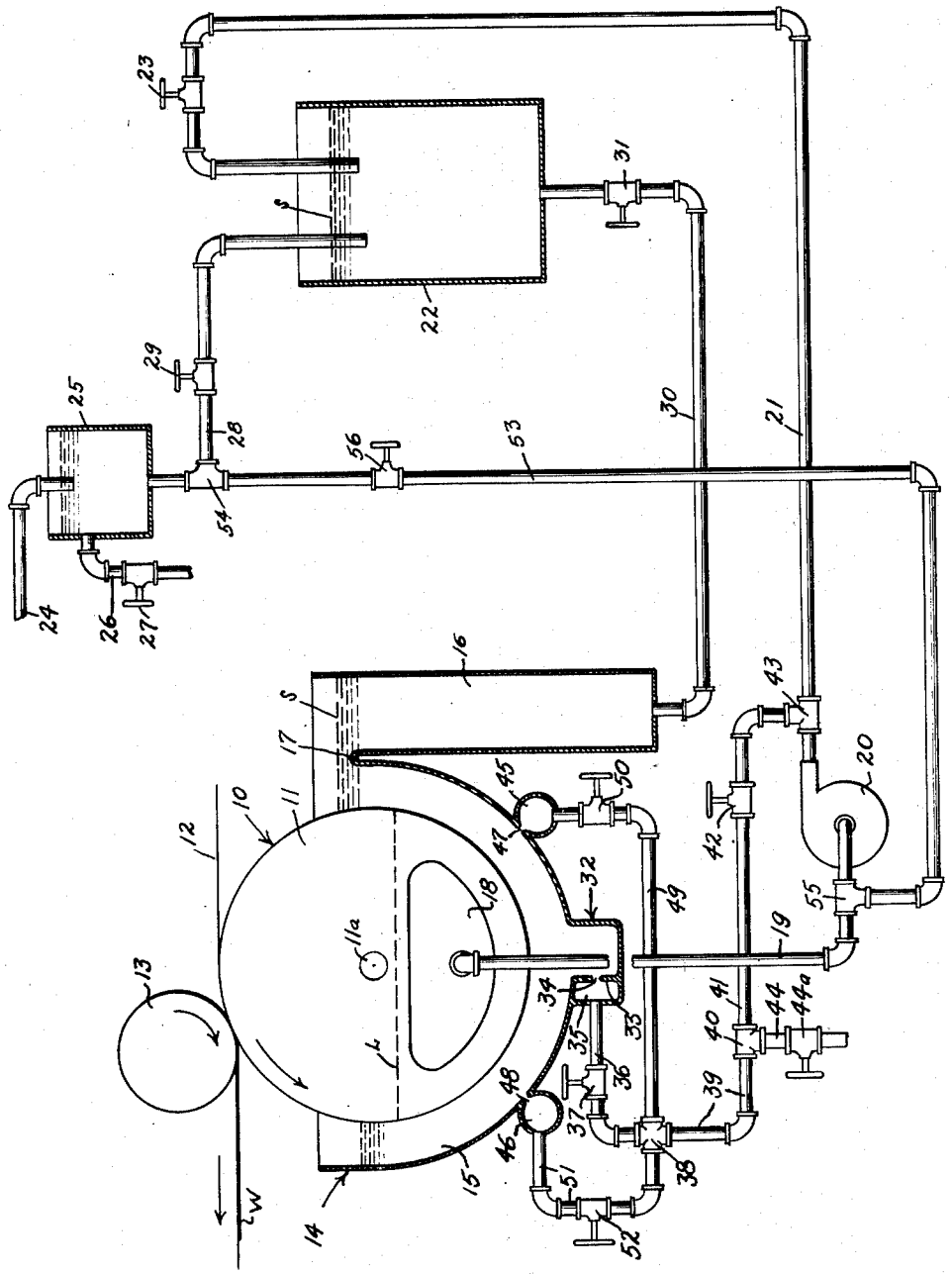
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CYLINDER PAPERMAKING MACHINE

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CYLINDER PAPERMAKING MACHINE

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1

This invention relates to the maintenance of desired stock consistencies in the vat circle of cylinder mold vats. Specifically the invention deals with the distribution and dilution of stock in the vat circle of a cylinder paper making machine to maintain either a constant stock consistency throughout the entire vat circle or zones of selectively regulated different stock consistencies around the vat circle.

In the manufacture of paper webs on cylinder type paper making machines wherein cylinder molds are rotated in a pond of stock supplied to the vat circle of a mold vat there is a tendency for the stock to become concentrated and thickened in the vat circle as white water from the stock continues to drain into the cylinder. This concentration of stock is highly undesirable since it results in uneven distribution of stock fibers on the cylinder and slows up formation of a fibrous web on the cylinder. In addition concentrated stock in the vat circle tends to agglomerate and settle out thereby creating heterogeneous fiber conditions in the vat circle which prevent the production of a uniform fibrous web.

In accordance with this invention stock concentration in a vat circle of a cylinder type paper making machine is maintained at any desired consistency by introducing white water, other diluting liquid, such as water, or stock of controlled consistency, into the vat circle at one or more points along the circle. The diluting fluid or stock is fed into the vat circle through orifices or slots which are positioned to extend along the length of the cylinder mold. The amount of diluting fluid or stock introduced into the vat circle can be carefully regulated to offset against formation of heavily concentrated stock areas in the vat circle.

In the preferred embodiment of the invention some of the white water drained into the cylinder mold during the formation of a paper web on the cylinder mold from stock in the vat circle is fed back to the vat circle for diluting the stock to maintain a constant stock consistency throughout the vat circle. If desired, fresh stock can be admixed with the white water being fed back to the vat circle. The dilution of stock in the vat circle with white water obtained from the stock itself results in saving of the fine fibers and sizing or loading material in the white water without requiring a separation of these fibers and materials from the white water. Since most of the web formation on a cylinder mold occurs on the descending side of the cylinder where the uncovered forming surface of the cylinder

2

first enters the vat circle, the stock in the vat circle on this side of the cylinder will be more rapidly robbed of its white water than the stock in the vat circle on the ascending side of the cylinder. Therefore in accordance with this invention it is possible to regulate the supply of white water for furnishing more white water to the vat circle on the descending side of the cylinder. In any event, however, white water is supplied and distributed to those areas of the vat circle which tend to contain concentrated stock and the amount of feeding of white water is controlled to dilute these areas and produce a constant stock consistency throughout the entire vat circle.

It is then an object of this invention to provide a cylinder type paper making machine with a device for introducing stock diluting fluid and/or fresh stock into stock in the vat circle of the machine.

Another object of this invention is to provide a cylinder type paper making machine with means for introducing white water or other diluting liquid into the vat circle of the machine and for regulating such introduction of white water or other diluting liquid so as to maintain constant stock consistency throughout the entire vat circle.

A further object of the invention is to provide a stock vat with devices for distributing stock or diluting liquid to different points around the vat circle thereof.

A further object of the invention is to provide a method of forming paper on cylinder type paper making machines wherein constant uniform web formations are maintained by distribution of diluting liquids, which may or may not contain fresh stock, into the vat circle of the machine.

A still further object of the invention is to increase the speed of web formation on a cylinder machine by maintenance of stock in the vat of the machine at a constant consistency.

Other and further objects of the invention will be apparent to those skilled in the art from the following detailed description of the annexed sheet of drawings which, by way of preferred example only, illustrate one embodiment of the invention:

On the drawing:

The single view of the drawing illustrates somewhat diagrammatically, a cylinder paper making machine equipped with stock diluting devices according to this invention.

As shown on the drawing:

The reference numeral 10 designates generally a cylinder type paper making machine having a cylinder mold 11 with a pickup felt 12 trained thereover and pressed thereagainst by a couch roll 13 to receive on its under face a fibrous web W from the forming surface around the periphery of the mold 11. A stock vat 14 defines a vat circle 15 receiving the under portion of the cylinder mold 11 therein. The cylinder mold 11 rotates on axles such as 11*a* supported by the stock vat 14. A feed box 16 is provided on the stock vat 14 at one end of the vat circle 15 thereof and supplies paper stock S to the vat circle over a making board or baffle 17.

The cylinder mold 11 is driven in the direction shown by the arrow and its forming surface around the periphery thereof enters the pond of stock S in the vat circle 15 at the end of the vat remote from the feed box 16. White water from the stock S in the vat circle drains into the cylinder mold 11 and is maintained at a desired level L therein which is sufficiently lower than the level of the stock S in the vat circle to provide a hydraulic head for effecting deposition of the stock fibers onto the cylinder mold. White water flows out of an end of the cylinder mold 11 into a drain box 18 mounted on the side of the vat 14. This drain box 18 drains through a pipe 19 entering the suction side of a white water pump 20. The pump 20 discharges through a pipeline 21 into a mixing box 22. A valve 23 is provided in pipeline 21 to control the rate of flow into the mixing box 22.

Stock from a source of supply (not shown) is fed through a pipe 24 to a head box 25 equipped with an overflow pipe 26 regulated by a valve 27. Stock fed to the head box 25 preferably has a fiber consistency of about 2 to 5% concentration in water. The overflow pipe regulating valve 27 is set to maintain a desired head of stock in the box 25. A pipe 28 connects the bottom of the box 25 with the top of the mixing box 22. A valve 29 in the pipe 28 regulates flow from the box 25 to the box 22. The box 22 drains through a pipe 30 into the bottom of the feed box 16. A valve 31 regulates flow from the mixing box 22 to the feed box 16. The level of the stock head in the mixing box 22 determines the level of stock S in the vat 14 and flow into the mixing box from the pipes 21 and 28 is regulated by the valves 23 and 29 to maintain a desired head or level of stock S in the mixing box 22.

White water supplied to the mixing box by the pipe 21 is preferably regulated to dilute the stock from the box 25 to a consistency of about ¼ to ½%. In other words the stock is diluted or thinned down from 2 to 5% to ¼ to ½% consistency.

In accordance with this invention the vat circle 15 of the stock vat 14 has a sump 32 on the bottom thereof. A side wall 33 of this sump is equipped with a slot 34 extending the full width of the vat circle 15. A chamber 35 is provided behind the wall 33 and extending the full width of the vat circle. A diluting liquid such as white water or plain water is fed to the chamber 35 from a pipe 36 having a valve 37 therein to control the rate of flow. This pipe 36 is connected to a four-way or cross pipe coupling 38 which is fed from a pipe line 39. The pipe line 39 in turn is connected to a T pipe coupling 40 having one branch receiving a pipe 41, containing a valve 42, and coupled to the pipe line 21 by means of a T coupling 43. The other branch of the T coupling 40 is connected to a pipe line 44. The pipe 44 has a valve 44*a* therein and is coupled to a source of water supply (not shown).

White water from the pump 20 is recirculated in controlled amounts through the pipe lines 41 and 39 into the pipe 36 for feeding the chamber 35. The white water then is distributed through the slot 34 into the sump 32 along the full width of the vat circle for diluting stock in the vat circle. Alternately this chamber 35 can receive plain water from the pipe 44. In this arrangement the valve 42 is closed and the valve 44*a* is open so that all of the white water from the pump 20 is fed to the mixing box 22 while the pipe 44 supplies plain diluting water to the sump 32.

If desired, according to this invention, auxiliary diluting liquid chambers 45 and 46 can be provided under the vat circle 15, one on each side of the sump 32. These chambers 45 and 46 communicate through slots 47 and 48, respectively, with the stock containing chamber of the vat circle 15. Slots 47 and 48 extend the full width of the vat circle.

Chamber 45 is supplied with diluting liquid through a pipe line 49 connected to one leg of the cross coupling 38. The pipe line 49 has a valve 50 controlling flow therethrough. The chamber 46 is connected to another leg of the coupling 38 through a pipe line 51 having a valve 52 therein.

In some instances it may be desirable to admix fresh stock with the liquids being distributed to the vat circle so that stock is not only fed from the feed box but is also fed from one or more points in the vat circle. For this purpose a by-pass pipe 53 is provided to connect the stock box 25 with the white water drain pipe 19 on the suction side of the fan pump 20. As shown, a T pipe coupling 54 is provided in the pipeline 28 from the box 25 ahead of the valve 29 and the pipe 53 is connected to one leg of the coupling. A second T pipe coupling 55 connects the pipe 53 with the pipe 19 adjacent the pump 20. A valve 56 is provided in pipe 53 to control flow from box 25 to pump 20 thereby regulating the proportion of fresh stock added to the white water entering the pump. Under certain conditions all of the stock fed to the vat circle could be fed through the by-pass route.

The arrangement is such that controlled amounts of plain water or white water, admixed if desired with fresh stock, can be selectively or simultaneously fed to the chambers 35, 45 and 46 from either or both of the pipes 21 and 44. Thus if it is desired to supply some plain water and some white water to any or all of the chambers 35, 45 and 46, the valves 42 and 44*a* are so regulated to supply the proper proportion of the two diluting liquids to these chambers and the valves 37, 50 and 52 are so regulated to distribute the mixed liquid as desired. If it is desired to only supply white water to the chamber 35 the valves 42 and 37 are opened while the valves 44*a*, 50 and 52 are closed. The piping and valving arrangement gives a very flexible control for diluting liquid distribution.

It has been found that when stock consistencies of ¼ to ½% are fed to the feed box 16 through the pipe 30, the white water pumped out of the cylinder mold 11 by the pump 20 will have a stock consistency of about $\frac{1}{10}$ to $\frac{3}{10}$%. The stock in the white water contains fibers, loading material, sizing materials and the like. These fibers and materials are normally reclaimed in a so-called white water concentrator and are then readmixed with fresh stock. The present

invention on the other hand utilizes these materials without the necessity for separating them from the white water. Some of the white water, according to this invention, is recirculated directly back to the vat circle 15 through the diluting liquid arrangement of this invention while the rest of the white water is circulated to the mixing box 22. Therefore it is not necessary, according to this invention, to use a separate white water concentrator for treating the white water.

Stock formation on the cylinder mold 11 occurs most rapidly on the descending side of the cylinder as it first enters the vat circle 15. There is therefore a tendency for stock to thicken out and become concentrated in this portion of the vat circle. Concentrated thick stock is not free flowing and web formation is normally slowed up. The introduction of the diluting liquid, in accordance with this invention, will prevent slowing up of fiber deposition by maintaining a desired stock consistency at all points in the vat circle. In addition, the introduction of the diluting water maintains the stock fibers in the vat circle in a well dispersed condition thereby insuring consistent web formation across the entire width of the cylinder mold. Diluting liquid therefore not only eliminates the heretofore encountered formation of concentrated stock areas in the vat circle but also disperses the stock in the vat circle to prevent accumulation of fiber bundles.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. A cylinder type paper making machine comprising a stock vat defining a vat circle for confining a pond of stock, a cylinder mold mounted in said vat circle for rotation through the pond of stock, said vat circle embracing substantially more than the lower half of said cylinder mold, but being open to the atmosphere at an elevation below the top of said cylinder mold, a feed box for supplying stock to the vat circle adjacent the top of the stock pond at the ascending side of the cylinder mold, a localized chamber extending across the width of said vat circle adjacent the bottom thereof, said chamber having an orifice communicating with the pond of stock in the vat circle across the width thereof, a drain outlet for the interior of said cylinder mold, means for pumping white water from said drain outlet, and valved conduits connecting said pumping means with said chamber for introducing white water into the vat circle throughout the width thereof to dilute stock in said circle adjacent the descending side of said cylinder mold.

2. The combination of claim 1 wherein there are a plurality of said localized chambers spaced peripherally about the lower side of said vat circle, each of said chambers having an orifice and a valved conduit as defined.

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