

March 18, 1952

S. A. STAEGE
PAPER MACHINERY

2,589,638

Filed July 19, 1946

2 SHEETS—SHEET 1

FIG-1

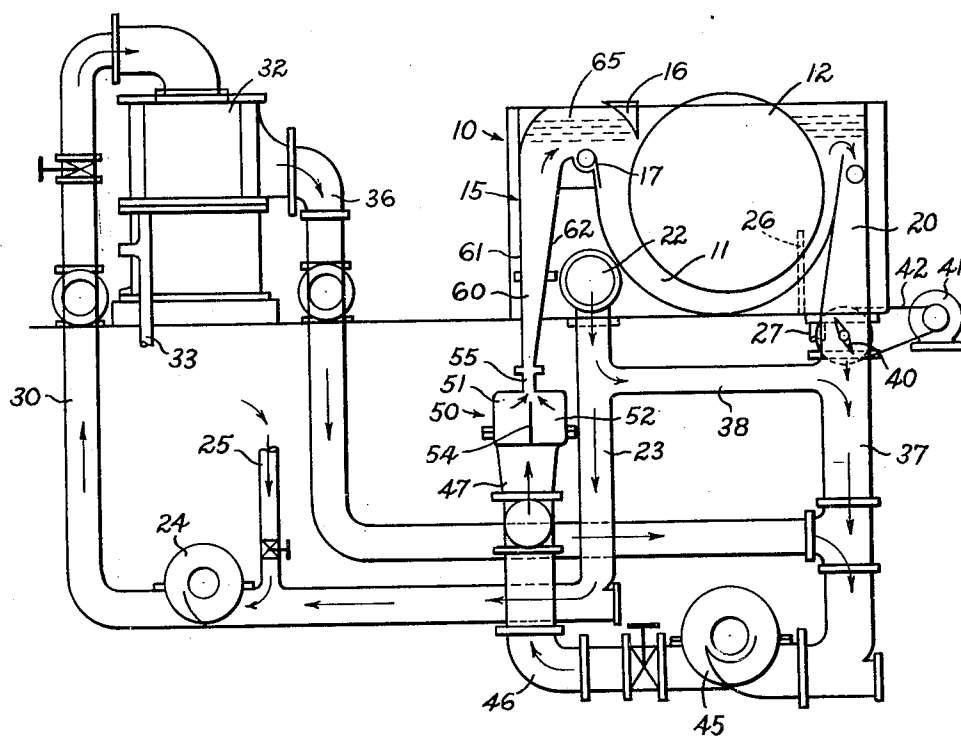
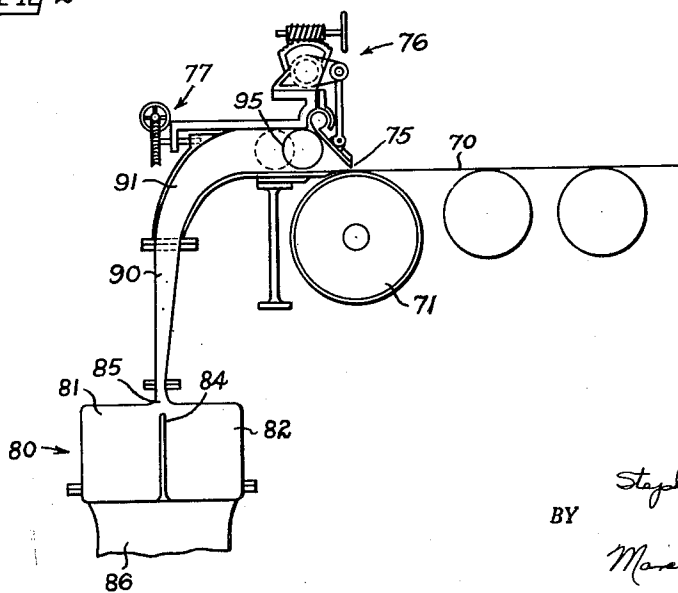


FIG-2



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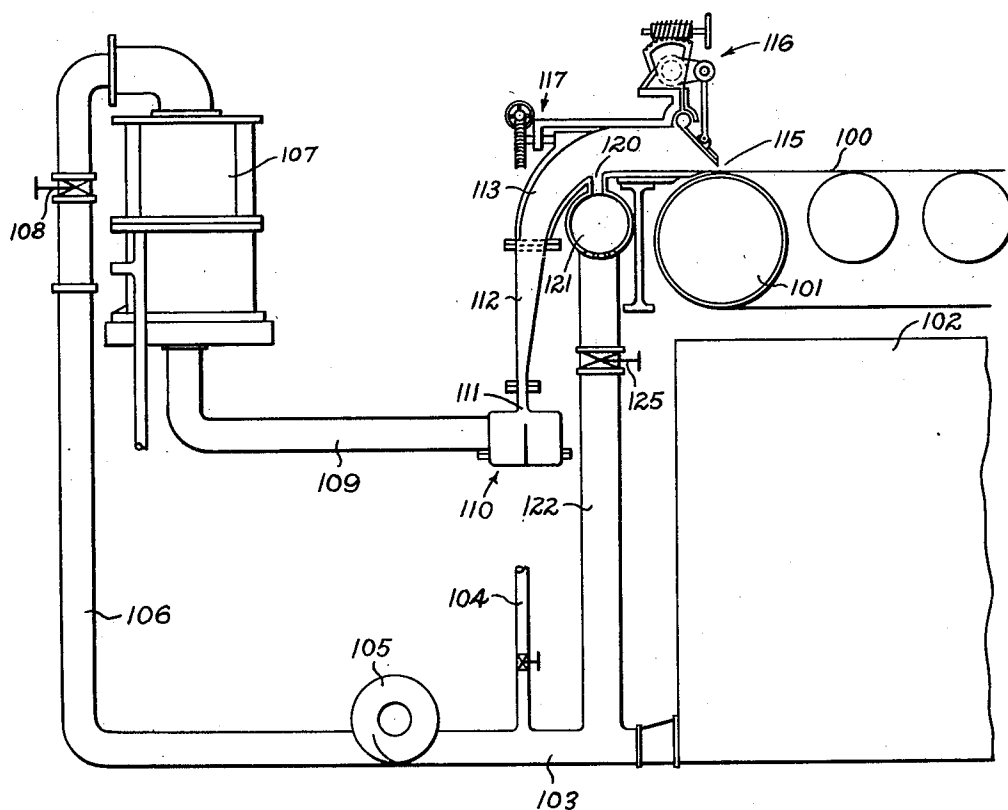
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PAPER MACHINERY

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2 SHEETS—SHEET 2

Fig-3



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UNITED STATES PATENT OFFICE

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PAPER MACHINERY

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Application July 19, 1946, Serial No. 684,980

11 Claims. (Cl. 92-44)

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This invention relates to paper making, and more particularly to stock supply systems for paper making machines. This application is a continuation-in-part of application Serial No. 607,820, filed July 30, 1945, for Paper Machinery, now Patent No. 2,540,301 issued February 6, 1951 and assigned to the same assignee as this application.

One of the principal objects of this invention is to provide for continuous control of the flow conditions of stock approaching the forming member of a paper machine to avoid abrupt changes in velocity or pressure and to maintain the desired smooth and uniform flow conditions across the width of the stock supply substantially continuously to the forming member.

Another object is to provide for dissipating without turbulence the velocity energy of stock entering the stock inlet passage of a paper machine at high velocity while at the same time avoiding abrupt or substantial changes in flow conditions such as might tend to cause flocculation or lump formation.

An additional object is to provide a stock inlet passage for a paper machine adapted to receive stock at high velocity and including a Venturi portion capable of dissipating the velocity energy of the stock with minimum turbulence and adapted to supply the stock to the forming member in substantially uninterrupted flow without the formation of pools or slow moving reservoirs of stock tending to cause abrupt or substantial changes in the flow conditions.

It is also an object of this invention to provide a stock supply system for a paper machine wherein optimum flow conditions may be maintained in the stock inlet passage over a wide range of speeds of the forming member.

A further object is to provide a stock supply system for a paper machine wherein the volume of flow of the stock at the slice may be readily varied over a wide range while maintaining substantially uniform flow conditions through the stock inlet.

Another object is to provide a stock supply system wherein the flow of stock into the inlet passage may be at a substantially higher velocity than at its point of delivery to the forming member in order to maintain the stock in properly mixed condition and to prevent the heavier constituents from settling out even when the machine is operated at comparatively low speed.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings—

Fig. 1 is a schematic view of a circulating and stock supply system in accordance with the in-

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vention for a cylinder type paper machine, showing the path of flow of incoming stock and collected white water as supplied to and discharged from the paper forming parts;

Fig. 2 is a fragmentary view similar to Fig. 1 showing a stock supply system in accordance with the invention for a Fourdrinier type machine; and

Fig. 3 is a view similar to Fig. 1 showing a stock supply system in accordance with the invention for a Fourdrinier type machine and including a by-pass connecting the inlet passage or head box with the suction side of the circulating pump to control the volume at the slice.

Referring to the drawings, which show preferred embodiments of the invention, in Fig. 1 the vat is indicated generally by the reference character 10 and includes the vat circle 11 with the rotary forming member or cylinder mold 12 mounted therein. A tapered vat inlet 15 supplies the incoming stock to the vat, as described in more detail hereinafter, and the usual mold slice 16 and adjustable rotary slice 17 may be provided as desired. The vat has an overflow compartment 20, with the overflow dam being lowered or removed when using the means for maintaining the vat level described in the above noted application Serial No. 607,820.

The white water is withdrawn from vat 10 through pickup 22 located in the vat, and it is fed through conduit 23 into white water pump 24, new stock from the regulating box being introduced into conduit 23 from pipe 25 directly ahead of pump 24 as shown. The level in the vat is maintained by the white water spill dam 26 shown in dotted lines in Fig. 1, the overflow from which may be discharged to the sewer as indicated at 27.

The discharge of the white water pump is supplied through conduit 30 to a suitable screen 32, the reject from which is removed as shown at 33 and discharged. The screened stock is withdrawn through conduit 36 and delivered into the conduit 37 which also receives the overflow from the overflow compartment 20, a branch conduit 38 also being provided for return of a portion of the white water directly into the stock overflow. Control of flow from overflow compartment 20 is provided by a butterfly valve 40, and provision is made for power operation of this valve, such mechanism being shown as comprising a reversible electrical motor 41 operatively connected to cause rotation of the valve by belt or sprocket 42. Automatic control of the operation of this motor may in turn be provided by means such as the liquid level control shown in detail in said application Serial No. 607,820, such control being effective to move the valve to a more open position when the liquid within the vat rises above the desired

level and to move the valve to a more closed position when the liquid within the vat falls below the desired level.

A circulating pump 45 delivers the stock from conduits 36 and 37 through a conduit 46 which is preferably branched at 47 to supply the stock to a counterflow inlet 50, shown as of the construction disclosed in Patent No. 2,347,717 assigned to the same assignee as this application. Within this inlet 50 is a pair of oppositely tapered, transversely extending conduits 51 and 52 separated by a vertical baffle 54 positioned immediately below and parallel to a common discharge orifice 55 which is substantially narrower than the corresponding dimensions of the tapered conduits 51—52 and extends transversely across substantially the entire width of the inlet passage 15. The branched conduits 47 supply stock to the larger end of each of these tapered conduits, and there is thus provided a cross flow of stock through orifice 55 which gives substantially uniform pressure and flow of stock at relatively high velocity into the inlet passage 15 and across its entire width.

As a result of the restricted dimensions of the discharge orifice 55 with respect to the tapered conduits 51—52, there is during operation a substantial pressure differential across this orifice which develops a definite velocity condition in the flow of stock therethrough, this velocity flow providing for thorough mixing and distribution of the stock and high uniformity across the entire width of the inlet passage. It is desirable to maintain the pressure differential and velocity of flow substantially uniform across the passage for maximum uniformity of sheet formation, and also to dissipate the initial velocity energy of this stock before it reaches the forming member in order to avoid objectionable turbulence tending to non-uniform sheet formation. Accordingly, the present invention provides for obtaining these results by means of the tapered construction of the inlet passage 15, which is shown as formed to coact with orifice 55 in the manner of a venturi.

In Fig. 1 the counterflow inlet passage 50 is shown as positioned with its discharge orifice 55 spaced at a substantial distance from the point of delivery of stock to the forming member 12, thus providing for substantial travel of stock between the orifice 55 and the forming member. The portion of the inlet 15 adjacent the discharge orifice 55, i. e. the lower portion 60 as shown in Fig. 1, has its walls 61 and 62 relatively diverging away from the discharge orifice and at a relatively small angle, this angle being not more than about 10° and a satisfactory example being a total included angle of the order of 7½° or an increase of approximately ⅛" per inch of travel. This tapered construction provides for gradually and progressively increasing the cross-sectional area to at least approximately four times the total area of the discharge orifice 55. The remaining portion 65 of the inlet passage 15 is shown as generally of at least as great cross-sectional area as the larger or upper end of the tapered passage portion 60, this portion 65 being smoothly curved to direct the stock from the tapered passage portion to the slice and the forming zone of the forming member with minimum turbulence or pockets where stock could collect and flocculate to form a lumpy condition.

With the above construction, the stock entering the inlet passage 15 through the discharge orifice 55 with a relatively high velocity of flow has its velocity energy gradually absorbed and

dissipated within the tapered Venturi passage portion 60 with minimum turbulence. At the same time, the construction of the adjacent passage portion 65, which is shown as of substantially the same capacity as the larger end of the Venturi portion 60, provides for directing the stock in a smooth and substantially uninterrupted flow directly to the forming zone without the formation of pools or slow moving reservoirs of stock such as may cause abrupt or substantial changes in flow conditions with resulting tendency toward flocculation and lump formation. With this stock supply system as shown and described, control over the flow of stock is maintained continuously from the entry of the stock by way of the discharge orifice 55 throughout the length of the inlet passage 15 and up to as close to the actual forming zone as is practicable. All the stock between orifice 55 and the forming member is kept in constant motion towards the forming member at a velocity which is constant across the width of the inlet passage, changes in velocity being substantially uniform laterally and taking place smoothly and with minimum turbulence.

Fig. 2 illustrates an inlet passage similar to that shown in Fig. 1 as applied to a Fourdrinier type paper machine. In this construction, the forming wire 70 travels over a breast roll 71, and stock is supplied through the slice or orifice 75, the width of which may be adjusted vertically by the adjusting mechanism indicated generally at 76. Forward and backward adjustment of the slice may similarly be made by the adjusting mechanism indicated generally at 77.

In Fig. 2, the stock is supplied to the slice and forming member through a counterflow inlet 80 and tapered inlet passage in substantially the same manner as shown and described in connection with Fig. 1. The inlet 80 includes tapered conduits 81 and 82, a baffle 84 and a restricted discharge orifice 85 common to both of the tapered conduits. Stock is supplied to the larger end of each of these tapered conduits, as described in connection with Fig. 1, through branched conduits indicated fragmentarily at 86. The inlet passage includes a portion 90 constructed similarly to the portion 60 as described in connection with Fig. 1 and providing a Venturi passage adapted to receive the stock entering through the orifice 85 and to dissipate the velocity energy thereof as the stock is transmitted to the slice. The remaining portion 91 of the inlet passage is curved, as shown, to convey the stock from the tapered portion 90 directly to the slice and forming wire in a substantially uninterrupted flow and with minimum turbulence. A rotating perforated cylinder 95 may be positioned as indicated adjacent the slice, and the stock flows through this cylinder to assure that the fibers will be properly dispersed throughout the water as the stock passes through the slice onto the forming wire.

The operation of the construction shown in Fig. 2 is substantially the same as described in connection with Fig. 1 with respect to control of the flow of stock between the counterflow inlet 80 and the forming member. The stock is initially supplied through conduit 86 under sufficient pressure to provide a flow through orifice 85 at a definite and substantially uniform velocity across the width of the inlet passage. As this stock enters the Venturi portion 90 of the inlet passage, the progressively increasing capacity of the passage provides for dissipating the

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velocity energy of the stock smoothly and with minimum turbulence. The curved passage portion 91 provides for directing the stock in smooth and continuous flow to and through the rotating perforated cylinder 95 and into the forming zone itself. This construction of controlled flow passage avoids formation of pools or slow moving reservoirs of stock capable of causing abrupt changes in flow velocity and thus facilitates maintaining the proper smoothness of the stock and freedom from lumps. As in the case of the construction shown in Fig. 1, the changes in velocity conditions are uniform laterally and take place smoothly throughout the entire extent of the inlet passage, thus greatly contributing to maximum uniformity of sheet formation.

Fig. 3 illustrates a stock supply system similar to that of Fig. 1 but applied to a Fourdrinier type paper machine and embodying means for varying the volume of flow of the stock to the forming member while maintaining optimum flow conditions through the orifice of the counterflow inlet. In Fig. 3, the forming wire 100 travels over breast roll 101, and the white water draining from the forming wire is collected in the wire pit or other collecting trough 102 and flows through a pipe 103, joining with new stock supplied through pipe 104 from a suitable regulator box, to a circulating pump 105 such as a centrifugal pump. The resulting stock mixture is supplied through a pipe 106 to a suitable screening machine 107, the flow through pipe 106 being shown as controlled by a suitable valve 108. From the screening machine the stock flows through conduit 109 to a counterflow inlet 110 similar in construction and operation to the counterflow inlet 50 shown and described in connection with Fig. 1. The stock discharged through the discharge orifice 111 of inlet 110 passes through a stock inlet passage similar to that shown in Fig. 2 and including a tapered Venturi portion 112, contiguous with orifice 111, and a curved portion 113 which cooperate to convey the stock as described in connection with Fig. 2 directly to the slice 115, the latter being provided with adjusting means 116 and 117 similar to those shown in Fig. 2.

As was explained in connection with Fig. 1, the counterflow inlet 110 is preferably operated under pressure conditions such that the flow of stock through the restricted discharge orifice 111 is at a definite velocity, these conditions having been found to give satisfactory results from a standpoint of thorough mixing of the stock and uniform distribution and velocity across the entire width of the inlet passage. The optimum flow conditions for a particular inlet of this type will depend upon the particular design and construction of the inlet, but in general it has been found that if such velocity is varied over any considerable range, the preferred uniform conditions may not be maintained. On the other hand, it is desirable from the standpoint of proper control of sheet formation that the volume of flow of the stock through the slice be properly correlated with the speed of the forming member. Furthermore, it is sometimes found desirable or necessary to vary quite widely both the speed of a given machine and the volume of flow of the stock at the slice, but with the inlet designed to give optimum results over particular range of flow rates, if the velocity falls substantially below the preferred range, some settling out of the heavier constituents may occur, particularly in the case of stock containing substantial quantities of clay

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or other types of loading material, with resulting departure of the sheet characteristics from those desired. The present invention accordingly provides control means such that the velocity at the inlet 110 may be maintained within the range giving optimum uniformity of flow even though the volume of flow of the stock through the slice 115 may be very much lower.

In accordance with the invention, these results are obtained with the construction shown in Fig. 3 by drawing off from the inlet passage sufficient stock to reduce the volume at the slice to a value such that the desired volume of flow is obtained. As shown in Fig. 3, there is provided a slot 120 positioned between the Venturi portion 112 of the inlet passage and the slice, and this slot extends completely across the width of the lowest side of the inlet passage parallel to the slice. A header 121 is positioned below slot 120 and in direct communication therewith, this header being of large enough cross-section, as shown, to provide that the pressure differential across slot 120 will be substantially the same throughout the width of the inlet passage in order that the amount of stock withdrawn from the passage will be the same across its width, thus assuring uniform lateral pressure at the slice. Header 121 is in turn provided with one or more pipes 122 bypassing the slice and connecting with pipe 103 on the suction side of pump 105 as shown. The connection from pipes 122 to header 121 may be made at one or both ends of the header, or in some cases at several points in addition to the two ends, as may be found desirable to maintain the proper uniform pressure differential across slot 120 as stated. Regulating means such as a valve 125 may also be provided for controlling the flow through pipe 122 in accordance with the pressure conditions to be maintained at the slice.

With this construction as shown, when the valve 125 is closed, all the stock transmitted by the inlet 110 will be conveyed through the inlet passage 112-113 to the slice and forming member, substantially as described in connection with Fig. 2. Similar continuously uniform control over flow conditions will be afforded as with the construction shown in Fig. 2, and regulation of flow conditions within the range giving preferred results may be readily attained by varying the speed of pump 105 or by throttling its discharge through pipe 106 between the pump and screening machine. In this manner, the volume of flow of the stock through the slice may be readily controlled over a substantial range.

The by-pass construction illustrated in Fig. 3 affords alternative or supplemental control over flow conditions, both independently of the rate of flow through the inlet passage, with the latter being maintained at its optimum value, and also in conjunction with the above described control to adapt the system to even wider ranges of speeds and rates of flow. Thus for a given speed or rate of delivery of pump 105, resulting in a uniform flow rate through the inlet, as valve 125 is opened, stock will be drawn off uniformly across the width of inlet passage, and the rate of flow of the remainder of the stock will be correspondingly reduced through the slice. This control may be readily obtained automatically, by operation of valve 125 through automatic level or pressure control means such as the type shown in the above noted application Serial No. 607,820.

As an example of the degree of control and range of conditions afforded by the above construction, the volume range through a typical

counterflow inlet of the illustrated construction could be varied in the ratio of two to one with little difficulty, and if desired probably over a range of three to one or even somewhat greater. By the use of the recirculation principle of this invention, however, the range of volume of flow at the slice could be extended to six to one or even considerably higher while still maintaining only a relatively small change in the inlet flow volume such as two to one, thus assuring best operating results.

It will accordingly be seen that the present invention provides a stock supply system for a paper machine of either the cylinder or Fourdrinier type, wherein the control over the flow conditions is continuous throughout the system and also highly uniform laterally throughout the inlet passage and substantially continuously up to the forming zone. In this supply system, the flow of stock into the inlet passage may be at controlled velocity to assure uniform mixing and distribution, and the velocity energy of this velocity stock is smoothly absorbed and dissipated before it reaches the forming zone, thus avoiding turbulence and abrupt velocity changes tending to produce flocculation or lump formation. It also provides for readily varying the flow conditions throughout the supply system, and particularly for uniform control over the volume of flow through the slice over a wide range while maintaining optimum flow conditions elsewhere in the system.

Reference is made to my copending application Serial No. 780,456, filed October 17, 1947, and assigned to the same assignee as this application.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In a stock supply system for a paper making machine including a forming member, the combination of means forming a slot orifice extending across the full width of said machine, means for discharging stock through said orifice at a definite and substantially uniform velocity and with substantially uniform distribution of fiber across the entire extent of said orifice, a chamber corresponding in width to that of said orifice and of substantially greater cross-sectional area than said orifice from which the stock is delivered directly onto said forming member, and walls forming an inlet passage connecting said orifice with said chamber to conduct said stock from said orifice to said chamber, said passage being of substantially the same width as said orifice and said forming member, said passage walls diverging at a predetermined small angle in the direction of flow from said orifice to provide with said orifice a Venturi passage for dissipating with minimum turbulence the velocity energy of said stock entering said passage through said orifice, said diverging passage continuing with substantially undiminished effective flow area up to said chamber for delivery of said stock to said chamber with minimum turbulence and flocculation, and said angle of divergence between said passage walls being not more than 10° to maintain said stock between said orifice and said chamber in continuous advancing motion to said forming member at a decelerating velocity which is sub-

stantially constant across each cross-sectional area of said passage.

2. In a stock supply system for a paper making machine including a forming member, the combination of means forming a slot orifice extending across the full width of said machine, means for discharging stock through said orifice at a definite and substantially uniform velocity and with substantially uniform distribution of fiber across the entire extent of said orifice, a chamber corresponding in width to that of said orifice and of substantially greater cross-sectional area than said orifice from which the stock is delivered directly onto said forming member, and walls forming an inlet passage connecting said orifice with said chamber to conduct said stock from said orifice to said chamber, said passage being of substantially the same width as said orifice and said forming member, said passage walls diverging at a predetermined angle of not more than 10° to maintain said stock between said orifice and said chamber in continuous advancing motion to said forming member at a decelerating velocity which is substantially constant across each cross-sectional area of said passage, said passage continuing with substantially undiminished effective flow area up to said chamber for delivery of said stock to said chamber with minimum turbulence and flocculation.

3. In a stock supply system for a paper making machine including a forming member, the combination of means forming a slot orifice extending across the full width of said machine, means for discharging stock through said orifice at a definite and substantially uniform velocity and with substantially uniform distribution of fiber across the entire extent of said orifice, a chamber corresponding in width to that of said orifice and of substantially greater cross-sectional area than said orifice from which the stock is delivered directly onto said forming member, and walls forming an inlet passage connecting said orifice with said chamber to conduct said stock from said orifice to said chamber, said passage being of substantially the same width as said orifice and said forming member, said passage walls diverging at a total included angle of approximately $7\frac{1}{2}^\circ$ in the direction of flow from said orifice to provide with said orifice a Venturi passage for maintaining said stock between said orifice and said chamber in continuous advancing motion to said forming member at a decelerating velocity which is substantially constant across each cross-sectional area of said passage, said diverging passage continuing with substantially undiminished effective flow area up to said chamber for delivery of stock to said chamber with minimum turbulence and flocculation.

4. In a paper machine having a forming member and provided with a stock inlet including a pair of oppositely tapered cross flow conduits arranged in side by side relation and having a common restricted discharge orifice extending across the full width of said machine through which the stock is discharged at a definite and substantially uniform velocity and with substantially uniform distribution of fiber across the entire extent of said orifice, the combination of a chamber corresponding in width to that of said orifice and of substantially greater cross-sectional area than said orifice from which the stock is delivered directly onto said forming member, and walls forming an inlet passage connecting said orifice with said chamber to conduct said stock from said orifice to said chamber, said passage being

of substantially the same width as said orifice and said forming member, said passage walls diverging at a predetermined small angle in the direction of flow from said orifice to provide with said orifice a Venturi passage for dissipating with minimum turbulence the velocity energy of said stock entering said passage through said orifice, said diverging passage continuing with substantially undiminished effective flow area up to said chamber for delivery of said stock to said chamber with minimum turbulence and flocculation, and said angle of divergence between said passage walls being not more than 10° to maintain said stock between said orifice and said chamber in continuous advancing motion to said forming member at a decelerating velocity which is substantially constant across each cross-sectional area of said passage.

5. In a stock supply system for a paper making machine including a forming member, the combination of a stock inlet passage leading to said forming member and of substantially the same width as said forming member throughout the entire length thereof, means including a conduit having a discharge orifice extending across the entire width of said machine for supplying stock to said inlet passage at a pressure and under flow distribution conditions providing a flow of stock through said orifice into said passage at a definite and substantially uniform velocity across the width of said passage and with substantially uniform distribution in said stock flow as delivered through said passage to said forming member, the walls of said passage diverging at an angle of not more than 10° in the direction of flow therethrough to maintain said stock between said orifice and said forming member in continuous advancing motion to said forming member at a decelerating velocity which is substantially constant across each cross-sectional area of said passage and to deliver said stock to said forming member in a smooth flow and with minimum turbulence, and means for drawing off stock from said inlet passage at a position downstream in the direction of flow from said energy dissipating means to said forming member and spaced upstream from the point of delivery of said stock to said forming member to reduce the volume of flow of said stock delivered to said forming member while maintaining a higher velocity flow of stock through said orifice to maintain said uniform flow and distribution conditions therein.

6. In a stock supply system for a paper making machine including a forming member, the combination of a pair of oppositely tapered conduits arranged transversely across said machine and each adapted to be supplied at the larger end thereof with stock under pressure, means forming a slot orifice common to said pair of conduits and extending across the full width of said machine through which said stock is discharged from said conduits at a predetermined velocity of flow and with substantially uniform distribution of fiber across the width of said machine, said orifice being of restricted cross-sectional area relative to said conduits to maintain said predetermined velocity substantially higher than the velocity of flow of said stock in said conduits and substantially uniform across the width of said machine, means adjacent said forming member forming a chamber corresponding in width to said orifice and of substantially greater cross-sectional area than said slot orifice, and walls forming an inlet passage of substantially the same width of said orifice and said forming mem-

ber for conducting stock from said orifice to said chamber, said walls being arranged to diverge at a predetermined total included angle of not more than 10° in the direction of flow of said stock from said orifice to said chamber to maintain said stock between said orifice and said chamber in continuous motion towards said forming member at a decelerating velocity which is substantially constant across each cross-sectional area of said passage and to dissipate with minimum turbulence the velocity energy of said stock as said stock flows from said orifice to said chamber while maintaining substantial uniformity of flow conditions in said stock across the width of said machine.

7. In a stock supply system for a paper making machine including a forming member, the combination of a pair of oppositely tapered conduits arranged transversely across said machine and each adapted to be supplied at the larger end thereof with stock under pressure, means forming a slot orifice common to said pair of conduits and extending across the full width of said machine through which said stock is discharged from said conduits at a predetermined velocity of flow and with substantially uniform distribution of fiber across the width of said machine, said orifice being of restricted cross-sectional area relative to said conduits to maintain said predetermined velocity substantially higher than the velocity of flow of said stock in said conduits and substantially uniform across the width of said machine, means adjacent said forming member forming a chamber corresponding in width to said orifice and of substantially greater cross-sectional area than said slot orifice, and walls forming an inlet passage of substantially the same width of said orifice and said forming member for conducting stock from said orifice to said chamber, said walls being arranged to diverge at a total included angle approximately $7\frac{1}{2}^\circ$ in the direction of flow of said stock from said orifice to said chamber to dissipate with minimum turbulence the velocity energy of said stock as said stock flows from said orifice to said chamber while maintaining substantial uniformity of flow conditions in said stock across the width of said machine.

8. In a stock supply system for a paper machine of the cylinder type including a forming member and a vat in which the forming member operates, the combination of a pair of oppositely tapered conduits arranged transversely across said machine and each adapted to be supplied at the larger end thereof with stock under pressure, means forming a slot orifice common to said pair of conduits and extending across the full width of said machine through which said stock is discharged from said conduits at a predetermined velocity of flow and with substantially uniform distribution of fiber across the width of said machine, said orifice being of restricted cross-sectional area relative to said conduits to maintain said predetermined velocity substantially higher than the velocity of flow of said stock in said conduits and substantially uniform across the width of said machine, and walls forming an inlet passage of substantially the same width as said orifice and said vat for conducting stock from said orifice to said vat, said walls being arranged to diverge at a predetermined total included angle of not more than 10° in the direction of flow of said stock from said orifice to said chamber to maintain said stock between said orifice and said vat in continuous motion

towards said vat at a decelerating velocity which is substantially constant across each cross-sectional area of said passage and to dissipate with minimum turbulence the velocity energy of said stock as said stock flows from said orifice to said vat while maintaining substantial uniformity of flow conditions in said stock crosswise of said passage and throughout substantially the entire length thereof.

9. In a stock supply system for a Fourdrinier paper machine including a forming member, the combination of a pair of oppositely tapered conduits arranged transversely across said machine and each adapted to be supplied at the larger end thereof with stock under pressure, means forming a slot orifice common to said pair of conduits and extending across the full width of said machine through which said stock is discharged from said conduits at a predetermined velocity of flow and with substantially uniform distribution of fiber across the width of said machine, said orifice being of restricted cross-sectional area relative to said conduits to maintain said predetermined velocity substantially higher than the velocity of flow of said stock in said conduits and substantially uniform across the width of said machine, means adjacent said forming member forming a closed chamber corresponding in width to said orifice and of substantially greater cross-sectional area than said slot orifice, and walls forming a totally enclosed inlet passage of substantially the same width of said orifice and said forming member for conducting stock from said orifice to said chamber, said passage being of substantially the same cross-sectional area as said chamber at the point of connection thereof to said chamber, said walls being arranged to diverge at a predetermined total included angle of not more than 10° in the direction of flow of said stock from said orifice to said chamber to maintain said stock between said orifice and said chamber in continuous motion towards said forming member at a decelerating velocity which is substantially constant across each cross-sectional area of said passage and to dissipate with minimum turbulence the velocity energy of said stock as said stock flows from said orifice to said chamber while maintaining substantial uniformity of flow conditions in said stock across the width of said passage over substantially the entire length thereof.

10. A stock supply system for a paper making machine including a forming member, comprising a stock inlet passage leading to said forming member and of substantially the same width as said forming member throughout the entire length thereof, means forming a restricted intake orifice extending across the entire width of said inlet passage, supply means including a pump for discharging stock through said orifice at a definite velocity providing substantially uniform distribution in said stock across the width of said passage, said passage being of substantial length between said orifice and said forming member, the walls of said passage diverging away from said orifice in the direction of flow there-through at an angle of not more than 10° to effect progressive increase of the cross-sectional area of said passage with respect to said orifice and to effect absorption of the velocity energy of said stock discharged through said orifice with delivery of said stock to said forming member in a smooth flow and with minimum turbulence, said inlet passage having a slot extending across

substantially the entire width of the lower side thereof at a position spaced downstream from said orifice in the direction of flow to said forming member and spaced upstream from the point of delivery of said stock to said forming member, a header positioned below said slot to receive stock flowing from said passage through said slot, a pipe for conducting stock from said header to the suction side of said pump to reduce the volume of stock at said forming member while maintaining said definite velocity of flow and uniform distribution of said stock through said orifice, and means for regulating the flow of stock through said pipe to maintain a predetermined volume of stock at said forming member.

11. A stock supply system for a paper making machine including a forming member, comprising a stock inlet passage of substantial length leading to said forming member and of substantially the same width as said forming member, a plurality of oppositely tapered cross flow conduits arranged transversely of said inlet passage and having a common restricted discharge orifice arranged longitudinally thereof to provide communication from both thereof across substantially the entire width of said passage, a pump for supplying stock to each of said conduits at a pressure sufficient to effect a flow of stock through said orifice at a definite velocity providing substantially uniform distribution in said stock across the width of said passage, the walls of said passage diverging away from said orifice at an angle of not more than 10° and cooperating therewith to provide a Venturi passage adapted to receive said stock from said orifice and to dissipate the velocity energy thereof with minimum turbulence, said passage continuing with substantially undiminished effective flow area from said orifice to said forming member to convey said stock in substantially uninterrupted flow from said orifice to said forming member, said inlet passage having a slot extending across substantially the entire width of the lower side thereof at a position spaced downstream in the direction of flow from said Venturi passage and spaced upstream from the point of delivery of said stock to said forming member, means for conducting stock from said slot to the suction side of said pump to reduce the volume of flow of said stock to said forming member while maintaining said definite velocity flow and uniform distribution of stock through said orifice, and means for regulating said flow of stock through said slot to maintain a predetermined volume of stock adjacent said forming member in accordance with the speed thereof.

STEPHEN A. STAEGE.

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