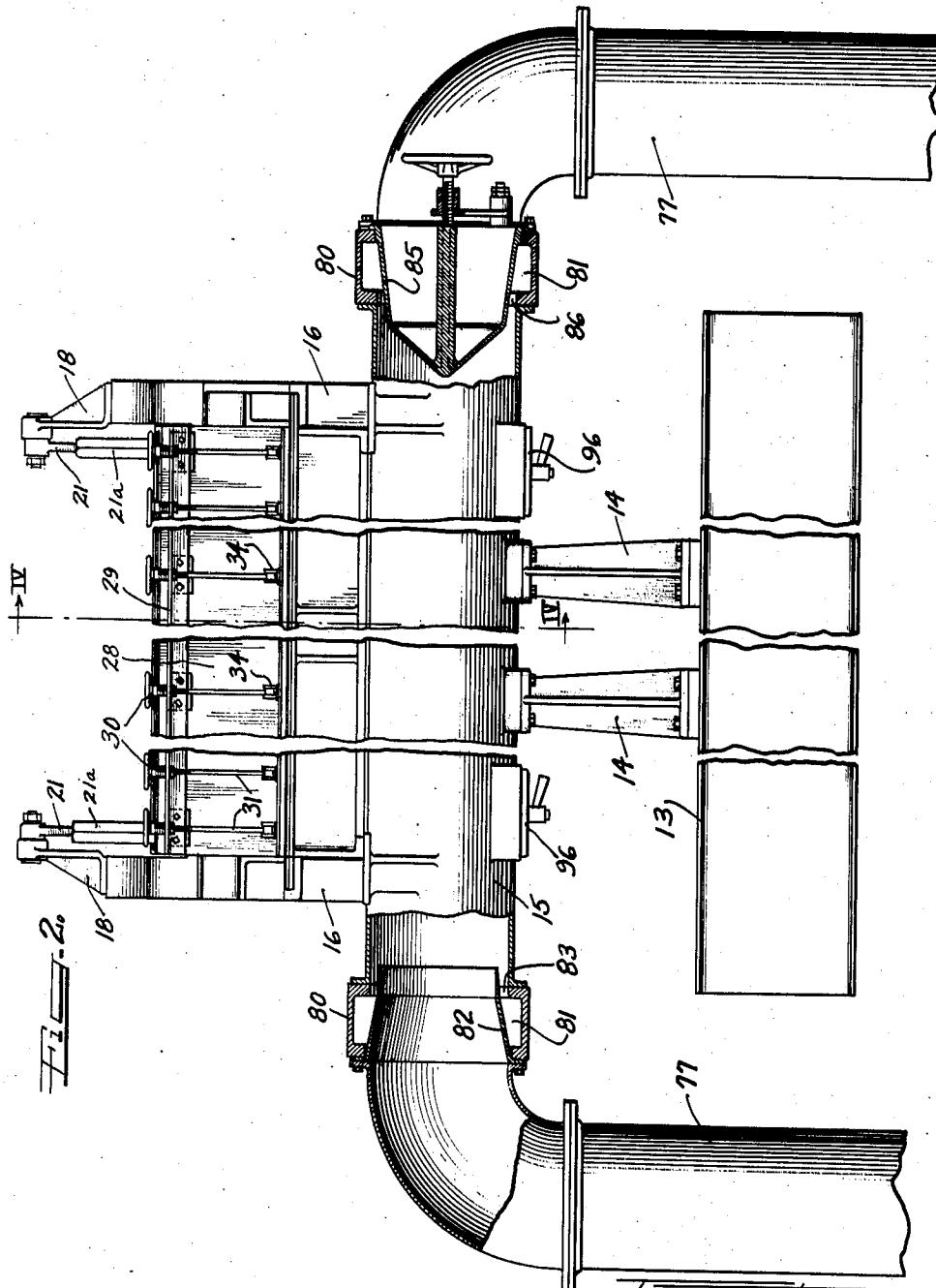
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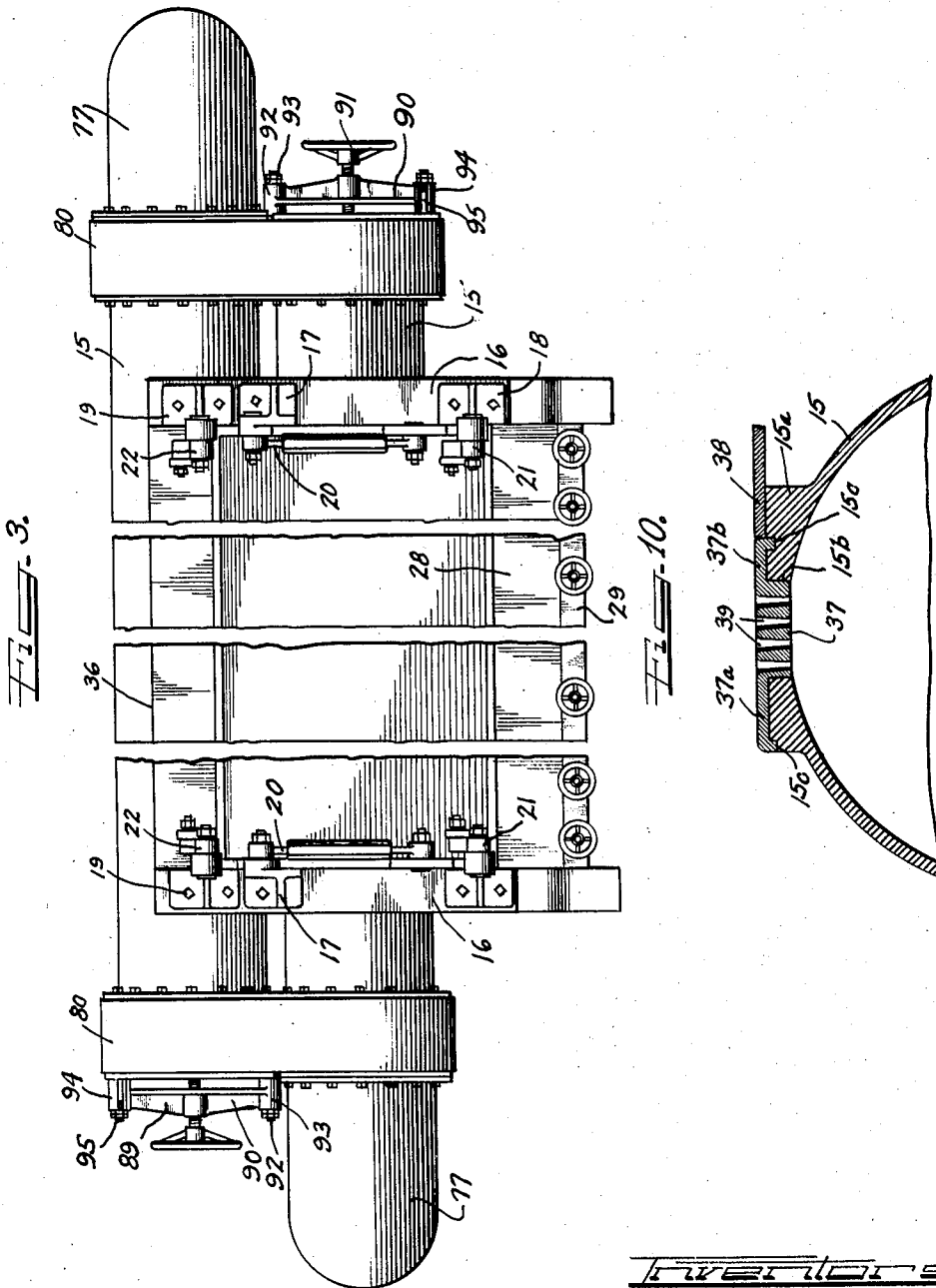
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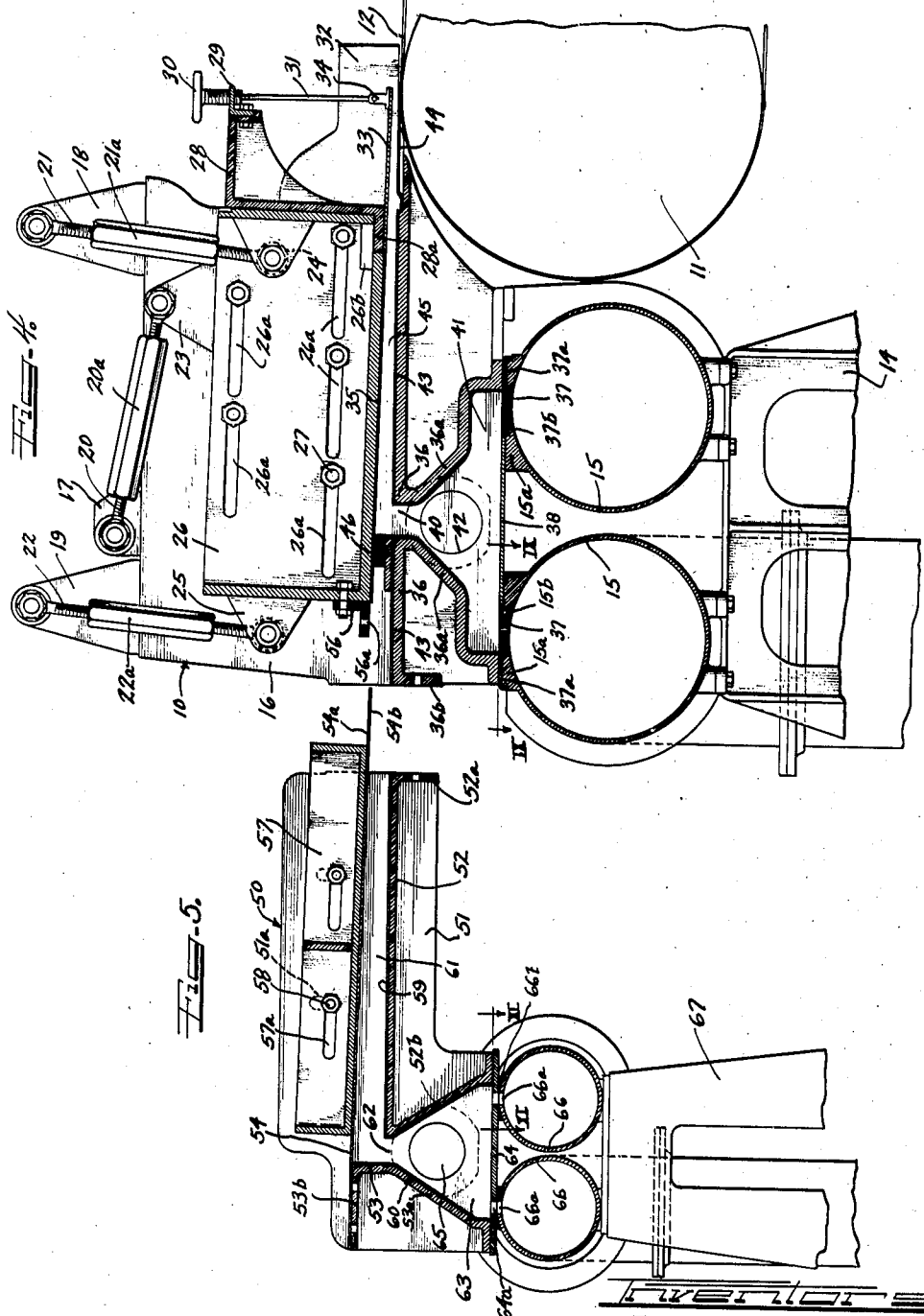
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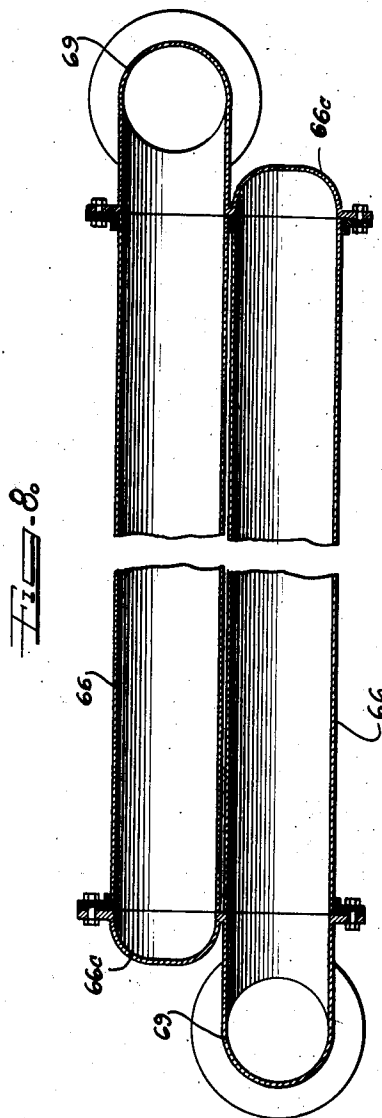
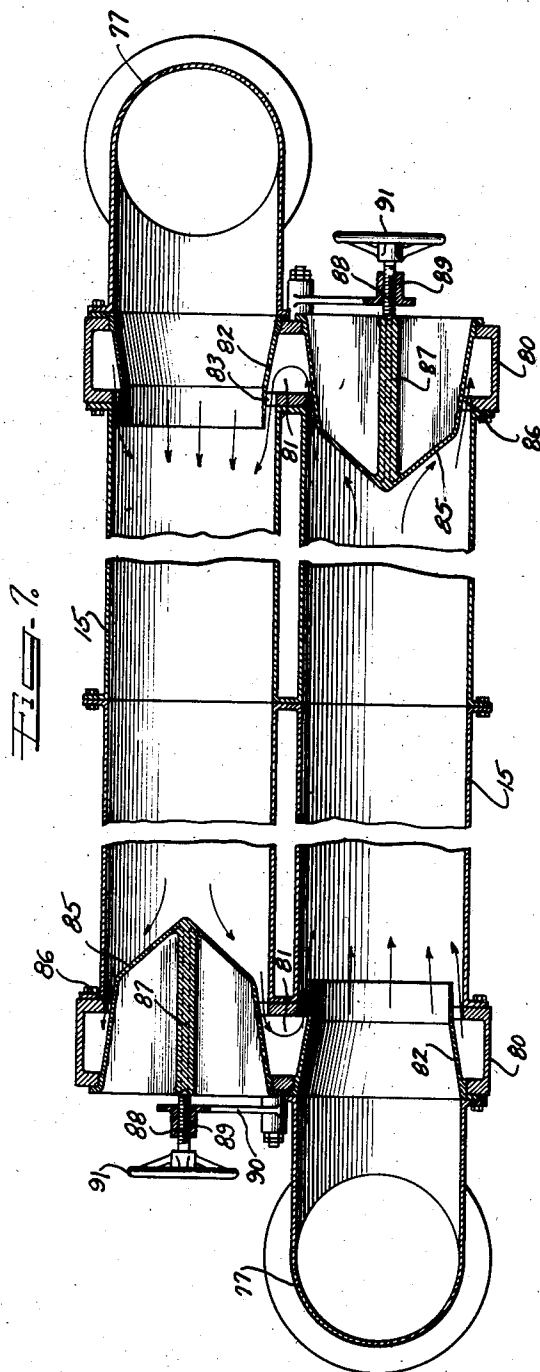
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12 Sheets-Sheet 6



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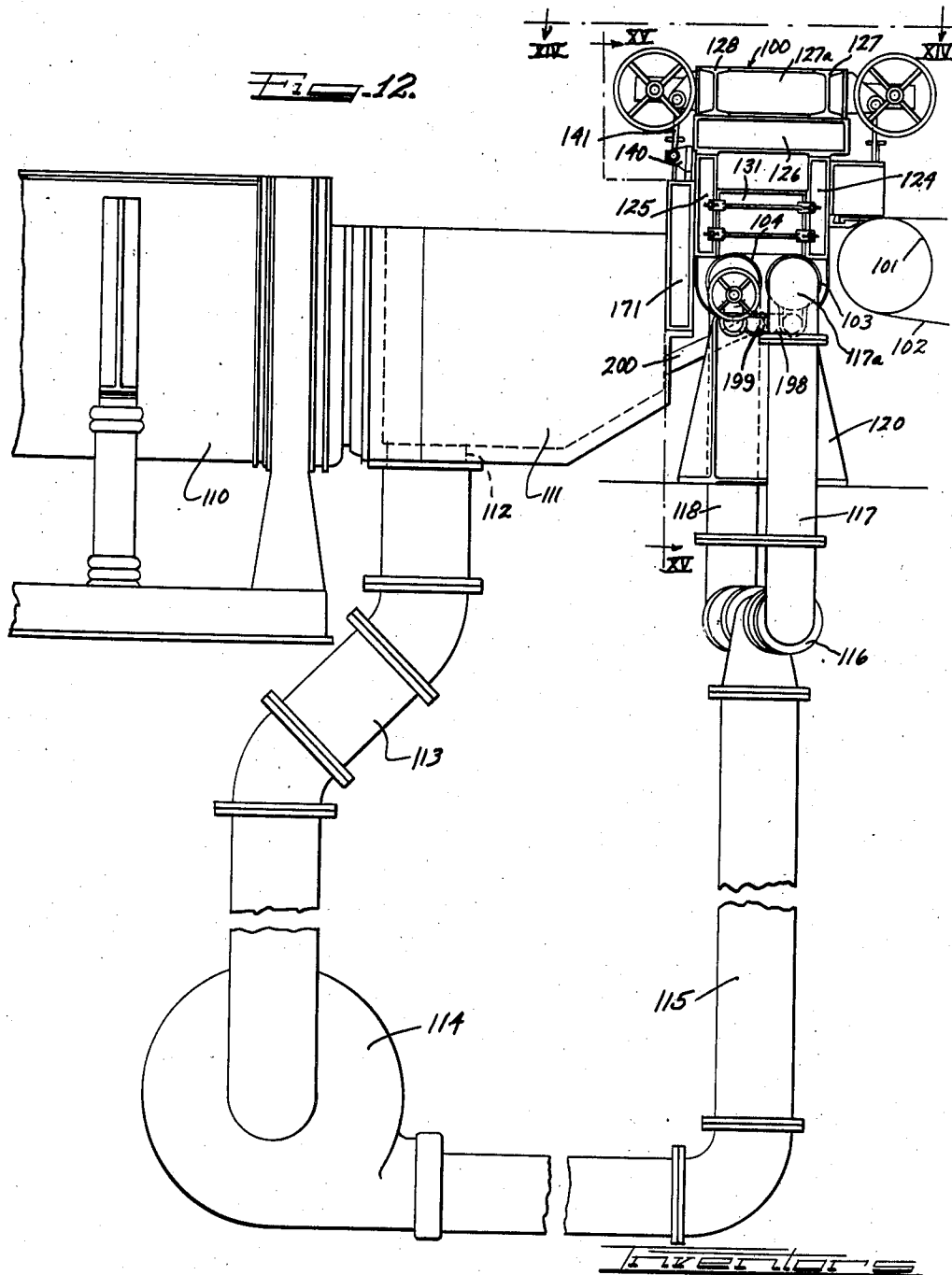
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12 Sheets-Sheet 7



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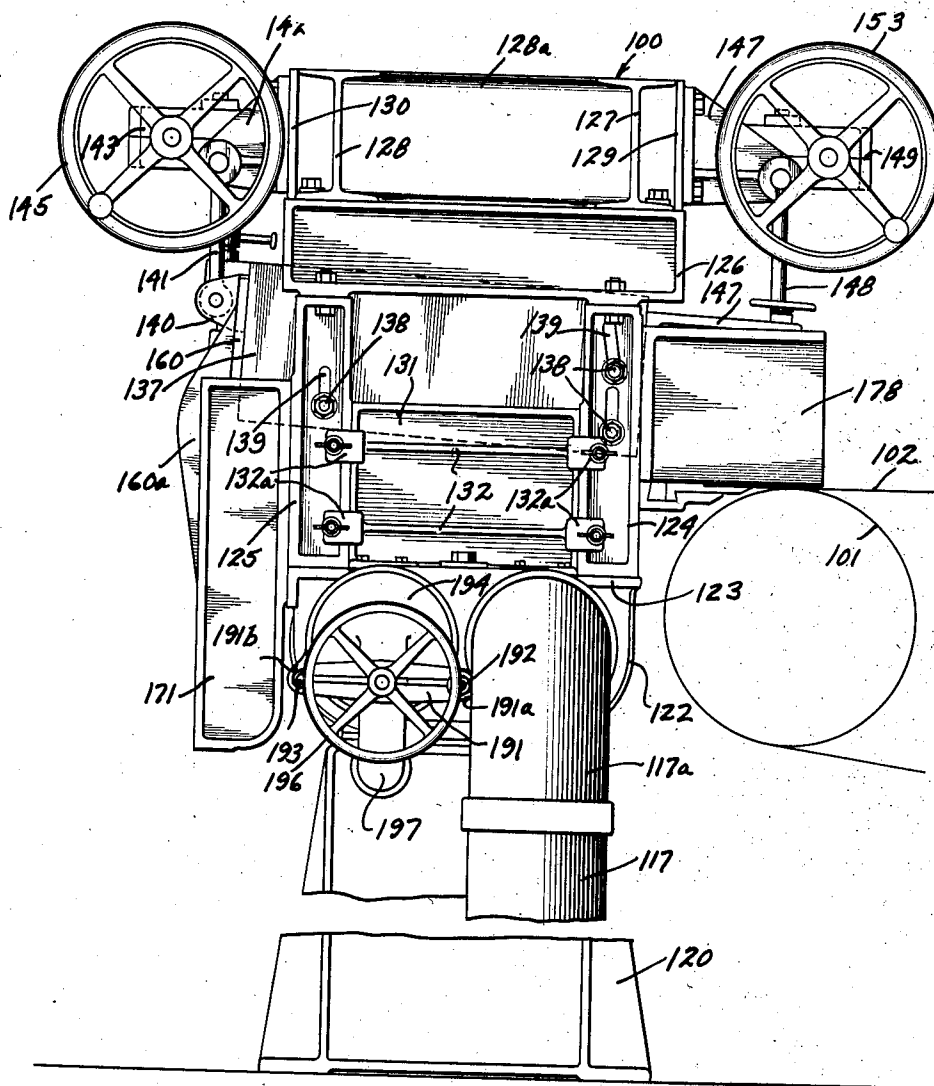
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12 Sheets-Sheet 8

Fig. 13.



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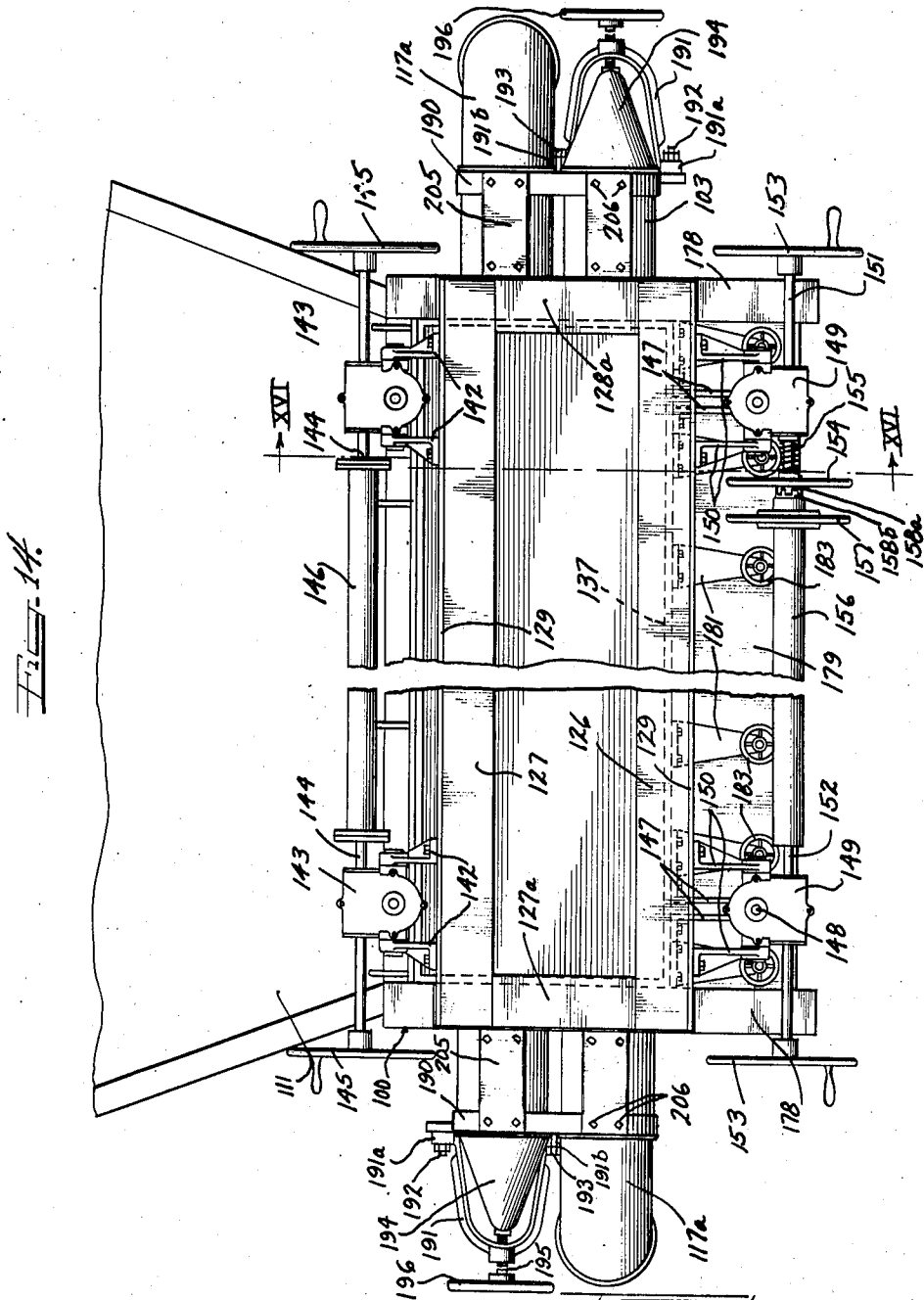
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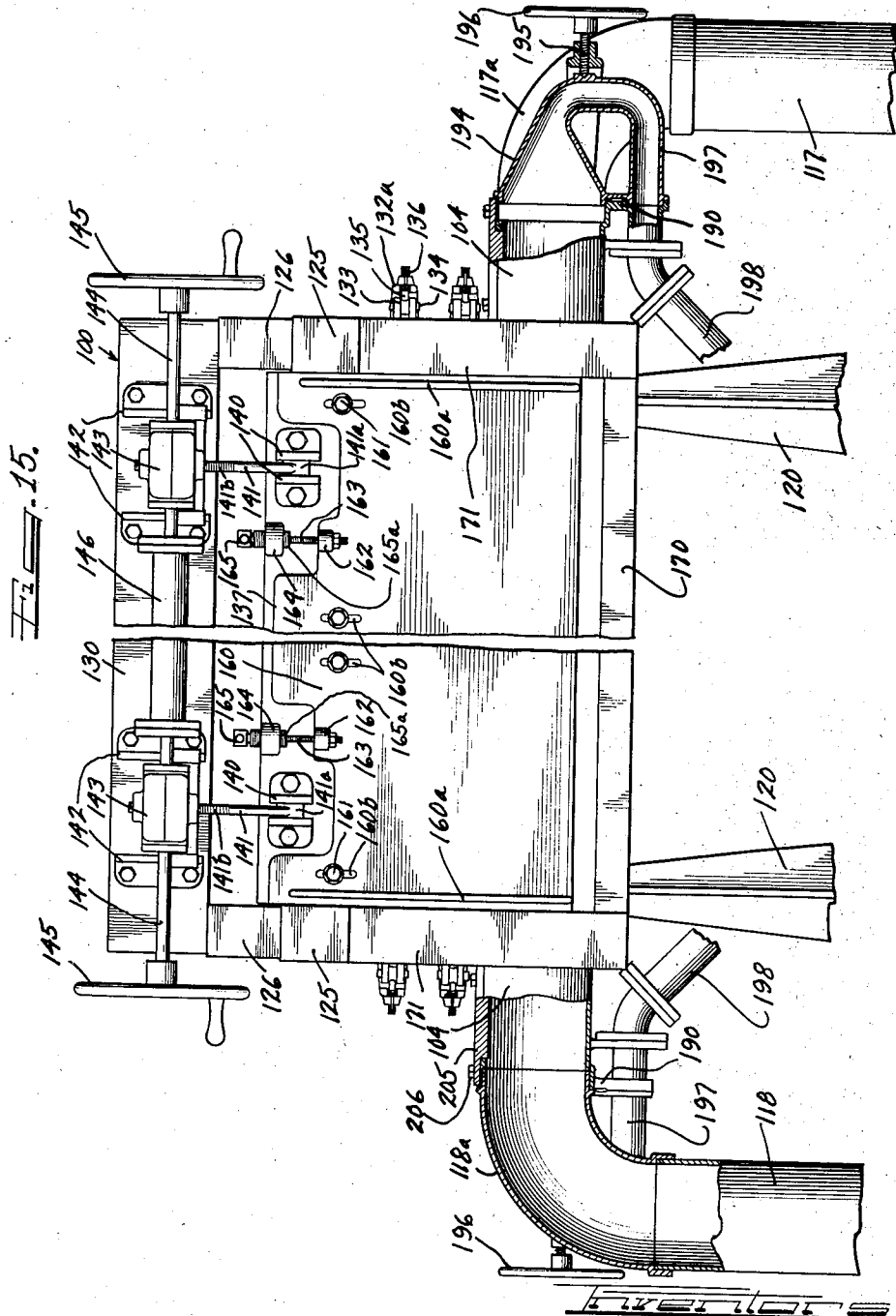
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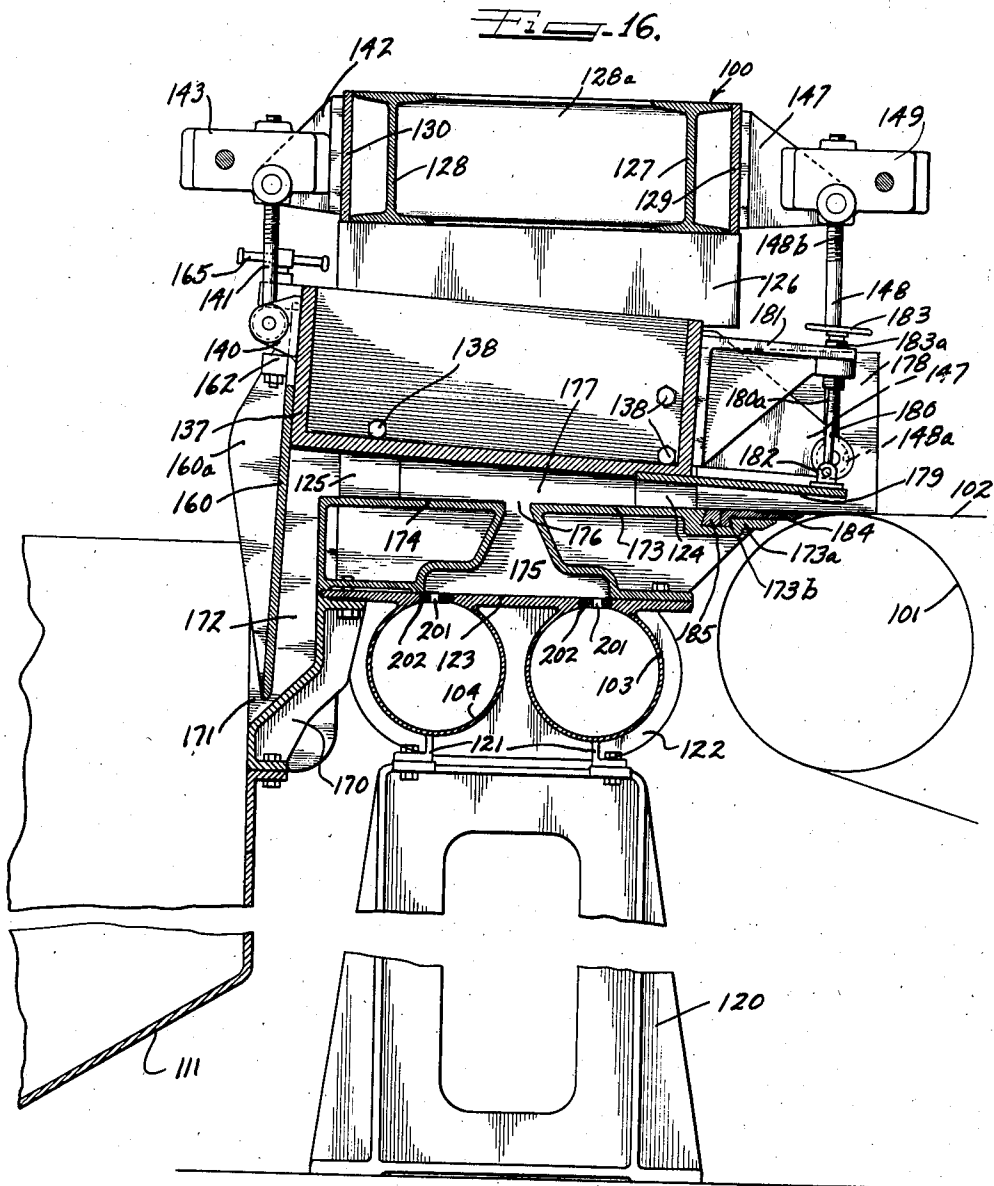
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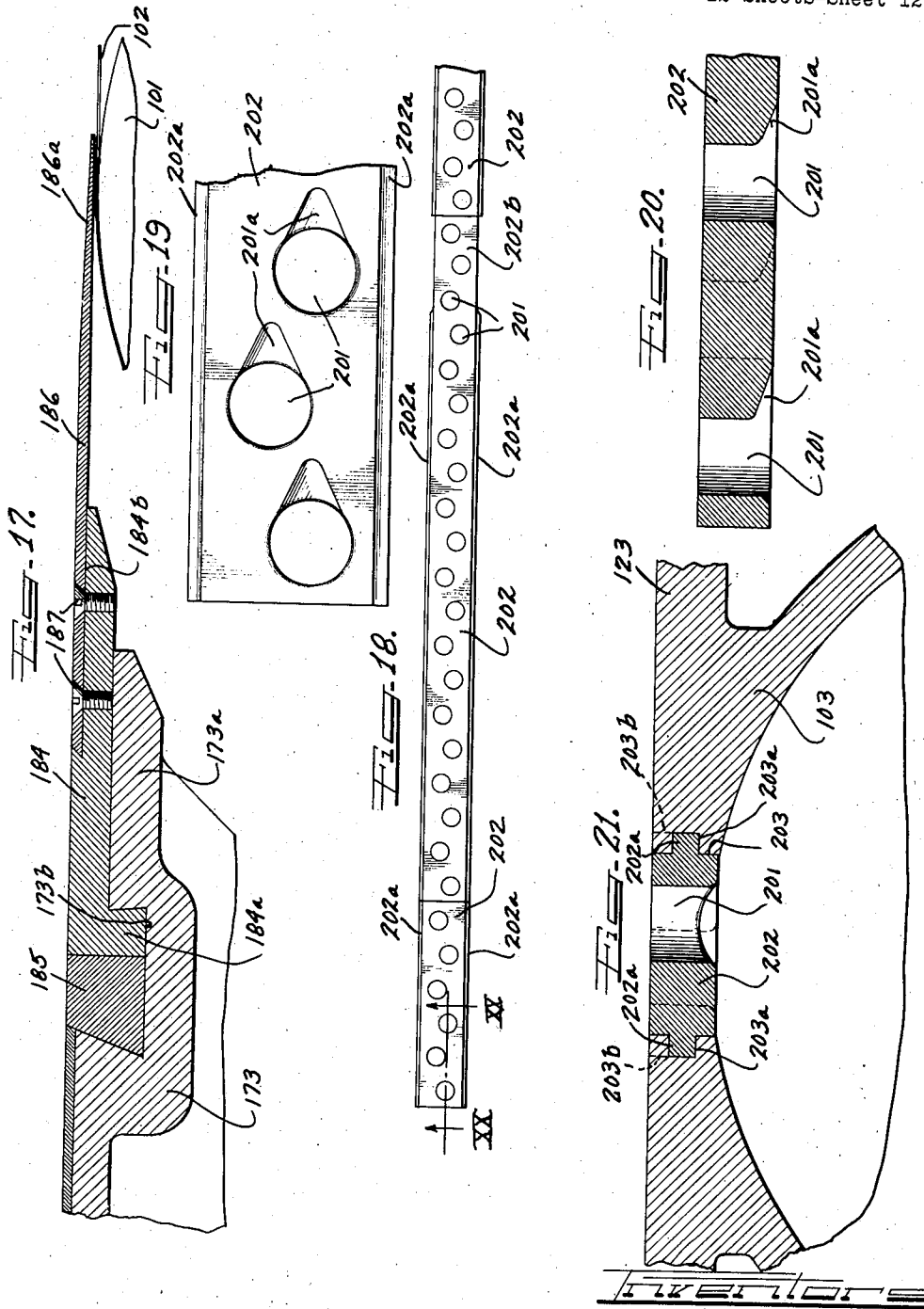
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UNITED STATES PATENT OFFICE

2,344,282

STOCK INLET FOR PAPERMAKING
MACHINES

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Application July 31, 1939, Serial No. 287,506

38 Claims. (Cl. 92—44)

This invention relates to a stock inlet for paper making machines and more specifically relates to the ejection of stock from oppositely flowing streams into a confined passageway immediately adjacent the forming surface of a paper making machine so as to deposit stock fibers on the forming wire in a completely dispersed condition.

It has heretofore been the practice to transport stock from the pulp supplying equipment to the forming surface of the paper making machine by flowing the same as smoothly as possible. Stock chests, pipes, head boxes, and inlets were designed so as to prevent agitation of the flowing stock.

It was known that a uniform suspension of stock in the pulp supplying equipment would assume the appearance of sour milk by the time it reached the forming surface of the paper making machine. The curdling effect was due to flocculation of fibers in the stock suspension probably caused by electrical charges, or effects of charges, produced in the fibers by the beaters and pumps. These electrical charges in the fibers cause attraction between the fibers to quickly build up fiber bundles in the suspension as soon as the flow of stock is slowed up sufficiently to take care of proper distribution of the stock across the width of the forming machine.

We have found that the heretofore necessary slow flowing speeds and the heretofore desired smooth flow promotes and makes possible the undesired fiber flocculation and, according to our invention, we now actually effect a turbulence in the stock suspension immediately before it is deposited on the forming surface of the paper making machine. The desired turbulence can be effected by spouting stock under pressure through submerged orifices placed in the stock stream at a point adjacent to the forming surface and the stock is maintained in a continually flowing condition at a speed that is above the point where fiber flocculation can occur.

While the invention will hereinafter be specifically described as applied to a Fourdrinier type paper making machine, we wish to point out that the principles of the invention are adapted for use on other types of web forming apparatus including cylinder type paper making machines.

According to one embodiment of this invention, the paper stock from the stock furnishing equipment is supplied to the opposite ends of parallel conduits mounted adjacent the breast roll of a Fourdrinier paper making machine.

The conduits have perforated tops along the length thereof and the oppositely flowing streams of stock are ejected through these perforated tops into a confined passageway communicating with the upper run of the forming wire. Excess stock that is not ejected through the perforated tops of the conduits is recirculated into the oppositely flowing stock streams for admixture with said streams. In this manner, uniform stock distribution is obtained throughout the entire width of the machine in spite of the fact that the rate of stock flow through the perforated holes might vary across the width of the machine due to change in velocity of the flowing streams in the conduits. Thus by causing the stock to be fed in the opposite direction through a similar conduit, the variations in the rate of flow of stock through perforations along its length will be opposite to the variations in the first conduit. The result of the combination is a uniform rate of flow of stock across the entire machine.

The apparatus of this embodiment of the invention may, if desired, be equipped with a recirculating device communicating with the passageway receiving the ejected stock from the conduits. This recirculating device is adapted for attachment to the rear end of the main stock inlet. The recirculating device is equipped with a plurality of parallel conduits having slotted tops along the length thereof. The conduits are drained from opposite ends thereof so that stock entering the slots will form oppositely flowing streams. These streams are merged and fed back to the pump for supplying stock to the main feed conduits. If desired the excess stock can be introduced into the stock chest or other pulp furnishing equipment.

According to a second embodiment of the invention, paper stock from the stock furnishing equipment such as the screens is flowed into a flow box and pumped from the bottom of the flow box into the opposite ends of parallel conduits mounted adjacent the breast roll of a Fourdrinier paper making machine. These conduits are slotted along the tops thereof and perforated metal strips are slidable into the slots. The perforated metal strips or plates have rows of holes or slots therein which may be or may not be undercut or beveled at the bottoms thereof in the direction of flow of the stock through the conduits so that the stock will be directed into and through the holes. Excess stock which is not ejected through the perforations or holes, is recirculated back to the flow box out of those

ends of the conduits which are opposite to the stock receiving ends.

The perforated strips or plates are readily removed from the slots in the conduits so that strips having different sized holes or slots can be mounted in the slots in accordance with the consistency of stock being fed to the conduits.

Uniform stock distribution is thus obtained across the width of the machine since any variation in the rate of flow through perforations along the lengths of the conduits will be opposite in the adjacent conduits and the resultant effect is neutral.

The stock ejected from the conduits is merged into a common chamber extending across the width of the machine. This common chamber has an open top, which may be adjustable for width, extending across the width of the machine communicating with a confined stock passageway. The front end of the stock passageway discharges stock onto the forming wire while the rear end of the stock passageway can be closed or can discharge stock in regulated amounts back to the feed box. The flow of stock from the passageway back to the feed box is regulated by means of an adjustable gate.

A feature of both embodiments of the invention includes the cradling of a box in the main frame of the stock inlet to form a shiftable top wall for the confined stock passageway. This permits a regulation of the size and capacity of the passageway as well as the formation of a confined stock zone on the upper run of the forming wire.

It is, then, an object of the invention to provide a stock inlet for paper making machines adapted to uniformly supply deflocculated paper stock across the entire width of the machine.

A further object of the invention is to provide stock streams flowing in opposite directions transversely across the entire width of the paper making machine and to supply stock from these oppositely flowing streams directly to the forming wire of the machine.

Another object of the invention is to provide a series of spaced parallel submerged orifices adjacent the forming wire of a paper making machine for receiving stock from oppositely flowing streams therethrough to uniformly distribute stock across the entire width of the machine.

Another object of the invention is to provide a stock inlet for a Fourdrinier type paper making machine having a confined passageway communicating with the upper run of the forming wire for receiving stock directly from oppositely flowing streams extending transversely across the width of the machine.

Another object of the invention is to provide intercommunicating transverse stock conduits adjacent the breast roll of a paper making machine for uniformly distributing paper stock across the width of the machine.

Another object of the invention is to provide a recirculating device for a stock inlet capable of receiving excess stock from the inlet for recirculation back to the inlet.

A further object of the invention is to provide a stock inlet for a paper making machine having a pair of parallel stock conduits extending transversely across the width of the machine and receiving stock from a flow box together with recirculating devices for flowing excess stock from the conduits back to the flow box.

Another object of the invention is to provide a stock inlet for a Fourdrinier type paper making machine having an open ended confined stock passageway adjacent the breast roll of the machine and a gate for regulating flow of stock out of the rear end of the passageway.

A specific object of the invention is to provide an improved stock distributing conduit having removable perforated plates mounted in a longitudinal slot thereof.

A further specific object of the invention is to provide improved perforated plates for ejection of stock therethrough to deflocculate the stock.

Other and further objects of the invention will become apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings which disclose a preferred embodiment of the invention.

On the drawings:

Figure 1 is a side elevational view of a stock inlet according to this invention.

Figure 2 is a broken front elevational view of the stock inlet shown in Figure 1, with parts broken away and shown in vertical cross section.

Figure 3 is a broken top plan view of the stock inlet shown in Figures 1 and 2.

Figure 4 is a vertical cross-sectional view, taken along the line IV—IV of Figure 2.

Figure 5 is a vertical cross-sectional view of a recirculating device for attachment to the stock inlet shown in Figures 1 to 4.

Figure 6 is a broken side elevational view of a stock inlet having a recirculating device attached thereto and illustrating the piping connections to and from the inlet and recirculating device.

Figure 7 is a horizontal cross-sectional view taken along the line VII—VII of Figure 1.

Figure 8 is a horizontal cross-sectional view taken along the line VIII—VIII of Figure 6.

Figure 9 is an enlarged fragmentary plan view taken along the line IX—IX of Figure 4.

Figure 10 is a cross-sectional view taken along the line X—X of Figure 9.

Figure 11 is an enlarged fragmentary top plan view taken along the line XI—XI of Figure 5, with parts broken away to show underlying structure.

Figure 12 is a broken, fragmentary side elevational view of a modified form of stock inlet according to this invention and illustrating a stock screen, flow box and piping connections to and from the inlet and flow box.

Figure 13 is an enlarged, broken side elevational view of the stock inlet illustrated in Figure 12.

Figure 14 is a top plan view of the stock inlet and a portion of the stock feed box taken along the line XIV—XIV of Figure 12.

Figure 15 is a rear end elevational view, with parts broken away and shown in vertical cross section, taken along the line XV—XV of Figure 12.

Figure 16 is a vertical cross-sectional view of the stock inlet taken along the line XVI—XVI of Figure 14.

Figure 17 is an enlarged vertical cross-sectional view of the apron and support therefor mounted on the front end of the stock inlet illustrated in Figures 12 to 16.

Figure 18 is a fragmentary top plan view of a series of perforated plates or strips adapted for mounting in the slots of the stock conduits form-

ing part of the stock inlet shown in Figures 12 to 16.

Figure 19 is an enlarged fragmentary bottom plan view of one of the plates or strips shown in Figure 18.

Figure 20 is an enlarged vertical cross-sectional view taken along the line XX—XX of Figure 18.

Figure 21 is an enlarged fragmentary vertical cross-sectional view of the top portion of a stock conduit forming a portion of the stock inlet of this invention and illustrating the manner in which the perforated plates are mounted in the top of the conduit.

As shown on the drawings:

Description of apparatus shown in Figures 1 to 11

One embodiment of the invention is illustrated in Figures 1 to 11, inclusive.

In Figure 1 the reference numeral 10 designates generally the stock inlet of this embodiment of the invention. As shown, the inlet 10 is mounted adjacent the breast roll 11 of a Fourdrinier type paper making machine (not shown). The forming wire 12 of the machine is trained around the breast roll 11.

As shown in Figures 1 and 2, the stock inlet 10 is supported on a plurality of transverse I-beams 3. Longitudinal web members 14 are mounted on top of the I-beams 13 and carry a pair of horizontal conduits 15 extending transversely across the line of the paper machine behind the breast roll 11 as best shown in Figure 4.

The stock inlet 10 includes spaced opposed side frame plates 16 mounted on top of the conduits 15 near the ends of the conduits.

The side plates 16 are provided with a plurality of spaced vertical slots 16a as best shown in Figure 1.

A bracket 17 is mounted on top of each plate 16 in spaced relation from the rear end of the plate. An additional bracket 18 is mounted on each plate 16 at the front ends of the plates while a third set of brackets 19 are mounted on the rear ends of the plates 16.

Turnbuckles 20, 21 and 22 are pivotally connected between the brackets 17, 18 and 19 respectively and ears 23, 24 and 25 of a box 26 mounted between the plates 16. The box 26 has a plurality of horizontal slots 26a in the side walls thereof adapted to be aligned with the vertical slots 16a in the side plates.

The turn sleeves 20a, 21a and 22a of the turnbuckles 20, 21 and 22 respectively are adapted to be manually rotated for adjusting the position of the box 26 between the side plates 16. The box 26 is thus cradled between the side plates and is locked in adjusted position by means of bolts 27 extending through the slots 16a and 26a. (Figure 4.)

A beam 28 extends transversely between the side plates 16 and is secured to the front end wall of the box 26. As shown in Figure 4, the lower front end of the box 26 is cut away as at 26b for receiving a flange 28a of the beam 28 in alignment with the bottom of the box.

An angle member 29 is bolted to the front wall of the beam 28 and extends along the length of the beam. This angle member 29 has the horizontal leg thereof provided with threaded apertures in spaced relation along the length thereof for receiving in threaded relation the threaded shanks of hand wheels 30. The shanks of the hand wheels are hollow and receive threaded

link rods 31 therein depending downwardly from the angle member 29. The exterior threads on the hand wheels are at a different pitch from the interior threads so that a rotation of the hand wheel to move it downwardly into the threaded apertures of the angle member 29 will cause an upward movement on the link rods 31 thereby resulting in a micrometer adjustment of the link rods.

As shown in Figures 1 and 4, vertical wall members 32 are secured to the front ends of the side frame plates 16 and extend forwardly over the upper run of the forming wire 12. These plates 32 are mounted alongside of the ends of the beam 28.

A flexible plate 33 is secured at its rear end to the flange 28a of the beam member 28 and extends forwardly between the side wall members 32. The forward end of the flexible plate 33 is provided with a plurality of upwardly extending lugs 34 which are pivoted to the lower ends of the link rods 31. Manipulation of the hand wheels 30 will raise and lower the front end of the flexible plate 33 to regulate its distance from the upper run of the forming wire 12. Since the plate is flexible, and since a plurality of link rods are provided across the width of the plate, micrometer adjustment of the gap between the forming wire and the plate can be obtained.

The bottom of the box 26 is covered on the under side with a plate 35 preferably of stainless steel or other non-corrodible alloy. This plate 35 abuts the rear end of the plate 33 and is aligned therewith.

The side frame plates 16 are connected by a bottom wall 36 which can be cast integrally with the plates 16. The bottom wall 36 is spaced above the conduits 15 but below the box 26.

As best shown in Figure 4, the bottom wall 36 has spaced opposed flanges 36a depending downwardly therefrom to the tops of the conduits 15.

As shown in Figures 4 and 9, the tops of the conduits 15 are built up as at 15a to define flat horizontal top walls. These walls are slotted as at 15b along the entire length of the conduit between the side frame plates 16.

A perforated plate 37 is disposed in each slot 15b. The plates 37 have flanges 37a disposed on top of the built up portion 15a of the conduits 15 and under the flanges 36a of the wall member 36.

The perforated plates 37 likewise have flanges 37b on the other sides thereof. These flanges 37b extend toward each other and receive a plate 38 therebetween to bridge the gap between the conduits 15.

As best shown in Figure 10, the flanges 37a and 37b of the perforated plates 37 have downturned end portions seated in grooves 15c of the built-up portions 15a on the conduits. This locks the plates 37 in position.

As shown in Figure 9, the portion of the plate 37 disposed in the slots 15b has rows of staggered holes 39 therethrough. The holes 39 in each row of holes are in overlapping relation so as to obtain a maximum spouting capacity for the plates.

As shown in Figure 4, the bottom wall 36 has a transverse slot 40 across the width thereof between the flanges 36a.

A chamber 41 defined by the flanges 36a, and the plates 37 and 38 is thus formed. This chamber 41 communicates through the holes 39 in the plates 37 with the interior of the conduits 15 along the entire length thereof. Likewise the

chamber 41 has the slotted opening 40 at the top thereof along its entire length.

A clean-out door 42 for the chamber 41 can be provided in a side frame plate 16.

The bottom wall 36 and the flanges 36a are preferably covered with sheets of non-corrodible metal 43.

An apron 44 (Figure 4) is secured on the bottom 36 at the forward end thereof and extends over the upper run of the forming wire 12.

There is thus provided a confined stock passageway 45 extending from the gap 40 to the forming wire 12. The top wall defining the passageway can be shifted as shown in dotted lines in Figure 1 to extend the plate member 33 beyond the apron 44 so that a confined zone is formed on the forming wire 12.

As shown in Figure 4, the passageway 45 is open at the back end thereof but is adapted to be sealed by means of a barrier 46. This barrier 46 is used when it is desired to feed all of the stock issuing from the slot 40 onto the forming wire 12. In the event, however, that it is desired to recirculate some of the stock from the passageway 45, a recirculating device indicated generally by the reference numeral 50 is provided. The recirculating device 50 is secured to the rear end of the stock inlet 10 as shown in Figure 6.

As best shown in Figure 5 the recirculating device 50 comprises spaced opposed side plates such as 51 joined by a bottom 52. The bottom 52 has a depending flange 52a at the front end thereof for abutting a dependent flange 36b on the bottom wall 36 of the stock inlet 10. As shown in Figures 4 and 5, these two flanges are adapted to be bolted together.

The bottom wall 52 also has a reverse sloping flange 52b at the rear end thereof.

A back wall member 53 is provided between the side plates 51 and has a reverse sloping portion 53a in spaced relation from the flange 52b.

The back wall 53 also has a horizontal portion 53b receiving a flat flexible metal sheet 54 thereon. This sheet 54 can be bolted to the top wall 53b and extends forwardly beyond the front ends of the side walls 51. As shown, the projection portion 54a of the flexible sheet 54 has apertures 54b therethrough.

An angle member 56 is bolted on the back wall of the box 26 in the stock inlet 10. This angle member 56 has the horizontal leg thereof provided with apertures 56a. When the recirculating device 50 is moved into position for cooperating with the stock inlet 10, bolts (not shown) join the projecting portion 54a of the flexible plate 54 with the angle member 56.

A box member 57 is mounted between the side walls 51 on top of the sheet 54. The side walls of the box have horizontally disposed slots 57a therein adapted to be aligned with vertical slots 51a in the side walls 51. Bolts 58 extend through the aligned slots and serve to adjustably support the box 57 on the side plates 51.

The flexible plate 54 is preferably formed of a non-corrodible alloy such as stainless steel or the like. The bottom 52 of the recirculating device is likewise covered with a non-corrodible alloy liner 59. The back wall 53 is also covered with a non-corrodible liner 60.

A stock passageway 61 is thus formed between the flexible plate 54 and the bottom 52. The rear end of this passageway 61 communicates through a slot or gap 62 with a chamber 63 defined by the flange 52b and the portion 53a of the rear wall 53. The bottom of this chamber 63

is closed by a slotted plate 64. A clean-out door 65 can be provided in one of the side walls 51 for cleaning out the chamber 63.

A pair of parallel horizontal stock conduits 66 are mounted under the plate 64 and support the previously described structure. These conduits 66, in turn, are carried by pedestals 67 and transverse beams 68 as shown in Figure 6.

As shown in Figures 5 and 11, the tops of the conduits 66 are slotted as at 66a along the entire length of the conduit that is disposed between the side plates 51.

The plate 64 has mating slots 64a as shown in Figure 5. The tops of the conduits 66 on each side of the slots 66a can be built up as shown at 66b to form a flat support for the plate 64.

When the recirculating device 50 is to be used, the barrier 46 is, of course, removed from the passageway 45 and the projecting end 54a of the flexible sheet 54 is bolted to the angle member 56. The box member 57 is then adjusted on the side plates 51 so that the passageway 61 in the recirculating device will have the desired shape and size. It should be noted that the flexible plate 54 can be bent since it bridges gaps between its anchored ends and the box 57. A changing of position of the box 57 is permitted by the slots 51a and 57a, thereby making it possible to vary the passageway 61.

Excess stock from the passageway 45 flows through the passageway 61 into the chamber 63 and thence through the slots 64a and 66a into the conduit 66.

As shown in Figure 8, these conduits 66 are closed at opposite ends by end caps 66c and are drained from the other opposite ends thereof through downpipes 69. As shown in Figure 6, the downpipes 69 discharge into a header 70 drained by a discharge conduit 71 into the stock supply line 72 on the suction side of a stock pump 73. Drainage is regulated by a valve 71a in the conduit 71.

The pump 73 pumps stock through a pipe 74 having a valve 75 therein into a header or pipe coupling 76 which discharges into feeder standpipes 77 communicating with opposite ends of the stock feed conduits 15 of the inlet 10.

As best shown in Figure 7, end caps or headers 80 are bolted on the ends of the conduits 15 and join the conduits together. The headers 80 are hollow and provide chambers 81 therein between the stock conduits 15.

End pieces or nozzles 82 extend through the end caps 80 and join the discharge ends of the feed pipe 77 with the interiors of the conduits 15 at opposite ends of the conduit. The nozzles 82 converge into spaced concentric relation from the walls of the conduits 15 thereby providing annular gaps 83 joining the chambers 81 with the interiors of the conduits.

The caps 80 have plugs 85 of a generally conical shape extending therethrough into the ends of the conduits 15 opposite the stock inlet ends thereof. These plugs 85 converge into the conduits 15 in spaced concentric relation from the conduit walls and thus define annular gaps 86 joining the chambers 81 of the end caps with the interiors of the conduits.

Stock enters each conduit 15 from a pipe 77 through a nozzle 82 and flows in opposite directions to the plugs 85 at the other ends of the conduits. As the stock flows, some of it is ejected through the perforated tops of the conduits while excess stock is deflected by the plugs

85 through the gaps 86 into the chambers 81 of the end caps 80. The stock in the end caps, however, is immediately drawn out through the gaps 83 to mingle with the oppositely flowing stock streams. Somewhat of a suction is caused at the gaps 83 by the flowing stock in the conduits. The excess stock is thus recirculated from one conduit to the next and the conduits therefore need not be provided with overflow devices to accommodate excess stock.

The plugs 85 are provided with central webs 87 acted upon by locking rods 88 threaded through the bosses 89 of arbors 90. The locking rods 88 are actuated by hand wheels 91.

As best shown in Figure 3, the arbors 90 have cylindrical bosses 92 on one end thereof swivelly mounted on bolts 93 extending from the end caps 80. The other ends of the arbors 90 have slotted bosses 94 thereon adapted to be swung around bolts 95 extending from the end caps 80.

The plugs are readily removed from the end caps and conduits by loosening the locking rods 88 and by swinging the arbors 90 so as to move the bosses 94 off of the bolts 95. The plugs can then be withdrawn and the opposite ends of the conduits are thus opened up for cleaning.

As best shown in Figure 2, clean-out doors or dump valves 96 can also be provided along the bottom of the conduits 15 intermediate the ends thereof. These clean-out doors can be opened to dump the contents of the conduits.

Operation of apparatus shown in Figures 1 to 11

From the above description it should be understood that the embodiment of the invention shown in Figures 1 to 11, inclusive, and specifically described above comprises a stock inlet which provides for the flowing of stock in opposite streams transversely across the width of a paper machine at a point adjacent the forming surface of a paper making machine. Stock is ejected or spurted through a myriad of orifices at the tops of the oppositely flowing streams into a superposed chamber. This superposed chamber has a slotted outlet at the top thereof extending across the entire width of the machine. The outlet may be adjusted in width, for example, by movement of a wall member 36.

Since the superposed chamber receives stock from oppositely flowing streams, the stock supplied to the slotted outlet of the chamber is constant both in volume and pressure across the entire width of the machine. Any pressure drop occasioned by ejection of stock from a flowing stream is offset by the oppositely flowing stream. Since the stock is ejected through submerged orifices before it can reach the slotted opening communicating with the forming wire of the machine it is subjected to a great turbulence and the fibers thereof will be in a complete dispersed condition.

A confined passageway connects the slotted opening of the superposed chamber with the upper run of the Fourdrinier wire and this passageway can be regulated in size, slope and extent in accordance with operating conditions. Thus the confined passageway can extend over the upper run of the wire to provide a confined pressure web forming zone on the wire.

The stock inlet of this embodiment can be used alone or in connection with a recirculating device which receives excess stock from the stock passageway and which divides this excess stock into oppositely flowing streams so as to prevent

any unevenness in stock pressure or volume across the width of the machine. The oppositely flowing streams from the recirculating device are merged and recirculated back to the stock furnishing equipment for the main outlet.

A single stock pump can be used and the discharge from this pump is split into the two oppositely flowing streams for supplying the stock inlet. The oppositely flowing streams of the recirculating device are merged before they reach the pump.

A feature of the embodiment includes the feeding of excess stock from one inlet stock stream to another so that this excess stock need not be recirculated back to the pump.

In actual use of a stock inlet according to this invention it has been found that the stock supplied to the forming wire of a paper machine can be more concentrated than was heretofore possible. Furthermore uniform sheets of paper free from cloud-like effect are obtained even from this concentrated stock. The stock fibers of the stock are in a thoroughly dispersed condition and the stock deposited on the forming wire has a uniform milky appearance as contrasted with the heretofore universally obtained mottled or flocculated appearance. Paper making machines equipped with stock inlets according to this invention can be operated at higher speeds than when equipped with heretofore known types of inlets because the use of a concentrated stock effects a more rapid web formation since it is not necessary to drain off such large amounts of dilution water as were heretofore required.

Description of apparatus shown in Figures 12 to 21

In the embodiment of the invention disclosed in Figures 12 to 21, the reference numeral 100 designates generally a stock inlet mounted behind the breast roll 101 of a Fourdrinier paper-making machine. A forming wire 102 is trained around the breast roll 101. The stock inlet 100 includes a pair of spaced parallel stock conduits 103 and 104 extending transversely across the width of the paper making machine behind the breast roll 101.

As best shown in Figure 12, paper stock from the stock furnishing equipment such as the stock screen 110 is discharged into a feed box 111 located immediately behind the inlet 100. The feed box 111 has a drain opening 112 in the bottom thereof and stock is discharged from the feed box through a pipe line 113 into a pump 114.

The pump 114 discharges stock under pressure into a pipe line 115 having a fitting 116 at the end thereof communicating with branch pipes 117 and 118. The branch pipes 117 and 118 enter the fitting 116 under the stock inlet 100 at a point mid-distant between the sides of the inlet. The branch pipe 117 has an elbow 117a on the top end thereof entering the stock conduit 103 of the inlet on the front side of the inlet while the branch pipe 118 discharges through an elbow 118a into the conduit 104 at the rear side of the inlet. The pipes 117 and 118 between the fitting 116 and the conduits 103 and 104 are of equal length.

As shown in Figures 12, 13, 15 and 16, the inlet 100 is mounted on web members 120. As best shown in Figure 16, the conduits 103 and 104 are cast integral with feet 121 which are bolted to the web members 120. End frame plates 122 are also cast integral with the conduits. A flat hori-

zontal wall member 123 is cast integrally with the tops of the conduits 103 and 104 to form a base extending between the end frame plates 122.

As best shown in Figure 13, pedestals 124 and 125 extend vertically upwardly from the wall 123 at the four corners thereof.

Beam members 126 bridge each pair of pedestals 124 and 125 at the front and rear sides of the inlet and are bolted to the tops of the pedestals.

I-beams 127 and 128 extend transversely across the top of the inlet and are mounted on top of the beams 126. Short I-beams 127a and 128a are mounted on the beams 126 between the I-beams 127 and 128. A vertical metal plate 129 is mounted in front of the I-beam 127. A second metal plate 130 is mounted behind the I-beam 128.

Clean-out doors such as 131 are mounted on the sides of the inlet between the pedestals 124 and 125. These doors 131 as shown in Figure 13 have horizontal web portions 132 extending along the outer face thereof and terminating in flanges 132a which extend over the outer faces of the pedestals 124 and 125.

As best shown in Figure 15, ears 133 extend outwardly from the pedestal and receive pivot pins 134 therein which pins pivotally support swing bolts 135. The swing bolts are adapted to extend through slots in the flanges 132a and wing nuts 136 threaded on the bolts 135 serve to draw the flanges 132a tightly against the pedestal for locking the doors 131 in closed sealing position.

As shown in Figures 13 and 16, a metal box 137 is cradled between the pedestals and held in position by means of bolts 138 extending through slots 139 in the pedestals. As will hereinafter be more fully described, the box is adapted to be swung for varying its position between the pedestals. The side walls of the box extend from below the tops of the doors 131 to seal the space therebeneath. Pairs of brackets 140 are bolted to the rear wall of the box 137 as best shown in Figures 13, 15 and 16. Link rods 141 have eye ends 141a pivotally mounted between the pairs of brackets 140.

The rear plate 130 at the top of the inlet has pairs of brackets 142 bolted thereon and projecting rearwardly therefrom. Worm and wheel housings or jack housings 143 are mounted between the pairs of brackets 142 and receive the threaded ends 141b of the links 141 therethrough.

The threaded ends 141b can be threaded through worm wheels in the casings 143. The worms in the casings are keyed on shafts 144 extending to the sides of the inlet and receiving hand wheels 145 on their outer ends.

A torque tube 146 can connect the shafts 144 between the casings 143 so that rotation of either hand wheel 145 will effect a raising or lowering of both links 141 to move the back end of the box 137 relative to the pedestals 125.

As shown in Figures 13, 14 and 16, the front end of the box 137 has pairs of brackets 147 bolted thereon and projecting forwardly therefrom. Link rods 148 have eye ends 148a pivotally mounted between each pair of brackets 147 and have threaded ends 148b threaded through the worm wheels in worm and wheel or jack casings 149. The casings 149 are carried between pairs of brackets 150 bolted on the front plate 129. The worm in the casing 149 at one side of the inlet is keyed on a shaft 151 while the worm in the other casing is keyed on a shaft 152.

The shafts 151 and 152 receive hand wheels 153 on their outer ends.

A second hand wheel 154 is slidably mounted on the inner end of the shaft 151 and is urged inwardly by a spring 155 disposed around the shaft between the hand wheel 154 and the casing 149.

A torque tube 156 is rotatably mounted between the shafts 151 and 152. A hand wheel 157 is mounted on the tube 156 adjacent to the hand wheel 154. The hand wheel 154 carries one portion 158a of a jaw clutch while the torque tube 156 carries the mating portion 158b of the clutch.

The spring 155 maintains the clutch in engagement so that a rotation of a hand wheel 157 will move both shafts 151 and 152 to raise and lower the front end of the box 137. However, if it is desired to move one shaft independently of the other, the jaw clutch can be disconnected by manual movement of the hand wheel 154 away from the hand wheel 157. The hand wheel 157 can be rotated to move the torque tube and shaft 152 independently of the shaft 151 and thus raise or lower one corner of the box 137 independently of the other front corner thereof.

The hand wheels 145 and 153 can be operated to move the box 137 when the bolts 138 are loosened in the slots 139. The front end of the box can be cocked or tilted by independent operation of the shafts 151 and 152.

The box 137 is thereby cradled between the pedestals 124 and 125 and can be adjusted to an exact desired position. After the box is adjusted the bolts 138 are tightened to lock the box in its adjusted position.

As shown in Figures 13, 15 and 16, a metal plate or gate 160 is mounted on the rear wall of the box 137 and extends downwardly therefrom. As best shown in Figure 15, the gate 160 has reinforcing webs 160a projecting rearwardly therefrom and is slotted as at 160b. The slots 160b receive bolts 161 therethrough which serve to secure the gate to the rear wall of the box 137.

The top edge of the gate 160 is cut away as shown in Figure 15 so as not to interfere with the brackets 140. The top of the gate has bosses 162 formed thereon receiving rods 163 therethrough. The rear wall of the box 137 also has bosses 164 formed thereon. Handle members 165 are pinned to the tops of sleeves 165a threaded in the bosses 164 and the rods 163 are threaded in the sleeves 165a. A rotation of the handles 165 will raise and lower the rods to move gate 160 relative to the box 137.

From the above description it should be understood that the box 137 is cradled in the frame structure of the stock inlet and can be adjusted to various positions. The box in turn carries the gate 160 and the gate can be adjusted relative to the box.

As best shown in Figure 16, a casting 170 is bolted to the wall 123 and extends downwardly from this wall to the front wall of the feed box 111. Side walls or castings 171 are secured to the rear pedestals 125 as shown in Figure 13 and abut against the sides of the gate 160 as shown in Figure 15 to form, with the gate and casting 170, a passageway 172 communicating with the interior of the feed box 111 whenever the gate is spaced above the wall 170 as shown in Figure 16.

Castings 173 and 174 (Figure 16) are bolted on top of the wall 123 and extend between the front and rear pedestals 124 and 125 respectively. These castings are in spaced opposed relation and include side walls defining a chamber 175

bove the stock conduits 103 and 104. The top of this chamber 175 is slotted as at 176 and the slot 176 extends transversely across the full width of the paper machine. The slot 176 communicates with a horizontal passageway 177 defined by the bottom of the box 137, the tops of the castings 173 and 174, the clean-out doors 131 and the pedestals.

The rear end of the passageway 177 communicates with the passageway 172 in front of the gate 160.

As shown in Figures 13, 14 and 16, the front pedestals 124 carry side plates 178 extending over the forming wire 102 of the machine. The bottom wall of the box 137 carries a plate 179 extending between the side plates 178. This plate 179 projects forwardly from the front wall of the box and is supported at its free end by rods 180 depending from brackets 181 mounted at spaced intervals across the front wall of the box. These rods 180 are pivotally mounted at their lower ends in ears 182 formed on the top of the plate 179 at the forward end of the plate.

Hand wheels 183 have shanks 183a threaded through the brackets 181. These shanks 183a are also internally threaded and receive the threaded ends 180a of the rods 180 therein. The threads on the inside and outside of the shanks 183a differ in pitch, so that a rotation of the hand wheels 183 to thread the shanks 183 downwardly into the brackets 181 will simultaneously cause an upward threading of the rods 180 into the shanks. This provides a micrometer adjustment for positioning of the front end of the plate 179 across the entire length of the plate. As shown in Figure 14, a plurality of hand wheels 183 are provided at spaced intervals along the length of the plate. The free forward end of the plate can thus be exactly positioned with respect to the forming wire 102 and the plate can be slightly warped if desired to vary the spacing between the forming wire and the plate.

The casting 173, as shown in Figures 16 and 17, has a forwardly extending lip 173a adjacent the breast roll 101. The top of the lip 173a has a dove-tailed slot 173b extending transversely across the width of the machine. An apron carrier 184 is mounted on top of the lip 173a and has a depending flange portion 184a extending into the groove 173b. The forward edge of the flange 184a converges in the same direction as the forward wall of the groove so as to snugly seat against this wall.

A wedge block 185 is also seated in the groove 173b behind the apron carrier 184 to lock the apron carrier to the lip 173a.

The leading end of the apron carrier 184 is recessed as at 184b (Figure 17) and the rear end of an apron 186 is mounted in the recess and secured to the apron carrier by means of screws 187. The apron 186 is preferably a rigid metal plate so that the front end of the apron will be suspended in spaced relation over the forming wire 102 as shown in Figure 17. The front edge of the apron 186 is tapered downwardly as at 186a so as to insure a smooth flow of stock onto the wire 102.

The passageway 177 shown in Figure 16 thus communicates at its front end with the upper run of the forming wire 102. The front opening of the passageway can have any desired width by adjustment of the box 137 and the plates 179.

The rear end of the passageway 177 communicates with the overflow passageway 172 and

excess stock can be delivered back to the feed box 111.

As shown in Figures 14 and 15, the ends of the stock conduits 103 and 104 have end plates 190 disposed therearound or cast integrally therewith. The inlet pipes 117 and 118 are connected with the inlet ends of the conduits 103 and 104 by means of elbows 117a and 118a respectively which pass through the end plates 190 as best shown in Figure 15.

The end plates 190 at the outlet ends of the conduits 103 and 104 carry U-shaped strap members 191 each having an eye portion 191a on one leg thereof. This eye portion 191a receives there-through a bolt 192 extending from the plate 190 to swivelly mount the strap on the plate. The other leg of the strap 191 has a slotted foot 191b adapted to be disposed around a second bolt 193 extending from the frame plate 190 behind the head of the bolt.

Funnel-shaped caps 194 have the mouths thereof seated in the discharge ends of the conduits 103 and 104. These caps 194 are held in seated position against the ends of the conduits by locking pins 195 which are threaded through the strap members 191 and operated by hand wheels 196.

When it is desired to remove the caps 194 from the conduits, the hand wheels 196 are rotated to retract the pins 195 from the caps. The straps 191 are then swung about the bolts 192 to move the slotted feet 191b away from the bolts 193. The caps can then be lifted away from the discharge ends of the conduits.

As shown in Figure 15 the caps 194 converge into pipes 197 which are reversed inwardly toward the middle of the stock inlet. These pipes 197 communicate with branch pipes 198 extending to a T or Y-coupling 199 (Figure 12) in the center of the stock inlet. The coupling 199 discharges into a single pipe 200 (Figure 12) entering the front end of the feed box 111. The stock is thus fed to the adjacent stock conduits through the feed pipes 117 and 118 and excess stock in the conduits is recirculated back to the feed box through the caps 194 and return pipes connected therewith.

During its passage through the conduits 103 and 104, some of the stock is ejected into the chamber 175 (Figure 16) through the holes 201 in perforated plates 202 which are slidably mounted in the longitudinally slotted tops of the conduits.

As best shown in Figure 21, each conduit such as the conduit 103 has an open top or slot 203 extending along the full length thereof. The slot 203 has grooves 203a in the sides thereof extending between the clean-out doors 131. The portions of the conduits extending outwardly from the clean-out doors have the tops of the side walls along the slots 203 cut back flush with the back walls of the grooves 203a as shown in dotted lines at 203b.

The perforated plates 202 have tongues 202a seated in the grooves 203a of the slots.

As best shown in Figure 18, a series of plates 202 are used in each slot 203. The end plates 202 which are disposed adjacent the clean-out doors 131 have the tongues 202a extending along the full length thereof. These end plates 202 are shorter than the intermediate plates 202 and the longer intermediate plates only have the tongues 202a extending along the sides thereof for a portion of their lengths. This provides tail portions

202b on one end of the intermediate plates for a purpose to be hereinafter more fully described.

As shown in Figures 14 and 15, end plates 205 cover the slots 203 in the conduits 103 and 104 between the outer ends of the conduits and the clean-out doors 131. These covers 205 can seat on the shoulders provided between the back walls 203b and the side walls of the slots 203. Bolts or screws 206 anchor the covers to the conduits.

The plates 202 are readily inserted and removed from the slots 203 of the conduits. For example, the covers 205 can be removed and the tail ends 202b of the intermediate plates 202 inserted into the slots 203. The leading end of the plate 202 is then moved so that the tongues 202a thereof will enter the grooves 203a of the slot. The tongues 202b make possible the use of longer plates 202 since, when the tongues 202a are entering the grooves 203a, the free ends of the plates must be aligned in the slots. The unseated portion of the plates can then not be longer than the length of the covers 205. Additional plates 202 are pushed along the slots 203 by the successively inserted plates until the entire lengths of the slots 203 between the clean-out doors is filled with plates. The covers are then inserted in exposed portions of the slots and bolted in place. When it is desired to remove the plates for cleaning purposes or to insert plates having different sized or differently arranged holes 201, the covers at the opposite ends of the conduits are removed and the plates are pushed from one end of the conduits to the other end and removed at this other end. This arrangement provides a convenient adjustment for changing the orifices in the conduits.

As shown in Figure 18, a plurality of rows of holes 201 are provided in the plates with the holes in each row being in staggered relation. As shown in Figure 20, each hole 201 has a beveled bottom portion 201a tapering upwardly into the hole in the direction of flow of stock through the conduit. As best shown in Figure 19, these beveled portions 201a converge from the holes and are readily formed by drilling at an angle to the axis of the holes.

These beveled portions 201a tapering into the holes in the direction of flow of the stock through the conduits prevent undesired flow of stock past the holes since the stock is, in effect, directed into the holes. The beveled portions also prevent the formation of eddy currents which might decrease ejection of stock through the holes and serve to tap off the stock from the flowing streams into the holes. The stock will be impacted against the back walls of the holes so as to be in a thoroughly deflocculated condition when it enters the chamber 175.

Operation of apparatus shown in Figure 12 to 21

In the embodiment of the invention shown in Figures 12 to 21, paper stock from the pulp furnishing equipment such as the stock screens is deposited into a feed box and pumped from this feed box under pressure to spaced parallel stock conduits mounted adjacent the forming wire of a paper machine. These stock conduits extend transversely across the width of the machine and have perforated plates along the length thereof for ejecting stock therefrom into a common chamber. The stock flows through the conduits in opposite directions so that a decrease in flow or pressure from the inlet to the outlet end of one conduit is compensated by the other adjacent conduit through which the stock is flowing in an opposite direction.

The perforated plates permitting ejection of stock from the conduits into the common chamber have holes therethrough arranged in staggered relation. The bottoms of the holes are beveled so as to direct the stock flowing through the conduits into the holes.

The stock inlet has a confined open ended passageway communicating intermediate its ends with the chamber receiving the stock from the conduits. The front end of the passageway opens onto the forming wire of the paper machine while the rear end of the passageway can be closed off or can communicate back with the feed box.

In this manner the stock can be flowed into the passageway under constant speeds and pressures while the volume of stock discharged on the forming wire can be entirely independent of the volume fed to the passageway. The return passage to the feed box can be regulated by a control gate and the size of the discharge opening onto the forming wire can also be regulated. In addition, the size of the passageway itself can be regulated and varied in shape by movement of a box which forms the top wall of the passageway.

Both stock conduits have discharge outlets at the ends thereof opposite their inlet ends, and these discharge conduits recirculate the excess stock back to the feed box.

The stock inlet has many adjustments that can be quickly made to maintain optimum conditions for the particular type of stock being used.

The counterflow stock feed principle transversely across the width of the paper machine is coupled with a uniform outlet distribution across the machine so that there will be no variation in the flow of stock supplied to the forming wire even on extremely wide machines. The merging of the stock from the oppositely flowing streams and the direct flowing of the merged stock onto the forming wire in amounts independent of the volume ejected from the stock conduits makes possible exact controlling of the feed. Thus the velocity of the stock can be killed at the top of the merging chamber since stock from the merging chamber can flow both to the wire and to the overflow chamber.

The stock pump can be operated by capacity at all times and no valves or other adjusting devices for the flow of stock are necessary.

The transverse counterflowing of the stock eliminates pump irregularities and ejection of slugs of stock on the wire, since the stock is flowed transversely of the direction of travel of the wire. Stock of heavier consistencies than was heretofore possible can be used to make high grade, uniform sheets.

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.

We claim as our invention:

1. A stock inlet for a paper making machine having a web forming surface which comprises a plurality of longitudinally orificed stock conduits extending transversely across the width of the paper making machine, means for flowing stock in opposite directions through said conduits for ejection from the conduits along the lengths thereof and means defining a stock passageway having a width as great as the width of said web forming surface for directly receiving stock ejected from said conduits.

2. A stock inlet for a Fourdrinier type paper making machine having a forming wire trained around a breast roll which comprises a pair of adjacent horizontal stock conduits extending transversely across the width of said paper making machine behind said breast roll, means for flowing stock longitudinally in said conduits in opposite directions, said conduits having a plurality of orifices along the length thereof to eject stock from the conduits, means defining a chamber communicating through the bottom with said orifices for receiving ejected stock, said chamber having a slot at the top thereof extending transversely across the width of said machine, and means for defining a confined stock passage connecting said slot with the upper run of the forming wire.

3. A stock inlet for a paper making machine comprising a frame member having spaced opposed side walls and a slotted bottom, means defining a chamber beneath said bottom in communication at the top thereof with said slot, a pair of elongated stock conduits beneath said chamber, and means for flowing stock in opposite directions through said conduits, said conduits having a plurality of orifices at the tops thereof communicating with the bottom of said chamber for ejecting stock into the chamber whereby stock received into the chamber will overflow through said slot and along the bottom of the frame to the forming surface of the paper machine.

4. A stock inlet for a paper making machine which comprises a frame having spaced opposed side walls and a bottom connecting said side walls, said bottom having a transverse slot there-through, a member cradled between said side walls above said bottom, said member having a bottom wall defining with the sides and bottom of the frame a confined stock passageway, means for moving said member in a plurality of planes relative to the side walls and bottom for varying the size and contour of the stock passageway, and means for supplying stock through the slot in said bottom into said passageway for delivery to the forming surface of the paper making machine.

5. A stock inlet for a paper making machine comprising a frame member having spaced opposed side walls, a box between said side walls, means carried by said side walls for cradling the box therebetween, and means for shifting said means to move the box horizontally and vertically.

6. A stock inlet for a paper making machine comprising a frame having spaced opposed side walls joined by a bottom wall, a box member between said side walls above said bottom wall, and a plurality of turnbuckles cradling said box in said frame for independent vertical and horizontal movements relative to the side walls and bottom.

7. A stock inlet for a paper making machine comprising spaced opposed side walls, a bottom wall joining said side walls, a box cradled between said side walls above said bottom, means for shifting said box vertically and horizontally relative to said side walls and bottom, a beam secured to the front end of said box, a plurality of rods depending from said beam at spaced intervals along the length thereof, a flexible plate extending forwardly from said box under said rods and means connecting said rods with the forward end of said flexible plate.

8. A stock inlet for a Fourdrinier type paper making machine adapted to be mounted behind

the breast roll of said machine which comprises a frame member having spaced opposed side walls and a bottom wall joining said side walls at the level of the upper run of the paper machine forming wire, a box cradled between said side walls above said bottom wall and having a flexible plate extending forwardly therefrom over the upper run of the forming wire, said box, side walls and bottom wall defining a confined stock passageway communicating at its front end with the upper run of the forming wire, means for shifting said box to move the flexible plate forwardly for defining a confined stock forming area on the upper run of the forming wire, and additional means for raising and lowering the box to vary the capacity of the stock passageway.

9. In a stock inlet for a Fourdrinier type paper making machine, a pair of spaced parallel horizontal stock conduits extending transversely across the width of the paper making machine, said stock conduits having a plurality of small orifices at the top thereof extending across the entire width of the paper making machine, means for flowing stock under pressure in opposite directions through said conduits, walls defining a housing above said conduits for receiving stock from said orifices, said walls converging at the tops thereof to define a slot across the entire width of the paper machine, and means defining a confined stock passageway communicating with the upper run of the forming wire of the machine for receiving stock directly from said slot.

10. In a stock inlet for a Fourdrinier type paper making machine, a pair of horizontal stock conduits extending transversely across the width of said machine, said conduits having a plurality of small orifices along the tops thereof, means for supplying stock into opposite ends of said conduits for inducing oppositely flowing stock streams through the conduits, and means for circulating excess stock from the outlet end of one conduit into the inlet end of the other conduit.

11. A stock inlet for a paper making machine comprising a pair of spaced parallel stock conduits having orifices along the lengths thereof, hollow end caps joining the adjacent ends of said conduits, a stock supply pipe extending through one hollow end cap into the adjacent end of one conduit, a second stock supply pipe extending through the other hollow end cap into the adjacent end of the other conduit, and said stock supply pipes being spaced from the conduit walls to provide gaps for receiving excess stock from the end caps.

12. In a stock inlet for a paper making machine, a pair of spaced parallel horizontal stock conduits, said conduits having a plurality of orifices along the lengths thereof, hollow end caps joining adjacent ends of said conduits, a separate nozzle extending through each end cap into one end of each conduit in spaced relation from the conduit walls, a separate plug extending through each end cap into the other end of each conduit in spaced relation from the conduit walls and means for flowing stock through said nozzles to create oppositely flowing stock streams in the conduits for ejection through the orifices thereof whereby excess stock at the plugged ends of the conduits will flow into the end caps and around the nozzles for admixture with the stock streams issuing from the nozzles.

13. In a stock inlet for paper making machines, a pair of stock conduits having openings along the lengths thereof, hollow headers joining the adjacent ends of said conduits, said headers be-

ing in communication with the interiors of the conduits and means for introducing stock into one end of one conduit and into the opposite end of the other conduit for inducing oppositely flowing stock streams therein whereby excess stock will enter the headers from one conduit and recirculate into the other conduit.

14. In a stock inlet for a paper making machine having a pair of stock conduits, hollow end caps joining the adjacent ends of said conduits, a separate conical plug extending through each end cap into one end of each conduit in spaced concentric relation from the conduit walls, arbors carried by said end caps and locking rods threaded through said arbors for forcing the plugs into the end caps.

15. A stock feed for paper making machines comprising a pair of parallel conduits, end caps for said conduits establishing communication therebetween, nozzles extending through said end caps into one end of one conduit and the opposite end of the other conduit, plugs extending through said end caps into the nozzle free ends of the conduits, said conduits having openings along the lengths thereof between the nozzles and plugs, means for flowing stock through said nozzles into the conduits to flow therein in opposed directions for ejection through the openings, said nozzles and plugs being in spaced relation from the conduit walls whereby excess stock from one conduit will be drawn around the nozzle in the other conduit for admixture with the stream emerging from said nozzle.

16. A stock inlet for a paper making machine comprising means defining a confined stock passageway, transverse slots through the bottom of said passageway in spaced relation from each other and from the front end of the passageway, means for flowing stock into said passageway through one of said slots, and means for draining stock from said passageway through the other of said slots.

17. A stock inlet for a Fourdrinier type paper making machine comprising means defining a confined stock passageway communicating at its front end with the upper run of the paper machine forming wire, said stock passageway having a transverse slot through the bottom thereof at the rear end of the passageway and a second transverse slot through the bottom thereof in spaced relation from the front and rear ends of the passageway, means for flowing stock through said second slot into the passageway for flow onto the forming wire and through said first mentioned slot.

18. A stock inlet for a Fourdrinier paper making machine comprising means defining a confined stock passageway at the level of the upper run of the paper machine forming surface, the mouth of said passageway communicating with the upper run of the forming surface, said passageway having a width equivalent to the width of the forming surface, the bottom wall of said passageway having front and rear spaced transverse slots therethrough, a pair of stock feed conduits supplying stock from oppositely flowing streams through the front slot to said passageway, a pair of stock drain conduits spaced rearwardly from the forming surface and extending transversely below the passageway in communication along their lengths with said rear slot, and means for flowing stock out of one end of one drain conduit and out of the opposite end of the other drain conduit.

19. A recirculating device for a paper making

machine stock inlet which comprises a pair of parallel stock conduits having openings along the lengths thereof, means defining a passageway communicating with said stock inlet to receive excess stock therefrom, said passageway having a slotted bottom communicating with said conduits and means for draining said conduits from opposite ends thereof to induce oppositely flowing streams of stock in said conduits.

20. An overflow attachment for a paper making machine stock inlet which comprises a frame member having spaced opposed side plates joined by a bottom wall, a back wall member between said side plates, a box member suspended between said side plates above said bottom wall, and a flexible plate secured to said back wall and underlying said box to form a confined passageway with said back wall, said side walls and said bottom.

21. A stock recirculating device for a paper making machine stock inlet which comprises a pair of parallel adjacent stock conduits, end caps closing opposite ends of said conduits, drain pipes communicating with the other opposite ends of the conduits, said conduits having longitudinally slotted tops, means defining a closed chamber above said conduits communicating with said slots in the conduits, said chamber having a slotted top and means defining a laterally extending stock passageway above said chamber whereby stock flowing through said passageway will drain through said slot into the chamber and from the chamber into the conduits to form opposite streams flowing out of the conduits into the drain pipes.

22. A stock inlet for a paper making machine comprising a pair of spaced opposed plates joined by a bottom wall, a box cradled between said plates in spaced relation above the bottom wall to form a confined stock passageway, a flexible plate secured to the front and rear ends of said box, a second frame member having spaced opposed side walls joined by a bottom secured to said first mentioned frame member, said flexible plate secured to the rear end of the box extending between said side plates of the second frame member in spaced relation above the bottom thereof to define with the side plates and bottom a rearward extension of the stock passageway, and a second box member suspended from said side plates of the second frame member above the flexible plate for rigidifying the plate and means for adjusting said second box member to flex the plate for varying the capacity of the rearward extension of the passageway.

23. A stock inlet for a Fourdrinier type paper making machine comprising means defining a stock passageway extending rearwardly from the upper run of the paper machine forming wire, said passageway having a width as great as the forming surface of the forming wire, the bottom wall of said passageway having a pair of spaced transverse slots therethrough rearwardly from the front end of the passageway extending across the full width thereof, means for feeding stock to said passageway through one of said slots, and drain means communicating with the other slot to receive excess stock from the passageway.

24. The method of feeding stock to the forming surface of a paper making machine which comprises ejecting stock from oppositely flowing streams into a stock passageway communicating with the paper machine forming surface, and recirculating excess unejected stock from one stream to the other.

25. The method of feeding stock to a forming

surface of a paper making machine which comprises inducing oppositely flowing streams of stock transversely across the width of the paper machine, spouting stock from said streams through small orifices into a passageway communicating with the forming surface and recirculating unspouted excess stock from one stream to another.

26. The method of feeding stock to a Four-drinier type paper making machine which comprises providing a confined stock passageway extending laterally from the upper run of the forming wire at the breast roll end thereof across the entire width of the forming wire, forcing stock under pressure through the bottom of said passageway at a point intermediate the ends thereof, draining excess stock from the rear end of the passageway to oppositely flowing transverse streams and recirculating stock from said oppositely flowing transverse streams back to the passageway.

27. The method of supplying stock to a Four-drinier paper making machine which comprises ejecting stock under pressure through submerged orifices from oppositely flowing streams extending transversely across the width of the paper machine, merging the ejected stock in a superposed chamber, laterally overflowing the stock from said chamber onto the upper run of the forming wire, laterally flowing excess stock from said chamber into oppositely flowing transverse streams, and recirculating said excess stock from the oppositely flowing transverse streams back to the first mentioned streams.

28. A stock inlet for a paper making machine comprising a feed box, stock conduits extending transversely across the width of the machine and having openings along the lengths thereof, a pump receiving stock from the box, pipes receiving stock from the pump and each communicating with a stock conduit at opposite sides of the machine to flow stock in opposite directions through adjacent conduits for ejection through the openings along the lengths of the conduits, outlet pipes joining the conduits at the ends thereof opposite the inlet ends with the feed box to return excess stock to the feed box, means defining an open topped chamber directly receiving stock ejected from the conduits to merge the ejected stocks, means defining an open ended passageway above the chamber receiving stock from the chamber, a gate at the rear end of said passageway controlling drainage of stock from the passageway back to the feed box, and a forming wire for receiving stock from the front end of the passageway.

29. A stock inlet for paper making machine which comprises a pair of parallel elongated stock conduits having openings in the tops thereof along their lengths, means inducing opposite flowing streams of stock in said conduits for ejection through said openings, means defining an elongated chamber above the conduits communicating with the openings in both conduits to receive the ejected stock, said chamber having a slot at the top thereof along its length, means including a shiftable top wall defining a confined open ended passageway extending laterally on both sides of said slot to receive stock from the chamber, means for shifting the top wall of the passageway to vary the shape and capacity of the passageway, a gate at the rear end of the passageway extending below said top wall and means for adjusting said gate relative to said top wall.

30. In a stock inlet for a paper making machine, a frame structure having spaced opposed side members and top members bridging the side members, a box between the side members, link rods pivotally connected to said box, worm and gear casings mounted on said top frame members receiving said link rods in threaded relation therein, and hand wheels to operate the worms and gears in the casings for raising and lowering the link rods whereby said box is cradled in said frame for movement relative to the frame.

31. In a stock inlet for paper making machines a frame structure having spaced opposed side members and transverse top members bridging the side members, a pair of jacks carried by each of said transverse members, shafts for operating each pair of jacks simultaneously, link rods acted on by said jacks for vertical movement relative thereto, a box between said side frame members pivotally connected at the front and rear thereof to said link rods, and a clutch for disconnecting the shaft between one pair of jacks to allow independent operation of each jack in said pair whereby said box is cradled in said frame and said jacks can move the box relative to the frame.

32. In a stock distributing conduit having a plurality of perforations along the length thereof, the improvement which comprises a longitudinally extending tapered wall portion sloping into each perforation to direct stock flowing through the conduit into the perforation.

33. A stock distributing element for a stock inlet comprising a conduit having a slot along the top thereof, said slot having grooved side walls, perforated plates seated in said slot having tongues extending along the sides thereof seated in said grooves, and longitudinally extending tapered bottom walls on said plates adjacent each perforation thereof and diverging outwardly in the direction of flow of stock in the conduit and upwardly into the perforations at the divergent ends thereof to direct stock through the perforations.

34. A stock inlet for a paper making machine comprising a frame member having a substantially flat top wall, a pair of spaced parallel stock conduits beneath said wall transversely thereof for flowing stock across the width of the wall, said conduits having slots along the length thereof extending through said wall, perforated plates seated in said slots joining the interiors of the conduits with the space above said wall, pedestals extending vertically upwardly from said wall at the four corners thereof, side beam members bridging the tops of said pedestals, transverse beams bridging the tops of said side beam members, a box suspended from said transverse beam members between said pedestals, doors disposed between said pedestals on each side of the inlet forming confining side walls beneath the bottom of said box, and members secured on said flat wall having side walls defining with said doors a chamber receiving stock from said conduits and said members also having top walls defining with the bottom wall of said box an open ended passageway communicating at its front end with the forming surface of the paper machine.

35. A stock inlet for paper making machines comprising side frame members defining the side walls of a stock chamber, stock distributing conduits extending transversely between said side walls and projecting outwardly therefrom, said conduits having slots in the tops thereof along their lengths, perforated plates slidable in said

slots from the exposed portions of the slots outside of the side frames, cover plates for sealing the exposed portions of said slots, and means for flowing stock in opposite directions through said conduits for ejection through the perforated plates into the stock chamber.

36. The method of feeding stock to the forming surface of a paper making machine which comprises pumping stock under pressure in opposite directions through conduits extending transversely across the width of the paper machine, spouting stock along the lengths of said conduits into a superposed chamber, merging the spouted stock in said chamber, overflowing the merged stock out of the top of the chamber into an open ended passageway communicating at its front end with the forming surface of the machine, draining stock out of the rear end of said passageway back into said feed box and regulating said drainage to control the velocity and volume of stock fed to the forming surface.

37. The method of feeding stock to the forming surface of a paper machine which comprises continually pumping stock from a feed box in opposite directions through stock conduits extending

transversely across the machine, recirculating excess stock from said stock conduits back to said feed box, spouting stock from the tops of said conduits into a chamber, overflowing stock from said chamber into a passageway, ejecting stock from the passageway onto the forming surface and draining excess stock from said passageway back to said feed box.

38. A stock inlet for a paper making machine having a forming surface comprising means defining a passageway to said forming surface, a pair of stock conduits extending transversely across the width of said machine, each of said conduits having restricted communication along its length with said passageway, means for supplying the stock into opposite ends of said conduits for inducing oppositely flowing stock streams through the conduits for ejection along the length of the conduits into said passageway across the width of said machine, and means circulating excess stock from the outlet end of one conduit into the inlet end of the other conduit to recirculate stock through the conduits.

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