METHOD AND MEANS OF MECHANICALLY SEPARATING SLIMY SUBSTANCE FROM FIBER STOCK

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FIG. 1

FIG. 2

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The invention relates to a method and means of mechanically separating slimy matter consisting of glue and resin etc. from the fibres of ground wood pulp or similar fibrous mixtures.

Heretofore, the separation of the most desirable quality of fibres used in paper making from the coarser material as tailings, knots or slivers was accomplished by separators equipped with a perforated sheet metal plate. By this means, the fine fibres pass through the perforations, whereas the tailings and slivers are retained and removed at one end of the circular plate. Inefficiency in results was one defect of these mechanisms. This invention has for its purpose to obtain a fibre stock substantially entirely free of this slimy matter adhering to the former.

The object of this invention is not to segregate the fibres into those of fine and coarser quality as in the mechanism just referred to, but to separate the fibres from the slimy substance, as glue and resin etc., such as adheres to the ground wood pulp, or similar fibrous mixtures.

A screening machine carrying out the stated object of the invention, is equipped with a wire mesh impassable for fibres, on the inside of which a washing process of the slimy substance and fibre material takes place, created by subjecting the liquid mixture to a pulsating action and a powerful stream of shower water.

A further feature of the invention, is the provision of partition walls in the circular space outside of the wire mesh and corresponding to its various zones, each partitioned off section having its own outlet.

The invention consists further in the improved method of separating the slimy substances from the fibres thereof of a stock contained in ground wood or other similar fibrous mixtures, in which the highly diluted fibres are separately washed under progressive movement and under pressure, whereby the slime is forced through screens, and the fibres removed therefrom, separately disposed of.

The fibres thus separated are washed very clean, and as the fibre solution has the proper consistency, it can be used immediately. The washing action obtained is very high and amount of water used is very low.

Embodiments of the invention will be herein-after described with the aid of accompanying drawings, and the invention finally pointed out in the claims.

In the accompanying drawings,

Figure 1 is a longitudinal section through the fibre washer with common slime discharge;

Figure 2 is a longitudinal section in part showing separate discharge openings for the slimy substance;

Figure 3 is a longitudinal section through the fibre washer of another form with open design impeller;

Figure 4 is a cross-section at right angles to the washer shaft, taken on line 4—4 of Figure 3; and

Figure 5 shows a partial section of a water supply in the whipper plate.

Similar characters of reference indicate corresponding parts throughout the various views.

Referring to the drawings, the fibre washer 10 is provided with a horizontal shaft 11, and has secured to it a runner 12, having an intake 13 and discharge 14. A wire mesh 15 similar to the known paper machine wire, surrounds the runner 12 and is equipped with shower pipes 16 and wing or whipper plates 17. The shower water is supplied to the shower pipes 18 through the shaft 11. The continuous surface of this wire mesh is interrupted at several places by solid areas circular or other shaped, placed either circumferentially as shown in Figs. 1 and 2, or longitudinally as shown in Figs. 3 and 4, which are designed as troughs 17, into which water for the purpose of diluting and agitating the fibre stock is supplied by the shower pipes 16. An outlet 18, which in accordance with the standard design of screens may be attached to one or the other side of the frame 10, has for its purpose to discharge all collected slimy substance. This may be carried out at separate places in accordance with the amount of slime contained in the liquid. For that purpose, the space where the slime is collected is subdivided at various places by providing partition walls 19 between the wire mesh 15 and the frame 10 as shown in Fig. 2. Each section thus partitioned off has its separate outlet 20.

While the slime contained in the fibre stock is separated easily and in large quantities at first, as soon as it reaches the wire mesh 15, the fibre stock travelling along its circumference loosens more and more of this slime and it becomes more difficult to separate it. It is, therefore, advisable, as shown in Fig. 2 to locate the troughs of the fibre washer closer together and decrease the length of the open wire mesh towards the discharge end of the fibre stock. The shower pipes may also be attached to the runner 12 in a manner similar to a hoop, in order to secure an intensive shower effect over the entire surface of the trough. The whipper plates 27 are car-
ried very close to the wire mesh in order to loosen the layer of fibre stock deposited thereon. It furthermore would be permissible to have these plates designed as hollow shower pipes, parallel to the shaft and disposed very close to the screening surface as shown in Figure 5. In cases where the wire mesh 15 as fine as it is required is not strong enough to resist the pressure of the liquid, it is secured upon radial rings 21 and can be reinforced by woven-in wires. The rings 21 made of this material are interconnected by plates 22 and braced against the frame 10, as shown in Figures 3 and 4. In its entirety, it resembles a basket of sturdy design which offers ample passage and discharge for the water containing the slimy substance. The fine wire mesh similar to the screen plates of standard design can easily be removed and cleaned. The washing zone is intersected by a circular trough 17 in which the retained fibre stock is collected and agitated until it is reintroduced upon the wire mesh. The washing action in the trough 17 can also be accomplished by means of wash water introduced from the outside, supplied through the trough 17 by pipes 23 and used for washing and agitating the fibre stock. The runner 12 can also receive its wash water through pipes 24 entering the inside of the runner parallel with the shaft 11. The holes 25 in the circumference of the runner are located very close to the whitewash plates 27, so that the water issuing from the former can cause a mixing and washing action upon the fibres loosened from the wire mesh. The slimy substance can be removed on top through outlet 18 as shown in Fig. 1, or on the bottom of the machine through trough 26, as shown in Figs. 3 and 4. The washed fibre stock depending upon the place where it is to be reused again is discharged parallel to the shaft either on top or on the bottom of frame 10 through outlet 14 and is removed by trough 30 of Fig. 3.

There is a certain amount of material on the screen. As the whitewash plate rotates, it moves a mass of material in front of it. This mass causes a compression on the material deposited on the screen, and thereby forces the slime through the screen immediately at the rear of the whitewash plate; where there is no mass of material, there is no compression, but a suction action, which acts upon the material on the screen which loosens it. The alternating positive and negative actions form a pulsating action. In Figure 4, water outlet holes 25 are placed in front of the plates 27, and the water passing therethrough increases the volume, and at the same time liquefies the mass. This pulsation is caused by a runner rotating on the inside of the wire mesh which may be equipped with cleats or have any other form to answer the purpose. According to the invention a satisfactory separation of the slimy substance from the fibre material, when handling large quantities of liquids as is required under economic operation, can be accomplished by a temporary deposit of a thin layer of stock fibres upon the wire mesh which is squeezed out by the pressure under which the shower water is applied to the wire mesh, washed out, removed and redeposited again. This cycle is aided by curved recesses and solid sections of the wire mesh in which the stock fibres are mixed again with water, diluted and agitated by powerful shower water jets and subjected once more to the washing action before proceeding to the following zone. During this cleansing process which takes place radially as well as parallel to the axis of the machine, the fibre stock while advancing towards the outlet is washed more and more and the slimy substance on this spiral-like path is found to be entirely removed at the end.

The solid and non-perforated recesses in the surface of the wire mesh are preferably constructed as circular troughs curved towards the outside, representing interruptions in the continuous surface of the screen cylinder. The necessary shower water is supplied to them from the inside or the outside by means of shower pipes. These recesses can be spaced more closely together towards the discharge end in order to intensify the washing action. The slimy substance in these various zones is deposited in varying densities and it becomes desirable to re-use it in that condition.

It will be noted that the ang 13 supplies the stock consisting of fibres and slimy material to one end of the runner 12, which has this end closed off, so that the stock is compelled to pass on the outside thereof. In the embodiments shown in Figures 1 and 2, the exterior contour of the runner is conical in shape and in consequence, the mass of greatest extent is operated upon at the incoming end of the runner. As the mass passes inwardly over the runner, the slimy part thereof passes through the screen, and a more and more condensed mass of fibres separated from the slimy part passes out of the space between the runner and screen, as shown by the arrow in Fig. 1, indicated by 28, and then passes out of the conduit 14. The mass is subjected to repeated washings in Figures 1 and 2, within the circumferential cup-shaped runners acted upon by the jets emanating from the pipes 16. The whitewash or wing plates 27 are arranged closely adjacent to the screen. Thus by centrifugal action of the wing plates 27, the slimy material is forced through the screen, particularly due to the action of the separating cylinder, and the fibres which are of lighter specific gravity, are retained without passing through the screens, the screens having a mesh preventing the fibres from passing through the screens, and the fibres assembled longitudinally of the runner towards the outlet 14.

In the embodiment of Figures 3 and 4, the runner is not of conical shape, but is closed at the incoming end, this action being as just described. At the forward side of the wing plates 27, there is a compression of fibres, and at the rearward side, a suction action, which loosely the fibres from the slimy material. The direction of rotation of the runner is shown by the arrow 29. The improved method consists in subjecting a mass of stock material to the action of centrifugal forces, and simultaneously to a water liquefaction, while moving the mass longitudinally through the machine, whereby the slimy material is separated from the fibres, and is discharged from the machine as separated, while the fibres are retained by the mesh, and from such slimy material are discharged elsewhere from the machine. A further step in the method, is the washing out of the slimy material, in zones.

The shower pipes attached to the runner may be designed in conjunction with wing extensions. The runner itself furthermore may have an oblong shape or any form which is a departure from the true circular design whereby a pressure and suction effect is created upon the fibre stock near the wire mesh and at regular intervals.

The wire mesh itself, contrary to practice of
the standard screen, is secured to a frame work consisting of upright bars which are supported by ribs parallel to the shaft and radially arranged over the circumference, as shown in Figures 3 and 4.

The fibre stock produced on this machine in large quantities and in accordance with the invention, is washed very clean and, since it has the proper consistency, can be used again immediately. Based upon the unit of effective wire surface, the washing action obtained is very high and the amount of wash water used is very low. Variations in the stock supply or the speed of the runner have no effect upon the operating results of the machine. This dependability makes it very suitable for practical operation particularly too since clogging up of the wire mesh is avoided. This reclaimed new kind of fibre stock and the fibre can be utilized for their respective different usages.

Various embodiments of the invention have been described, and shown, but it is clear that changes may be made therein without departing from the spirit of the invention as defined in the appended claims.

We claim:
1. The method for mechanically separating slurry substance from fibre stock contained in ground wood or other similar fibrous mixtures, which consists in repeatedly washing the fibres in highly diluted state, and subjecting the same to centrifugal forces, whereby the slime is separated from the fibres, and the slipped material and fibres are separated from each other.
2. An apparatus for separating slurry material from the fibres of a stock of ground wood or other fibrous material, comprising a runner, a screen surrounding the same, and a washing zone member interposed between parts of the screen.
3. An apparatus for separating slurry material from the fibres of a stock of ground wood or other fibrous material, comprising a runner, a screen surrounding the same, and a plurality of washing zone members interposed between parts of the screen.
4. An apparatus for separating slurry material from the fibres of a stock of ground wood or other fibrous material, comprising a runner, a screen surrounding the same, a washing zone member interposed between parts of the screen, and shower pipes for the supply of wash water into the zone member.
5. An apparatus for separating slurry material from the fibres of a stock of ground wood or other fibrous material, comprising a runner, a screen surrounding the same, a washing zone member interposed between parts of the screen, and radial partition walls disposed in line with the zone member, forming separate channels for the flow of the removed slime.
6. An apparatus for separating slurry material from the fibres of a stock of ground wood or other fibrous material, comprising a runner, a screen surrounding the same, and a plurality of washing zone members interposed between parts of the screen, said washing zone members being separated by decreased distances towards the discharge end of the apparatus, in a direction parallel with the shaft.
7. An apparatus for separating slurry material from the fibres of a stock of ground wood or other fibrous material, comprising a runner, a screen surrounding the same, and a washing zone member interposed between parts of the screen having a fine mesh, smaller than the fibres, to prevent the fibres from passing therethrough.
8. An apparatus for separating slurry material from the fibres of a stock of ground wood or other fibrous material, comprising a runner, a screen surrounding the same, and a washing zone member interposed between parts of the screen having a fine mesh, smaller than the fibres, to prevent the fibres from passing therethrough, and a reinforcing frame surrounding the screen or wire mesh, consisting of rings radially arranged, and secured to the screen.
9. An apparatus for separating slurry material from the fibres of a stock of ground wood or other fibrous material, comprising a runner, a screen surrounding the same, a washing zone member interposed between parts of the screen, said screen having a fine mesh, smaller than the fibres, to prevent the fibres from passing therethrough, and a reinforcing frame surrounding the screen or wire mesh, consisting of rings radially arranged and secured to the screen, and additional reinforcing means formed by bars parallel with the shaft, and out of contact with the screen.
10. An apparatus comprising a shaft, a runner on said shaft, having its incoming end closed, wing plates on the runner, a water supply for the runner, and a screen or wire mesh circumferentially surrounding the runner, and in close proximity to the wing plates, whereby the slime is separated from the fibres.
11. An apparatus comprising an inlet for a stock material, a shaft, a runner having its incoming end closed, wing plates on the runner, a water supply for the runner, a screen circumferentially surrounding the runner, and in close proximity to the wing plates, said wing plates and screen being longitudinally disposed in parallelism with each other, a water zone member disposed in the screen, an outlet for the slime separated from the fibres, and an outlet for the fibres separate from the slime outlet.
12. An apparatus comprising an inlet for a stock material, a shaft, a runner having its incoming end closed, wing plates on the runner, a water supply for the runner, a screen circumferentially surrounding the runner, and in close proximity to the wing plates, said wing plates and screen being longitudinally disposed in parallelism with each other, a water zone member disposed in the screen, an outlet for the slime separated from the fibres, and an outlet for the fibres separate from the slime outlet.
13. An apparatus comprising an inlet for a stock material, a shaft, a runner on said shaft having a conical shape with its smallest diameter at the inlet end of the runner, wing plates on the runner, a water supply for the runner, a cylindrical screen circumferentially surrounding the runner secured to the frame of the machine and in close proximity to the wing plates, said wing plates and screen being longitudinally disposed in parallelism with each other, a water zone member disposed in the screen, an outlet for the slime separated from the fibres, and an outlet for the fibres separate from the slime outlet.
14. An apparatus comprising an inlet for a stock material, a shaft, a runner having a closed end, plates on the runner in proximity to the screen, and a water supply for spaced portions of the screen for subjecting the stock to a liquefying action while under the action of the plates on the runner, the mesh of the screen permitting...
passage of the slimy material of the stock but preventing passage of the fibres of the stock.

15. The method for mechanically separating slimy substance from fibre stock contained in ground wood or other similar fibrous material, which consists in subjecting the stock to repeated washings with water, under the action of pressure and centrifugal forces, while moving the stock along a separating member for allowing its slimy substance to pass therethrough, while impeding the fibres of the stock.

16. The method for mechanically separating slimy substance from fibre stock contained in ground wood or other similar fibrous material, which consists in subjecting the stock to a pulsating action through zones of water dilutions, for separating the liquefied slimy substance from the fibres, and then independently of each other conveying off the slimy substance and the fibres.

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CERTIFICATE OF CORRECTION.


RICHARD T. LANG, ET AL.

It is hereby certified that error appears in the heading to the printed specification of the above numbered patent requiring correction as follows: Line 10, date of filing in Germany, for "August 8, 1933" read August 12, 1933; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of March, A. D. 1935.

Leslie Frazer

(Seal)

Acting Commissioner of Patents.