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METHOD OF DISPERSING FLOCKS OF AGGLOMERATED FIBERS IN PULP CONVEYED TO A PAPER MACHINE

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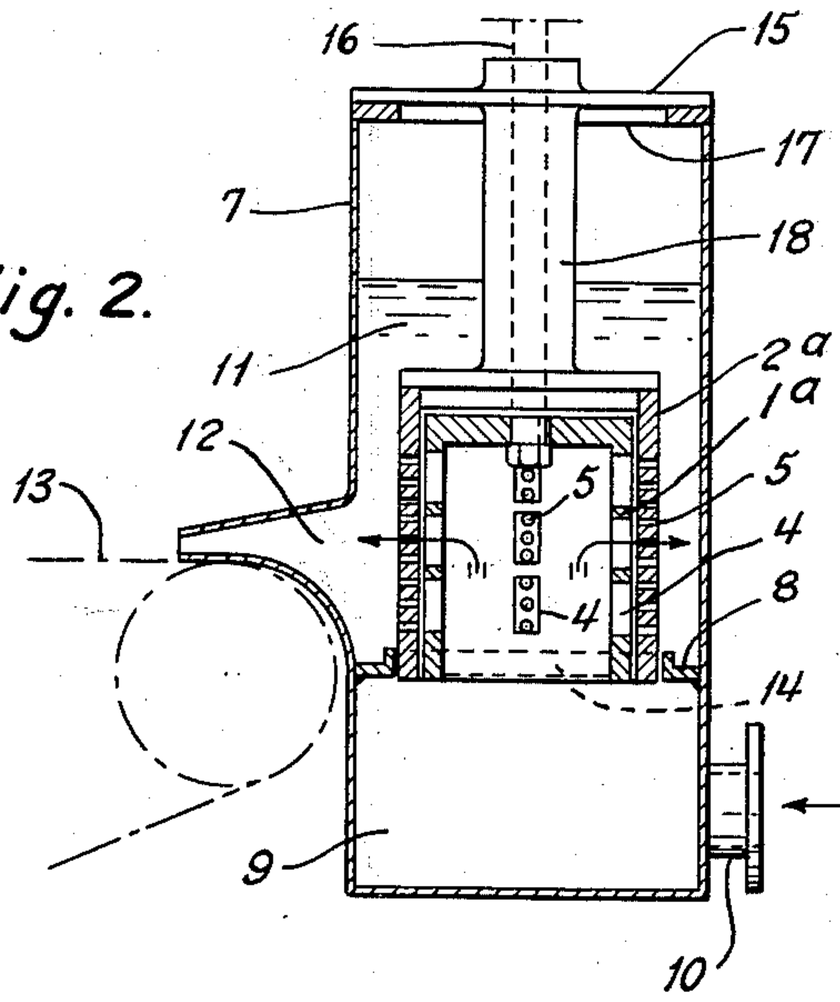


Fig. 2.

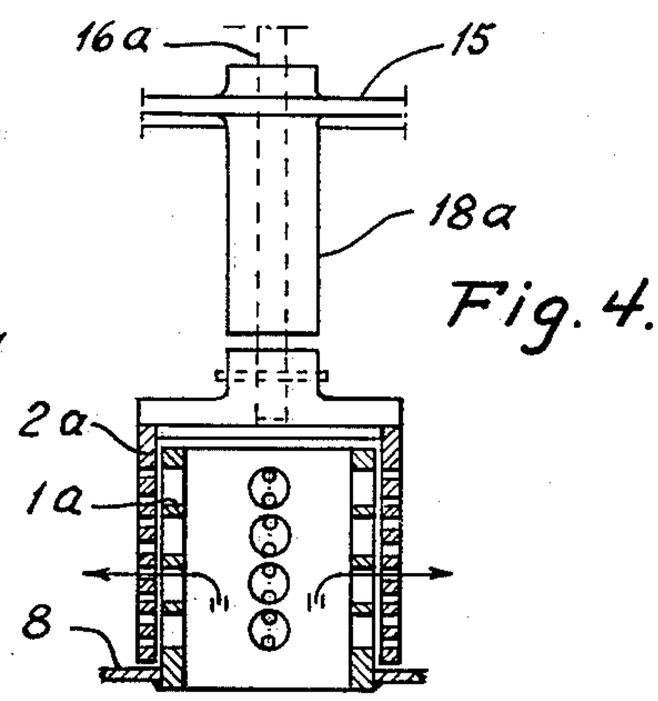


Fig. 4.

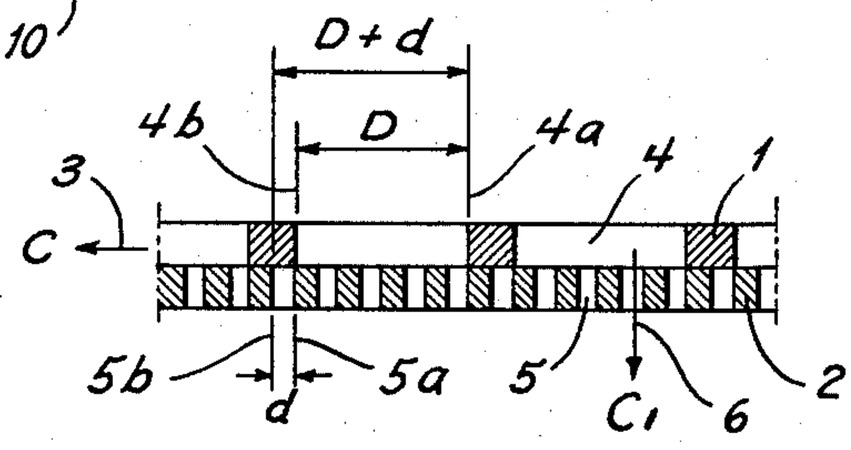
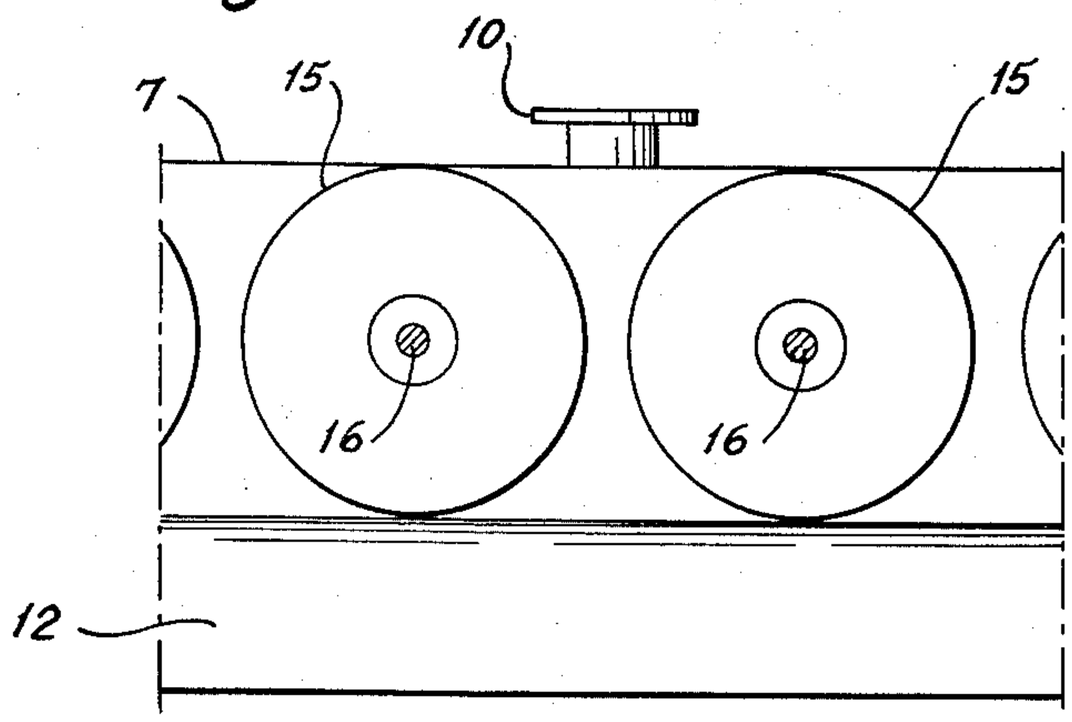


Fig. 1.

Fig. 3.



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METHOD OF DISPERSING FLOCKS OF AGGLOMERATED FIBERS IN PULP CONVEYED TO A PAPER MACHINE

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In order to achieve in paper making the greatest possible uniformity in respect of the distribution of fibers in forming the paper web, it is inter alia of importance that the pulp supplied to the endless wire does not contain flocks of agglomerated fibers of substantial size. Insofar as the pulp conveyed to the paper machine contains such flocks, it is thus highly desirable that said flocks will be dispersed in some manner before the pulp reaches the wire. It is also suitable to carry out this dispersion so close to the wire as to prevent new formation of flocks. Many arrangements for this purpose have been suggested, mostly however without satisfactory results.

An arrangement of this kind which has been used for several decades and still is used, consists of a hollow cylinder having a perforated shell, which is mounted in the inlet box across the direction of the main flow so as to take up part of the cross-section only, and which is rotated around its central axis. The purpose of this cylinder is to cause the pulp to enter the drum through the holes or apertures in the part of the shell, which during the rotation momentarily faces the direction of flow, and to be discharged through the holes at the opposite side of the shell, so that the flocks will be dispersed due to the turbulent flow thus achieved.

In practice, however, it has been proved that only a rather insignificant portion of the pulp passes through the hollow cylinder, which only partially spans the path of flow of pulp to the paper machine, whilst the main portion will pass outside said hollow cylinder. This seems to be due to the possibility for such by-passing on one hand and due to the resistance against radial passage from outside and inside through the holes of the cylinder, on the other hand, due to the effect of the centrifugal force on the pulp penetrating into the holes. Often no difference can be observed in paper produced with or without such hollow cylinder in the inlet box.

The main object of the present invention is to provide an appreciably more rational method—as compared with earlier known methods—to achieve dispersion of flocks in the connection now referred to. To this purpose the pulp, during its passage through the inlet box of the paper machine preferably in the vicinity of the outlet of the inlet box to the endless wire, is passed through a system of two perforated walls placed close to each other whilst relative movement is maintained between said walls in direction parallel to the planes of the walls.

The invention will now be described more in detail with reference to the enclosed drawing, in which:

FIG. 1 illustrates a cross-section of part of the arrangement for carrying out the invention;

FIG. 2 illustrates a side-section of an inlet box having a complete arrangement for carrying out the invention;

FIG. 3 illustrates a plan view of part of the inlet box according to FIG. 2 and

FIG. 4 illustrates a side-section of a modified embodiment of the arrangement according to FIG. 1.

All figures are diagrammatic and only serve as examples, without restricting the invention. Identical parts are indicated with the same reference numerals in the different figures.

In FIG. 1 two perforated walls **1** and **2** are situated close

to each other, one wall **1** being displaceable along the other wall **2** in the direction of the arrow **3** at a speed C relative to the latter wall. In this direction of movement the holes or apertures of the walls have a width which in the wall **1** between the bordering edges *4a* and *4b* has the size D and in the wall **2** between the bordering edges *5a* and *5b* have a substantially smaller size *d*. Pulp is passed through the walls in the direction of the arrow **6** at a speed C_1 and between the walls there is a very small interspace not shown in the figure sufficient to give space for the thickness of individual fibers. The arrangement operates in the following manner:

Each time when during the movement of the wall **1** an edge *4a* passes an edge *5b*, flocks of fibers, which together with the pulp on the way in through the walls, to some part come between said edges, will be torn apart by the cutting effect of the edges, whilst individual equally positioned fibers will only be subjected to a temporary bending effect. If in every passage-hole **5** the edge *5b* is passed by an edge *4a* at shorter time-interval than the time a flock of unpermissible size requires to pass entirely from the mouth of the passage-hole into the hole, there will be achieved full security against no such flock escaping said tearing effect. If the extension of the flock in the direction of flow **6** is designated L, this condition will be fulfilled in the equation $(D+d)/C<L/C_1$, as it will be realized from FIG. 1.

It is thus obvious that it is of importance to keep the size of the holes small in order—at certain relative speed C and passage speed C_1—to disperse even very small flocks. The possibility for this, however, is limited, because the holes in the wall **1** must be sufficiently wide so as not to be clogged by larger flock-formations, but in any circumstances permit passage of such flock-formations for shredding or rubbing against the wall **2** so as to initiate the dissolution of the flocks by shredding against said wall and to maintain the passage of the pulp. The wall **2**, however, can be provided with small holes, which are suitable from the point of view of manufacture and can thus also be constructed as a sieve-wall as a precaution against possible occurrence of alien solid matter in the pulp. With predetermined widths of the holes different demands can be met in respect of flock dispersing effect by selecting different ratios between the relative and the passage speed. As examples of practical hole-widths can be mentioned that D may be approximately 20 mm. and *d* approximately 3.5 mm. It is to be pointed out, however, that in principle nothing prevents achieving dissolution of the flocks even when the holes in the wall **2** are large. The required magnitude of the ratio C/C_1 will be much greater, however, which at unchanged relative speed and requirement for dispersing effect means equally reduced capacity. The passage-holes can naturally be shaped in manifold ways, for example circular or square, or may be extended longitudinally transversely to the relative movement.

In the complete arrangement according to FIG. 2 a partition-wall **8** divides the inlet box **7** into an inlet chamber **9** communicating with the inlet **10** of the inlet box for pulp and an outlet chamber **11** communicating with the outlet **12** of the inlet box to the endless wire gauze **13**. In the partition wall **8** there is a passage-hole **14**, and above this a cap or hood system of two concentric drums arranged close to each other, namely an outer drum *2a* having passage-holes **5** and an inner drum *1a* having passage-holes **4**, which correspond to the walls **2** and **1**, respectively, in FIG. 1. The outer drum is rigidly connected with the inlet box by means of a frame **18** with attachment means in the form of a flange **15**. The inner drum is rotatably mounted in the frame and provided with driving shaft **16**, coupled to some driving power source of known kind, not shown in the figure. By this device, pulp passing through the inlet box from the inlet **10** to the

outlet 12, is forced to flow through the walls of the drum-system, as indicated by the arrows, the flocks being dispersed as described with reference to FIG. 1, whereby the relative speed easily can be varied on changing the speed of rotation. By dispersing the flocks close to the outlet to the endless wire, the possibility for subsequent new formation of flocks will be utterly small.

In addition to the advantages concerning the dissolution step, the arrangement now described also offers the special advantage that by rotation of the wall 1*a* and thus also by rotation of the pulp caught in the holes 4, the pulp will be forced through the walls under the influence of the centrifugal effect. On one hand this results in a greater security against clogging of the holes 4 and on the other hand the throttling losses in the system can be counterbalanced to a greater or lesser degree and possibly overcome by pumping-effect in the system.

Through a hole 17 in the inlet box, which is wider than the outer diameter of the outer drum—and upon loosening the flange—the entire drum unit can be removed from the inlet box and reinserted into the same. Thus, the entire drum-system forms a separate unit, which can be easily built-in into the inlet box and removed again, for example for adjustment or repair purposes. In most cases and particularly in the case of a wide wire gauze and long inlet box it is suitable to build in a plurality of such units side by side as shown in FIG. 3. In this manner, merely by varying the number of units, the system can be adapted to different widths of wire gauze, which entails appreciable advantages.

FIG. 4 illustrates that in principle it is also possible to mount the outer drum 2*a* rotatably in the frame 18*a*, driven by the axis 16*a*, whilst the inner drum 1*a* is rigidly connected with the partition wall 8 since the relative movement can also be obtained in this manner. However, in this case it is not possible to obtain the special advantages in respect of security against clogging and the possibility of easy dismounting, which are characteristic for the previous arrangement.

Naturally, it is also possible to arrange the drum-system with its central axis directed towards another direction than the vertical one, for example horizontally, in connection with causing passage of the pulp through a vertical part of the partition wall in the inlet box.

What I claim is:

1. A method for dispersing flocks of agglomerated fibers in pulp conveyed to a paper machine so as to pass through a head box provided with an outlet discharging the pulp from the head box to the wire of said paper machine, comprising the steps of causing the pulp in said head box to flow towards said outlet through two perforated walls in succession while crossing a small interspace between said walls, said interspace being dimensioned to make space for individual fibers of the pulp but being substantially smaller than the size of said flocks, and moving said walls relative to each other in a direction perpendicular to the main flow direction of the pulp through said walls whereby to tear apart and disperse the fibers of flocks flowing through said walls.

2. A method as claimed in claim 1, wherein said walls are disposed close to the outlet of the head box.

3. A method for dispersing flocks of agglomerated fibers in pulp conveyed to a paper machine so as to pass through a head box provided with an outlet discharging the pulp from the head box to the wire of said paper machine, comprising the steps of causing the pulp in said head box to flow towards said outlet substantially radially through two concentric perforated drum walls of circular cross section while crossing a small interspace between said walls, said interspace being dimensioned to make space for individual fibers of the pulp but being substantially smaller than the size of said flocks, and rotating said drum walls relative to each other, whereby to tear apart and disperse the fibers of flocks flowing through said drum walls.

4. A method as claimed in claim 3, wherein said drum walls are disposed close to the outlet of the head box.

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