Nov. 10, 1953 S. S. STEVENS 2,658,430

PAPERMAKING MACHINE

Filed Jan. 28, 1950 2 Sheets-Sheet 1

Fig 1

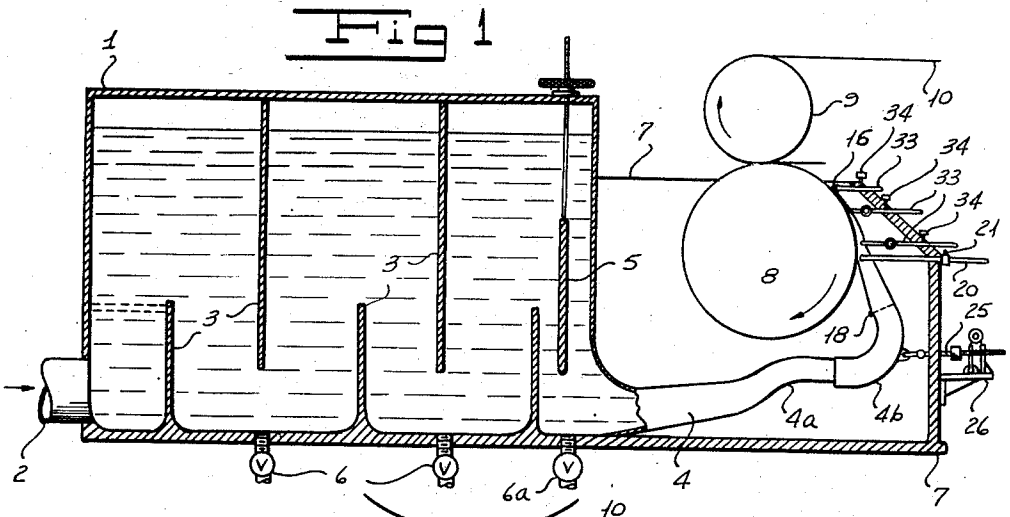


Fig 2

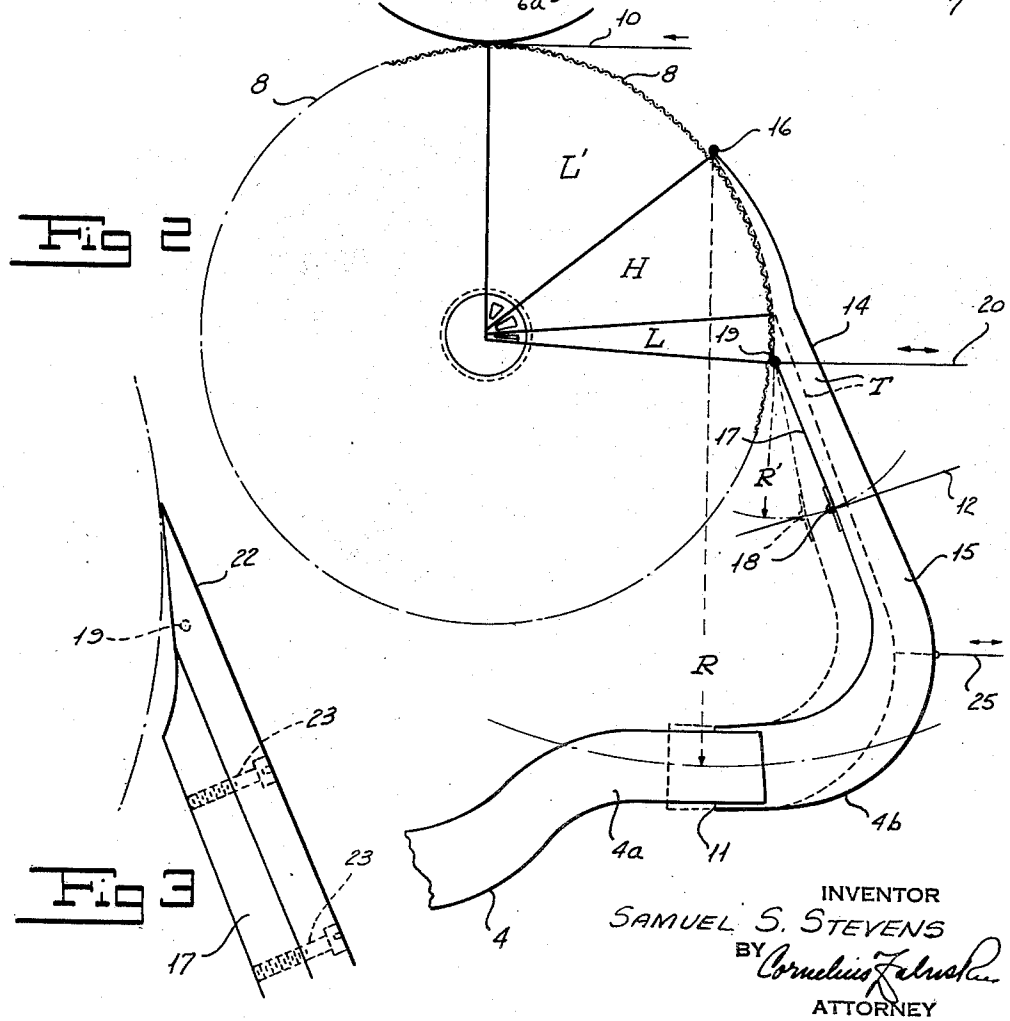


Fig 3

INVENTOR
SAMUEL S. STEVENS
BY Cornelius Falrush
ATTORNEY

Nov. 10, 1953 S. S. STEVENS 2,658,430

PAPERMAKING MACHINE

Filed Jan. 28, 1950 2 Sheets-Sheet 2

Fig 4

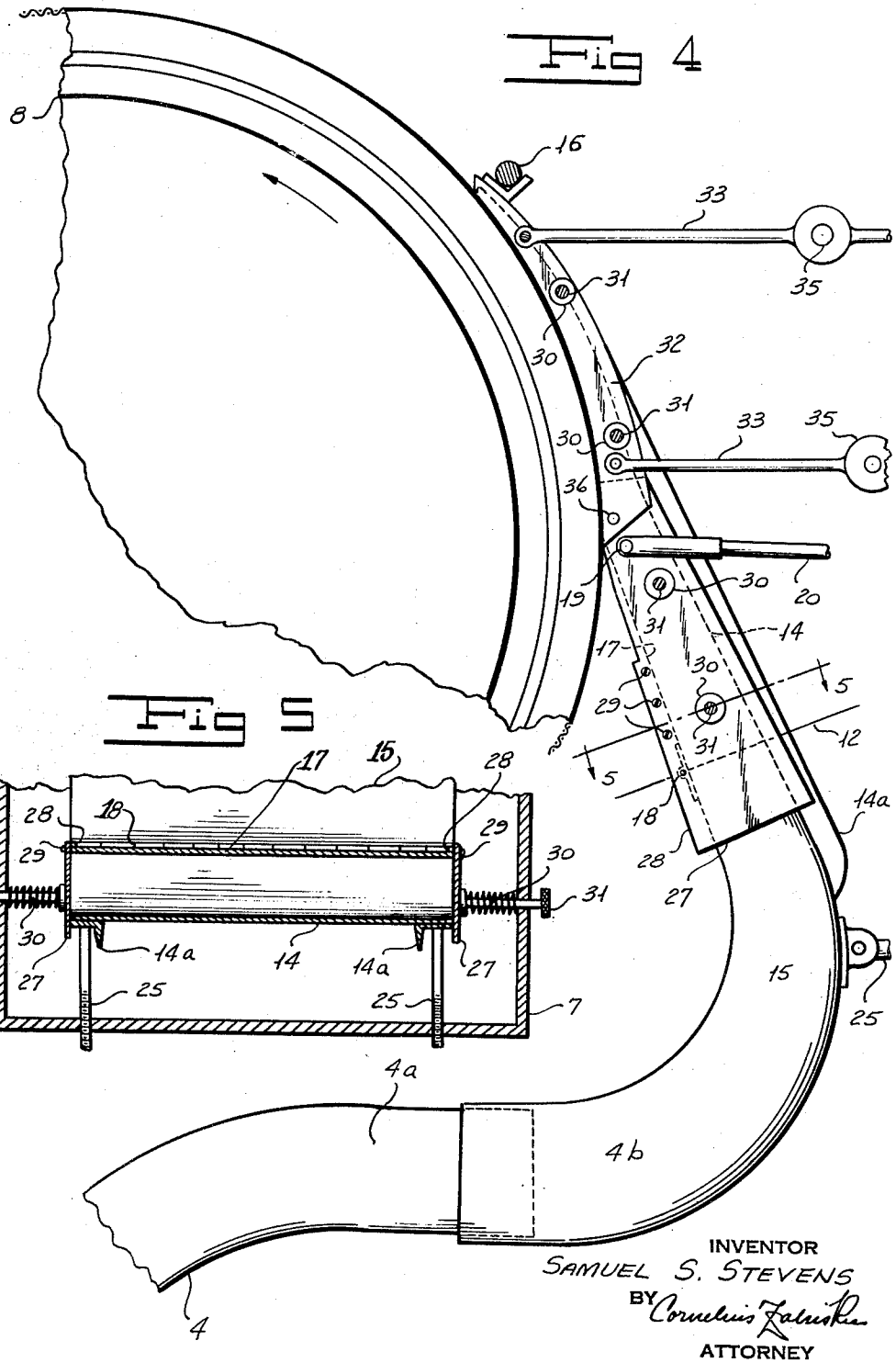


Fig 5

INVENTOR
SAMUEL S. STEVENS
BY Cornelius Zalewski
ATTORNEY

Patented Nov. 10, 1953

2,658,430

UNITED STATES PATENT OFFICE

2,658,430

PAPERMAKING MACHINE

Samuel S. Stevens, Plattsburg, N. Y.

Application January 28, 1950, Serial No. 141,090

14 Claims. (Cl. 92—43)

1

This invention relates to paper making and is directed to a simple economical and efficient means whereby the feed of stock may be better controlled than heretofore. The invention may be utilized to feed such stock in paper making machines of the kind wherein the stock is fed directly to the foraminous surface of a rotary mold roll or machines of the kind wherein the stock is fed to the surface of a mesh screen traveling about the surface of such a roll.

In the preferred form of this invention, paper stock is fed to the roll through a stock supply duct comprising feed and delivery sections. The stock is led from the chest through the feed section to the delivery section which is provided with an outlet mouth juxtaposed with and enclosing an angular portion of the circumference of the roll. This delivery section is of unique construction. Its wall on the roll side is hereinafter referred to as the "inner wall," while its opposite wall is termed the "outer wall." The outer wall is pivoted at the slice point, i. e., at the top of the outlet mouth, while that portion of the inner wall adjacent the outlet mouth comprises a "throat plate." The upper end of said throat plate is pivoted at the bottom of the outlet mouth adjacent the circumference of the roll and the lower end of said plate is pivoted to the upper end of the remainder of said inner wall. The lateral edges of the throat plate and the outer wall are connected by appropriate deckles or other closures so constituted as to permit swinging movement of the delivery section and throat plate on their respective pivots to vary the area of "the throat" thereby formed between the throat plate and the outer wall immediately below the outlet mouth and thus regulate the quantity of stock fed to the roll.

Features of the invention, other than those adverted to, will be apparent from the hereinafter detailed description and appended claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate one practical form of the invention, but the construction therein shown is to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a longitudinal vertical section through a machine embodying this invention, showing the parts in a schematic manner, so that the general relation between these parts may be understood.

Figure 2 is an enlarged fragmental schematic view illustrating the effect of relative pivotal

2

movement between the throat plate and the outer wall of the delivery section.

Figure 3 is an enlarged fragmental view showing a seal which is provided between the upper end of the throat plate and the molding cylinder.

Figure 4 is a view similar to Figure 2, but showing the delivery section of the stock supply duct in elevation.

Figure 5 is a section in the plane of the line 5—5 of Figure 4, showing the manner in which the deckles are supported at the opposite sides of the delivery section.

In Figure 1, which shows the apparatus generally, 1 designates the stock chest, adapted to contain a dilute aqueous suspension of paper stock. This chest has a stock inlet 2 and the interior of the chest is provided with baffles 3 which insure uniformity of the stock as it passes through the chest to the supply duct, generally indicated at 4. A baffle 5 is positioned at the outlet of the chest and is vertically adjustable to eliminate undue agitation or frothing of the stock as it leaves the chest. The various compartments of the chest are provided with appropriate draw off or dump valves 6 and 6a.

Positioned at one end of the chest is an enclosure 7 in which the foraminous mold roll 8 is mounted to rotate on a transverse fixed horizontal axis. Above the mold roll is a directional roll 9 for the felt conveyor 10, which serves as a take off for the molded sheet.

The supply duct 4 comprises two sections 4a and 4b. The section 4a is the feed section which leads from the stock chest to the delivery section 4b. The section 4a may, if desired, be wholly or partly flexible, but, as shown, it is made rigid and is connected to the delivery section 4b by a telescoping joint 11. The delivery section 4b is in the form of an inherently rigid conduit 15 between the telescoping joint 11 and the plane of the line 12. Above that plane, the outer wall 14 of the delivery conduit is rigid with that portion of the delivery section below that plane and extends upwardly to a pivot 16 at the slice point contiguous to the surface of the roll 8. To insure this rigidity the outer wall 14 is preferably provided with reinforcing ribs 14a shown in Figures 4 and 5 to stiffen the same so that said wall will not bend during adjustment.

Pivoted at 18 to the upper end of the rigid portion 15 is a throat plate 17 which extends upwardly to a lower elevation than the slice point and is there secured to a pivot 19 positioned contiguous to the surface of the roll. That portion of the delivery section on the near side of the

roll between the pivots 16 and 19 is open and constitutes the outlet mouth through which stock is fed to the surface of the roll. With this construction, the rigid conduit portion 15 and the relatively rigid outer wall 14 are mounted for movement along an arcuate path on the pivot 16. Likewise, the throat plate 17 is mounted for similar movement on the pivot 19 and for pivotal movement with respect to the rigid conduit portion 15.

If the feed section 4a is in the form of a flexible hose, this arcuate movement may be freely accomplished but, if the feed section 4a is rigid, the telescoping joint 11 is incorporated to permit of such arcuate movement as shown in Figure 2. When the telescoping sections are employed, the arcuate movement of the combined rigid portion 15 and the outer wall 14 will be on a radius R which is greater than the radius R' of the arcuate movement of the throat plate 17. To permit of such arcuate movement with a telescoping joint connection, those portions of the sections 4a and 4b which telescope are curved on the radius R, while the pivot 19 is mounted for slight up and down movement on an adjustable tie rod 20. This rod extends substantially horizontally away from the pivot 19, which it carries, through the end wall of the chest 7, as shown in Figure 1, and may be adjusted longitudinally and locked in position of adjustment by means of a set screw 21 or otherwise in such manner as to position the upper edge of the throat plate 17 in contact with the surface of the roll 8. To insure wiping contact between the upper end of the throat plate and said roll, said plate is provided with a wiper 22 of rubber or a synthetic plastic impregnated fabric or the like secured to the plate 17 by screws 23, as shown in Figure 3.

Swinging movement of the delivery section about the pivot 16 may be accomplished by means of a regulating rod 25 passing through the end wall of the enclosure 7 and connected with appropriate regulating means 26 which, when operated, will cause the sections to be telescoped to a greater or lesser degree. During this adjustment the rod 20 may be flexed slightly and may require some longitudinal adjustment, but the pivot 16 remains stationary during operation of the machine, although it may be mounted for adjustment if desired to control the slice.

The opposite lateral edges of the throat plate 17 and the outer wall 14, respectively, are connected by deckles or other appropriate closures, exemplified in Figures 4 and 5. In this showing, each lateral edge of the throat plate is provided with a flange 28 to which are secured closing plates 27 held in place by screws 29. These plates are maintained in facial contact with the lateral edges of the outer wall 14 by means of springs 30, best shown in Figure 5. These springs are interposed between the side walls of the enclosure 7 and the outer faces of the plates 27 and their compression is sufficient to form a fairly tight joint with the edges of the outer wall 14. If desired the inner surfaces of the plate 27 may have rubber gaskets to insure tighter joints. Rods 31 pass through the springs to properly guide and support them. These rods may be retracted to release the plates from spring pressure during adjustment of the delivery section.

Above the pivot 19, deckles 32 are also held in engagement with the opposite lateral edges of the outer wall 14 by springs in the same manner as the side plates 27. To the opposite ends of each of the deckles 32 are secured adjusting rods 33 which pass through the end wall of the enclosure 7 and are adapted to be locked in any position of adjustment by set screws 34. These rods hold the concave forward edges of the deckles 32 in close cooperative relation with the surface of the roll 8 and they include swing joints 35 to permit of a more flexible adjustment. The lower ends of the deckles overlap and are secured by pivots 36 to the upper portions of the plates 27 whereby they are supported in a vertical direction and cooperate with the plates 27 to close the opposite sides of the delivery section above the horizontal plane of the line 12.

By the structure shown and described, the sections 4a and 4b may be telescoped to a greater or less extent through adjustment of the tie rod 25. As the delivery section is bodily swung in a clockwise direction about the pivot 16, from the full line position of Figure 2 into the dotted line position of that figure, that portion of the interior of the delivery section directly below the outlet mouth and juxtaposed with the throat plate will be constricted. The cross sectional area of this zone, which constitutes the throat T of this section, will thus be varied as the sections 4a and 4b are telescoped to a greater or lesser degree. By varying the area of the throat T, the quantity of stock fed to the outlet mouth may be correspondingly varied and controlled.

The surface of the roll or screen onto which the stock is to be deposited is caused to travel at a constant speed and such stock may be collected thereon by employing either or both suction back of the molding surface or stock under pressure. When suction is used to effect the deposit on the molding surface of a mold roll partial vacuum is maintained within the roll and consequently stock is deposited at the outlet mouth directly on the foraminous surface of the roll as shown in the drawing. For this purpose, a partial vacuum may be maintained within the entire interior of the roll to produce suction at the outlet mouth. However, in practice, I preferably provide the interior of the roll with a plurality of suction boxes which are relatively stationary with respect to the roll in that they do not rotate therewith. Figure 2 of the drawings schematically shows three suction boxes L, H and L' formed by four partitions extending substantially radially of the roll. For best results, a relatively low vacuum is maintained in the box L, a relatively high vacuum is made in the box H, and a reatively low vacuum is maintained in the box L'.

The amount of vacuum maintained in these boxes will naturally vary in accordance with the stock and the product to be made. With a relatively "slow" stock, the vacuum in each of the boxes referred to should be higher than with the "free" stock. The freeing of water from the respective boxes may be accomplished in any desirable way, but it may be conveniently drawn off through ports in the ends of said boxes. This may be readily accomplished by mounting the roll to rotate on hollow trunnions and passing suction pipes and water draw off pipes outwardly through such hollow trunnions.

It is important in carrying out the present invention as shown, that the outer wall 14 of the discharge section be rigid with the rigid conduit portion 15 of such section, so that these parts may swing together from the anchorage formed by the pivot 16 and it is also important that the throat plate 17 be bendable or pivotal with respect to the rigid conduit portion 15 in order to

effect the change in throat area to which I have referred. By making the outer wall 14 rigid, as stated, and forming the upper portion of that outer wall, opposite the inlet mouth, on the arc of a circle as shown, the entire length of the outer wall is configurated to impart to the stock a smooth and even flow to the roll at all times irrespective of the adjustment of the throat. With the structure shown, the stock will flow along the inner surface of the outer wall along a smooth and even path, so that it leaves the throat along the curvilinear portion of the wall at approximately the same speed as the peripheral speed of the roll. As a result, the stock felts nicely and uniformly upon the surface of the roll. When the delivery section is moved into a position to constrict the throat, the flow of material impinging the throat plate will be deflected to impinge the curvilinear surface of the outer wall 14 in a substantially tangential manner so that the stock will flow along said surface to the roll. This is true even if the throat is constricted to relatively small dimensions. Such a condition would not result if the outer wall embodied a succession of relatively pivotal parts longitudinally thereof for in that case the change in angular relation of such pivotal parts would interrupt the smooth flow of stock in contact therewith and interfere with proper felting.

In the apparatus described, the feed of stock to the roll may be quickly and easily regulated with great nicety and, after adjustment, the deposit of stock upon the roll will be substantially uniform for a given roll speed. The stock level in the chest is kept sufficiently high to permit of gravity flow to the drum during the normal operation of the machine. Should it be desired at any time to drain the system, the dump valves 6 and 6*a* may be opened for this purpose. The valve 6*a* shown in Figure 1 is positioned at the lowest point of the supply duct and when this valve is opened, the entire duct will be drained.

The machine of this invention is unusually simple in construction. The parts may be manufactured economically and assembled with ease and expedition. Close tolerances are not required and the adjustments may be readily made.

The foregoing detailed description sets forth the invention in its preferred practical form, but the invention is to be understood as fully commensurate with the appended claims.

Applicant herein is also the applicant in subsequently filed application Serial No. 199,163, filed December 5, 1950.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. A paper making machine comprising: a rotatable mold roll, a stock feed duct entirely closed on all four sides by rigid walls with the wall remote from the roll having an extension permanently rigid with the duct and projecting uninterruptedly from one end of the duct to a slice point contiguous to the surface of the roll and there secured to a pivot to mount said duct and its permanently rigid extension for conjoint movement along an arcuate path about the axis of said pivot, a throat plate one end of which is attached to a second pivot contiguous to the surface of the roll and angularly spaced along the surface of the roll from the slice point to form between said pivots a stock outlet mouth and the other end of the throat plate being hinged to the adjacent end of the feed duct, there being adjustable closures along the lateral edges of said extension and throat plate, and means for bodily moving the duct and its extension along an arcuate path about the axis of the pivot at the slice point to vary the cross sectional area of such duct in the region of the throat plate.

2. A paper making machine comprising: a rotatable mold roll, a stock supply duct leading to said roll and there provided with an outlet mouth embracing an angular circumferential portion of the roll, a pivot at the slice point end of the outlet mouth contiguous to the roll for supporting said supply duct for bodily movement along an arcuate path relative to the roll, a second pivot contiguous to the surface of the roll at the other end of the outlet mouth, one end of the wall of the supply duct nearest the roll being secured to said second pivot and the pivoted end of which wall constitutes a throat plate, a third pivot securing the lower end of the throat plate to the remainder of the supply duct, and deckles between the side edges of the throat plate and the corresponding edges of the opposite wall of the supply duct.

3. A paper making machine according to claim 1, wherein the pivot of the throat plate contiguous to the surface of the roll is adjustable toward and away from the surface of the roll.

4. A paper making machine according to claim 1, wherein the pivots of both the inner and outer walls are adjustable toward and away from the surface of the roll.

5. A paper making machine according to claim 2, including a stock chest and a yieldable connection between the stock chest and the supply duct to permit of pivotal movement of the latter without interrupting the flow of stock through said duct.

6. A paper making machine according to claim 2, including a stock chest and a flexible supply duct portion leading from the chest to the duct which is mounted for swinging movement.

7. A paper making machine comprising: a rotatable horizontal mold roll, a stock supply duct embodying a feed section connected to a delivery section, the latter of which leads to the roll and has a discharge outlet embracing an angular portion of the circumference of the roll, said delivery section embodying a rigid walled conduit portion for a distance from said connection with the rigid outer wall of said conduit portion extending beyond the discharge end of said conduit portion to and attached to a pivot at the slice point adjacent the circumference of the roll at one end of the outlet mouth, and a throat plate one end of which is attached to a pivot at the discharge end of the rigid conduit portion with its other end attached to a pivot contiguous to the roll at the opposite end of the outlet mouth, the lateral edges of said extension and throat plate being provided with adjustable closures, and means for bodily swinging the entire delivery section about the pivot at the slice point to vary the cross sectional area of the supply duct in the region of the throat plate.

8. A paper making machine according to claim 7, wherein the feed and delivery sections are connected to one another by an arcuate telescoping joint, the radius of which has its center at substantially the slice point.

9. A paper making machine comprising: a rotatable horizontal mold roll, a stock supply duct embodying relatively fixed and movable feed and delivery sections telescoped with respect to one another, the delivery section having inner and outer walls movable toward and away from one

another and between the adjacent ends of which is formed an outlet mouth juxtaposed with the surface of the roll and in advance of which mouth a thorat is formed between said walls, the outer wall being attached to a pivot at the slice point end of the outlet mouth and the inner wall being attached to a pivot at the throat end of the outlet mouth.

10. A paper making machine according to claim 9, embodying means for varying the degree of overlap of the feed and delivery sections at the telescoping joint of said sections.

11. A paper making machine comprising: a rotatable horizontal mold roll, a stock feed supply duct entirely closed on all four sides by rigid walls with the wall remote from the roll having an extension permanently rigid with the duct and projecting uninterruptedly from one end of the duct to a slice point contiguous to the surface of the roll and there secured to a fixed pivot to mount said duct and its permanently rigid extension for conjoint bodily movement along an arcuate path about the axis of said pivot, a throat plate the upper end of which is attached to a pivot contiguous to the surface to the roll below the slice point to form between the pivots a stock outlet mouth and the lower end of said throat plate being hinged to the adjacent end of the supply duct, there being adjustable closures between the lateral edges of said extension and the throat plate, and means for bodily moving the duct and its extension along an arcuate path about the pivot at the slice point to vary the cross sectional area of such duct in the region of the throat plate.

12. A paper making machine according to claim 11, wherein the pivot at the upper end of the throat plate is yieldable in a direction longitudinally of the latter to compensate for the difference in the radius of swinging movement of the supply duct and that of said throat plate.

13. A paper making machine comprising: a rotatable mold roll, a stock supply duct leading to said roll and there provided with an outlet mouth embracing an angular circumferential portion of the roll, a pivot at the slice point at the upper end of the outlet mouth contiguous to the roll for supporting said supply duct for bodily movement along an arcuate path relative to the roll, the wall of the supply duct on the side nearest the roll having a relatively movable portion constituting a throat plate, a pivot for holding the outlet mouth end of the throat plate in proximity to the surface of the roll in all operative positions of arcuate movement of the supply duct, and deckles between the side edges of the throat plate and the corresponding edges of the opposite wall of the supply duct.

14. A paper making machine comprising: a rotatable mold roll, and a stock supply duct leading to said roll and having an outlet embracing a portion of the circumference of the latter, said roll and duct being supported for relative pivotal movement on a pivot located substantially at the slice point, the inner wall of said duct including a throat plate one end of which is attached to a pivot contiguous to the surface of the roll and the other end of which is connected by a pivot with the remainder of the duct, the outer wall of the duct being permanently rigid from the slice point to a point rearwardly beyond the pivot connection of the throat plate with the duct, and deckles between the side edges of the throat plate and the corresponding edges of the opposite wall of the supply duct.

SAMUEL S. STEVENS.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
693,895	Parker	Feb. 25, 1902
2,005,839	Edge	June 25, 1935
2,162,097	Metcalf	June 13, 1939
2,200,002	Lane	May 7, 1940
2,203,802	Thaler	June 11, 1940
2,243,773	Randell	May 27, 1941
2,304,735	Leeson	Dec. 8, 1942
2,329,553	Newbould	Sept. 14, 1943
2,402,063	Malkin	June 11, 1946

FOREIGN PATENTS

Number	Country	Date
528,352	Germany	June 18, 1931