May 22, 1928. 1,670,874

A. BANKUS ET AL

MEANS FOR RECLAIMING SUSPENDED SOLIDS FROM WHITE WATER OF PAPER MANUFACTURE

Filed Nov. 24, 1925 2 Sheets-Sheet 1

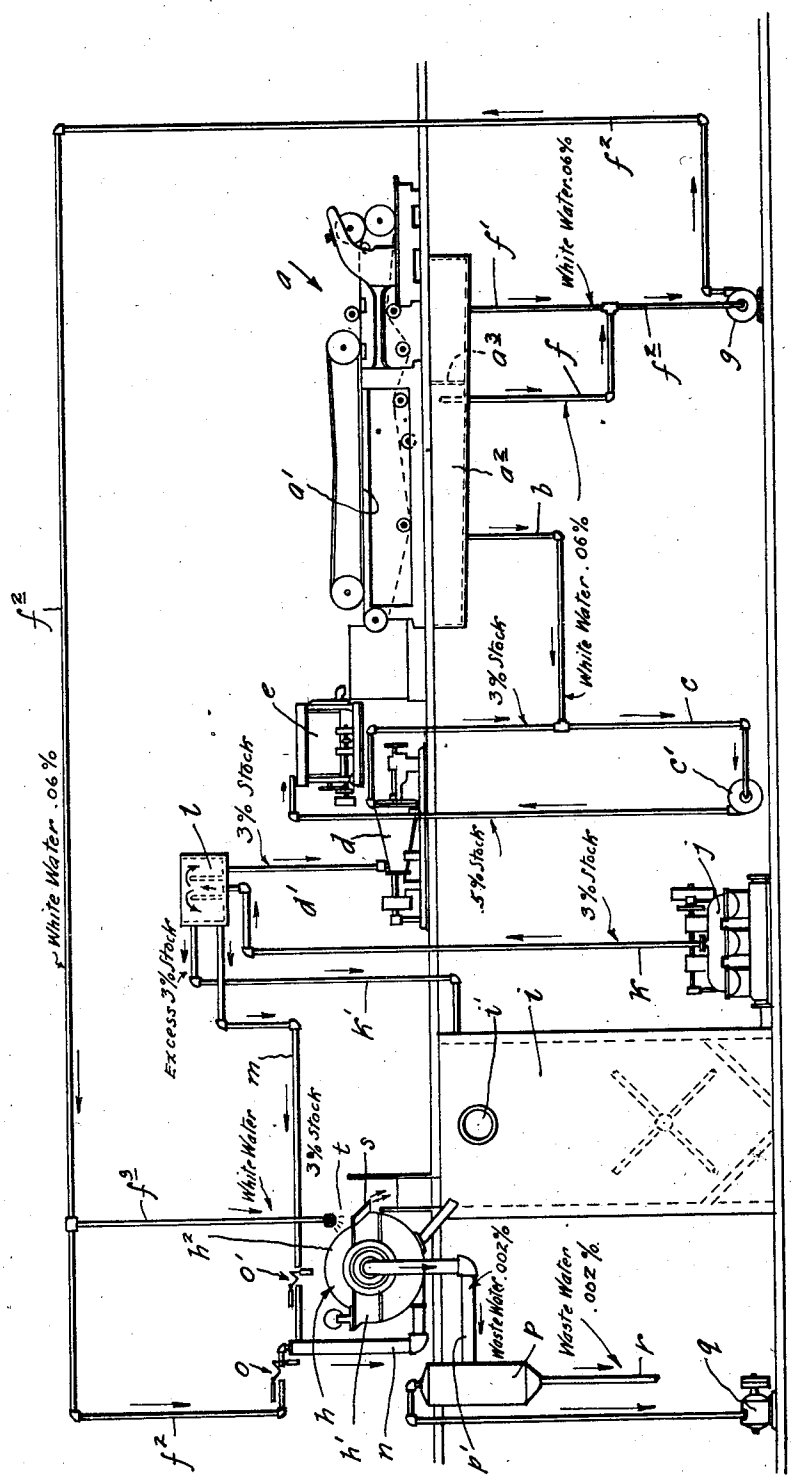


Fig. 1.

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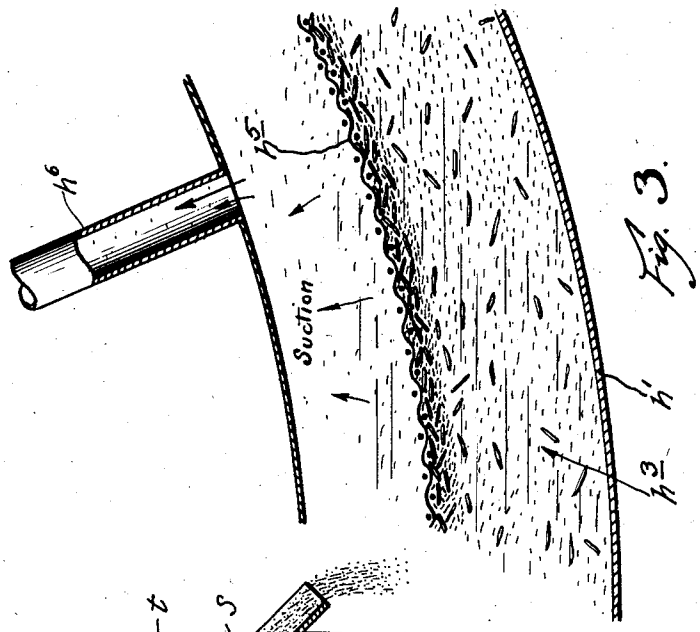


Fig. 3.

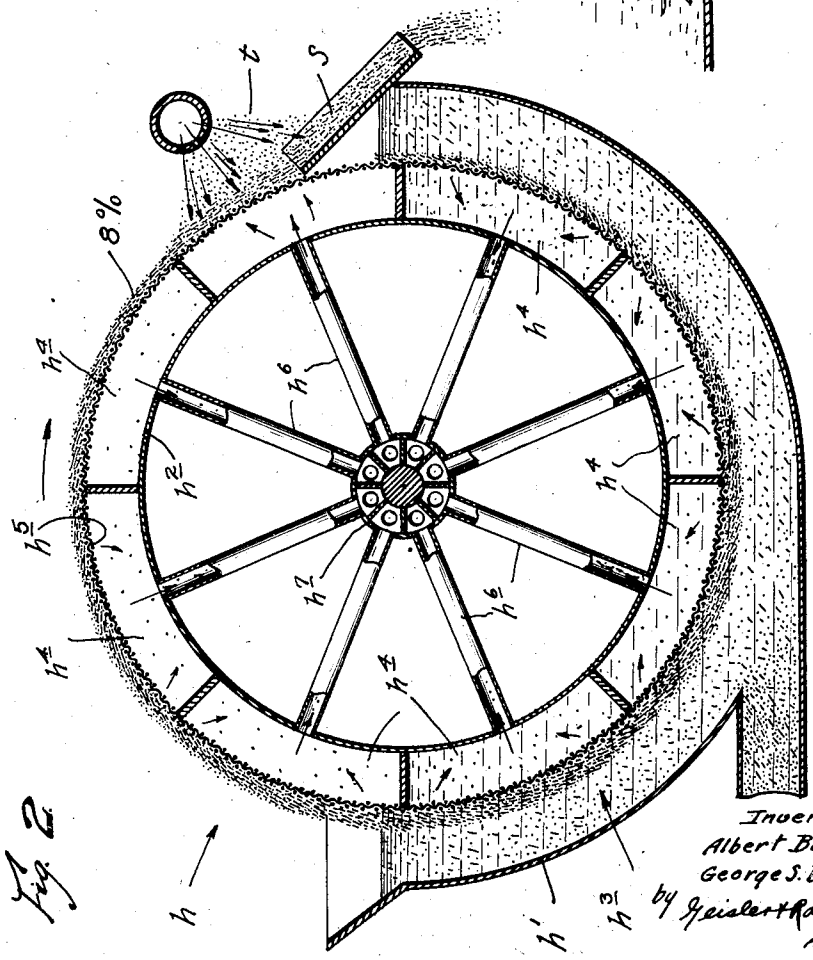


Fig. 2.

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UNITED STATES PATENT OFFICE.

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MEANS FOR RECLAIMING SUSPENDED SOLIDS FROM WHITE WATER OF PAPER MANUFACTURE.

Application filed November 24, 1925. Serial No. 71,234.

Our invention relates to the process of paper making in which so-called machine-furnish—that is, a mixture of paper making materials suitable to produce the particular kind of paper desired—is fed to the paper making machine and produces the paper sheet and so-called "white-water."

It is well known that said white-water has suspended in it a considerable quantity of short fibres and other solids, which collectively have an appreciable value, and the waste of which constitutes an appreciable loss in the process of mechanical paper making.

The object of this invention is to reclaim the short fiber and other solids from the white water by a practical method and means thru a medium which will return the solids recovered from the white-water, without contamination to the machine furnish from which the white-water is produced.

In short, in order to reclaim, in an efficient manner, the short fibres and other solids suspended in the white-water, it has been found expedient to make, or cause the formation of, a filter mat, or filter aid, from some of the long fibered material used for paper making, and to filter the white-water through such mat; but as we have discovered, if such long fibered material be supplied from any other source than the particular materials of which the machine-furnish for the work in hand is made up, detrimental variations in the character of the paper produced will result. For example, in paper making plants manufacturing different kinds of paper, several kinds of paper stock are produced. Now if paper stock other than the actual machine-furnish of a given paper machine be used as a filter-aid for reclaiming the said solids of the white-water coming from that machine, a contaminating ingredient may be introduced into the stock so used, which would be detrimental thereto, and tend to render such stock unfit as a general source of supply of the machine-furnish for the manufacture of other kinds of paper.

We have discovered that such contamination may be avoided by using as the said filter-aid, or medium, a part of the same machine-furnish as prepared and used for making the particular kind of paper.

Our invention therefore resides in the improvement of the method previously used for reclaiming the short fibers and other suspended solids, of the white-water resulting from the process of mechanical paper making by using for the filter aid part of the same machine-furnish as that from which the white-water is obtained, and then returning, directly or indirectly, as convenient or desirable, to the machine-furnish in the regulating box of the paper making machine, the material taken off the filter.

A further object of our invention is to effect the reclaiming of the suspended solids of the white-water without interfering with the operation of the paper making machine or disturbing the nice adjustments of the various controls for the stuff.

The details of our method and the means which we found convenient for carrying the same into practice are hereinafter described with reference to the accompanying drawings, in which:

Fig. 1 is a diagrammatic elevation of a portion of a paper making machine with its various supply and control devices arranged in accordance with our preference;

Fig. 2 is a section taken longitudinally through a certain mechanical filter element which we find expedient to use; and

Fig. 3 is a larger scaled diagrammatic fragmentary view of said mechanical filter element serving to illustrate the manner in which the long fibers of a part of the materials making up the machine-furnish tend to felt with each other to form a filter medium over the screen-like surface of said filter element.

The means comprised in our mechanical combination are especially adapted for recovering the said solids of the white-water coming from a Fourdrinier type of paper making machine which we have chosen for convenience as illustrating the carrying of our invention into practice.

Referring to Fig. 1, the arrow a points to a miniature diagrammatic representation of the wire part of a Fourdrinier machine of which a' designates the wire on which the paper sheet is formed. The excess water draining through said wire, and constituting the so-called white-water, is collected in a vat a^2.

A drain pipe b is provided in the bottom of said vat a^2, said pipe discharging into the

stock supply line c between the Jordan, or other mixer d and the fan pump c'. The white-water drained from said vat a^2 thus is mixed with and serves to dilute the stock processed in the Jordan. The combined stock and white-water discharged from the fan pump c' is thus of the correct consistency to be delivered directly to the screen e of the paper machine.

The vat a^2 is preferably divided by a transverse partition a^3 so that the white-water at that end of the vat to which the pipe b is connected is separate from the white-water in the other end of the vat, because the fiber content of the first mentioned end of the vat is usually much greater than that at the other end.

Another drain pipe f extends through the bottom of said vat a substantial distance on the same side of said partition a^3 as that to which the pipe b is connected. By locating the mouth of said pipe f a substantial distance above the bottom of the vat a^2 an ample supply of white-water is assured the pipe b.

A branch pipe f' taps the other end of said vat a^2, connects with the pipe f and both pipes connect with the pipe f^2 in which a pump g is located which forces said white-water to a filter or "save all" h.

The machine-furnish is delivered from a general supply, such as the beaters, through an inlet i' into the machine chest i and is kept in agitated condition in the latter; and it is continuously pumped out from the bottom of the machine chest by the pump j through a pipe k into a regulating box l. From this box a portion of the machine-furnish is directed to the Jordan through a pipe d' and the excess portion is returned to the machine chest through a pipe k'.

A pipe m carries a portion of the machine-furnish from the regulating box l and the pipe f^2 the white-water to a mixing pipe n in which said two materials tend to intermix and from there are introduced into the vat h' of the filter h. Automatic control valves are preferably provided at o and o' in said pipes f^2 and m, respectively, by which to regulate the quantities of white-water and machine-furnish delivered to said filter h.

The particular filter shown in detail in Fig. 2 merely illustrates a type which we find convenient to use. This type is known as the Oliver continuous filter described in U. S. Patent No. 919,628 issued to Edwin L. Oliver April 27th, 1909. Said filter comprises a vat h' in which is rotatably mounted a cylinder h^2 provided with a plurality of contiguous suction boxes h^4 which make up its circumference, the suction boxes being covered with a screen-like draining surface h^5. Said suction boxes are connected to a hollow chamber h^7, provided at the hub or center of said cylinder h^2, by radial tubes h^6; and said hollow chamber h^7 is connected to a vacuum receiver p by a pipe p', as shown in Fig. 1. A vacuum pump q maintains reduced pressure in said vacuum receiver p and thus the liquid drawn into said suction boxes h^4 from the space h^3 between the cylinder h^2 and the vat h' is removed from the vacuum receiver p through a pipe r. Means, not shown, are preferably provided by which compressed air is introduced into that one of said suction boxes h^4 which has reached a predetermined position so that the mat formed on the draining surface of such suction box will be blown off and run down the chute s and the material so removed may be diluted by a shower of white-water, as indicated at t in Fig. 2, to a desired consistency before it is returned into the machine chest i; said diluting being effected by a branch pipe f^3 connected to the pipe f^2, as shown in Fig. 1.

As illustrated diagrammatically in Fig. 3, the long fibers in the machine-furnish introduced into the vat h' of the filter h tend to felt and form a filter mat on the draining surface of the cylinder h^2 and in that way provide a filter medium or mat for catching short fibers or other solids suspended in the white-water. At first the filter mat formed on the draining surface of the cylinder h^2 is relatively thin, but as the cylinder rotates the mat will increase in thickness because the short fibers of the white-water will combine with the long fibers of the machine-furnish. Hence our invention provides a convenient and efficient method and means by which the fiber content and other suspended solids of the white-water are reclaimed by the use of a part of the machine-furnish of the same paper making machine as the filter medium and the reclaimed solids are kept free from contamination likely to be introduced by the use of a material as a filter aid taken from an outside source.

For the convenience of the person using our invention, we have indicated, approximately, on Fig. 1 the values of the stock or solids relatively to the liquid of the material carried from one part of the machine to another in the different stages of our process.

While describing our method specifically as used in connection with a Fourdrinier machine, it is, of course, applicable to other types of paper making machines.

We claim:

1. In a paper making machine, in combination with a container of the machine-furnish, a vat for the "white-water" drained off the machine-furnish, and a filter for said white-water,—means for delivering part of the machine-furnish from said container to said filter, continuously; and means for returning to the machine-furnish the material taken from said filter.

2. In a paper making machine, in combination with a container of the machine-furnish, a vat for the "white-water" drained off the machine furnish, and a filter for said white-water,—means for delivering part of the machine-furnish from said container and of the white-water to said filter, continuously; and means for returning to the machine-furnish the material taken from said filter.

3. In a paper making machine, in combination with a container of the machine-furnish, a vat for the "white water" drained off the machine furnish, and a filter for said white-water,—means for delivering part of the machine-furnish from said container and of the white-water to said filter, continuously; means for automatically controlling relatively to each other, the quantities of said white-water and the machine-furnish delivered to said filter; and means for returning to the machine-furnish container the material taken from said filter.

4. In a paper making machine, in combination with a container of the machine-furnish, a vat for the "white-water" drained off the machine furnish, and a filter for said white-water,—means for delivering part of the machine-furnish from said container and the white-water to said filter, continuously; a machine chest into which the material taken for said filter empties; an agitator in said machine chest; and means for returning the material in the machine chest to said machine-furnish.

5. In a paper making machine, in combination with a container of the machine-furnish, a vat for the "white-water" drained off the machine furnish, and a filter for said white-water,—means for delivering part of the machine-furnish from said container and of the white-water to said filter, continuously; means for automatically controlling relatively to each other, the quantities of said white-water and the machine-furnish delivered to said filter; a machine chest into which the material taken for said filter empties; an agitator in said machine chest; and means for returning the material in the machine chest to said machine-furnish.

6. In a paper making machine, in combination, a regulating-box for machine-furnish; a vat for the "white-water"; stock-processing devices; means for delivering part of the machine-furnish from said regulating box and a part of the white-water from said vat to said stock-processing device, a filter for the white-water; means for delivering part of the white-water from the vat, and means for delivering part of the machine-furnish from said regulating box to said filter, means for automatically controlling, relatively to each other, the quantities of said white-water and of machine-furnish delivered to said filter; a machine-chest into which the material taken off said filter empties; an agitator in said machine chest; and means for returning the material in the machine chest to said regulating box.

7. In a paper making machine, in combination with a container of the machine-furnish, a vat for the "white-water" drained off the machine-furnish, and a filter for said white-water,—means for delivering part of the machine-furnish from said container to said filter, and means for returning to the machine-furnish the material taken from said filter.

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