Sept. 11, 1962 N. G. LEFFLER 3,053,068

TOWERS FOR BLEACHING PULP MATERIAL, ESPECIALLY CELLULOSE PULP

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FIG. 1

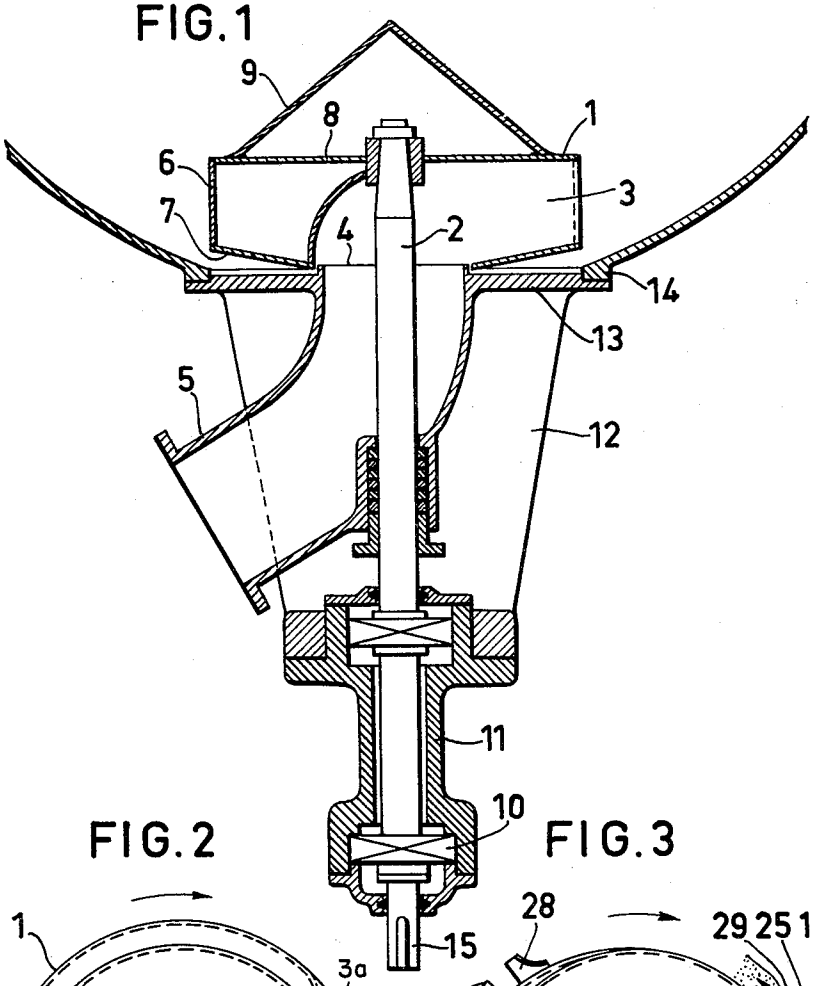


FIG. 2

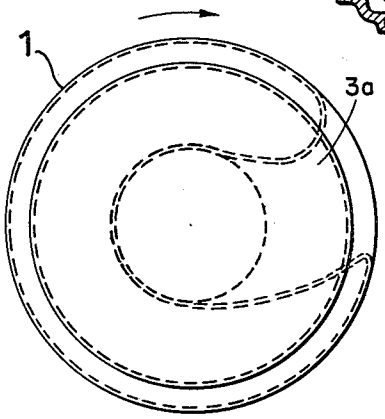
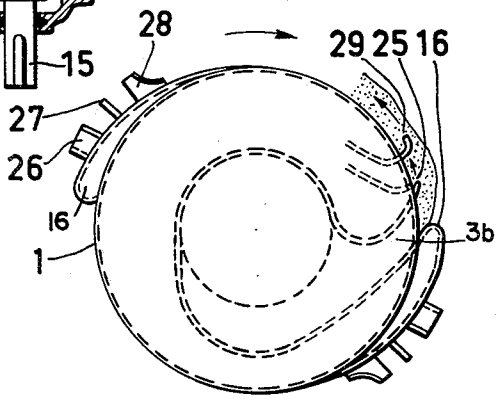


FIG. 3



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TOWERS FOR BLEACHING PULP MATERIAL, ESPECIALLY CELLULOSE PULP

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FIG.4

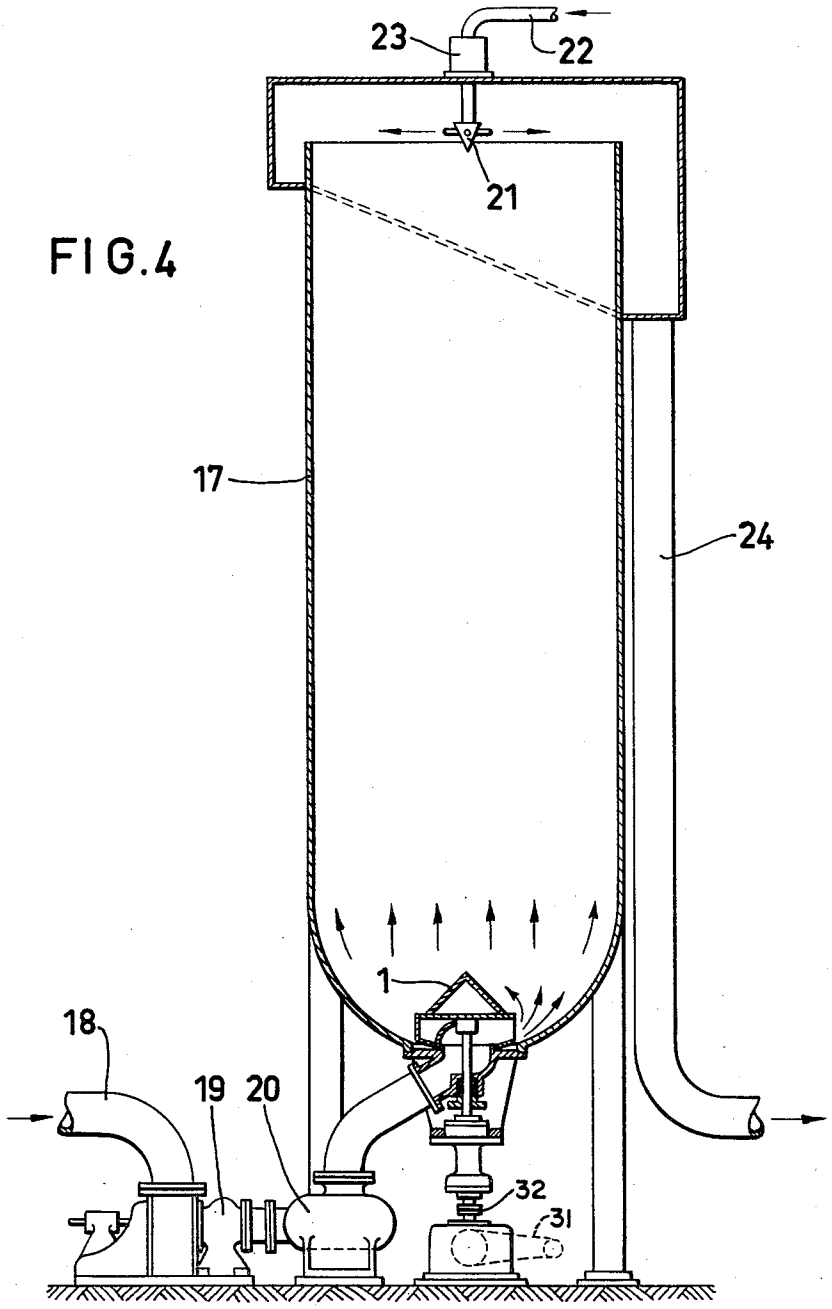

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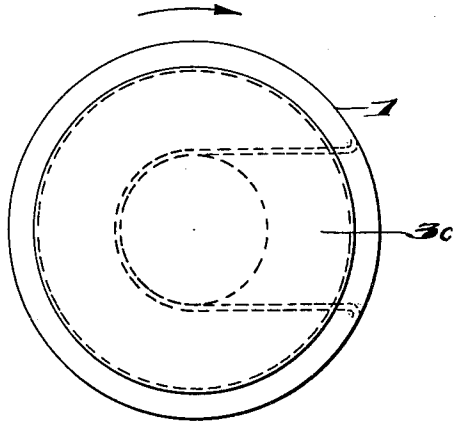
Fig. 5.



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United States Patent Office 3,053,068 Patented Sept. 11, 1962

3,053,068

TOWERS FOR BLEACHING PULP MATERIAL, ESPECIALLY CELLULOSE PULP

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Filed Aug. 20, 1958, Ser. No. 756,091
Claims priority, application Sweden Aug. 21, 1957
2 Claims. (Cl. 68—181)

In continuously bleaching pulp material, for instance, cellulose pulp, in a tower, the pulp is fed into the tower at the bottom thereof and is discharged at the top of the tower or the pulp is fed in the opposite direction, i.e. from above downwards. The first mentioned system is commonly used when pulps of low concentrations are concerned, the last-mentioned system having been used for concentrations above about 8%.

However, the system of feeding the material from below upwards involves apparent advantages in connection with the bleaching of cellulose pulp of a concentration above about 8%. There is no risk of the pulp "hanging" in the tower and dilution of the ready-treated pulp, in order to make possible the further conveyance thereof by means of a pump, is more easily done and controlled at the top of the tower than at the bottom thereof.

In order to obtain a uniform flow inside a bleaching tower, in which pulp of a relatively high concentration is fed from below upwards, it is, however, necessary to provide for an effective charging and distribution of the pulp at the bottom of the tower. The present invention relates to an arrangement for creating such effective charging and distribution of the pulp. The invention mainly consists therein that the stationary inlet opening located preferably centrally at the bottom of the tower is combined with a pulp feed distributing device which is rotatable about a vertical or substantially vertical shaft and is adapted, through at least one discharge opening, provided in said distributing device, to conduct the pulp in a radial or substantially radial direction out into the tower, said discharge opening of the distributing device being located at the bottom of the tower.

The pulp feed distributing device should be arranged so as to rotate at a constant speed, bringing about the advantage of the same quantity of pulp being, per unit of time, distributed in every radial direction, independently of the fact whether the discharge opening is in the position shown in FIG. 1, or rotated half a revolution relatively to the position shown.

The invention will be described below with reference to the accompanying drawings. In the drawings FIG. 1 shows a vertical sectional view of the distributing device according to the invention; FIG. 2 is a top plan view of the distributing device; FIG. 3 is a modified embodiment of the distributing device, likewise in plan view; FIG. 4 is a vertical sectional view of a bleaching tower, provided with a distributing device according to the invention, and FIG. 5 is a top plan view of another embodiment of the distributing device.

The distributing device 1 is secured to a rotary shaft 2 in such a manner that its discharge opening 3 for the pulp is radially, or substantially radially, directed outwards in the vertical plane, preferably somewhat upwards, so that the direction of motion of the pulp, on flowing outwards, will substantially coincide with the direction of the bottom of the tower near the discharge opening 3. The height of the opening 3 is substantially equal to the height of the cylindrical shell 6 of the distributing device 1. By modifying, to some extent, the direction of said opening—counting in the vertical plane—the quantity of pulp fed outwards to the periphery of the tower can be controlled relatively to that quantity which begins to

move upwards immediately after having emerged from the discharge opening. The more the opening is directed upwards the larger the quantity of pulp supplied to the central zone of the tower. The modifications of the discharge opening 3 of FIG. 1 shown in FIGS. 2, 3 and 5 are designated 3*a*, 3*b* and 3*c* respectively.

In the embodiment shown in FIG. 1 the pulp will be pressed outwards towards the cylindrical part of the tower within a zone located relatively close to the bottom of the tower, and the pressure created and maintained there will generate an upward force, which is evenly distributed over the whole cross sectional area of the tower, a uniform upward flow being obtained within said cross sectional area without "channeling" occurring.

The inlet opening 4 of the distributing device is tightly connected to the inlet pipe 5 and should have at least approximately the same diameter as the latter. The connection between the distributing device 1 and the inlet pipe 5, at 4, may consist of a narrow slot.

In order to reduce the need of effective power for rotation of the distributing device 1 said distributing device may be provided with a cylindrical shell 6 and with end portions 7 and 8 along with a covering cone 9 or the like. The latter will help in preventing pulp from remaining on the end portion 8. The surface of the covering cone 9 extends substantially in the direction of flow of the pulp, due to which pulp cannot accumulate on this surface. The cone 9 also may be provided with a screw thread (not shown) for feeding the pulp upwards.

The rotary shaft 2 carrying the pulp feed distributing device 1 is mounted in two roller bearings 10, mounted in a housing 11. The housing 11 is formed with brackets 12—preferably one at each side of the inlet pipe 5—and a flange 13, which, for instance, by means of bolts (not shown), is secured to a flange 14 at the bottom of the tower. The opening in the flange 14 should be so large as to permit the downward removal of the entire distributing device without taking it to pieces. The driving power for the shaft may be transmitted from an electric motor or some other source of power (not shown) to the journal 15 by means of a cone belt drive 31 and an elastic or a rigid coupling 32. In the latter case the drive assembly is to be mounted below the distributing device.

As appears in FIG. 2 the discharge opening 3*a* for the pulp is curved backwards, counting in the direction of rotation, indicated by an arrow, for the purpose of facilitating the outflow of pulp. In order to further improve the outflow of pulp the cylindrical shell 6 may be provided with a protuberance 16, as shown in FIG. 3, just ahead of the discharge opening, said protuberance 16 being adapted to press the pulp aside in the radial direction, possibly also in the axial direction, and thereby to provide space for the outflowing pulp. As shown, the protuberance 16 may be counter-balanced by a similar opposite protuberance 16.

The direction of the opening of the pulp feed distributing device may be varied. As mentioned, said opening may curve backwards, counting in the direction of rotation, as shown in FIGS. 2 and 3, but also embodiments of the kind, in which the outflow is caused to take place radially as shown in FIG. 5 may involve advantages. In the first mentioned embodiment the driving device for the shaft 2 may be omitted under certain circumstances and the distributor driven by the outflowing pulp. The speed of rotation of the distributing device could then be controlled in case great demands are made on a uniform flow being obtained in the tower. It should also be pointed out that it may be advantageous not to control the speed of rotation of the distributing device, in which case a larger quantity of pulp will be distributed in

that radial direction in which the pressure is lowest, resulting in a balancing of the pressure in the tower.

The main features of the distributing device according to the invention having been described, there will now be explained in what way the distributing device may be arranged in a bleaching tower and what further equipment may be advantageously combined with the distributing device. In FIG. 4 the distributing device is indicated by **1** and the bleaching tower by **17**. Normally, the bleaching tower is of a cylindrical shape. The pulp to be treated is supplied through a pipe line **18**. The pulp may come from a filter, not shown, which is positioned either high up—for instance above the top of the tower—or at the bottom plane. Through said pipe line **18** the pulp is conducted into a thick stock pump **19**, which preferably may be of the gear pump type. Also, some other conventional charging device could be used instead. A desirable, very uniform feeding is, however, obtained with the type of a pump just mentioned. From said pump the pulp is then pressed further through a mixer **20** to the distributing device **1** and further upwards through the tower **17**. At the top of the tower there may be provided a conventional removing device or scraper (not shown) for removing the treated pulp. In such a case the removing device or scraper may be driven from a common shaft, which preferably is located centrally in the tower. In the drawing, however, there is shown another alternative of removing the pulp, viz. by means of a rotating water spout **21** with a supply pipe **22** for water under pressure and driven by a motor **23**. An arrangement of this kind is simpler and cheaper than a scraper, and the water spout may serve for effecting both the removal of the pulp and the dilution thereof to a suitable concentration. The treated pulp finally is led away through a pipe **24**.

Due to the fact that bleaching agents and/or vapour are added in a separate mixing device **20** outside the tower, said mixing device being specially constructed for that purpose, an effective admixing is obtained. Furthermore, it is easy to control the dosages by taking samples. However, if it is desired to save expenses, by dispensing with a separate mixing device, the bleaching agent, for example chlorine gas, and/or the vapour may be supplied to the pulp within the tower at the periphery of the distributing device through a spout **25** (FIG. 3), said spout constituting the one, open end of a pipe through which the bleaching agent and/or vapour is supplied, said open end of the pipe being located at the periphery of the distributing device. It is suitable then to run the distributing device at a higher speed than that required for a uniform distribution of pulp in the tower, so that a relatively thin layer of pulp is spread around the distributing device. The bleaching agent and/or the vapour will be supplied between such layers. Mixing may then be effected by means of slanting plates **26** or similar agitating members, for example, of the kind shown at **27, 28**. Of said agitating members member **28** is turned so that a layer of pulp, or part thereof, will be turned, for instance, about 90°. Several members may be provided in vertical direction. The opening of the distributing device preferably should be made with a small width (in peripheral direction) as compared with its height (in axial direction). Regarding the extension of the opening in the horizontal and vertical directions, the bleaching agent and/or vapour should be

distributed in the horizontal layer of pulp. The idea of the invention also includes embodiments having an oval or a cylindrical opening of the distributing device.

It is, of course, also possible to provide spouts in such a manner that bleaching agent and/or vapour is supplied within the distributed layer and in thin streams at suitable intervals in the axial direction. A spout of this kind, which is located further out, is indicated by **29** (FIG. 3), said spout constituting the one, open end of a pipe through which the bleaching agent and/or the vapour is supplied, said open end of the pipe being located just outside the periphery of the distributing device. Such spout arrangement may be devised in the form of an inset, which is removable through manholes (not shown) in the portion **7** and in the flange **13**

A distributing device in accordance with the invention provides for a controlled feeding of pulp into the tower, substantially in radial direction, bringing about a controlled flow in axial direction. Besides a controlled admixing of chemicals with the lowest consumption is obtained due to the fact that a layer of chemicals can be spread between the layers of pulp, whereby a uniform admixing will be obtained without necessitating the provision of any means for agitating the pulp, which hitherto has been necessary.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Apparatus for bleaching pulp material comprising a vertically disposed cylindrical tower having bottom and side walls, a circular opening in the bottom wall of said tower which is coaxial with the vertical axis of said tower, a pulp supply pipe having a circular discharge end connected to said circular opening in the bottom of said tower, a distributing member mounted to rotate within said tower around said vertical axis, said distributing member having a top wall and an annular side wall which is substantially coaxial with said vertical axis, an opening in the lower part of said distributing member communicating with said discharge end of said pulp supply pipe through said opening in the bottom wall of said tower, an opening in said annular side wall of said distributing member, a closed conduit within said distributing member connecting said opening in the lower part thereof with said opening in the side wall thereof, said conduit extending in the radial direction of said distributing member, said opening in said side wall of said distributing member extending circumferentially over only a part thereof, a shaft coaxial with said tower journaled below and connected to and supporting said distributing member and means for rotating said distributing member.

2. Apparatus as defined in claim 1 in which the conduit curves rearwardly with respect to the direction of rotation of the distributing member.

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