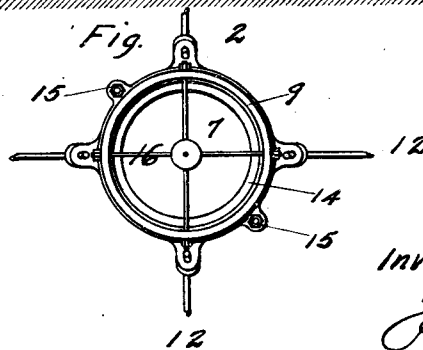
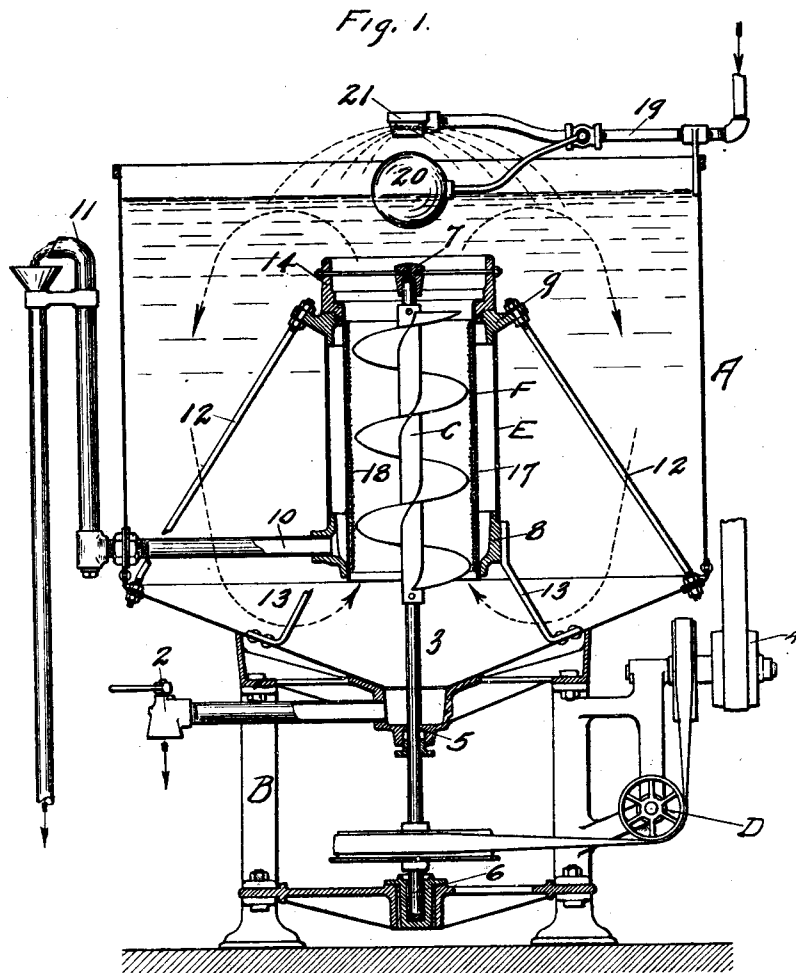


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 FILTER PULP WASHING MACHINE.
 APPLICATION FILED FEB. 25, 1907.

1,036,123.

Patented Aug. 20, 1912.



Witnesses
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FILTER-PULP-WASHING MACHINE.

1,036,123.

Specification of Letters Patent.

Patented Aug. 20, 1912.

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To all whom it may concern:

Be it known that I, KARL KIEFER, a citizen of the United States, and resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Filter-Pulp-Washing Machines, of which the following is a specification.

The object of my invention is to wash filter pulp that has been contaminated by the process of filtration with impurities, such as yeast cells and other suspended matter; to bring pulp after being cleansed to a flocculent and silky condition, and at the same time to prevent the formation of balls or knots in the pulp. The object is attained by means of novel means and arrangements in the construction as set forth in this specification and illustrated in the accompanying drawings, of which—

Figure 1 is a cross section through the center of the machine and Fig. 2 a detail view upon the center part of the machine.

The apparatus consists of a large tank A having a funnel shaped part to facilitate the drawing off of the cleansed filter pulp from the outlet 2. This tank is carried on frame work B. Centrally revoluble within the tank is the conveyer screw C fastened to shaft 3 and set in motion by right angle belt drive D by means of pulley 4. Shaft 3 revolves in stuffing box 5 and is supported in foot bearing 6. Another bearing 7 steadies the shaft at its extreme upper end.

Centrally within the main tank A is a second cylinder E and a screen cylinder F. Between cylinders E and F is a ring shaped space which is closed toward the bottom by ring 8 and toward the top by ring 9 so that no filter pulp can enter the ring-shaped space between E and F, but the water can percolate through the screen cylinder from the center of the washing machine to the ring shaped space mentioned. From there it finds an exit through tube 10 and the gooseneck overflow 11. Ring 9 is held by rods 12 centrally and down against the cylinder E, which in turn is held against the ring 8, which ring is supported by feet 13 so as to carry the cylinders E and F centrally within the tank A and allow free circulation of the pulp mixed with water as shown by the arrows, Fig. 1. The preferable way of attaching the screen cylinder F is by means of the cast iron ring 14 so

that it can be pulled out of the ring 9, which facilitates a thorough cleaning of the screen from its reverse side. During the operation of washing, it may be held down by screws 15 against ring 9, but its own weight may be sufficient. The bearing 7 is centered by means of the thin bolts 16, Fig. 2, which are taken of small cross sections so as not to obstruct the flow of pulp.

The operation of the machine is simple. The screw C rotates at a high speed, which is about 250 revolutions when the screw is about 12 inches in diameter and for a 1,000 gallon tank. This action of the screw causes the pulp to ascend rapidly within the cylinder F and a circulation as shown by the arrows is readily obtained. The screw C also communicates a centrifugal motion to the pulp and water mixture and the water being of a higher specific gravity than the pulp, is pressed into the annular space between cylinders E and F and issues at the gooseneck 11. This water contains the impurities, while the pulp itself is retained in the vessel by the screen F and passed upward to mix with fresh water. This screen cylinder F preferably consists of an outer perforated sheet metal cylinder 17 and an interior fine mesh woven screen cylinder 18. The fine mesh cylinder 18 may contain about 40 meshes to the inch. Now, heretofore, in washing machines there was great difficulty in keeping the screen from being clogged by pulp, as such machines should of course work as rapidly as possible, and the pulp, naturally following the direction of the water would adhere to the fine meshes of the screen and thus prevented the efficient working. This difficulty is avoided in my improved washing machine, as the current in an upward direction caused by the screw C is so strong that such pulp, if it would attempt to form mats against the interior of the cylinder F would be broken away immediately, and therefore my arrangement is practically self-cleaning. The centrifugal force also tends to separate the dirty water from the pulp by virtue of the greater specific gravity of the water, as compared to the pulp, thus imparting to the water a greater tendency to pass through the screens than is possessed by the pulp, not only due to the fluidity of the water, but to such greater momentum as it derives from the centrifugal action. Pre-

sumably, due to this centrifugal force, together with the head of water in the tank, the machine, in practice, produces a greater rate of outflow than is desirable consistent with practical economy of water, and than is necessary to properly wash the pulp and requires some means of moderating it. At the same time, it is desirable to have the outlet from the annular space around the screen cylinder near the bottom of the space, to insure proper drainage and freedom from sediment therein. These two conditions are fulfilled by providing the gooseneck 11, with its height slightly below the level of the water in the tank, thus affording a counteracting head of water in the outlet, only slightly less than that of the water in the tank. By regulating the height of the gooseneck, when the machine is constructed, the combined effects of the head of water in the tank, and of the centrifugal force of the screw, may be counteracted and regulated to secure the desired rate of application of water to the pulp, in a simple, yet effective manner. If the tank be six feet in diameter, a screw one foot in diameter is sufficient to produce the desired effects, as before described, when running at the rate of about 250 revolutions per minute. To properly counteract the effect of the screw, in the manner above referred to, the gooseneck should be from six to eight inches below the level of the contents of the tank, under the conditions above described.

In order to supply the fresh water, a water connection 19 is attached to the tank, and is provided with a valve having a float 20, supported directly on the surface of the mixture of pulp and water in the tank, to keep the level of the water in the tank regulated to a steady height. A perforated head 21 distributes the water uniformly over the surface of the mixture. A peculiarity of my machine is the large capacity provided for water, compared to the amount of pulp to be operated upon. For instance, in practice, a tank with a capacity of 1,000 gallons is used for operating upon 135 pounds of pulp, giving it a fluid consistency especially favorable to the operation of the float valve directly on the surface of the mixture. In this way only, can such a device be depended upon to supply no more water than is needed merely to supply the deficiency. Both provisions are highly important; the one because the proper working of the machine requires that a certain fluidity of contents be maintained, and the other, because the necessarily variable conductivity of the screen cylinder results in running over of the contents with the use of any controlling means not operated by direct contact with the mixture itself.

The cylinders E and F are connected to the bottom shell of the tank, which is pref-

erable, because the bottom shell, being cone-shaped, is stiffer than the sides.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a filter pulp washing machine, a tank holding a mixture of pulp and water, an outlet from the tank through which water is impelled to separate it from the pulp, means for impelling the water, a water inlet to the tank, a valve in said inlet, and a float directly on the surface of said mixture in the tank, to control said valve.

2. In a filter pulp washing machine, a tank holding a mixture of pulp and water, an outlet from the tank through which water is impelled to separate it from the pulp, means for impelling the water, said outlet and said impelling means being submerged in said mixture, and the outlet having an opening, outside the tank, above the highest level at which the impelling means operates, but below the level of the surface of the mixture.

3. In a filter pulp washing machine, the combination of an exterior tank and an interior cylindrical and stationary screen, of a cylinder surrounding said screen surface so as to produce an inclosed space, means for conducting liquid within said inclosed space through said tank and below the liquid level, and agitating means surrounded by said screen.

4. In a filter pulp washing machine the combination of an exterior tank, a central cylindrical screen surface, of an agitating screw within said screen cylinder, means to produce an inclosed space on the outside of said screen cylinder, and means to conduct the water entering said inclosed space outside of said tank.

5. In a filter pulp washing machine, a tank holding a mixture of pulp and water, a conduit with pervious walls submerged in said mixture, means inclosing an outlet space around the pervious walls of the conduit, said means and said pervious walls excluding pulp from said outlet space but said pervious walls admitting water thereto, means contained in said conduit to impel the water through said pervious walls, and an outlet from the lower region of said outlet space, opening outside the tank and above the highest level at which the impelling means operates, but below the level of the mixture in the tank.

6. In a filter pulp washing machine, a tank holding a mixture of pulp and water, an outlet from the tank through which water is impelled to separate it from the pulp, means for impelling said water, said outlet and said impelling means being submerged in said mixture, and the outlet having an opening, outside the tank, above the highest level at which the impelling means operates, but below the level of the surface

of the mixture, means for supplying water to the mixture in the tank, and means for regulating the supply of water automatically.

5 7. In a filter pulp washing machine, a tank holding a mixture of pulp and water, outlet means from the tank having a stationary pervious wall admitting water to the outlet but excluding pulp therefrom,
10 and means to impel water through said pervious wall, moving in close proximity to said wall to clean the wall of accumulated pulp, but out of contact therewith, whereby it avoids balling and knotting of
15 the fiber of the pulp.

8. In a filter pulp washing machine, a tank holding a mixture of pulp and water, an interior upright conduit with pervious walls and open at its lower and its upper
20 ends to admit circulation of the mixture continuously upward through it, means in said conduit agitating the mixture and propelling it upward through the conduit, and also acting centrifugally on the mixture,
25 said pervious walls allowing passage of water but preventing the passage of pulp, and the centrifugal action on the mixture impelling the water through said pervious walls to separate it from the pulp, and
30 means for conducting the water away from

said pervious walls, with the pulp excluded, to the exterior of the tank.

9. In a filter pulp washing machine, a tank holding a mixture of pulp and water, an interior upright conduit with pervious 35 walls and open at its lower and its upper ends to admit circulation of the mixture continuously upward through it, means in said conduit agitating the mixture and propelling it upward through the conduit, said 40 means also acting centrifugally on the mixture, said pervious walls allowing the passage of water and sediment but preventing the passage of pulp, and the centrifugal action on the mixture being to impel the 45 water and sediment through said pervious walls to separate said water and sediment from the pulp, and means, leading from said pervious walls, in the lower region of said conduit, for conducting water and sediment 50 away from said pervious walls, with the pulp excluded, to the exterior of the tank.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

KARL KIEFER.

Witnesses:

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SAML. J. WEIS.