

June 14, 1949.

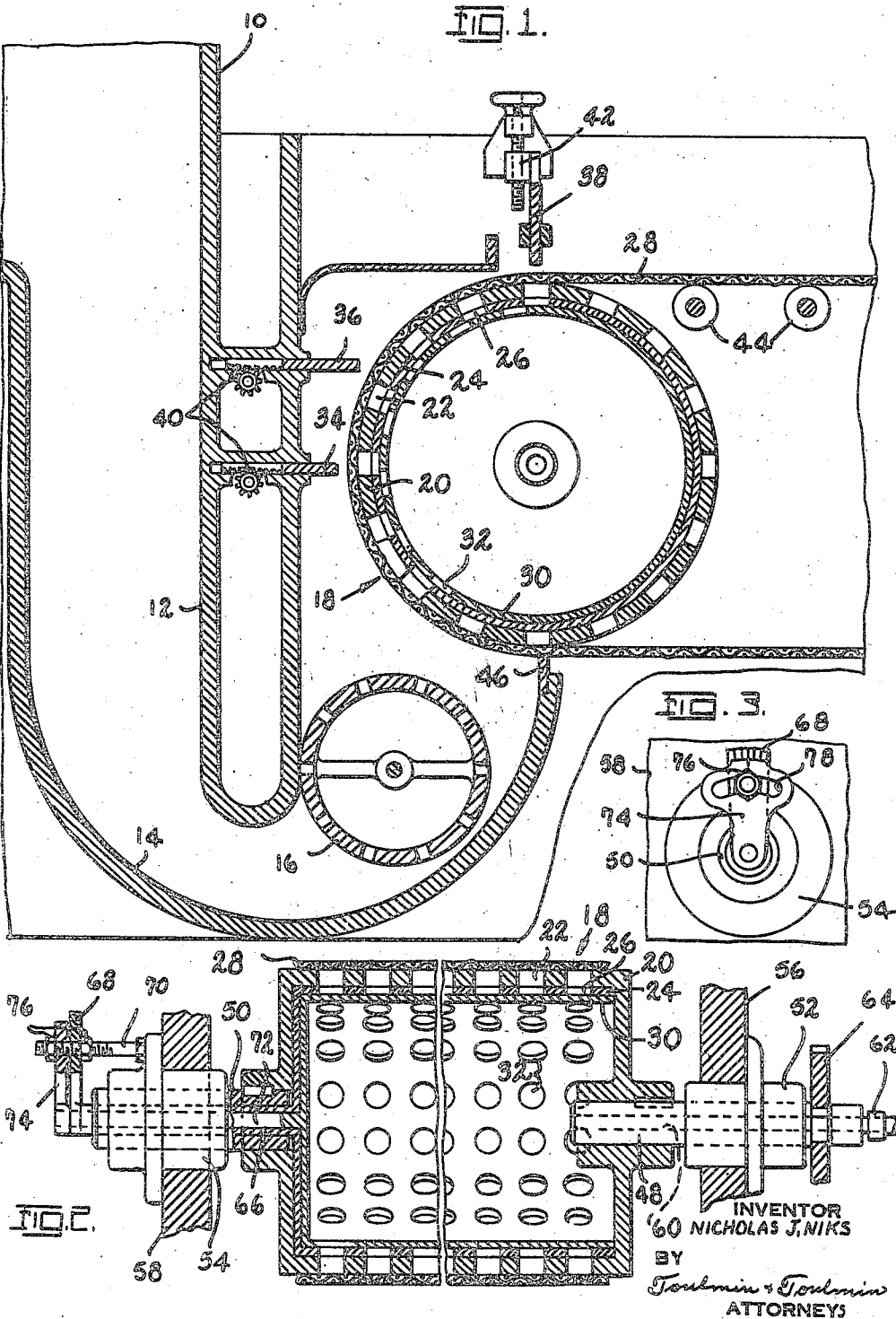
N. J. NIKS

2,473,069

APPARATUS FOR MANUFACTURE OF PAPER

Filed April 27, 1945

2 Sheets-Sheet 1



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Filed April 27, 1945

2 Sheets-Sheet 2

FIG. 4.

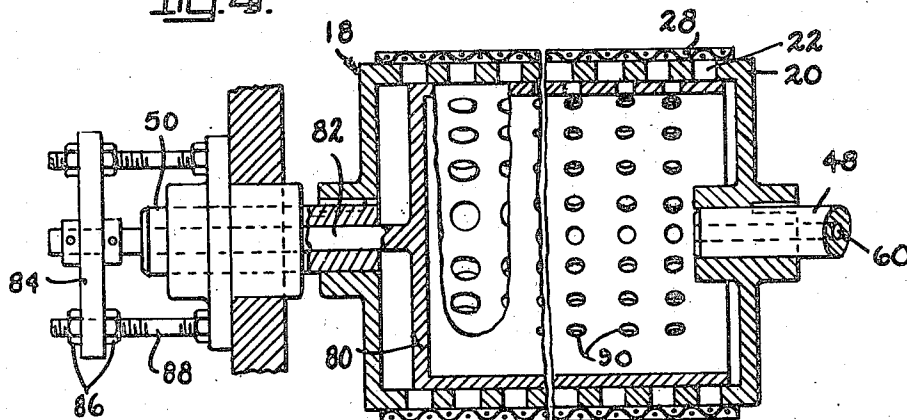


FIG. 5.

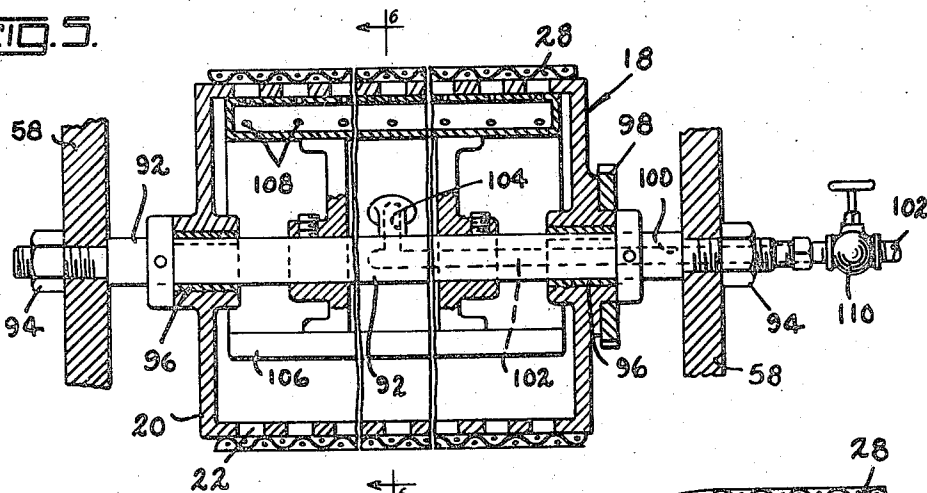


FIG. 6.

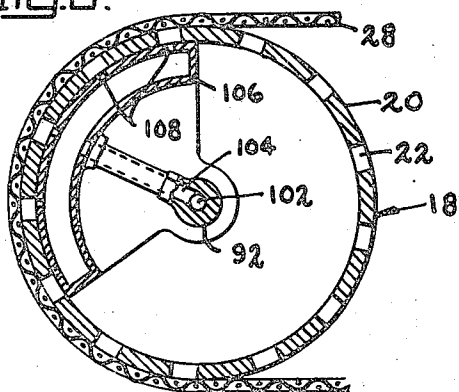
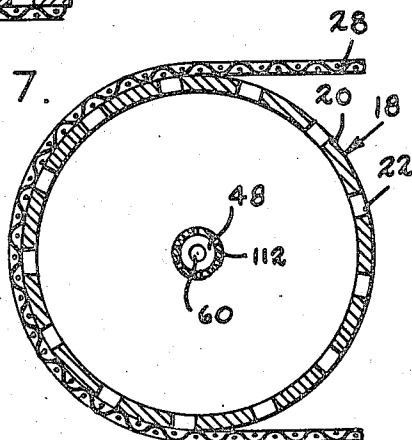


FIG. 7.



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2,473,069

APPARATUS FOR MANUFACTURE OF PAPER

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Application April 27, 1945, Serial No. 590,627

7 Claims. (Cl. 92-44)

1

This invention relates to Fourdrinier type paper machines and, particularly, to the construction of the breast roll.

In the making of paper in the case of the Fourdrinier machine the web of paper is first formed on the travelling wire, is subsequently de-watered by the press section of the machine, is dried out by the driers, and is finally finished or smoothed out by the calenders.

The stock which is delivered to the machine comprises an aqueous mixture containing about 1/2% 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 that my invention is primarily concerned.

Particularly, my invention proposes the control of 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 travelling 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.

Accordingly, the principal object of this invention is to provide 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 quality of the paper made in the machine 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 adjustable means for controlling the quality of the paper pulp which is delivered to the breast roll.

It is still another object to provide a method and apparatus for controlling the color of the stock as it is delivered to the wire.

These and other objects and advantages will become more apparent upon reference to the accompanying drawings, in which:

Figure 1 is a vertical section through one end of a paper making machine constructed according to my invention;

2

Figure 2 is a transverse section through the breast roll of Figure 1;

Figure 3 is an elevational view of an adjusting means associated with the breast roll of Figure 1;

Figure 4 is a view similar to Figure 2 but showing a modified arrangement of the water supply control means;

Figure 5 is a view similar to Figures 2 and 4 but showing still another modified arrangement;

Figure 6 is a section on the line 6-6 of Figure 5; and

Figure 7 is a view similar to Figure 6 showing a spray head positioned within the breast roll for supplying water thereto.

Referring to the drawings, 10 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 10 comprises a tortuous passage defined by the central wall 12 and the outer wall 14. There is located in this passage beneath the breast roll a perforated drum 16 which is driven so that the stock is thoroughly mixed and agitated immediately prior to being received by the breast roll 18.

The breast roll 18 according to my invention 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 the wire 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 around the breast roll 18 are a plurality of slices arranged horizontally and vertically, the former being indicated at 34 and 36 and the latter at 38. There are provided means comprising the gears and racks at 40 for adjusting the slices 34 and 36 relative to the breast roll 18 for controlling the thickness of the stock film applied thereto. The slice 38 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 wall 14 adjacent the lowermost part of the breast roll has a sealing strip 46 so that the head box 10 may maintain a predetermined pres-

sure of the stock against the breast roll and slices thereby providing for a continuous supply of stock to the screen 28.

The construction of the breast roll 18 is more particularly shown in Figure 2 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 3 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.

Referring to Figure 4, a similar arrangement is shown except that the inside drum has been eliminated and a single apertured drum or sleeve 80 is provided which is effective to control the fluid communication between the inside and the outside of the breast roll 18. The drum 80 has a shaft 82 thereon which extends through the shaft 50 and has attached thereto a crosshead 84 which may be adjusted inwardly or outwardly by the nuts 86 on the studs 88. The drum 80 being axially shorter than the breast roll 18, the apertures 90 in the drum 80 may be adjusted relative to the apertures 22 in the drum 20 of the breast roll so that the fluid communication between the interior of the breast roll and the wire 28 is controlled. As in the case of the construction shown in Figure 2, fluid is supplied to or taken from the breast roll 18 by the passage 60 in the right hand supporting shaft 48.

Referring to Figures 5 and 6, there is shown still another method of controlling the supply of fluid to the wire 28. In these figures the breast roll 18 is carried on a shaft 92 which extends completely through the machine and is attached to the walls 56 and 58 by the nuts 94. The drum 20 of the roll 18 is journaled on the bearings 96 and is adapted to be driven by the gear 98 attached thereto.

The shaft 92 is bored from the right end thereof with a passage 100 which is in communication with a conduit 102 and terminates centrally of the roll in a passage 104 which extends into a shell 106 which engages the interior surface of the drum 20 over at least a portion of the arc of contact thereof with the wire 28. The shell 106 is provided with a plurality of relatively small apertures 108 which register with the apertures

22 in the drum 20 and thereby provide for fluid communication between the shell 106 and the wire 28. Control of the fluid communication is had by a valve 110 in the conduit 102.

In Figure 7 is illustrated a modification wherein a spray head 112 is located within the drum 20 of the breast roll 18 and is especially adapted for supplying fluid to the wire 28. In the operation of the device of Figure 7 fluid is supplied to the shaft 48 by means of the bore 60 and the pressure thereof causes a spray to be directed against the interior of the drum 20. The portion of the spray which impinges upon the drum over the arc of contact therewith with the wire 28 supplies fluid thereto while the remainder is collected and recirculated.

In the practice of my invention fluid may be supplied or taken from the stock which is delivered to the wire 28 in accordance with the various factors which influence the quality of the finished product. Fillers and sizing may also be supplied in the fluid in order to make up for loss of the same from the stock or in order to supply an excess to the stock in order to compensate for loss as the film is drained or dried in passing through the machine.

Also, it will be apparent that the method of my invention is adapted for close control of the color of the paper. Dyes or pigments may be added to the stock with the water in order to correct for inaccuracies in the original mixing of the stock. Thus, it will be seen that the method and apparatus of my invention provides for the complete control of the quality and color of paper and that, furthermore, this control is exercised at the final point in the paper making machine where it is possible to do so.

It will be understood that various modifications may be made in this structure without departing from the spirit of this disclosure and accordingly it is desired to comprehend such modifications as may be considered to come within the scope of the appended claims.

I claim:

1. The combination in a paper making machine of a breast roll, a wire belt supported by said roll and contacting substantially 180° of the surface thereof, means for supplying a layer of paper stock to said belt over said 180°, and means for effecting fluid communication with said paper stock layer from within said breast roll over substantially the whole of the said 180° comprising perforations in said roll and a member within said roll having ports therein adapted continuously to register with the perforations in said roll in the arc of contact of said belt with said roll.

2. The combination in a paper making machine of a rotatably supported breast roll, a wire belt supported thereby and contacting the same over substantially half of its periphery, means for supplying paper stock to said belt, means comprising a plurality of slices for controlling the thickness of the layer of paper stock which is carried away by said belt, and means for controlling the moisture content in said layer comprising perforations in said roll, an adjustable valve member within said roll for adjustably effecting fluid communication with the greater portion of the perforations in the said one-half of the periphery of said roll, and conduit means for supplying fluid to the interior of said valve member.

3. The combination in a paper making machine of a rotatably supported breast roll, a wire

5

belt passing around said roll and extending away from said roll in a horizontal direction, means comprising a head box and a plurality of slices for applying a layer of paper stock to said belt, and means for controlling the ingredients in said stock comprising spaced peripheral perforations in said roll, a first cylindrical member stationarily supported within said roll and having apertures therein adapted to register with the perforations in said roll over the greater portion of the arc of contact thereof with said belt, a second cylindrical member within said first cylindrical member having apertures therein adapted adjustably to register with the apertures in said first cylindrical member, and conduit means for effecting fluid communication with the interior of said second cylindrical member whereby fluid communication is also had with said layer as it is applied to said belt.

4. The combination in a paper making machine of a hollow breast roll, means rotatably supporting said roll, a wire conveyor belt passing around said roll and extending away therefrom in a horizontal direction, means comprising a head box and a plurality of slices for applying a layer of paper stock to said belt, and means for controlling the ingredients in said layer comprising circumferentially spaced perforations in said roll, a first cylindrical member within said hollow roll having apertures therein adapted to register with the greater portion of the perforations in said roll over the arc of contact thereof with said belt, a second cylindrical member within said first member having apertures therein adapted to register with the apertures in said first member, channel means in said roll supporting means for effecting fluid communication with the interior of said second member, and means extending through said supporting means for maintaining said first member stationary and for adjustably clamping said second member to said first member whereby adjustable fluid communication may be had with said layer at said roll.

5. The combination in a paper making machine of a frame, a hollow breast roll, stub shafts journaled said roll and said frame, a wire belt supported by said roll, means comprising a head box and a plurality of slices for applying a layer of paper stock to said belt, and means for controlling the ingredients in said stock comprising circumferentially spaced perforations in said roll, a first cylindrical member engaging the inner surface of said roll and having apertures therein adapted to register with the perforations in said roll over the greater portion of the arc of contact of said roll with said belt, a second cylindrical member adapted slidably to fit within said first cylindrical member and having apertures therein adapted for registration with the apertures in said first cylindrical member, channel means in one of said stub shafts for effecting fluid communication with the interior of said roll, means

6

extending through the other of said stub shafts for clamping said first cylindrical member against rotation and also for securing said second cylindrical member to said first member in any predetermined position of angular adjustment.

6. The combination in a paper making machine of a hollow breast roll, a wire conveyor belt supported thereby, means comprising a head box and slices for applying a layer of stock to said belt, and means for effecting fluid communication with said layer through said roll comprising a plurality of circumferentially spaced perforations in said roll, a cylindrical member adapted slidably to be received within said roll and having apertures therein adapted for registration with the perforations in said roll over the greater portion of the arc of contact thereof with said belt, means external of said roll for axially adjusting said cylindrical member relative to said roll for varying the fluid communication between said apertures and said perforations, and conduit means for effecting fluid communication with the interior of said roll.

7. The combination in a paper making machine of a hollow circumferentially perforated breast roll, shaft means rotatably supporting said roll, a wire belt passing around said roll and extending away therefrom in a horizontal direction, means for applying a layer of paper stock to said belt at said roll, and means for effecting variable fluid communication with said layer at said roll comprising a curved hollow shell having one surface thereof in fluid communication with the inner surface of said roll over the greater portion of the arc of contact thereof with said belt, aperture means in the said one surface of said shell for effecting fluid communication of the interior of the shell with the perforations of said roll, channel means in said supporting shaft communicating with the interior of said shell, and valve means connected with said shaft whereby a controlled supply of fluid may be delivered to said layer through said roll.

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