March 24, 1925. 1,530,494

J. E. HEISKANEN

PULP BLEACHING APPARATUS

Filed April 27, 1922

Fig. 1.

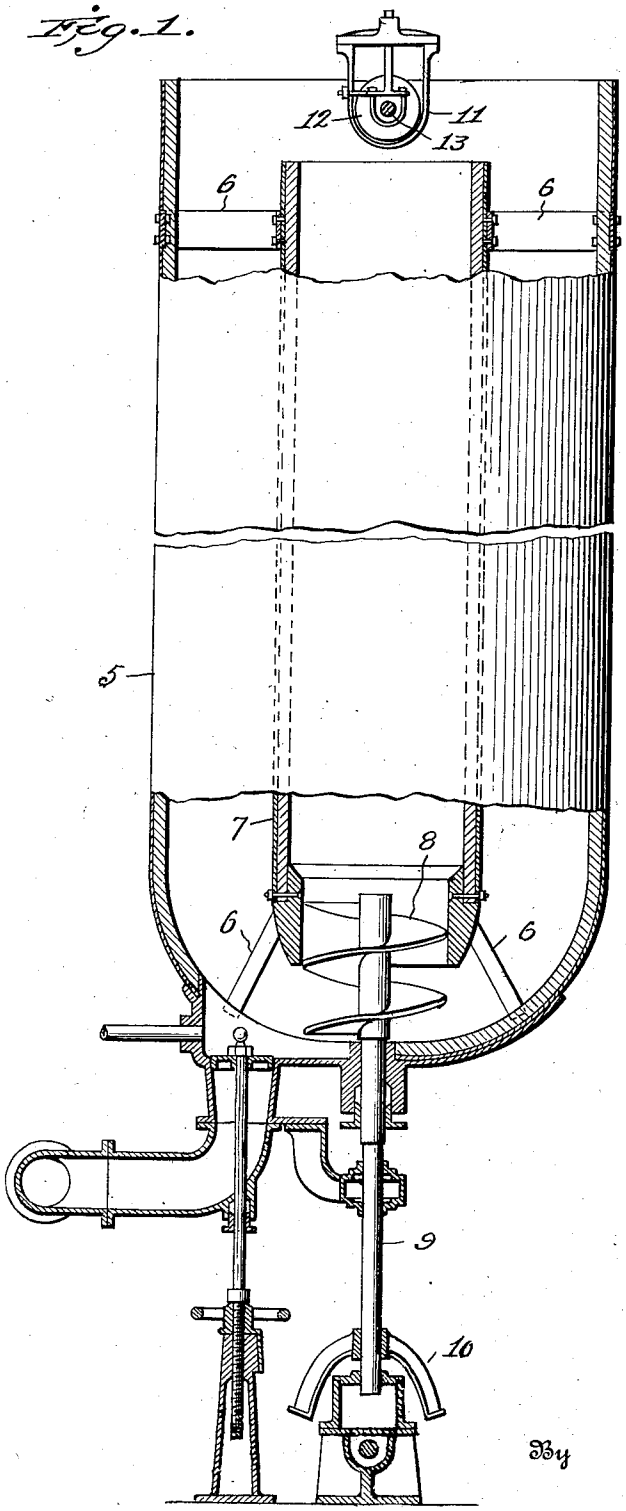
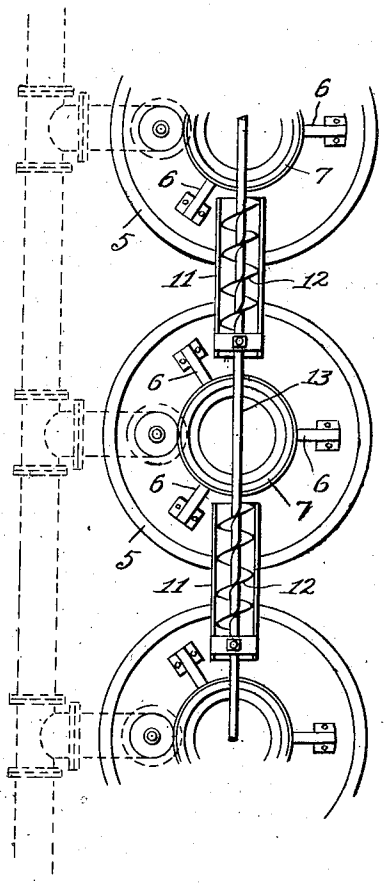


Fig. 2.



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UNITED STATES PATENT OFFICE.

JALMAR E. HEISKANEN, OF ENSO, FINLAND, ASSIGNOR TO STEBBINS ENGINEERING AND MANUFACTURING COMPANY, OF WATERTOWN, NEW YORK, A CORPORATION OF NEW YORK.

PULP-BLEACHING APPARATUS.

Application filed April 27, 1922. Serial No. 556,894.

To all whom it may concern:

Be it known that I, JALMAR E. HEISKANEN, a citizen of Finland, and a resident of Enso, Finland, have invented certain new and useful Improvements in Pulp-Bleaching Apparatus, of which the following is a full and clear specification.

This invention is designed to provide a simple and efficient apparatus especially tho not exclusively for carrying out the pulp-bleaching method disclosed in my 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.

In the drawing—

Fig. 1 is a vertical sectional view of one of the units of my improved apparatus;

Fig. 2 is a plan view of several of the units connected together by screw-conveyor devices.

Referring to the drawing annexed, 5 is a main cylindrical tank in which is supported concentrically, by means of suitable supports 6, a supplemental tank or uptake 7, the lower, inlet end of this uptake being supported at a distance above the bottom of the main tank while the upper end of this central tank terminates at a point below the top of the main tank. Arranged in the lower part of the main tank is a vertical screw-conveyor 8 which extends across the space between the lower end of the central tank and the bottom of the main tank and extends up a suitable distance into the supplemental tank. The screw-conveyor approximately fits the interior of the lower end of the central uptake but at a point above the screw-conveyor the interior diameter of the central uptake increases.

The shaft 9 of the screw-conveyor extends downwardly through a stuffing-box in the lower end of the main tank and is stepped in a suitable step-bearing 10 below. Connecting each pair of adjacent main tanks is a trough 11 whose bottom is just above the upper end of the central, uptake tank. In each trough is arranged a screw-conveyor 12, these conveyors being all affixed to a common shaft 13 so that they shall be simultaneously rotated at a uniform speed. The operation of this apparatus is the same as in my former Patent 1,277,926. In the preferred operation, the screw-impeller pulls the pulp downwardly in the main tank and forces it to ascend in the central tank, and a comparatively small quantity of the pulp in each unit is carried over to the next unit by the screw-conveyor, where it is further circulated in said unit; and so on to the last unit of the plant, from which last unit the bleached pulp is discharged in any suitable manner.

An advantage in the present screw-conveyer arrangement over my former patent is that the thrust in the present apparatus is downwardly, thus tending to hold the shaft in its stepped bearing, whereas in the apparatus covered by my former patent the thrust constantly tended to unstep the shaft. It will be understood that the screw-conveyor 8 may be extended up into the uptake to any distance desired, depending on the thickness of stock being worked. With this apparatus, I am enabled to work much heavier stock than with my former apparatus. My present apparatus is further desirable on the ground that it is simpler and more compact and ensures a more thorough, even treatment of the stock.

The purpose in enlarging the internal diameter of the uptake at a point above the narrowed throat-like entrance thereof is to provide for expansion of the stock after it passes the narrowed throat, to thus permit the stock to be pushed upwardly in the uptake with decreased friction. It will be observed that the bottom of the main tank is rounded to thus insure a substantially uniform delivery of the stock from all directions to the propeller and thus also insure against any dead spaces in the tank. The elimination of dead spaces in the bottom of the main tank avoids the necessity of employing a special form of agitator or gatherer to bring the stock to the propeller.

As hereinbefore stated, my invention is designed especially to handle paper stock of heavy density, as heretofore it has been impossible to bleach high percentage stock with the apparatus known, except possibly by very costly methods. One of the difficulties lies in keeping the heavy stock in uniform circulation, as otherwise an effec-

tual and efficient bleaching action cannot be maintained. In my present invention, I can maintain a constant uniform circulation of heavy stock and in an apparatus that is exceedingly compact and inexpensive as compared with previous plants for bleaching pulp. One of the features of my invention is the arranging of the tanks one within the other, the uptake tank being centrally located within a larger main tank. With this construction, by maintaining uniform movement of the pulp upwardly in the central tank and having the upper delivery end of the central uptake-tank free of obstructions, the pulp as it rises breaks over the upper edge of the uptake-tank into the main tank and then gravitates to the lower end of the uptake tank. The "feed" over the upper edge of the uptake-tank takes place all around the same, being naturally distributed equally around the rim of the uptake-tank. In this way and by reason of the fact that the outer main tank is circular in cross-section, as near uniform movement of the stock as is possible is maintained. This is promoted by having the lower end of the main tank wall rounded, so as to merge into the bottom wall of the tank, thereby delivering the gravitating stock directly to the propeller screw, the delivery being even all around and being accomplished without the necessity of employing stirrers or gatherers in the bottom of the main tank.

To make the foregoing apparatus effective and economical, it is essential that the two tanks be vertically arranged and that they be of considerable height in order to get the capacity needed for economical operation. The difficulty in employing a high uptake-tank is that in pushing the heavy stock up through the same, a considerable friction is generated as this stock is semi-solid and approximately the consistency of wet sand. To move this stock steadily and slowly upwardly in the uptake requires the expenditure of considerable power. Now, in order to reduce this power to an economical point, I provide for easing up the upward flow of the stock. To do this, I enlarge the uptake at a point beginning just above the screw and extending the full height of the uptake, in order that, as heretofore stated, the compression of the stock as it is forced through the throat of the uptake by the impeller may relieve itself as soon as it has passed the impeller. As soon as the stock passes the impeller, it loosens and expands and thus greatly reduces the friction against the wall of the uptake. It is desirable that the enlarging of the uptake shall be only slightly greater than the diameter of the screw and also that the enlarged part of the uptake shall be of the same diameter throughout, in order that the upward movement of the pulp shall be practically uniform throughout the cross-section of the uptake.

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 central cylindrical tank arranged within the main tank and having its lower open end terminating above the bottom of the main tank, and a shaft carrying a screw impeller extending across the space between the two ends of the tanks and up into the central tank, the interior diameter of the lower end of the central tank being approximately the same as the diameter of the screw impeller while the upper part of the central tank has an increased internal diameter.

2. In an apparatus for bleaching pulp, a main tank circular in cross-section, an inner uptake-tank circular in cross-section arranged centrally within said main tank and having a lower unobstructed open end and also an upper unobstructed open end, the lower end of the uptake-tank terminating above the bottom of the main tank and its upper end terminating below the top of the main tank, an impeller-screw extending across the space between the lower end of the uptake-tank and the bottom of the main tank and into the uptake-tank, the interior diameter of the lower end of the central uptake-tank being approximately the same as the diameter of the screw-impeller, while the part of the central uptake-tank above the screw-impeller has an increased internal diameter uniform to the top of the uptake-tank.

3. In an apparatus for bleaching pulp, a main tank circular in cross-section, an inner uptake-tank circular in cross-section arranged centrally within said main tank and having a lower unobstructed open end and also an upper unobstructed open end, the lower end of the uptake-tank terminating above the bottom of the main tank and its upper end terminating below the top of the main tank, an impeller-screw extending across the space between the lower end of the uptake-tank and the bottom of the main tank and into the uptake-tank, the interior diameter of the lower end of the central uptake-tank being approximately the same as the diameter of the screw-impeller, while the part of the central uptake-tank above

the screw-impeller has an increased internal diameter uniform to the top of the uptake-tank, the wall of the main tank being rounded all around to merge into the bottom wall of the main tank, to thereby insure delivery of the stock to the impeller without the use of a gathering appliance.

In testimony whereof I hereunto affix my signature.

JALMAR E. HEISKANEN.

Witnesses:
ERNEST W. LINDQUIST,
FRANS E. TELILENIUS.