

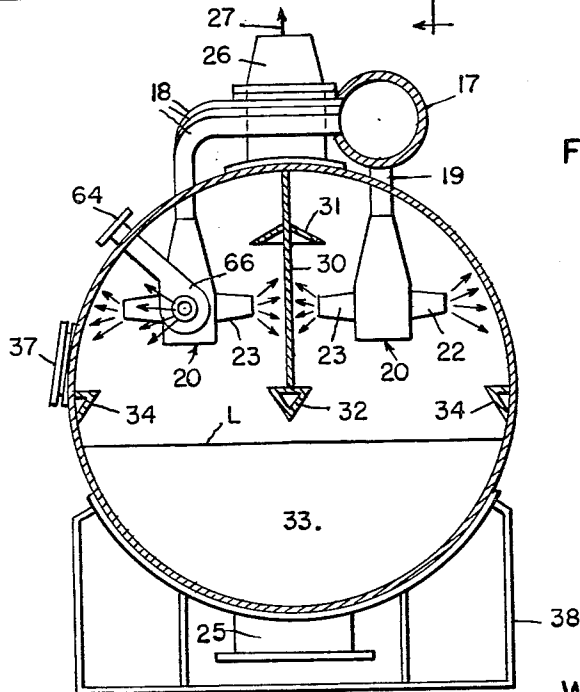
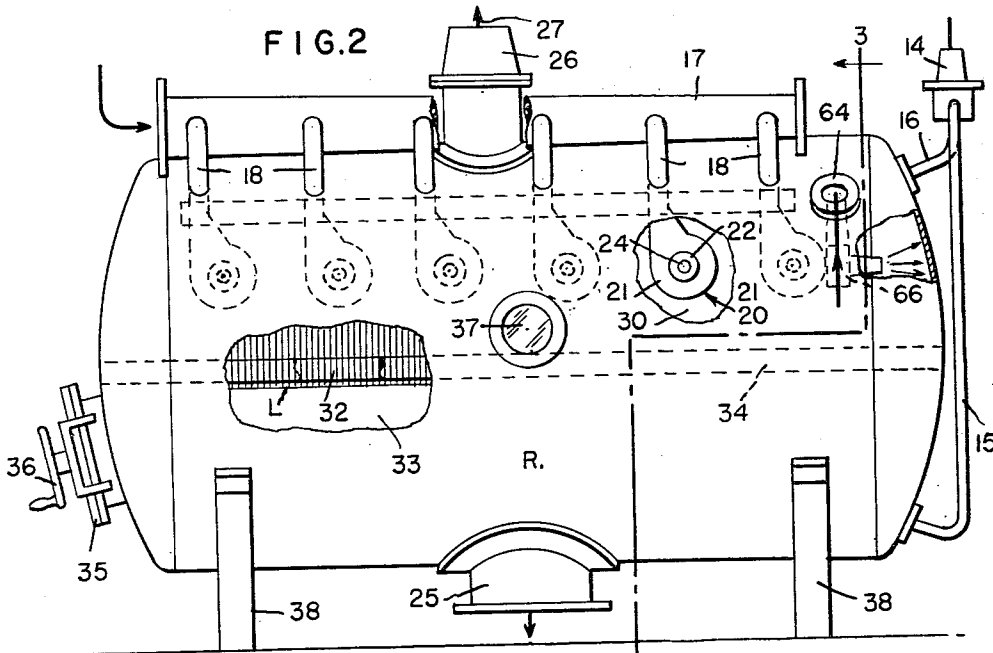
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TREATING PAPER-MAKING STOCK BY VACUUM DEAERATION
PRIOR TO ADDITION OF DILUTING WATER

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TREATING PAPER-MAKING STOCK BY VACUUM DEAERATION PRIOR TO ADDITION OF DILUTING WATER

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The present invention relates to the treatment of paper-making stock, and more particularly to the conditioning of the paper-making pulp while on its way from the pulp mill to the headbox of a paper-making machine.

It has been recognized for some time in the art that in order to obtain high quality paper, it is necessary to eliminate the bundles or flocks of fibers which normally occur at the headbox of the paper-making machine. These bundles or flocks produce clouding of the paper which is disadvantageous in the production of high quality paper. It is also well recognized that even in the production of lesser grades of paper, the occurrence of the flocks and bundles is undesirable.

It has also been known for some time that it is highly desirable to de-aerate the stock as it travels from the pulp mill to the headbox of the paper-making machine. Such de-aeration results in better overall quality of the paper and aids in the prevention of flocks and bundles in that the air entrained with the stock or absorbed and adsorbed by the particles of stock tend to produce a cementing effect which holds the particles together and prevents ready dispersion thereof.

Actually, one of the primary considerations in the production of paper is to produce a uniform homogeneous fiber suspension. Such uniform dispersion of the fibers in the white water which is combined therewith to properly dilute the stock has been a primary objective for many years. Perfect dispersion would be the ideal situation wherein each individual fiber would be completely separate and distinct and unattached from all the other fibers of the suspension. This ideal state has never been reached in practice, since the fibers are provided with projections which extend outwardly therefrom and catch onto and tangle with fibrillations on other fibers thereby causing the fibers to stick together and produce bundles or flocks.

The accumulation of fibers in the form of clumps or flocks once formed are extremely difficult to disperse, and the occurrence of these flocks at the head box is a well-recognized problem.

Prior art arrangements have relied upon the pump means of the system to produce the proper mixing of the stock fibers and white water. It has been realized that the utilization of a single conventional pump is not adequate for this purpose and accordingly attempts have been made to connect the pumps in series so as to produce a better mixing. In this connection, it should be noted that with the increase in speed of modern day paper-making machines and the corresponding greater amounts of pulp and white water which are treated, the size of the pumps employed in the system has increased tremendously. The varied sizes of the pumps themselves are intended to provide proper mixing of the pulp and stock, and accordingly prior art methods have contemplated the use of smaller pumps operating at higher speeds to obtain greater mixing action because of the greater turbulence in combination with the large pumps now in common use in high speed paper-making machines. Although these methods represent an improvement over the utilization of only the high capacity, low speed pump, the results are still not satisfactory.

The present invention is accordingly directed to an arrangement which is particularly adapted to de-aerate

the stock and to also produce a uniform homogeneous dispersion of stock fibers in the white water, this homogeneous mixture being fed to the headbox of a paper-making machine. A first fundamental concept of the present invention is an arrangement which permits a very substantial reduction in the size of various components of the system thereby producing a marked reduction in cost thereof. It is, of course, necessary to dilute the thick stock coming from the pulp mill and it is desirable to de-aerate the stock. Prior art arrangements have always completely diluted the stock before it is de-aerated. As a matter of fact, this has been an essential feature since it has been assumed that once the stock has been de-aerated, it must pass directly to the headbox of the paper-making machine without any admixture with a non-de-aerated substance.

In this connection, applicant has made the startling discovery that satisfactory results can be obtained by only de-aerating a very minor portion of the dilute paper-making stock which is fed to the headbox of the paper-making machine. This is accomplished in the present invention by de-aerating the thick stuff received from the pulp mill and also providing a primary dilution thereof, and then mixing this mixture with non-de-aerated white water from the wire pit of a paper-making machine. This dilute mixture is then further mixed in a pump and fed to the headbox of a paper-making machine. It is apparent that with this arrangement, the size of the components may be substantially reduced, particularly the tank employed in the de-aeration step, this tank representing a very substantial investment in such systems. In fact, when only de-aerating a minor portion of the stock in the present invention as compared to prior art systems wherein all of the stock fed to the headbox was treated in a de-aerating tank, the cost of the system can be reduced as much as 66 percent which is, of course, a tremendous saving in cost.

The present invention is predicated upon the discovery that it is only the air which is entrained or entrapped in or on the ligno cellulosic fibers of the stock which causes the major problem in paper production. Accordingly, the mixture of the non-de-aerated white water from the wire pit with the de-aerated and diluted thick stock results in satisfactory results.

A second fundamental concept of the present invention lies in the manner of providing a homogeneous suspension to the headbox of the paper-making machine. This is accomplished by providing a two-stage dilution of the paper-making stock, the first stage being accomplished in a novel manner with a relatively small amount of diluting white water and the second stage being accomplished with the admixture of the output of the first stage with a relatively large amount of white water.

The primary dilution stage incorporates the novel concept of introducing stock and diluting water in an atomized form in the upper portion of a closed container, and allowing the atomized particles to fall downwardly and intermix within the container into a pool of liquid at the bottom of the container. This mixing action is enhanced by causing the atomized particles of both the stock and the diluting water to impinge upon solid surfaces within the tank. As a result of this novel coaction, a homogeneous liquid suspension is obtained at the bottom of the tank wherein the stock fibers are uniformly dispersed throughout the suspension.

The homogeneous suspension is pumped from the container and is mixed with white water from the wire pit pond to provide a dilute mixture in such proportions that the quantity of white water from the wire pit pond is substantially greater than that of the homogeneous mixture introduced from the container.

It has been found that by so mixing the output of the

container with the white water from the wire pit, the stock particles are also uniformly dispersed within the dilute mixture when it arrives at the headbox of the machine thereby providing a substantial reduction in the flocks or bundles of fibers which normally appear in the dilute stock fed to the headbox of a paper-making machine.

A pump is employed for moving the dilute mixture to the headbox of the machine, and this pump assists in maintaining the desired homogeneous mixture.

Means is provided for maintaining a substantially constant liquid level of the pool within the tank, by controlling the rate of feed to the tank. In addition, means is provided for regulating the consistency of the stock pumped to the headbox of the paper-making machine.

The last-mentioned means comprises a consistency sensing means which is inserted in the outlet conduit from the de-aerating and diluting tank means. In the preferred embodiment, this consistency sensing means comprises a flow meter which measures the rate of flow from the container. This flow sensing means is in turn connected to a valve inserted in a conduit providing communication between the wire pit pond and the de-aerating and diluting tank. The interconnection is such that the flow sensing means controls the valve whereby the rate of flow of diluting white water into the primary treating station represented by the de-aerating and diluting tank is such that the consistency of the mixture leaving the primary treating station remains substantially constant. This is true since the rate of flow of the mixture from the tank is a function of the consistency of the mixture flowing from the tank.

An object of the present invention is the provision of a new and novel method and apparatus for treating paper-making stock which provides an effective de-aeration of the stock.

Another object is to provide a method and apparatus for treating paper-making stock wherein the occurrence of flocks or bundles of fibers is substantially reduced thereby enabling the production of better quality paper.

A further object of the invention is to provide a novel arrangement for treating paper-making stock wherein the cost is very substantially reduced.

A still further object of the invention is the provision of a novel method and apparatus for treating paper-making stock wherein the consistency of the stock may be accurately controlled to provide uniform end results.

Yet another object is to provide an apparatus and method of treating paper-making stock which is quite simple and inexpensive and yet which is quite efficient and reliable.

Other objects and many attendant advantages of the invention will become more apparent when considered with the specification and accompanying drawing, wherein:

FIG. 1 is a somewhat diagrammatic flowsheet of the system for practicing the invention;

FIG. 2 is a vertical side view partially broken away illustrating the de-aerating and diluting tank employed at the primary treatment station; and

FIG. 3 is a transverse cross-sectional view along the line 3-3 of FIG. 2 looking in the direction of the arrows.

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, an inlet conduit or feed pipe 11 is suitably connected to suitable refiners or a machine chest (not shown), the pulp sometimes being referred to as stuff and being in a thick or undiluted form. Inlet pipe 11 is connected to a tapered or trumpet shaped header 17, an automatic valve 12 being connected in the inlet conduit 11. Valve 12 is regulated in a circuit from a controller 13 which is in turn connected to and operated by a differential pressure type transmitter 14, two probe-tubes 15 and 16 being connected to the transmitter 14 and being in communication respectively with a bottom and a top

portion of the de-aeration and diluting receiver identified by letter R.

Stuff is forcibly fed or pumped through inlet conduit 11 and manifold 17 and thence downwardly through elbow distribution pipes 18 and straight pipes 19 as seen most clearly in FIG. 3, each of these pipes terminating within the upper portion of the receiver R, spray nozzles 20 being connected to the terminal ends of each of the pipes. Each nozzle has an interiorly unobstructed cylindrical body 21 into which the pipes 18 and 19 are connected, the stuff being fed tangentially from pipes 18 and 19 and then changed in direction and swirlingly emitted laterally through the tapered necks 22 and 23, each having a bore 24 therein. A hood 25 serves to cover the angled intersection of the pipes and associated cylinders 21 to prevent stuff from being caught and accumulated at such points.

The receiver R is shaped substantially as shown and is provided with a de-aerated stuff bottom-discharge outlet 25 and at 26 on its top there is provided a dome-like fitting or a manifold to which is attached a pipe 27 connected to a vacuum-producer VP such as a liquid-piston pump 28 or a steam jet, by the use of which the effect of high vacuum or greatly reduced pressure can be applied to the contents of receiver R. The tank can thus be vacuum-influenced to practically any degree of vacuum desired for accomplishing satisfactory de-aeration of the stuff atomizingly diminished therein. The vacuum used in the receiver R varies with the paper being made. Examples are 25.5 inches of Hg for kraft paper; 27.5 inches for newsprint; and 28.6 inches for book paper. So that the stuff in being swirlingly emitted from the orificed conical necks 22 and 23 of the nozzles 20 is diminished or atomized as a spray or mist or fog, it is desirable that the swirling stuff be impinged against impingement surfaces such as plate 30 by one set of nozzles and by the other set against the inner wall of the receiver R. The depending impingement plate is provided along its upper section with a guard or inverted gutter 31 for preventing sprayed stuff from flying up into the vacuum fitting 26, while at the bottom along the lower edge of the impingement plate is a deflector or shelf member 32 and along the walls are deflectors or shelves 34, for further diffusing the sprayed stuff and preventing undue turbulence in the pool 33.

Atomized stuff emitted into the receiver R is, under the influence of vacuum therein, de-aerated. That is, air entrapped, absorbed, or adsorbed in or by the cellulose fibers of the stuff is thus removed therefrom. The atomized and de-aerated stuff falls or descends or rains to be collected as a pool or pond or body 33 thereof in the receiver whose liquid-level L and thus the depth of the pool, is maintained constant by means of the probe-tubes 15 and 16, the transmitter 14, and the controller 13 which, as the liquid-level L tends to fall, opens valve 12 in the stuff feed line 11 to overcome the fall, and as the liquid-level tends to rise, closes valve 12 to overcome the rise. Receiver R has a manhole 35 and cover 36 for inspection and cleaning purposes as well as a sight-glass 37. 38 indicates a cradle or other support for the receiver.

At this point it should be noted that the atomized particles of stuff and diluting white water form an atomized spray or rain of particles that mingle and mix in the atmosphere of the receiver as they fall downwardly therein. During this process, the particles of stuff and white water become dispersed among one another such that when the particles collect as a pool at the bottom of the receiver, a substantially homogeneous uniform suspension is provided wherein the particles are quite evenly dispersed throughout the liquid.

A liquid-conducting conduit indicated by reference numeral 40 is connected to the outlet 25 of the receiver, a fan-pump 41 being connected in this conduit means. Conduit 40 connects at point 42 with a white water conducting conduit 45 which in turn is connected with the

wire pit 46 so as to be in communication with the pond 47 within the wire pit which is maintained at a constant level by an overflow lip means or the like (not shown).

The homogeneous mixture and white water from the wire pit pond are mixed at point 42 to provide a dilute mixture which in turn is pumped by a fan-pump 50 through conduit 51 to the headbox 52 of a more or less conventional paper-making machine. Headbox 52 is provided with the usual slice lip 53 of the paper-making machine for delivery onto the wire 54 thereof. A valve 55 is connected in conduit 51 for controlling the flow and consistency of dilute stock to the headbox of the paper-making machine. The consistency is so controlled because the weight of fiber being admitted from the flow-meter 60 is constant for a given paper machine speed and grade of paper produced; accordingly, the total volume of mixture being pumped by pump 50 through valve 55 is governed, or determined, by the positioning of valve 55, and this in turn determines the relative proportions of fiber to water.

The flow meter 60 is connected in liquid conducting conduit 40 for the purpose of sensing the rate of flow of homogeneous de-aerated and diluted liquid from the closed container R. This flow meter may be of various constructions, and preferably may be of a magnetic type such as the magnetic flow meter manufactured by the Foxboro Company, Foxboro, Massachusetts, and as illustrated in this company's bulletin No. 20-14. This flow meter operates on an induction principle, wherein an alternating magnetic field is generated across the cross-sectional area of the conduit which transmits the liquid through the flow meter. The magnetic field is uniform, and as the liquid passes therethrough, an e.m.f. is generated across the liquid which is sensed by two point electrodes disposed at substantially diametrically opposite points in the conduit. The faster the liquid moves through the conduit, the greater the voltage generated, any change in average velocity being proportional to voltage changes. The average velocity is directly proportional to the volume rate of flow, and accordingly, the volume rate of flow is measured.

A white water diluting conduit 65 is connected with the wire pit pond and is connected at its opposite end with an infeed fitting 64 as seen in FIG. 3, the infeed 64 in turn communicating with a spray nozzle 66 disposed within the container the spray nozzle 66 being identical to spray nozzles 20. As shown, the spray nozzle 66 is preferably disposed such that the atomized output therefrom will impinge upon the inner wall of the tank for enhancing the atomizing effect of the diluting white water.

A valve 70 is connected in conduit 65 and is an automatic electrically operated type which is adapted to be operated in accordance with the voltages developed in the flow sensing meter 60. The intercooperation is such that the flow meter will sense the consistency of the liquid flowing out of receiver R since the flow will be dependent thereon, and suitable voltages will be developed so as to actuate the valve means 70 in an appropriate manner to maintain the consistency substantially constant. For example, if the de-aerated stuff passing out of the tank becomes too viscous, the amount of diluting white water fed into the tank will be increased by opening valve 70 to a greater degree. On the other hand, if the stuff leaving the tank should become too thin, valve 70 will be actuated in a closing direction to diminish the amount of diluting water which is fed into the tank. The overall action is to maintain the consistency of the stuff passing through conduit means 40 substantially constant.

The amount of diluting white water which enters the receiver R during operation is only a minor portion of the total amount of diluting white water traveling through conduit 45 from the wire pit pond. Under typical normal operation conditions when manufacturing kraft paper, the amount of white water introduced into the receiver may comprise approximately 15 percent of the total

amount of white water traveling through conduit 45 from the wire pit pond. When manufacturing newsprint, this percentage may be about 14 percent and when manufacturing book paper, this percentage may be approximately 30 percent.

As mentioned previously, the dilute mixture traveling to the headbox is composed of a mixture of the de-aerated uniform suspension obtained from receiver R which is mixed with the non-deaerated white water from the wire pit pond. The homogeneous de-aerated part of this dilute mixture is only a minor portion.

In practice, the particular proportioning will be determined according to well-known design characteristics in accordance with the type of paper which is being manufactured, but in any circumstances, the homogeneous de-aerated portion of the final dilute mixture is only a minor portion.

For a clear understanding of this invention, it must be borne in mind that there is a major difference between pulp or stuff that comes from the pulp mill on the one hand, and on the other hand dilute stock or furnish that is flowed onto the wire of the paper-machine from the headbox. The principal difference is one of the proportion of cellulosic fibers to water. In the thick stuff, there are commonly approximately 3% fibers and 97% water by weight, whereas in the paper-making stock or furnish, there may be for thin paper as little as 0.15% fibers and 99.85% water up to for heavy box board 1.5% fibers to 98.5% water. So instead of de-aerating all of the volume of highly dilute stock as was considered necessary heretofore, this invention offers a method by which only a very minor fraction of the total volume going to the headbox needs to be deaerated.

The stock is diluted with white water which has a fairly constant consistency of about 0.04% fibers and 99.96% water so that in mixing the white water with the stuff, the stuff added to the white water has to be regulated. This regulation and proper proportioning is obtained in the present invention by designing the pumps 41 and 50 to have certain predetermined capacities, and by adjusting the control of valve 70 by flow meter 60 to maintain the desired proportion of homogeneous de-aerated mixture to the non-deaerated white water in forming the final dilute mixture. If it is desired to adjust the final dilute mixture, the consistency of the mixture within the tank R may be altered by adjusting the calibration of valve 70 which is operated by the voltages obtained in flow meter 60.

Now a word about the degree of de-aeration of the stuff: Since it is not the dissolved air in the dilute stock, but the air in or on the cellulosic fibers that causes the trouble in the headbox and on the paper machine, the more air that is removed from the stuff, the better will be the paper made by the paper machine. Therefore, if substantially all of the air is to be removed from the fibers in the stuff, the stuff must be de-aerated under high vacuum, indeed, as high as can be made use of in the de-aerating receiver without having the stuff boil at the mill temperature at which it is supplied to the receiver and while under the reduced pressure in the receiver. Moreover, since operation of the vacuum is substantially only effective on the surface of the particles being de-aerated, the stuff must be minutely diminished by being atomizingly sprayed into the receiver and in addition sprayed against an impingement surface to assure the diminution of the stuff particles into the form of a fog or mist thereof.

During operation of the continuous process, the stuff from the pulp mill such as from the refiners or machine chest passes into the system through feed conduit 11 past the automatic valve, through the manifold 17 and is distributed by pipes 18 and 19 to the spray nozzles within the receiver. The pulp passes out of the spray nozzles 22, 23 as a swirling or whirling atomized spray that is projected against the impingement surfaces, namely the plate 30 or the sides of the receiver such that the spray

is rendered into a fine mist or fog of atomized particles which rain downwardly within the space in the receiver above the liquid pond 33 at the bottom thereof. The liquid level of the pond 33 is maintained constant by the transmitter 14 which controls the feed of the stuff through the intermediary of valve 12.

The vacuum producer 28 continuously applies a vacuum to the interior of the tank for de-aerating the atomized particles. Simultaneously with the atomization and de-aeration of the particles of stuff, a minor quantity of white water under constant pressure flows through conduit 65 under the control of valve 70 and is emitted as atomized spray against a suitable impingement surface within the container so that the atomized white water also rains downwardly from the upper portion of the tank and intermingles and is dispersed uniformly among the stuff particles.

The homogeneous suspension is pumped from the receiver through the flow meter 60 and is mixed at point 42 with white water from the wire pit pond in certain predetermined portions such that the homogeneous mixture forms only a minor portion of the final dilute mixture supplied to the headbox 52.

Flow meter 60 of course regulates valve 70 to maintain the consistency of the mixture passing through conduit means 40 substantially constant.

It is apparent from the foregoing that there is provided a new and novel method and apparatus for treating paper-making stock which produces efficient de-aeration of the stock or stuff received from the pulp mill or the like and which substantially eliminates flocks or bundles of particles by producing a substantially uniform homogeneous suspension of white water and particles of stuff. The size and expense of the components, particularly the de-aeration and dilution container or receiver, are substantially reduced with the invention arrangement, and the consistency of the end product is accurately controlled to enable the production of high quality paper.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

This application is a continuation-in-part of Serial No. 676,986, filed August 8, 1954, now abandoned.

I claim:

1. A method of conditioning papermaking stock, which comprises subjecting thick stuff to the influence of de-aerating vacuum to remove entrained air from the fibers thereof and admixing said deaerated thick stuff with non-deaerated dilution water to provide dilute stock suitable for use in papermaking.

2. A method of conditioning papermaking stock, which comprises maintaining a confined zone under the influence of deaerating vacuum, atomizingly introducing into said zone of deaerating vacuum thick stuff having a fiber concentration too great for use in papermaking, simultaneously atomizingly introducing into said zone of deaerating vacuum a minor amount of diluting water to admix intimately with said atomized thick stuff and form a homogeneous suspension of stock, said suspension still having a fiber concentration too great for use in papermaking, collecting said homogeneous stock suspension as a pond within said confined zone, withdrawing homogeneous stock suspension from said pond, and admixing said suspension exteriorly of said zone with a major amount of non-deaerated diluting water to provide a dilute mixture of stock having a fiber concentration suitable for use in papermaking.

3. A method according to claim 2, wherein the level of the pond within said zone is maintained substantially

constant by regulating the amount of thick stuff admitted to said zone responsively to the level of said pond.

4. A method according to claim 2, wherein the consistency of said homogeneous suspension is maintained substantially constant by regulating the flow of said minor amount of diluting water into said zone responsively to the consistency of the suspension withdrawn from said pond.

5. A method according to claim 2, wherein the minor amount of diluting water atomizingly introduced into the zone of deaerating vacuum corresponds to between about 14% and about 30% of the total diluting water added to the thick stuff.

6. A method of conditioning papermaking stock, which comprises maintaining a confined zone under the influence of deaerating vacuum, atomizingly introducing into said zone of deaerating vacuum thick stuff having a fiber concentration too great for use in papermaking, simultaneously atomizingly introducing into said zone of de-aerating vacuum a minor amount of diluting white water to admix intimately with said atomized thick stuff and form a homogeneous suspension of stock, said suspension still having a fiber concentration too great for use in papermaking, collecting said homogeneous stock suspension as a pond within said confined zone, withdrawing homogeneous stock suspension from said pond, maintaining the level of said pond substantially constant by regulating the amount of stuff introduced into said zone responsively to the level of said pond, maintaining the consistency of said homogeneous suspension substantially constant by regulating the flow of said minor amount of diluting white water to said zone responsively to the consistency of suspension withdrawn from said pond, and admixing said suspension exteriorly of said zone with a major amount of non-deaerated diluting white water to provide a dilute mixture of stock having a fiber concentration suitable for use in papermaking.

7. Apparatus for conditioning papermaking stock, comprising receiver means adapted to receive and pool stock suspension, means for maintaining said receiver means under the influence of deaerating vacuum, means for admitting thick stock suspension to said receiver means to encounter said deaerating vacuum, means for withdrawing deaerated thick stock suspension from said receiver means, and means for admixing said deaerated thick stock suspension with diluting water exteriorly of said receiver means.

8. Apparatus for conditioning papermaking stock, comprising an enclosed receiver adapted to receive stock through its upper portion and to collect and discharge stock through its lower portion, means communicating with the upper portion of said receiver for maintaining the receiver under the influence of deaerating vacuum, means for atomizingly introducing thick stuff into the upper portion of said receiver to encounter the influence of said deaerating vacuum, means for simultaneously atomizingly introducing a minor amount of diluting water into the upper portion of said receiver in intimate contact with atomized particles of thick stuff to encounter the influence of deaerating vacuum and to fall with said stuff and collect as a homogeneous deaerated suspension in the bottom of said receiver, means for regulatably withdrawing homogeneous stock suspension from said pond, means supplying a major amount of non-deaerated diluting water, and means for mixing said withdrawn homogeneous suspension and said major amount of non-deaerated diluting water exteriorly of said receiver.

9. Apparatus according to claim 8 in combination with means regulating the flow of thick stuff into said receiver, means responsive to the level of said homogeneous mixture in said receiver, and means operatively connecting said stuff flow regulating means and said level-responsive means to regulate said flow responsively to said level.

10. Apparatus according to claim 8 in combination with means regulating the flow of said minor amount of dilut-

ing water to said receiver, means responsive to the consistency of said stock withdrawn from said pond, and means operatively connecting said suspension flow-regulating means and said consistency-responsive means to regulate said flow responsively to said consistency.

11. Apparatus for conditioning papermaking stock, comprising an enclosed receiver adapted to receive stock through its upper portion and to collect and discharge stock through its lower portion, means communicating with the upper portion of said receiver for maintaining the receiver under the influence of deaerating vacuum, means for atomizingly introducing thick stuff into the upper portion of said receiver to encounter the influence of said deaerating vacuum, means for simultaneously atomizingly introducing a minor amount of diluting white water into the upper portion of said receiver in intimate contact with atomized particles of thick stuff to encounter the influence of deaerating vacuum and to fall with said stuff and collect as a homogeneous deaerated suspension in the bottom of said receiver, means for regulatably withdrawing homogeneous stock suspension from said pond, means regulating the flow of thick stuff into said receiver, means responsive to the level of said homogeneous mixture in said receiver, and means operatively connecting said stuff flow regulating means and said level-responsive means to regulate said flow responsively to said level, means regulating the flow of said minor amount of dilut-

ing white water to said receiver, means responsive to the consistency of said stock withdrawn from said pond, and means operatively connecting said suspension flow-regulating means and said consistency-responsive means to regulate said flow responsively to said consistency, means supplying a major amount of non-deaerated diluting white water, and means for mixing said withdrawn homogeneous suspension and said major amount of diluting white water exteriorly of said receiver.

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