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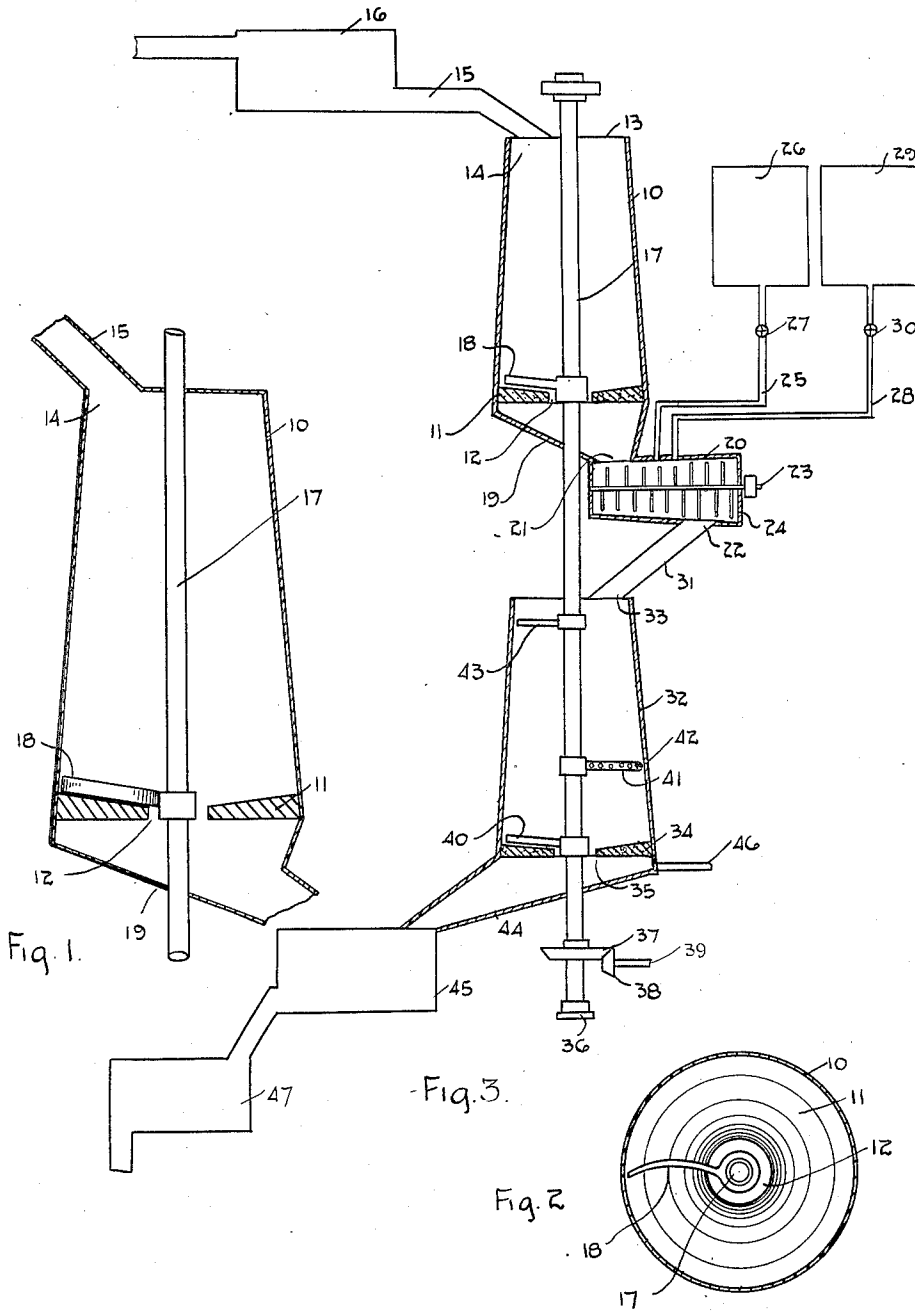
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APPARATUS FOR BLEACHING PURPOSES

Filed Oct. 7, 1925

2 Sheets-Sheet 1



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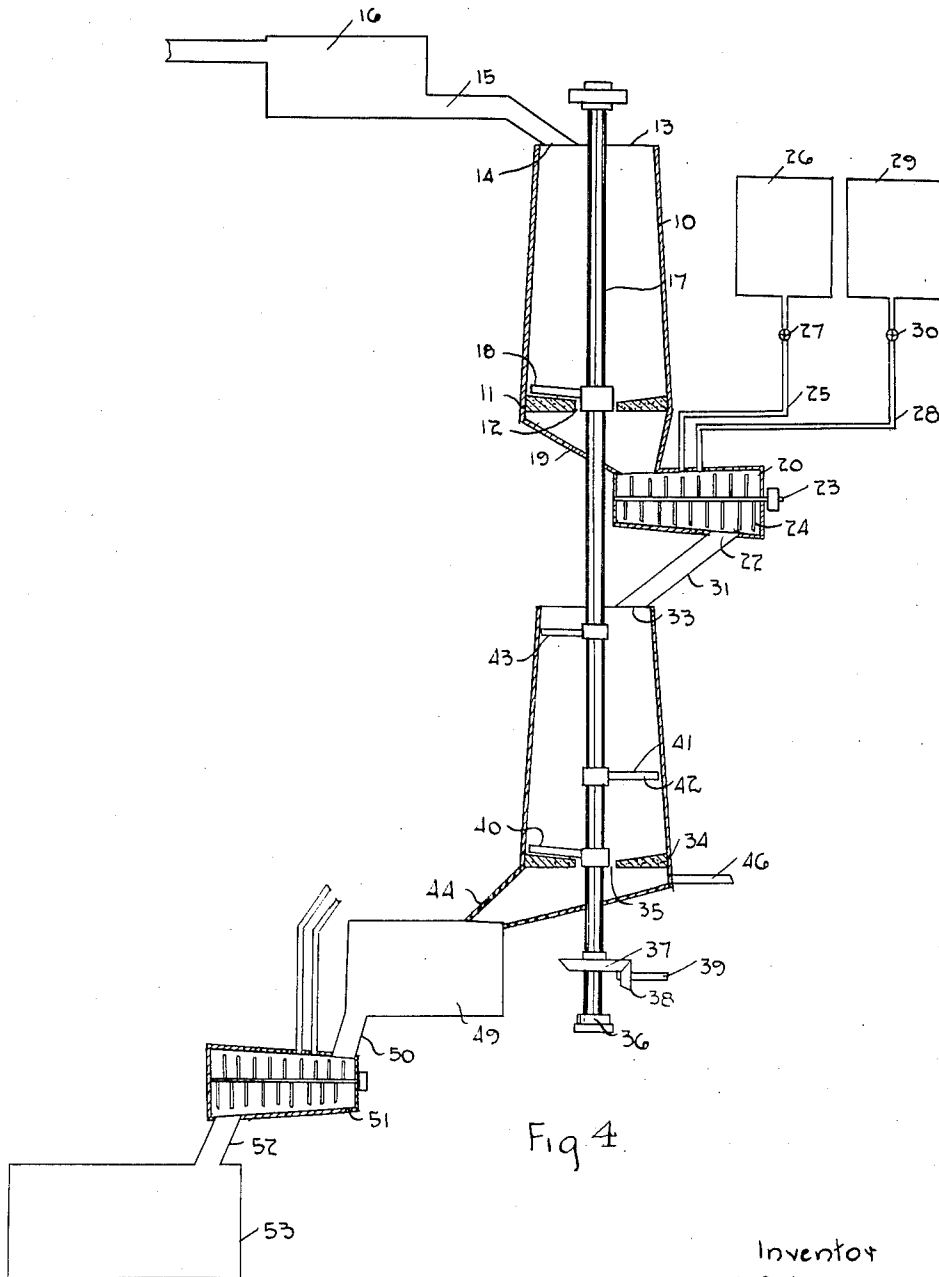


Fig. 4.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR BLEACHING PURPOSES.

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The invention relates to an apparatus for bleaching purposes, as described in the present specification and illustrated in the accompanying drawings that form part of the same.

The invention consists essentially of the novel features of construction pointed out broadly and specifically in the claims for novelty following a description containing an explanation in detail of an acceptable form of the invention.

The objects of the invention are to facilitate the production of pulp in sulphite mills, whereby the product is more refined and of good quality throughout; to quicken the process of bleaching and thereby materially increase the output and reduce the manufacturing costs; to eliminate irregularity in the flow of pulp and furnish a means adapted to maintain a continuous treatment in a constantly moving stream of the product; to economize in both labor and material; and generally to provide efficient means for carrying out bleaching processes, such as is described in copending application Serial Number 62,873 filed on October 16th, 1925, and that will be reasonable in regard to its cost of manufacture and applicable under many different conditions.

In the drawings, Figure 1 is a vertical, sectional view of the equalizing tower.

Figure 2 is a horizontal sectional view of Figure 1 showing the hopper bottom and scraper arm.

Figure 3 is an assembled view of the equalizing tower, the bleaching tower and the mixer and feed parts.

Figure 4 is a diagrammatic view showing a greater assembly including high density and low density bleaching vessels in one equipment.

Like numerals of reference indicate corresponding parts in the various figures.

Referring to the drawings, the tower indicated by the numeral 10 is known as the equalizing tower and has a hopper bottom 11 surrounding the central outlet 12. The top 13 of this tower 10 is formed with inlet 14 to which the feed chute 15 leads from the concentrator 16.

The shaft 17 which extends vertically and centrally through the tower is journaled in suitable bearings at the upper and lower ends of the tower 10.

The scraper arm 18 is mounted on the shaft 17 and sweeps around the bottom 11

thus scraping the pulp towards the centre and discharging it through the opening 12.

The chute 19 is attached to the bottom of the tower 10 and directs the discharging pulp into the smaller end of the mixer 20 through the inlet 21. The mixer 20 widens towards its delivery end and outlet 22, and the shaft 23 from which the paddles 24 project, rotates in suitable bearings in the heads of the mixer, and this shaft 23 is driven by a pulley connected to the power installation. The water supply is connected by the pipe 25 to the mixer 20 and the bleaching agent supply is connected by the pipe 28 to the mixer 20, and both of these supplies are regulated so that they flow into the mixer at the required uniform rate. The mixer thoroughly mixes the pulp, bleaching agent and water together so that a uniform mass is discharged through the opening 22. The chute 31 leads from the outlet 22 to the bleaching tower 32, through the inlet 33 in the top of said tower 32, this tower being of similar shape to the tower 10 and having a hopper bottom 34 surrounding the outlet 35. The shaft 17, which in this tower is hollow, projects centrally through the tower 32 and is driven by the gear 37, and pinion 38, the shaft 39 of the latter being connected to any convenient source of power.

The scraper arm 40 which is curved is fixedly mounted on the shaft 17 and sweeps the hopper bottom 34 of the tower and keeps the pulp moving towards the central outlet 35. A short distance above this scraper arm, the hollow arm or nozzle 41 is mounted on the shaft 17. This nozzle, which is hollow and perforated along its entire length, communicates with the interior of the hollow shaft 17, this shaft being in turn connected to a compressed air supply. Both of the arms 40 and 41 are curved in shape, but the arm 43 is straight, this arm is fixedly mounted on the shaft 17 and its purpose is to level the contents of the tower as it is poured in through the chute from the mixer.

In one assembly of the invention the chute 44 leads from the outlet 35 to the washer and thickener 45, the spray 46 assisting the discharge of the pulp along the chute 44. The washer and thickener may discharge into a stock chest 47, or else the pulp may be used for further manufacture directly as it leaves the washer and thickener.

In another assembly the chute 44 is connected to a washer and thickener 49 and then

by the chute 50 to the mixer 51 where fresh supplies of bleaching agent and water are again thoroughly mixed with the pulp. This mixer 51 is connected by the chute 52 to a vessel 53, which is intended to represent any known apparatus for bleaching pulp at low density.

It must be understood that so far as this invention is concerned, there is no preference in the type of apparatus used for the low density bleaching, but there is a preference in the apparatus for high density bleaching, as the particular one described is most efficient in operation.

The bleaching operation is readily followed, in the above explanation of the details, but for the better understanding of some, it may be added that the pulp from the mill flows into the concentrator and is there greatly increased in density and in this condition it flows down into the equalizing tower. The discharge from the equalizing tower cannot vary as the uniform rotation of the scraper arm at the bottom of the tower discharges a uniform amount from the central opening, consequently the mixer receives a measured quantity of pulp per second, which fits in precisely with the regulated feed of bleaching agent and water, therefore uniform amounts of pulp, bleaching agent and water are used continuously and a uniform product is assured.

The mixer merely mixes the bleaching agent and water with the pulp and very little bleaching action actually occurs in the mixer. The bleaching takes place in the bleaching tower, which operates quite full of pulp and it is during its very slow passage through the tower that the bleaching takes place, the decomposition gases being driven out by compressed air coming from a compressed air supply suitably connected to the hollow shaft.

The bleaching process may be entirely completed in one, two or more of these towers, being finished in the conventional way of washing and thickening before being removed to the stock chest, but it has been discovered that the pulp may be further improved for commercial purposes by doing part of the bleaching at high density and then finishing the bleaching at low density, thus necessitating a combination of high density and low density bleaching apparatus as desired, therefore while many of the parts to this apparatus are already known their association and combination in the present invention is quite new.

There may be other ways discovered of reaching the result claimed for this invention, but to equalize the feed to a bleaching tower or vat or mixer by an accumulating tower similar to the one described herein is believed to be novel and likewise to construct an assembly of parts to bleach in

stages partly at high density and partly at low density is also believed to be novel.

The introduction of mixers intermediately between the feeders and the bleaching apparatus and between the bleaching towers themselves when bleaching by stages is also a point of novelty to be emphasized.

What I claim is:—

1. In an apparatus for bleaching purposes, the combination with a concentrator having an inlet and an outlet passage therefrom, an equalizing tower connected at its upper end with said outlet passage and having an outlet at the lower end, a driven shaft operating in suitable bearings and situated centrally in said tower, and a scraper arm mounted on said shaft and in rotation sweeping the bottom of said tower, a mixer being connected to the outlet passage therefrom, a bleaching tower being connected to the outlet passage of the mixer, and a washer being connected to the outlet of the bleaching tower.

2. In an apparatus for bleaching purposes, the combination with a concentrator having an inlet and an outlet passage therefrom, of an equalizing tower connected at its upper end with said outlet passage and having an outlet at the lower end and a passage therefrom, a mixer connected to the outlet of the equalizing tower and having an outlet passage therefrom, a bleaching tower connected to the outlet passage of the mixer, a shaft extending centrally through said equalizing and bleaching towers and carrying scraper arms sweeping the bottoms of the towers, bearings above and below for said shaft, a gear mechanism suitably driven and driving said shaft and washer connected to the outlet of the bleaching tower.

3. In bleaching apparatus, a concentrator forming the primary feed member, an equalizer forming the secondary feed member, a mixer, and a bleaching vessel all freely communicating with one another in the order named, and forming a continuously onward passage for a stream, said bleaching vessel having a discharge opening adapted to relieve it of its contents continuously in accordance with said communications.

4. In bleaching apparatus, a plurality of towers of similar construction and an intermediate mixer together forming a continuous tubular passage for a gravity discharge from the topmost tower to the mixer and bleaching tower, the latter having a gravity discharge opening in accordance with the capacity of the passage.

5. In bleaching apparatus, a tower forming an equalizer and a gravity discharge feed member, a mixer having agitating rotary arms suitably driven and forming a communicating member connected to said gravity discharge, a bleaching tower freely communicating with said mixer and having

a contracted gravity discharge opening and a concentrator emptying into said feed tower.

6. In an apparatus for bleaching purposes, a concentrator acting as an accumulator of the pulp from the mill and having a pouring spout, an equalizing tower connected to said concentrator and having a hopper bottom and central gravity discharge opening from said discharge opening, a mixer extending from said chute, a bleaching tower connected with said mixer and having a hopper bottom and central gravity discharge opening, a chute from the latter discharge opening, finishing vessels connected with the latter chute, a shaft common to said towers and suitably journalled and driven, and scrapers mounted on said shaft and operating over said hopper bottoms to promote the constant flow of a stream of pulp through the gravity passage formed by said vessels.

7. In bleaching apparatus, a concentrator adapted to receive the material from the mill and having a pouring spout, an equalizing feed tower connected to said spout and having a gravity discharge outlet adapted to permit an uninterrupted flow therefrom, a mixer connected to said tower outlet and to a bleaching agent supply, a bleaching tower

connected to said mixer and having a gravity outlet adapted to permit the passage of a constantly flowing stream, a second mixer connected to said bleaching tower outlet and a comparatively shallow bleaching receptacle connected to said second mixer.

8. A bleaching apparatus, comprising a plurality of bleaching vessels of suitable construction and intervening mixers and washers forming a continuous onward passage for a pulp stream, and a feed vessel determining the rate of flow of the flowing stream of pulp introduced between the mill feed and said bleaching receptacles.

9. In bleaching apparatus, a chain of bleaching vessels having contracted inlets and outlets and forming a passage for a stream of pulp continuously flowing by gravity, means for feeding the bleaching agent to said stream preparatory to the entrance to each bleaching vessel, a concentrator for accumulating the pulp, and a feed vessel at the beginning of said chain discharging thereinto by gravity formed to equalize the flow of the stream during bleaching operations.

Signed at Montreal, Canada, this 26th day of September, 1925.

CARL BUSCH THORNE.