May 8, 1956 N. J. NIKS 2,744,452

ADJUSTABLE DISTRIBUTING ROLL IN PAPER MAKING MACHINES

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Fig. 1.

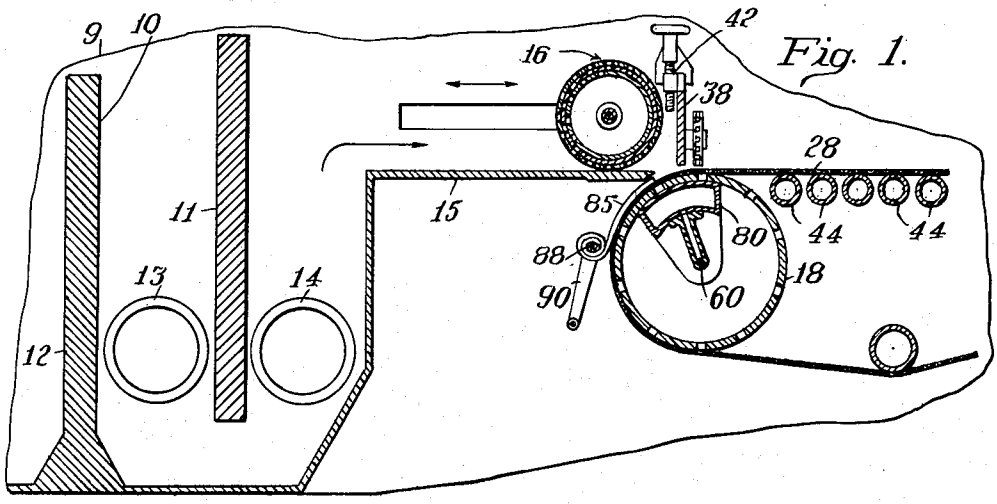


Fig. 2.

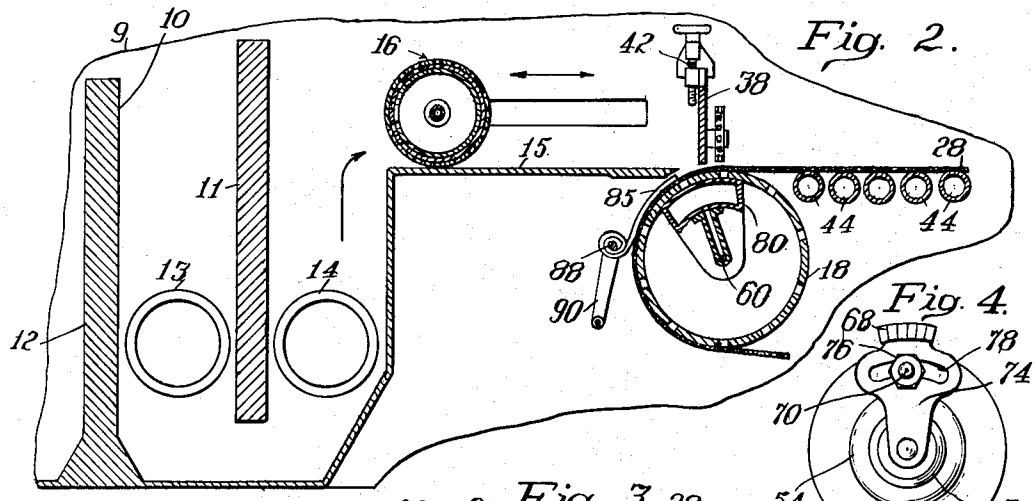
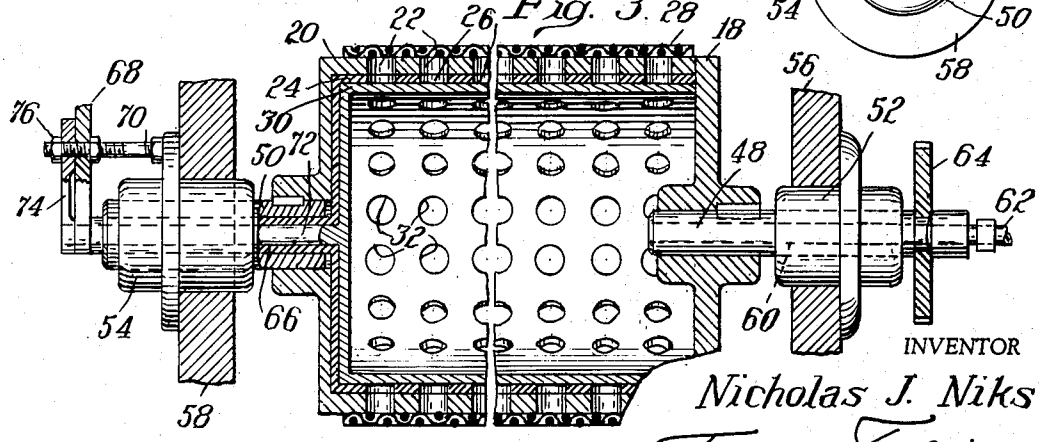


Fig. 4.

Fig. 3.



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Fig. 5.

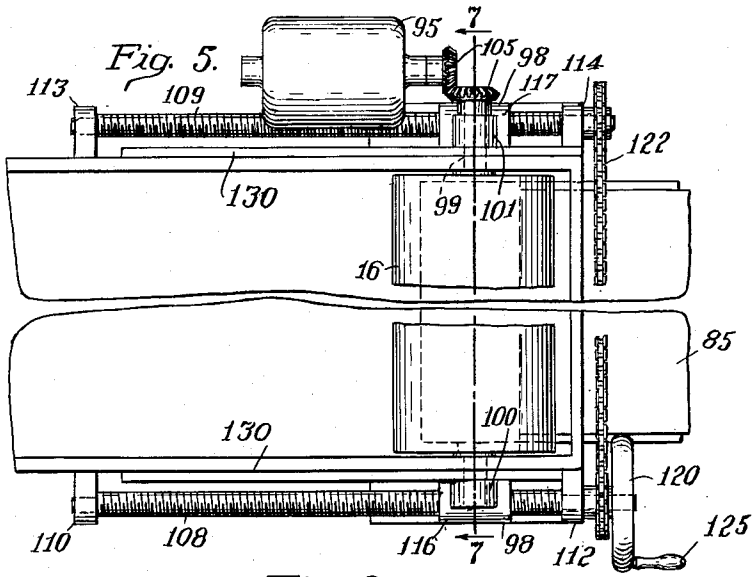


Fig. 6.

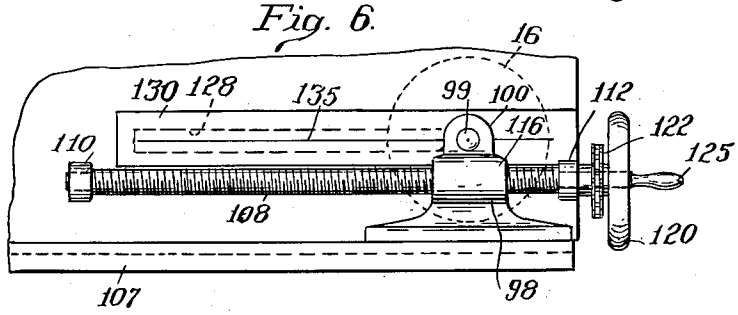
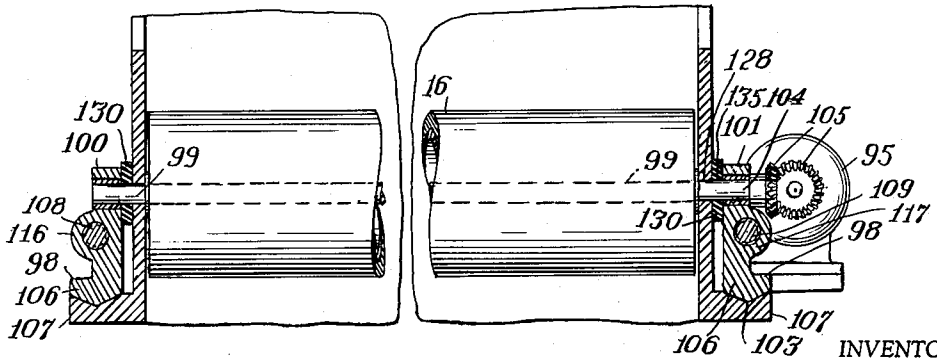


Fig. 7.



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ADJUSTABLE DISTRIBUTING ROLL IN PAPER MAKING MACHINES

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Application October 16, 1953, Serial No. 386,496

3 Claims. (Cl. 92—44)

This invention relates to Fourdrinier type paper machines, and, particularly to an improved method and apparatus for manufacturing paper. The invention includes improvements in a distributing roll and its co-action with a slice and breast roll whereby the stock delivered to the wire may be controlled to produce a desired quality of paper.

In the making of paper employing a Fourdrinier machine, the web of paper stock is first formed and delivered onto a traveling wire where it is subsequently de-watered by the press section of the machine, then dried by the action of driers, and is finally finished or smoothed out by the calendars.

The stock which is delivered to the machine comprises an aqueous mixture containing generally about one-half of one percent (½%) fiber, fillers, and sizing. The fibers mat together when the stock is de-watered and form the body of the paper sheet. The sizing is added for the purpose of controlling fluid absorption of the finished paper while the fillers are added to give the finished sheet the proper bulk and feel.

The particular proportions of water, sizing and filler is of the utmost importance in producing paper of the desired quality and it is with the control of these factors and improvement features of the inlet distributor roll that my invention is primarily concerned.

My invention makes it possible to accurately control the water, filler and sizing content of the stock as it is delivered to the wire in a Fourdrinier machine. By the method of my invention, water, sizing and filler may be added to or subtracted from the stock as it is laid on the traveling wire at the breast roll of the machine. This provides for an accurate control of these variable factors in the stock and insures that the final product will be of high quality. Also, according to this invention, the rate of modifying the above mentioned variable factors, as well as the extent of the zone over which they are so modified, is under the selective control of the machine operator at all times.

It is an object of this invention to provide an improved arrangement for the control of the moisture, filler, and sizing content of the paper web which is delivered to the wire passing around the breast roll.

It is another object to control the speed of the machine and regulate the quality of the paper made by controlling the addition thereto of moisture, fillers, etc., as the paper pulp is delivered to the screen at the breast roll.

It is another object to provide an adjustable distributing roll which can be moved towards and away from the slice for controlling the quality of the paper stock which is delivered to the breast roll.

It is another object to provide a method and apparatus for controlling the stock as it is delivered to the wire by providing an improved breast roll and using a distributing roll that is adjustable towards or away from the slice as necessary to get the best results depending upon the grade of paper desired and the speed of the machine.

Still another object is to provide means for varying the

effective working surface of the breast roll which is effective for controlling the quality of the stock delivered to the wire.

These and other objects and advantages will become more apparent upon reference to the following description taken in connection with the accompanying drawings in which:

Figure 1 is a vertical section through the flow box end portion of a paper making machine of my invention showing a preferred embodiment thereof;

Figure 2 is a like sectional view as in Figure 1 showing the distributing roll moved back away from the slice;

Figure 3 is a transverse section through the breast roll;

Figure 4 is an elevational view of an adjusting means associated with the breast roll;

Figure 5 is a fragmentary plan view partly broken away illustrating the mechanism for moving the distributing roll and positioning it with respect to the slice;

Figure 6 is an elevational view of the mechanism shown in Figure 5 and looking in the direction of the arrows 6—6;

Figure 7 is a vertical sectional view of the mechanism illustrated in Figure 5, shown partly broken away and looking in the direction of the arrows 7—7.

Referring to the drawings, 9 indicates a head box or flow box which receives stock from a stock box, not shown. The stock is a thin mixture of fibers, fillers, sizing and water. The flow box 9 comprises a tortuous passageway 10 defined by the central wall 11 and the outer wall 12. Located in this passageway 10 are perforated drums 13 and 14 which are suitably driven so that the stock is thoroughly mixed and agitated. After passing the perforated drum 14 the stock flows over the head box bottom plate 15 and by the perforated distributing roll 16 to the breast roll 18.

The breast roll 18 comprises a drum 20 having perforations 22. Slidably received within the drum 20 is a second drum 24 which has the perforations 26 therein which extend around an arc equal to or less than the arc of contact of a wire or forming screen 28 with the drum 20. Slidably received within the drum 24 is a third drum 30 having the perforations 32 therein extending over an arc substantially identical with the arc of the perforations in the drum 24. The purpose of the aforementioned perforations will become more apparent hereinafter.

Arranged adjacent the breast roll 18 is a slice 38. The slice is adjustable by means of the nut and screw at 42 so that a final control of the film thickness is to be had.

The wire or screen 28 extends rightwardly from the breast roll 18 over a plurality of table rolls 44 and thence to the other stations in the paper making machine where the film is finally dried, pressed and calendered.

The construction of the breast roll 18 is more particularly shown in Figure 3 wherein it will be seen that the drum 20 has affixed to the right end thereof a shaft 48 and, to the left end thereof, a shaft 50. These shafts are journaled, respectively, in the bearings 52 and 54 carried in the side walls 56 and 58 of the machine.

The shaft 48 comprises an axial bore 60 which is connected with a conduit 62 externally of the wall 56. The shaft 48, likewise, comprises the drive gear 64 which is actuated by a means, not shown, so that the breast roll is driven at the proper speed.

The shaft 50 on the left end of the drum 20 is hollow and receives a sleeve 66 which is attached to or is integral with the drum 24. The sleeve 66 extends leftwardly through the shaft 50 and terminates in an arm 68 which is retained in position by a stud 70 attached to the wall 58 or bearing 54. The position of the drum 24 is thus made rigid with respect to the stationary parts of the machine so that the drum 20 revolves therearound.

The drum 30 which is slidably received within the drum 24 has a shaft 72 thereon which extends through the

sleeve 66 and terminates in an arm 74 which is clamped to the arm 68 by the nuts 76 on the stud 70.

Reference to Figure 4 will reveal that the arm 74 is slotted as at 78 so that the angularity of the drums 30 and 24 may be adjusted. This is effective to adjust the size of the opening from the inside of the inner drum to the apertures 22 in the outer drum so that the flow of fluid between the interior of the breast roll and the wire 28 may be controlled.

As illustrated in Figures 1 and 2, the perforated breast roll 18 is equipped with a box therein through which pressure or suction is applied to the roll. Such a pressure or suction box is shown at 80. The breast roll 18 may be used with or without the application of vacuum, as illustrated, depending on how fast it is desired to withdraw or drain away water from the paper web passing thereover.

Co-operating with the box 80, as shown in Figures 1 and 2, is an adjustable apron 85 for regulating the amount of the periphery of the breast roll over which the pressure or suction box 80 is effective. This apron comprises a flexible member made of dense or rubberized fabric. The apron passes around a shaft 88 and this shaft has a crank 90 on the outside of the machine for adjusting the apron extending over the breast roll.

It will be evident that by turning the crank in one direction the apron 85 can be withdrawn from the breast roll and that by turning the crank in the opposite direction the apron can be caused to extend outwardly over a greater part of the breast roll. This mechanism affords means whereby the application of pressure or suction to the paper stock or web passing on to the breast roll can be adjusted to suit the type of paper being manufactured. Adjustment of the apron and masking off of a portion of the roll surface affects the final orientation of the fibers of the paper stock and thus controls the nature of the paper produced thereby.

Suitable mechanism for adjustably positioning the distributing roll 16 so that the same can be moved close to the slice 38 or back away from the slice, as may be necessary to get the best results, is illustrated in Figures 5, 6 and 7. As shown, the distributing roll 16 is driven by a motor 95, the roll 16 and motor 95 being mounted for movement as a unit on a carriage 98. The motor is preferably of the variable speed type so that it can be set at any desired speed as required for different paper stock.

The distributing roll surface is perforated as described, the roll being mounted for rotation on an axle shaft 99, opposite ends of the shaft being journaled as at 100 and 101. The journals 100 and 101 are mounted on the carriage 98 which is slidable along the V-way 103.

One end of the shaft 99 is extended, as at 104, and geared to the variable speed motor 95 through bevel gears 105. The carriage 98, on which the distributing roll 16 is rotatably mounted, is provided with a base portion 106 which is shaped to fit the V-way 103 so that the carriage can be made to slide back and forth on the supporting frame 107.

To provide for movement of the carriage 98, upon which the distributing roll 16 and motor 98 are mounted, a pair of threaded rods 108 and 109 are arranged at opposite sides of the roll, as shown in Figure 5, the rods being suitably journaled at their opposite ends in frame portions 110 and 112 and 113 and 114 respectively.

Threaded onto the rod 108 is a nut 116 which is an integral part of the carriage 98. A like nut 117 on the opposite side of the carriage is threaded onto the rod 109 so that upon rotation of the threaded rods 108 and 109 the carriage 98 is made to travel along the length of the rods. To provide for turning the rods 108 and 109, a hand wheel 120 is suitably keyed onto the outer end of the rod 108. A sprocket and chain means 122 connects the rods 108 and 109, as illustrated in Figure 5, whereby upon turning the hand wheel 120 the rods are rotated in synchronism so that the carriage 98 is moved smoothly along without binding. For turning the hand wheel 120 a crank handle 125 is suitably provided. The hand wheel may be turned to position the distributing roll as desired and then the wheel locked as by the use of suitable locking means, not shown.

To cover the slot 128 along which the distributing roll axle shaft is moved to retain the stock in the head box a flap 130 of rubberized fabric or flexible material is disposed over the opening, being slitted longitudinally centrally thereof as at 135. In this manner the head box is kept closed during operation of the machine.

It will be appreciated by utilizing the paper making machine of this invention, it is possible to vary the composition of the stock through the use of my improved breast roll and at the same time position the distributing roll relative to the slice, as required, so that the best results can be obtained for the particular grade of paper which is being made and in accordance with the speed of operation of the machine. By thus adjustably positioning the distributing roll in accordance with my improved apparatus and regulating its rotational speed by the variable speed motor, a more close control can be maintained during the paper making operation.

This application is a continuation in part of my co-pending application Serial No. 70,510 filed January 12, 1949, entitled Method for Manufacture of Paper, now U. S. Patent 2,665,615.

It will be understood that invention illustrated and described herein is susceptible to modification as required to adapt it to different conditions and use. Accordingly, it is desired to comprehend such modifications and substitutions as come within the scope of this invention and as particularly defined in the appending claims.

I claim:

1. The combination in a paper making machine of a hollow breast roll, shaft means rotatably supporting said roll, a forming wire passing around said roll and extending horizontally therefrom, a head box for supplying a layer of paper stock to said forming wire, a suction box positioned in said breast roll for effecting variable fluid communication with said layer of paper stock as the same is supported on said forming wire and carried by said breast roll, a slice, a perforated distributing roll, a motor for rotating said distributing roll, said motor and distributing roll being mounted for movement as a unit on a base portion, said base portion having an elongated guideway for slidably supporting said roll and motor unit, and means for moving said roll and motor unit over said guideway to adjustably position said distributing roll with respect to said slice.

2. The combination in a paper making machine of a hollow breast roll, shaft means rotatably supporting said roll, a forming wire passing around said roll and extending horizontally therefrom, a head box for supplying a layer of paper stock to said forming wire, a suction box positioned in said breast roll for effecting variable fluid communication with said layer of paper stock as the same is supported on said forming wire and carried by said breast roll, a slice, a perforated distributing roll, a variable speed motor for rotating said distributing roll, said motor and distributing roll being mounted for movement as a unit on a base portion, said base portion having an elongated guideway for slidably supporting said roll and motor unit, and means for moving said roll and motor unit over said guideway to adjustably position said distributing roll with respect to said slice, and means for locking said roll and motor unit on said guideway after positioning the same.

3. The combination in a paper making machine of a hollow breast roll, shaft means rotatably supporting said roll, a forming wire passing around said roll and extending horizontally therefrom, a head box for supplying a layer of paper stock to said forming wire, a suction box positioned in said breast roll for effecting variable fluid communication with said layer of paper stock as the same is supported on said forming wire and carried by said breast

roll, a slice, a perforated distributing roll, a motor for rotating said distributing roll, said motor and distributing roll being mounted for movement as a unit on a base portion, said base portion having an elongated guideway for slidably supporting said roll and motor unit, means for moving said roll and motor unit over said guideway to adjustably position said distributing roll with respect to said slice, and an adjustable apron for masking off a portion of said forming wire as the same passes around said breast roll to apply fluid pressure at selected portions of said forming wire.

References Cited in the file of this patent

UNITED STATES PATENTS

1,727,928	Berry	Sept. 10, 1929
2,118,491	Chuse	May 24, 1938
2,225,435	Kellett et al.	Dec. 17, 1940
2,345,647	Witham	Apr. 4, 1944
2,381,286	Hornbostel et al.	Aug. 7, 1945
2,473,069	Niks	June 14, 1949
2,521,261	Smith et al.	Sept. 5, 1950
2,548,108	Hornbostel	Aug. 10, 1951
2,589,638	Staege	Mar. 18, 1952
2,615,374	Malkin	Oct. 28, 1952
2,665,615	Niks	Jan. 12, 1954