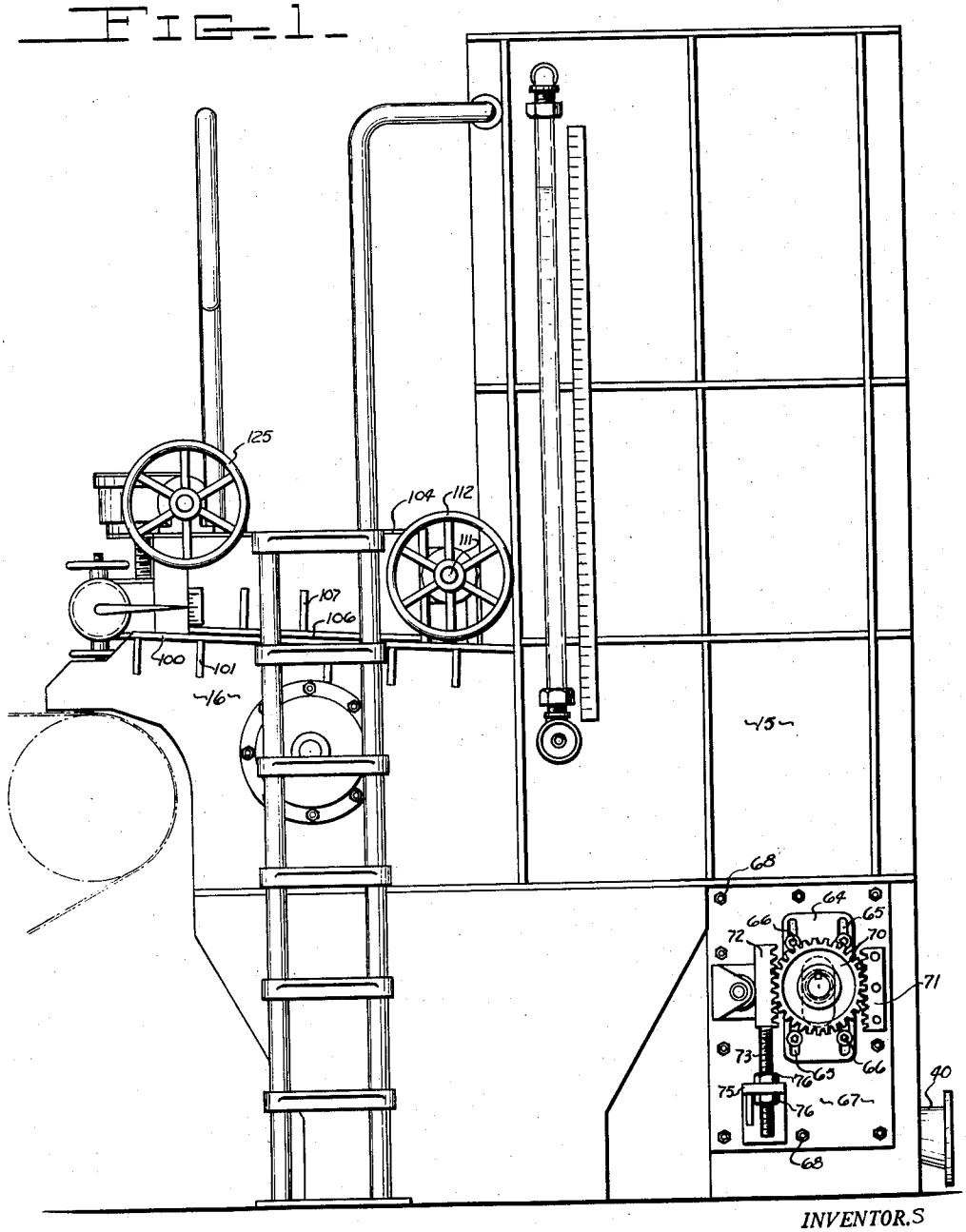
Jan. 27, 1959 W. S. CORBIN ET AL 2,870,690

HEAD BOX FOR PAPER MAKING MACHINES

Filed Nov. 6, 1952 3 Sheets-Sheet 1

Fig. 1.



INVENTOR.S

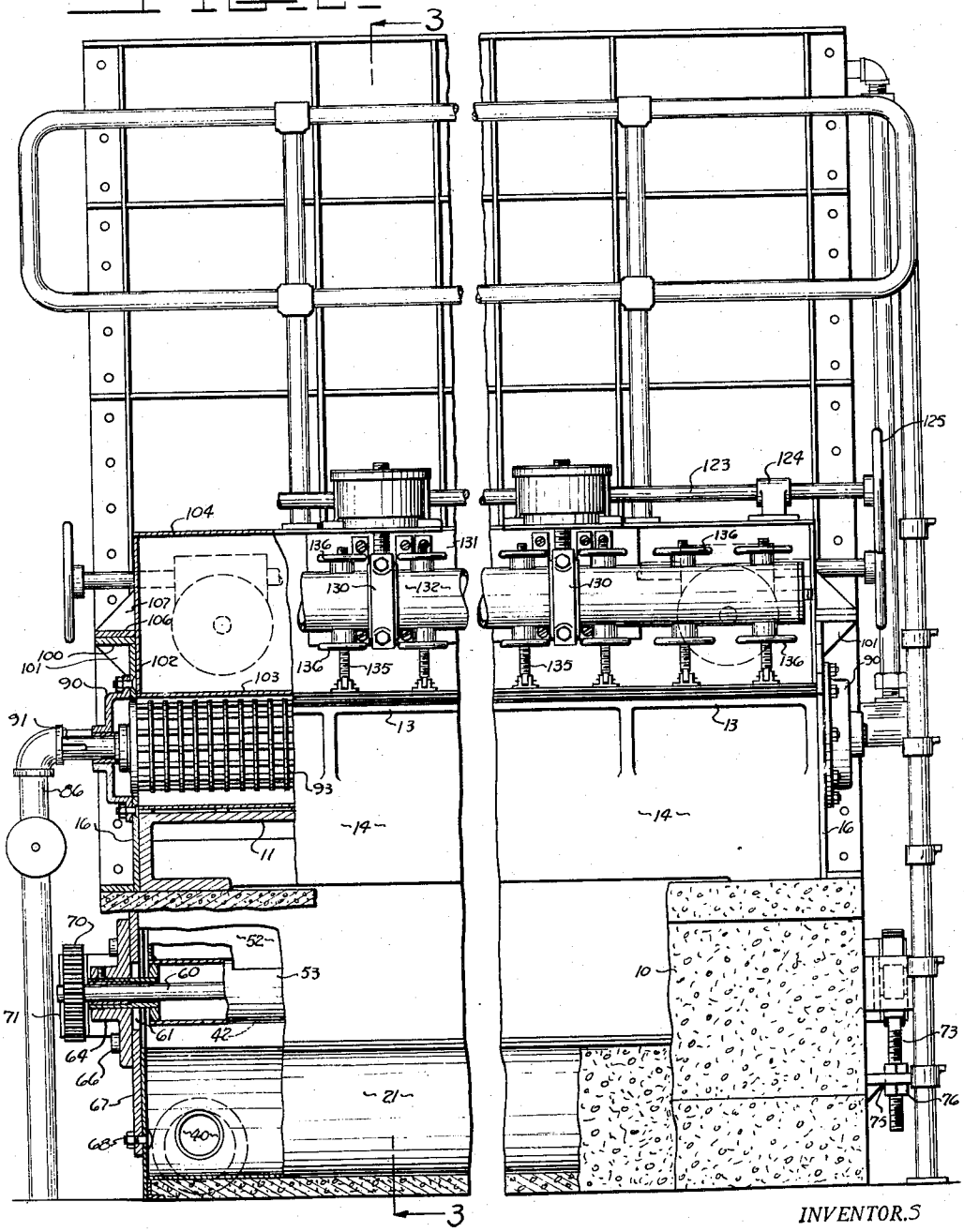
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Jan. 27, 1959 W. S. CORBIN ET AL 2,870,690

HEAD BOX FOR PAPER MAKING MACHINES

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FIG. 2



INVENTOR.S

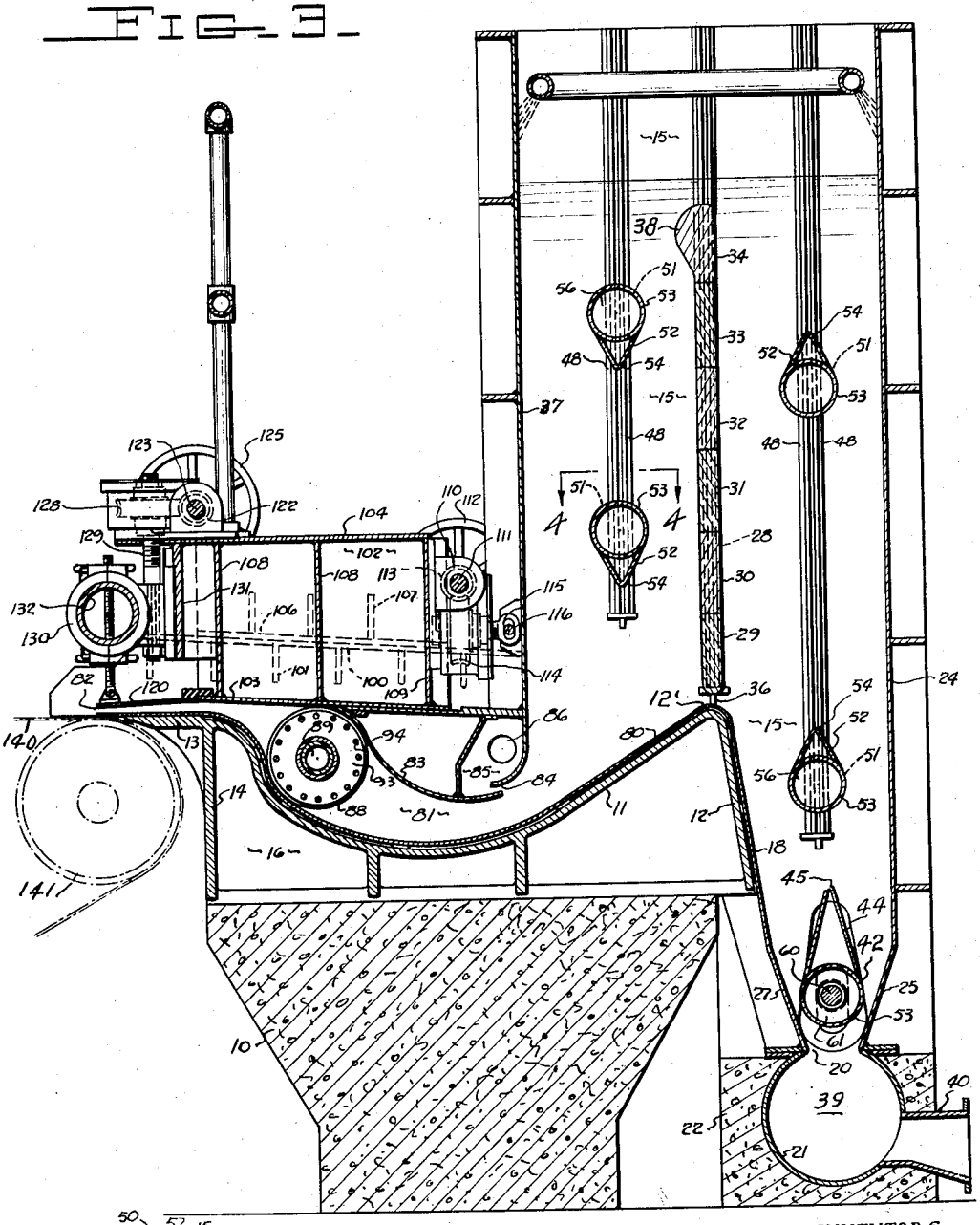
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Charles M. Pearson
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HEAD BOX FOR PAPER MAKING MACHINES

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FIG. 3



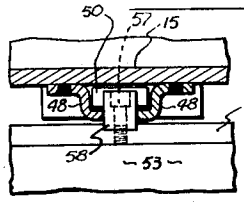


FIG. 4

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United States Patent Office 2,870,690 Patented Jan. 27, 1959

2,870,690

HEAD BOX FOR PAPER MAKING MACHINES

Wesley S. Corbin, Charles M. Pearson, and Henrik Walden, Watertown, N. Y., assignors, by mesne assignments, to The Black-Clawson Company, Hamilton, Ohio, a corporation of Ohio

Application November 6, 1952, Serial No. 319,157

11 Claims. (Cl. 92—44)

This invention relates to head boxes for Fourdrinier paper making machines.

The invention has as an object a head box embodying a construction such that the box will perform efficiently over a wide range of weights of paper and speeds of paper on the machine. For example, this head box will operate efficiently over a range of speeds of 125 feet to 1000 feet per minute and on a basic weight range of from 25 lbs. to 125 lbs., and with a stock consistency range varying from .3% to .7% fiber.

This performance is obtained by keeping the flow of stock through the successive passages of the box under what might be termed controlled agitation up to the time the stock is discharged through the slice lip, the invention embodying a structural arrangement by which the box can be adjusted for such controlled agitation of the stock for different consistencies of stock moving at different velocities.

The invention has as a further object the provision of means for the removal of air from the stock so when the stock is discharged through the slice, it is practically free from entrapped air.

The invention has as a further object a head box embodying a structural arrangement which minimizes the collection of slime and flocs of fiber.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

In the drawings—

Figure 1 is a side elevational view of a head box embodying our invention.

Figure 2 is a front elevational view of the head box with parts broken away and parts in section.

Figure 3 is a vertical sectional view taken on line 3—3, Figure 2.

Figure 4 is an enlarged fragmentary sectional view taken on line 4—4, Figure 3.

The head box comprises a heavy casting or structural base member mounted upon a suitable concrete foundation **10**. This base member is formed with an upper concave wall **11** which merges with a downwardly extending portion **12** to form a permanent ridge **12'** extending across the full width of the head box. The forward end of the curved surface **11** joins a horizontal forwardly extending portion **13** which is supported by a vertically extending forward wall portion **14** and forms a portion of the lower slice lip.

The box proper is formed with side plates **15** resting at their lower edges on the concrete foundation **10** and being attached to the ends of the base member. The lower portions of the side plates **15** are formed with forwardly extending portions **16**. The bottom wall **17** of the box is positioned upon the concave surface **11** of the base member following the contour thereof and extending downwardly, as at **18**, over the surface of the rear wall

12 of the base, and being fixedly secured, as by welding, to one edge of an inlet slot **20** formed in a tubular member **21** extending transversely of the head box and suitably supported, as by a concrete foundation **22**.

The rear wall **24** of the box is attached to its lower edge to the opposite edge of the slot **20**. The lower portion **25** of the rear wall and the lower portion **27** of the depending bottom wall diverge outwardly and upwardly from the slot **20** and form the lower portion of an up-flow compartment, the upper portion of which is formed by a partition member designated generally **28** and consisting of plates **29, 30, 31, 32, 33, 34**, extending transversely of the box. The lowermost plate **29** is positioned slightly above the ridge **12'** or crest of the bottom wall of the box to provide a slot **36** through which a portion of the stock flow passes forwardly into the lower end of the down-flow compartment which is formed by the partition **28** and the front wall **37** of the box. The uppermost plate **34** has its upper edge formed as shown in Fig. 3 with a convexly curved face **38** on its forward side to provide for smooth flow of stock thereover with minimum tendency to cavitation and undesirable fiber or slime deposits such as may result from a flow of stock over a vertical surface.

The tubular inlet member **21** forms a stock inlet chamber **39** which is connected to the stock supply through a plurality of rearwardly extending flanged pipe members **40**. The chamber **39** forms in effect an explosion chamber, since the stock flowing through the inlet pipes **40** travels at relatively high velocity and, due to the large cross sectional area of the member **21**, the stock is permitted to expand suddenly, so to speak, whereby the velocity is reduced and a high static head is formed, creating the first turbulence, or agitation, of the stock.

The up-flow of stock through the inlet slot **20** is restricted by a baffle **42** extending transversely of the box between the inclined side walls **25, 27**, and this baffle is of inverted teardrop shape including side portions **44** converging upwardly to an apex **45**. This baffle is adjustable vertically toward and from the inlet slot **20**. Because of the restriction by baffle **42** of the flow area between itself and the sides **25, 27**, the velocity of the stock is again increased, but as it flows upwardly into the broader portion of the up-flow compartment, the velocity is decreased. The inverted teardrop arrangement of baffle **42** promotes smooth deceleration of this upward flow of stock with minimum tendency to cavitation.

To the inner surface of each end wall **15** of the box, there are fixedly secured, as by welding, a plurality of pairs of angle strips **48**, see Figure 4, these strips extending vertically in parallel spaced relation and providing a T-slot in which there may be mounted spacing blocks **50**.

This T-slot arrangement is to provide a mounting for baffles **51** in the up-flow and down-flow compartments. In cross sectional form, the baffles **51** are of tear-drop shape, the baffles as shown being formed by welding inverted V-shaped members **52** to tubular members **53**. The baffles are arranged with the apexes **54** pointing or extending in the direction of the flow of the stock. As shown in Figure 3, the apexes **54** point upwardly in the up-flow compartment and the apexes of the baffles **51** in the down-flow compartment point downwardly, The baffle **42** is of similar construction, except the V-shaped member is of substantially greater vertical dimension.

An end plate **56** is secured to each end of each of the baffles, and to each end plate there is secured, as by screws **57**, a block **58** slidably mounted between the guide rails **48** for cooperation with spacing blocks **50** of the proper selected heights to support the respective baffles **51** in the desired positions.

The baffle 42 controlling the inlet slot 20 is constructed with a shaft 60 extending therethrough and outwardly through vertically arranged slots 61 in the end plates of the box. The outwardly extending end portions of the shaft 60 are journalled in bearing members 64 formed with vertically extending slots 65, see Figure 1, for the reception of mounting screws 66 extending through the slots 65 and being threaded into a plate 67 secured to the end wall of the box, as by screws 68. To each end of the shaft 60 there is secured a spur gear 70 arranged in mesh with a rack 71 fixedly secured to the plate 67. The gear 70 on one end of the shaft also meshes with a rack 72 having a threaded stem 73 extending through a bracket 75 carried by the plate 67, the stem being provided with adjusting nuts 76 above and below the bracket and by adjusting the nuts 76, the rack is moved vertically. The baffle 42 is fixedly secured at each end to a sleeve encircling the shaft, the sleeves being also fixedly secured to the bearing members 64 as by set screws, see Figure 2. With this arrangement the baffle is adjusted vertically at one side of the machine toward and from the inlet slot 20 and is restrained against rotation during such adjustment.

It is well known that every furnish or stock solution has its flocculating time. This means that if the fibers in the stock remain in the same relative condition, either because of stagnation, or uniform velocity, for a certain period of time, the fibers will tend to become attached to each other and form clots or flocs. There is a standard procedure used in determining the time required to cause this so-called flocculation of the fibers, and this flocculation time is standard for any given furnish. If at any time within the flocculating period, the fibers are violently agitated, or disturbed, the tendency to flocculation is broken up. This flocculation of fibers is a serious problem in manufacturing paper on a Fourdrinier machine. If the fibers are discharged through the slice onto the forming wire in flocs or clots, the quality of the sheet will be impaired, the non-uniform distribution of the fibers adversely affecting the quality of the paper from a utility standpoint.

The baffles 42, 51 are effective to reduce flocculation of the stock to a minimum and if the baffles are properly spaced apart, flocculation can be entirely eliminated. As the flow of stock encounters each baffle, its progress is restricted in moving through the reduced area between the baffle and the sides of the up-flow and down-flow compartments. This restriction causes an increase in the velocity of the movement of the stock, but after the stock has passed the baffle, its velocity is reduced. This periodic change in the velocity of the stock creates considerable agitation of the stock and, as previously pointed out, this avoids flocculation of the fibers. The baffles 51 are spaced apart proper distances in accordance with the determined flocculation time of the stock. This adjustment is by the employment of the spacer blocks 50 positioned in the guide pieces 48. The baffles, because of their structural arrangement, also serve an additional purpose.

Another problem in the manufacture of paper is caused by air entrapped and absorbed in the stock. The baffles of teardrop shape tend to collect small bubbles of air from the stock and to discharge them off the points or apexes 54. These bubbles rise rapidly in the up-flow compartment and collect on the surface of the pond where they are eliminated.

Such air as remains in the stock during its downward flow, in the down-flow compartment, tends to collect on and to follow down the forward wall 37 of the box, and the bubbles passing off of the apexes 54 of the baffles 51 likewise move toward the wall 37.

The bottom wall of the box inclines downwardly, as at 80, from the ridge 12' and the front wall of the up-flow compartment, and forms the bottom wall of a discharge compartment or passage 81 which curves upwardly and communicates with the slice opening 82. The top wall 83 of the discharge compartment 81 likewise curves upwardly and at the joinder of this wall with the front wall 37, there is provided a slot 84 communicating with a compartment 85 provided at one or both ends with a suction outlet pipe 86. The slot 84 is in the nature of an air vent for removing the accumulation of air bubbles traveling down the surface of the front wall 37, and it will also be seen in Fig. 3 that since the slot 84 is located at a position well below the ridge 12' where the wall 83 is formed to introduce a considerable restriction of the flow area of the compartment or passage 81, the resulting change of the pressure head to velocity promotes the release of entrained air bubbles at the top of this passage for removal by way of the slot 84.

There is journalled in the box and extending transversely in the discharge compartment 81, a distributor roll 88, the top and bottom walls of this passage diverging upwardly from the vicinity of the slot 84 to enlarge the passage sufficiently for reception of the distributor roll 88. This roll is mounted upon a shaft 89 journalled in bearings 90 mounted on the portions 16 of the side plates 15 of the box. One end of the shaft, as 91, extends outwardly through the bearing for the reception of a pulley or gear to effect rotation of the roll. The roll consists of a series of disks 93 arranged in spaced apart relation on the shaft with a plurality of rods 94 extending parallel with the shaft 89 through the disks 93 adjacent the periphery thereof, as shown in detail in the copending application of W. S. Corbin, Serial No. 238,723, filed July 26, 1951, and assigned to the same assignee as this application. The function of this roll is to effect agitation of the stock without imparting movement thereof transversely of the box.

The top wall 83 of the discharge compartment 81 extends upwardly about a portion of the distributor roll 88, the roll being of such diameter that its periphery moves in close adjacency to the bottom and top walls of the compartment, whereby the roll is continually and completely submerged in the stock flowing through the discharge compartment 81.

The forward lower portions 16 of the end walls 15 are provided at their upper edges with laterally extending plates 100 reinforced by brackets 101. There is slidably mounted on the plates 100, a deck having end walls 102, a bottom wall 103, and a top wall 104. The end walls 102 engage the inner surface of the wall portion 16 of the box and carry laterally extending members 106 reinforced with angle pieces 107, the members 106 being slidably mounted upon the plates 100.

The deck structure is formed with a plurality of vertically extending walls or partitions 108, and a rear wall 109 to which bearing blocks 110 are mounted and in which there is journalled a shaft 111 provided at one end with a hand wheel 112. The shaft 111 carries a pair of worm gears 113 arranged in mesh with worm wheels 114 forming nuts for screws 115 having eye heads attached to the forward wall of the box, as by a rod 116. With this arrangement, rotation of the hand wheel 112 effects forward and rearward movement of the deck structure. The bottom wall 103 extends forwardly and upwardly from the roll 88 to the slice 82 forming a continuation of the top wall of the discharge compartment. An upper slice lip 120 is hingedly secured to the front end of the bottom wall 103, and mechanism is provided for adjusting this upper lip 120 toward and from the bottom lip of the slice 82. There is mounted on the top wall 104 of the deck structure, a plurality of gear housings 122 in which there is journalled a shaft 123 extending horizontally and also supported in bearings 124 and provided on at least one end with a hand wheel 125. The shaft has fixed on it worms engaging with worm wheels 128 which constitute nuts for screws 129 extending vertically and being secured at their lower ends in housings 130 mounted for vertical sliding move-

ment on a front wall 131 of the deck structure. A beam in the form of a tubular member 132 is carried by the housings 130 and extends transversely across the front of the deck. A series of relatively closely placed screws 135 are attached to the forward edge of the lip 120 and extending through the beam 132, these screws being provided with upper and lower nuts 136 to effect individual vertical adjustment of the screws to level the lip 120, initial vertical adjustment of the lip being effected by rotation of the hand wheel 125.

As clearly shown in Fig. 3, the ridge 12' is located in substantially the same horizontal plane with the forming wire 140 where the latter leaves the breast roll 141. The entire approach flow of stock to the wire through the discharge passage 81 is therefore below the wire level except for the short distance after leaving the distributor roll 88 to the slice. It is accordingly apparent that since some head of stock is required above the ridge 12', which even for minimum speeds will extend above the ridge to a level appreciably higher than the upper slice lip 120, this construction assures both that the distributor roll 88 be at all times completely submerged in stock, and also that no part of this discharge passage will be above the liquid level during operation, thus preventing possible drying and tendency to collect fiber thereon.

In addition, with the top wall portion 103 of the discharge passage inclined upwardly from the distributor roll 88 to its junction with the upper slice lip 120 as shown, if air bubbles should travel with the stock beyond the slot 84, they will tend to migrate upwardly and outwardly along the wall 103 until they are entrained by the scouring action of the stock as discharged there by the slice. This discharge passage construction therefore provides for control of the flow distribution of the stock at a position close to the slice even at minimum speeds of operation, and at the same time it gives maximum assurance against possible depositing of air, slime or the like tending to build up obstructions to smooth sheet formation as well as to the formation of lumps capable of subsequently breaking off into the flow and forming defects in the sheet.

What we claim is:

1. A head box for a Fourdrinier paper machine having a forming wire and a breast roll supporting the wire in a predetermined horizontal plane, comprising front and rear walls and a pair of side walls defining a main chamber for receiving the paper making stock, said chamber being open to atmospheric pressure at the top thereof, means including a bottom wall forming a ridge extending permanently across said main chamber and defining therewith a rear and a front compartment, means for delivering stock into said rear compartment for flow therefrom over said ridge to said front compartment, means forming a slice in substantially the same horizontal plane as the wire for delivering the stock from said front compartment to the wire, means including a top wall forming a discharge passage leading from said front compartment to said slice, means establishing said ridge at substantially the same horizontal level as the wire to provide for slow speed operation of said head box with a correspondingly low pressure head of stock above said ridge, removable partition means above said ridge for raising the height of said front compartment to increase the pressure head of stock therein for correspondingly increasing speeds of operation, a distributor roll journaled within said discharge passage for agitating the stock flow through said passage to even the flow distribution of the stock therethrough, said top wall having a substantial portion of the length thereof located below the horizontal level of said ridge and the remainder thereof located not substantially higher than said ridge to maintain said distributor roll submerged in stock through the full speed range of operation of said head box, means forming a bleed chamber in said head box located forwardly of said ridge, said top and said bottom walls including portions located between said ridge and said distributor roll in relatively close proximity to each other to introduce a restriction in said discharge passage intermediate said ridge and said distributor rolls with resulting change of the pressure head on the stock flowing therethrough to velocity promoting release of entrained air bubbles at the top of said restriction, means defining a slot in said top wall extending substantially the full width of said restriction for conducting air bubbles from the stock in said discharge passage to said bleed chamber, and means for venting said bleed chamber.

2. A head box for a Fourdrinier paper machine having a forming wire and a breast roll supporting the wire in a predetermined horizontal plane, comprising front and rear walls and a pair of side walls defining a main chamber for receiving the paper making stock, said chamber being open to atmospheric pressure at the top thereof, means including a bottom wall forming a ridge extending permanently across said main chamber and defining therewith a rear and a front compartment, means including partition members removably mounted above said ridge for extending the heights of said compartments in accordance with the desired pressure head of stock in said chamber, means for delivering stock into the lower end of said rear compartment for flow upwardly therein and over said partition means to said front compartment, means forming a slice in substantially the same horizontal plane as the wire for delivering the stock from said front compartment to the wire, at least one imperforate baffle member extending between said side walls in each of said compartments, said baffle members being of generally teardrop configuration in cross section providing a rounded surface on one side thereof tapering to an apex on the opposite side thereof, and means mounting said baffle members with the apex of each thereof pointing in the direction of stock flow therepast to cause sudden acceleration of said stock flow followed by more gradual deceleration and thus to effect agitation of said stock with minimum turbulence and tendency to flocculation of the fibers therein.

3. A head box for a Fourdrinier paper machine having a forming wire and a breast roll supporting the wire in a predetermined horizontal plane, comprising front and rear walls and a pair of side walls defining a main chamber for receiving the paper making stock, said chamber being open to atmospheric pressure at the top thereof, means including a bottom wall forming a ridge extending permanently across said main chamber and defining therewith a rear and a front compartment, means including partition members removably mounted above said ridge for extending the heights of said compartments in accordance with the desired pressure head of stock in said chamber, means for delivering stock into the lower end of said rear compartment for flow upwardly therein and over said partition means to said front compartment, means forming a slice in substantially the same horizontal plane as the wire for delivering the stock from said front compartment to the wire, at least one imperforate baffle member extending between said side walls in each of said compartments, said baffle members being of generally teardrop configuration in cross section providing a rounded surface on one side thereof tapering to an apex on the opposite side thereof, means mounting said baffle members with the apex of each thereof pointing in the direction of stock flow therepast to cause sudden acceleration of said stock flow followed by more gradual deceleration and thus to effect agitation of said stock with minimum turbulence and tendency to flocculation of the fibers therein, and the uppermost of said partition members having a convex surface on the side thereof facing said front compartment to minimize cavitation in the flow of stock over the top thereof from said rear compartment.

4. A head box for a Fourdrinier paper machine having a forming wire and a breast roll supporting the

wire in a predetermined horizontal plane, comprising front and rear walls and a pair of side walls defining a main chamber for receiving the paper making stock, said chamber being open to atmospheric pressure at the top thereof, means including a bottom wall forming a ridge extending permanently across said main chamber and defining therewith a rear and a front compartment, means including partition members removably mounted above said ridge for extending the heights of said compartments in accordance with the desired pressure head of stock in said chamber, means for delivering stock into the lower end of said rear compartment for flow upwardly therein and over said partition means to said front compartment, means forming a slice in substantially the same horizontal plane as the wire for delivering the stock from said front compartment to the wire, means including a top wall forming a discharge passage leading from said front compartment to said slice, means establishing said ridge at substantially the same horizontal level as the wire to provide for slow speed operation of said head box with a correspondingly low pressure head of stock above said ridge, a distributor roll journaled within said discharge passage for agitating the stock flow through said passage to even the flow distribution of the stock therethrough, said top wall having a substantial portion of the length thereof located below the horizontal level of said ridge and the remainder thereof located not substantially higher than said ridge to maintain said distributor roll submerged in stock through the full speed range of operation of said head box, and at least one imperforate baffle member extending between said side walls in each of said compartments, said baffle members being of generally teardrop configuration in cross section providing a rounded surface on one side thereof tapering to an apex on the opposite side thereof, and means mounting said baffle members with the apex of each thereof pointing in the direction of stock flow therepast to cause sudden acceleration of said stock flow followed by more gradual deceleration and thus to effect agitation of said stock with minimum turbulence and tendency to flocculation of the fibers therein.

5. A head box for a Fourdrinier paper machine comprising front and rear walls and a pair of side walls defining a main chamber for receiving the paper making stock, partition means dividing said chamber into front and rear compartments, means for delivering stock into the lower end of said rear compartment for flow upwardly therein and over said partition means to said front compartment, means forming a slice at the lower end of said compartment for discharge of the stock therefrom, at least one imperforate baffle member extending between said side walls in each of said compartments, said baffle members being of generally tear-drop configuration in cross section providing a rounded surface on one side thereof tapering to an apex on the opposite side thereof, means mounting said baffle members extending horizontally across said compartments intermediate said partition means and the adjacent one of said front and rear walls with the apex of each thereof extending in the direction of the stock flow therepast through the associated said compartment, and each said baffle being of a width measured from back to front of the associated compartment less than the corresponding dimension of said compartment to cause abrupt narrowing of the flow passage through said compartments for sudden acceleration of the flow of stock past both sides thereof followed by progressive widening of such flow passage for controlled deceleration of said stock with minimum turbulence.

6. A head box for a Fourdrinier paper machine comprising front and rear walls and a pair of side walls defining a main chamber for receiving the paper making stock, a partition dividing said chamber into front and rear compartments and including removable partition members for varying the effective height of said partition, means for delivering stock into the lower end of said rear compartment for flow upwardly therein and over said partition means to said front compartment, means forming a slice at the lower end of said compartment for discharge of the stock therefrom, at least one imperforate baffle member extending between said side walls in each of said compartments, said baffle members being of generally tear-drop configuration in cross section providing a rounded surface on one side thereof tapering to an apex on the opposite side thereof, means mounting said baffle members extending horizontally across said compartments intermediate said partition means and the adjacent one of said front and rear walls with the apex of each thereof extending in the direction of the stock flow therepast through the associated said compartment, each said baffle being of a width measured from back to front of the associated compartment less than the corresponding dimension of said compartment to cause abrupt narrowing of the flow passage through said compartments for sudden acceleration of the flow of stock past both sides thereof followed by progressive widening of such flow passage for controlled deceleration of said stock with minimum turbulence, and means forming vertically adjustable mountings for said baffle members to provide for varying the positions of said baffle members in accordance with the height of said partition.

7. A head box for a Fourdrinier paper machine having a forming wire and a breast roll supporting the wire in a predetermined horizontal plane, comprising front and rear walls and a pair of side walls defining a main chamber for receiving the paper making stock, means including a bottom wall forming a ridge extending permanently across said main chamber and defining therewith a rear and a front compartment, means for delivering stock into said rear compartment for flow therefrom over said ridge to said front compartment, means forming a slice in substantially the same horizontal plane as the wire for delivering the stock from said front compartment to the wire, means including a top wall forming a discharge passage leading from said front compartment to said slice, means establishing said ridge at substantially the same horizontal level as the wire to provide for slow speed operation of said head box with a correspondingly low pressure head of stock above said ridge, removable partition means above said ridge for raising the height of said front compartment to increase the pressure head of stock therein for correspondingly increased speeds of operation, said bottom wall extending downwardly and forwardly from said ridge toward said front wall and cooperating therewith and with said top wall to establish a constriction in said discharge passage intermediate said ridge and said slice, said top and bottom walls having relatively diverging portions between said constriction and said slice to enlarge the portion of said discharge passage defined thereby, a distributor roll journaled within said enlarged portion of said discharge passage, and said top wall having a substantial portion of the length thereof located below the horizontal level of said ridge and the remainder thereof located not substantially higher than said ridge to maintain said distributor roll submerged in stock through the full speed range of operation of said head box.

8. A head box for a Fourdrinier paper machine having a forming wire and a breast roll supporting the wire in a predetermined horizontal plane, comprising front and rear walls and a pair of side walls defining a main chamber for receiving the paper making stock, means including a bottom wall forming a ridge extending permanently across said main chamber and defining therewith a rear and a front compartment, means for delivering stock into said rear compartment for flow therefrom over said ridge to said front compartment, lips forming a slice outlet in substantially the same horizontal plane as the wire for delivering the stock from said front compartment to the wire, means including a top wall forming a discharge passage leading from said front compartment to said

slice outlet, means establishing said ridge at substantially the same horizontal level as the wire to provide for slow speed operation of said head box with a correspondingly low pressure head of stock above said ridge, removable partition means above said ridge for raising the height of said front compartment to increase the pressure head of stock therein for correspondingly increased speeds of operation, said bottom wall extending downwardly and forwardly from said ridge toward said front wall and cooperating therewith and with said top wall to establish a constriction in said discharge passage intermediate said ridge and said slice, said top and bottom walls having relatively diverging portions between said constriction and said slice to enlarge the portion of said discharge passage defined thereby, a distributor roll journaled within said enlarged portion of discharge passage, said top wall having substantially the entire portion of the length thereof upstream of said distributor roll located below the horizontal level of said ridge to maintain said roll submerged in stock through the full speed range of operation of said head box, and said top wall being inclined upwardly and forwardly from said distributor roll to said slice outlet to promote discharge of entrained air bubbles with the stock flow through said slice outlet.

9. A head box for a Fourdrinier paper machine having a forming wire and a breast roll supporting the wire in a predetermined horizontal plane, comprising front and rear walls and a pair of side walls defining a main chamber for receiving the paper making stock, means including a bottom wall forming a ridge extending permanently across said main chamber and defining therewith a rear and a front compartment, means for delivering stock into said rear compartment for flow therefrom over said ridge to said front compartment, means forming a slice in substantially the same horizontal plane as the wire for delivering the stock from said front compartment to the wire, means including a top wall forming a discharge passage leading from said front compartment to said slice, means establishing said ridge at substantially the same horizontal level as the wire to provide for slow speed operation of said head box with a correspondingly low pressure head of stock above said ridge, said bottom wall extending downwardly and forwardly from said ridge toward said front wall and cooperating therewith and with said top wall to establish a constriction in said discharge passage intermediate said ridge and said slice, said top wall having a substantial portion of the length thereof located below the horizontal level of said ridge and the remainder thereof located not substantially higher than said ridge to maintain said passage filled with stock through the full speed range of operation of said head box, means forming a bleed chamber in said head box located forwardly of said ridge, means defining a slot in said top wall adjacent said constriction and below said bleed chamber and extending substantially the full width of said discharge passage for conducting air bubbles from the stock in said discharge passage to said bleed chamber, and means for venting said bleed chamber.

10. A head box for a Fourdrinier paper machine having a forming wire and a breast roll supporting the wire in a predetermined horizontal plane, comprising walls defining a main chamber for receiving the paper making stock, means including a bottom wall forming a ridge extending permanently across said main chamber and defining therewith a rear and a front compartment, means for delivering stock into said rear compartment for flow therefrom over said ridge to said front compartment, means forming a slice in substantially the same horizontal plane as the wire for delivering the stock from said front compartment to the wire, means including a top wall forming a discharge passage leading from said front compartment to said slice, means establishing said ridge at substantially the same horizontal level as the wire to provide for slow speed cooperation of said head box with a correspondingly low pressure head of stock above said ridge, removable partition means above said ridge for raising the height of said front compartment to increase the pressure head of stock therein for correspondingly increased speeds of operation, said bottom wall extending downwardly and forwardly from said ridge toward said front wall and cooperating therewith and with said top wall to establish a constriction in said discharge passage intermediate said ridge and said slice, said top and bottom walls having relatively diverging portions between said constriction and said slice to enlarge the portion of said discharge passage defined thereby, a distributor roll journaled within said enlarged portion of said discharge passage, said top wall having a substantial portion of the length thereof located below the horizontal level of said ridge and the remainder thereof located not substantially higher than said ridge to maintain said distributor roll submerged in stock through the full speed range of operation of said head box, means forming a bleed chamber in said head box located forwardly of said ridge, means defining a slot in said top wall located adjacent said constriction and extending substantially the full width of said discharge passage for conducting air bubbles from the stock in said discharge passage to said bleed chamber, and means for venting said bleed chamber.

11. A headbox for a Fourdrinier paper machine having a forming wire and a breast roll supporting the wire in a predetermined horizontal plane, comprising front and rear walls and a pair of side walls defining a main chamber for receiving the paper making stock, said chamber being open to atmospheric pressure at the top thereof, means forming a partition extending across said main chamber and defining therein a rear and a front compartment, means defining a stock inlet chamber adjacent the bottom end of said rear compartment, means defining an inlet slot connecting said inlet chamber with said rear compartment and of materially lesser flow area than said inlet chamber and said rear compartment, the lower portions of opposed walls of said rear compartment being arranged to diverge upwardly from the opposed edges of said slot, an imperforate baffle within the bottom end of said rear compartment mounted between said diverging walls above and in controlling relation with said inlet slot, said baffle being of generally inverted teardrop shape in cross section providing a substantially semi-cylindrical lower face and upper side faces converging to an apex, means maintaining said baffle with said apex pointing upwardly to cause sudden acceleration of the stock flow past the lower end thereof followed by gradual deceleration of the stock flow to and past said apex, and means for adjusting said baffle towards and away from said slot to vary the effective flow area therepast.

References Cited in the file of this patent

UNITED STATES PATENTS

1,534,080	Russell	Apr. 21, 1925
1,727,928	Berry	Sept. 10, 1929
1,775,905	Lang	Sept. 16, 1930
1,886,607	Wood	July 12, 1932
1,898,372	Hyde	Feb. 1, 1933
1,909,150	Bell-Irving et al.	May 16, 1933
2,062,471	Murray	Dec. 1, 1936
2,118,491	Chuse	May 24, 1938
2,202,890	Berry	June 4, 1940
2,205,693	Miline	June 25, 1940
2,284,098	Lang	May 26, 1942
2,308,370	Kellett et al.	Jan. 12, 1943
2,325,016	Warren	July 20, 1943
2,329,799	Thorsen	Sept. 21, 1943
2,339,730	Vedder et al.	Jan. 18, 1944
2,381,286	Hornbostel et al.	Aug. 7, 1945

(Other references on following page)

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UNITED STATES PATENTS

2,506,678	Osgood	May 9, 1950
2,509,822	Hornbostel	May 30, 1950
2,563,790	Lowe	Aug. 7, 1951
2,677,316	Heys	May 4, 1954
2,677,991	Goumeniouk	May 11, 1954

FOREIGN PATENTS

222,219	Germany	May 20, 1910
226,400	Germany	Oct. 1, 1910
254,873	Germany	Dec. 17, 1912

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255,097	Italy	Oct. 8, 1927
353,133	Great Britain	July 23, 1931
539,372	Germany	Nov. 25, 1931
660,354	Great Britain	Nov. 7, 1951
672,278	Great Britain	May 21, 1952
681,549	Great Britain	Oct. 29, 1952

OTHER REFERENCES

MacNaughton: Paper Trade J., Dec. 26, 1940, pp. 30 and 31.

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,870,690 January 27, 1959

Wesley S. Corbin et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 5, line 65, for "increasing" read -- increased --; column 6, line 4, for "rolls" read -- roll --; column 10, line 61, list of references cited, under the heading "UNITED STATES PATENTS", for the patent number "1,886,607" read -- 1,866,607

Signed and sealed this 9th day of June 1959.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents