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A. F. RICHTER

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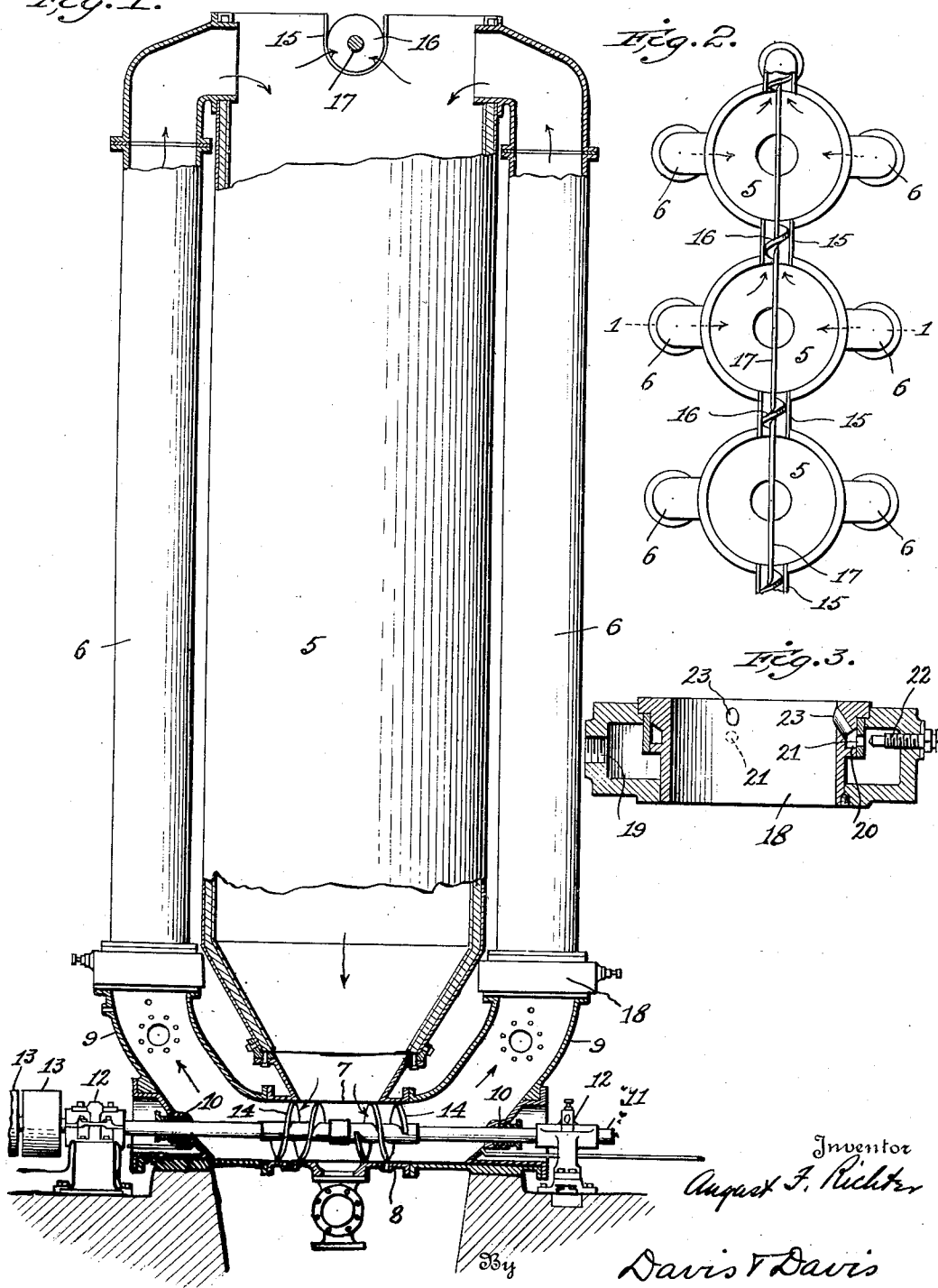
PULP BLEACHING METHOD AND APPARATUS

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Fig. 1.

Fig. 2.

Fig. 3.



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PULP-BLEACHING METHOD AND APPARATUS.

Application filed March 6, 1922. Serial No. 541,463.

To all whom it may concern:

Be it known that I, AUGUST F. RICHTER, a citizen of the United States of America, and a resident of Watertown, county of Jefferson, and State of New York, have invented certain new and useful Improvements in Pulp-Bleaching Methods and Apparatus, of which the following is a full and clear specification.

This invention is designed to provide a simple and efficient method and apparatus for carrying out the pulp-bleaching method disclosed in Heiskanen Patent No. 1,277,926, dated Sept. 3, 1918, and the special object of the invention is to so construct the apparatus as to reduce to a minimum the consumption of steam, bleach and power, as more fully hereinafter set forth.

It will be understood, however, that this invention is not exclusively confined to the carrying out of the method disclosed in the aforesaid patent.

In the drawing—

Fig. 1 is a view partly in side elevation and partly in vertical section, taken on the line 1—1 of Fig. 2;

Fig. 2 is a miniature plan view of a series of units of my apparatus;

Fig. 3 is a detail vertical sectional view through the air ring or nozzle.

Referring to the drawing, 5 designates the main tank of each unit and 6 two supplemental conduits or receptacles arranged at opposite sides of the main receptacle, all three receptacles being circular in cross-section. The supplemental receptacles 6 are much smaller in diameter than the main receptacle and they serve to convey the pulp and bleach to the upper end of the main receptacle and empty the same thereinto, the upper ends of these uptakes 6 entering the main receptacle at opposite sides through openings therein, these openings being located at or near the upper end of the main receptacle.

The bottom of the main tank is tapered downwardly to a throat 7 leading into a short horizontal conduit 8 which forms a part of the uptakes 6, each end of this conduit being connected to the adjacent lower end of one of the uptakes by a curved upwardly-tapering conduit 9. Extending through stuffing-boxes 10 in the walls of the curved conduits 9 is a shaft 11 mounted

in suitable bearings 12 and driven by suitable fast and loose pulleys 13. Affixed to the shaft 11 is a pair of screw-impellers 14 which fit the conduit 8 and are arranged at opposite sides of the throat 7. These impellers are arranged to oppose each other, so as to impel the pulp outwardly in opposite directions from the throat 7, so that in the operation of the apparatus these screw-impellers will draw equal amounts of pulp down through throat 7 and force it outwardly and upwardly into the uptakes, thereby delivering it back into the main receptacle at the upper ends thereof. This arrangement of opposed impellers and two uptakes enables me to move the pulp without end-thrust on the impeller shaft, since the two impellers balance each other so far as end-thrust is concerned. This overcomes an objection found to exist in the apparatus shown in the Heiskanen patent, since in the Heiskanen structure there was liability that the end-thrust on the impeller would unstep the shaft. In this way, I am enabled to work unusually thick pulp, i. e., pulp having a very high percentage of fiber to water, thereby greatly economizing in steam, power and bleach.

The main receptacles are located side by side, as shown in Fig. 2, and are connected by overflow tubes or troughs 15, in each of which works a screw 16, these screws all being fastened to a common shaft 17 driven by any suitable power mechanism. As in the Heiskanen method, the pulp is kept in constant circulation in each unit (a unit being composed of a main tank and two supplemental uptakes) and at the same time a quantity of the pulp equal to the quantity fed into the first tank is carried over into the next adjacent tank. The screws or propellers 16 ensure a constant and uniform feed of the pulp from unit to unit and enables me to handle thick pulp. It is obvious that if one unit contains a little more than the next one, the discharge-screw thereof will immediately correct the situation by carrying a little more over into the next unit, thereby ensuring substantially the same level of pulp in all the main receptacles to thus ensure a uniform distribution throughout the system.

Each of the curved conduits 9 is connected to the vertical part of the uptake

by means of an air-ring 18 which is hollow and is adapted to be connected to a compressed-air supply through an inlet 19. The interior of the ring 18 is connected to a supplemental air channel 20 by means of air-holes 21, associated with each of which is a needle-valve 22 by which the amount of air entering the hole 21 is regulated. The annular channel 20 is connected to the interior of the uptake by upwardly-inclined nozzle-passages 23, whereby one or more upwardly-directed compressed-air currents is directed into the upgoing mass of pulp. These upwardly-flowing air currents tend to lift the stock and thus assist the impellers greatly in keeping it moving. This air also cuts down friction by giving the stock a sort of air cushion to travel on and thus enables me to move the heaviest stock at a minimum consumption of power. And, furthermore, the chemical reaction that takes place when the calcium chloride liquor of the bleach comes in contact with cellulose or pulp is greatly aided by this aeration, thereby speeding up the bleaching action.

It will be understood, of course, that any other fluid, such as oxygen, chlorine gas or any other liquid or gas which will assist in moving as well as bleaching the stock may be employed.

I do not desire to be understood as limiting myself to the precise details of construction and arrangement shown, as variations and modifications therefrom may be made without departing from the spirit and scope of my invention and improvements. I therefore reserve the right to all such variations and modifications as properly fall within the scope of my invention and improvements and as set forth in the terms of the following claims.

What I claim is:

1. In an apparatus for bleaching pulp, a main tank, a pair of conduits arranged at opposite sides of the main tank having their upper ends discharging into the main tank, a horizontal conduit arranged across the lower, open end of the main tank and arranged to discharge into the lower ends of the conduits, and a shaft extending horizontally through said horizontal conduit and provided with a pair of opposed propellers arranged at opposite sides of said open end of the main tank, for the purpose set forth.

2. In a pulp-bleaching apparatus em-

bodying an uptake for conveying the pulp upwardly, means for propelling the pulp, and means for introducing a bleaching-accelerating fluid under pressure into said uptake, this latter means embodying a plurality of nozzles arranged around the uptake and directed upwardly to thereby introduce the fluid into the mass of pulp in the form of a plurality of upwardly-directed streams, for the purpose set forth.

3. In an apparatus for bleaching pulp, a series of tank-units, each comprising a main tank and a pair of supplemental or uptake conduits arranged on opposite sides thereof, means for withdrawing the pulp from the bottom of the main tank and discharging equal quantities upwardly into the uptakes, a horizontal trough connecting each pair of adjacent main tanks, said troughs being in horizontal alinement, and a common shaft extending through said troughs and carrying an impeller for each trough, for the purpose set forth.

4. In a pulp-bleaching apparatus embodying an uptake for conveying the pulp upwardly, means for propelling the pulp upwardly, and means for continuously introducing an accelerating fluid under pressure into said uptake at the lower end thereof, said latter means embodying a nozzle extending only to the interior surface of the uptake so that the fluid will lubricate and thus reduce the friction of the upgoing pulp.

5. The method herein described of bleaching pulp consisting in maintaining an upgoing continuously-moving mass of pulp and water and bleaching agent, and continuously introducing under pressure into the lower end of said upgoing column of pulp a bleaching accelerating fluid; this fluid being delivered at a point between the pulp and the enclosing wall of the uptake, for the purpose set forth.

6. The method herein described of bleaching paper pulp consisting in injecting under pressure a plurality of jets of bleaching-accelerating fluid directly into a mass of mixed pulp and bleaching liquor to thereby not only agitate the mass to thus intimately mix the bleaching-accelerating fluid with the pulp and the bleaching liquor, but also to assist in moving the same.

In testimony whereof I hereunto affix my signature.

AUGUST F. RICHTER.