

J. SCHNEIBLE.
PULP WASHING MACHINE.
APPLICATION FILED JUNE 5, 1913.

1,111,408.

Patented Sept. 22, 1914.
2 SHEETS—SHEET 1.

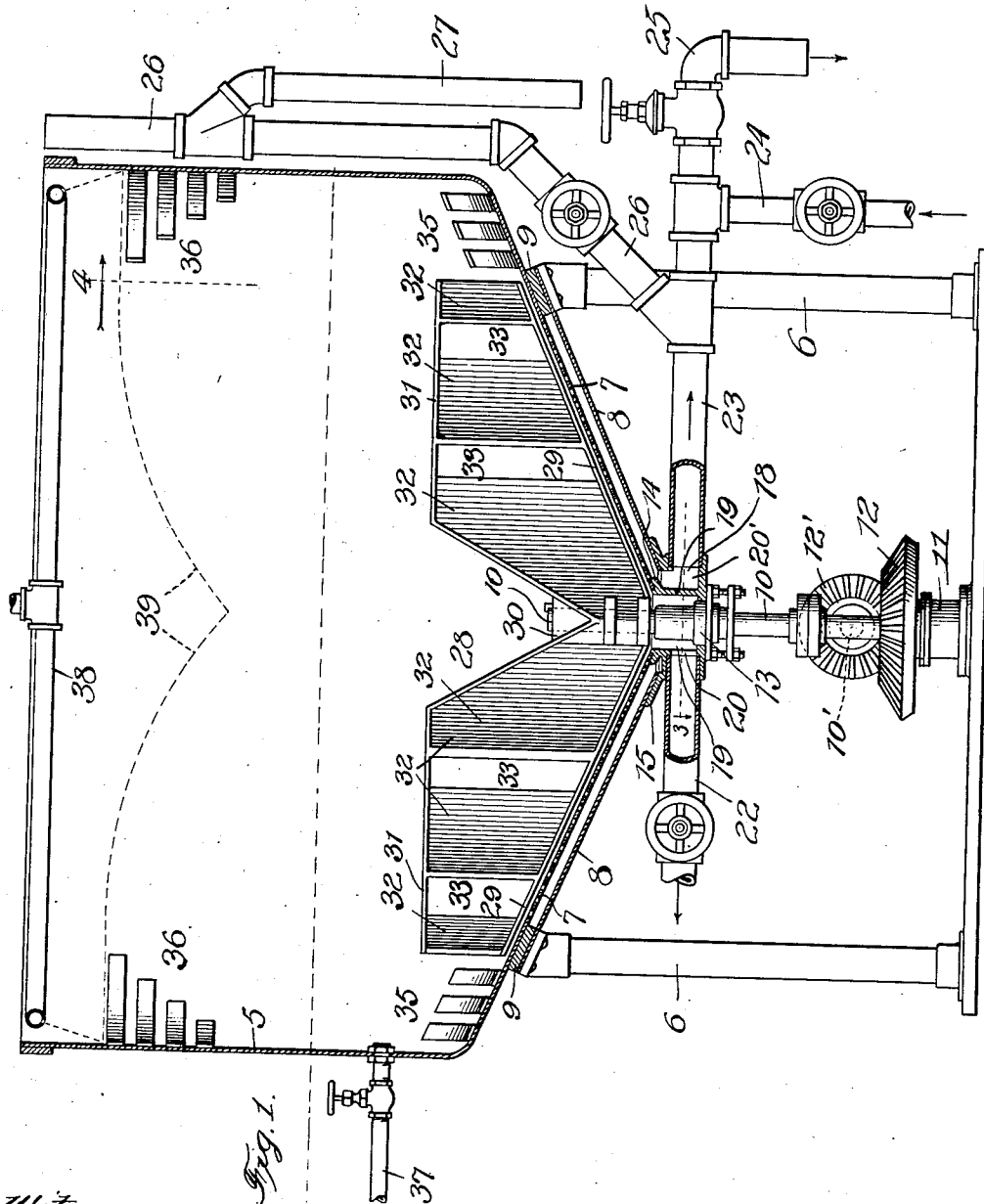


Fig. 1.

Witnesses:
E. C. Lyford,
Chas. H. Buell.

Inventor:
Joseph Schneible,
By Dejeu, Fork, Lee, Chas. and White,
Attys.

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2 SHEETS-SHEET 2.

Fig. 2.

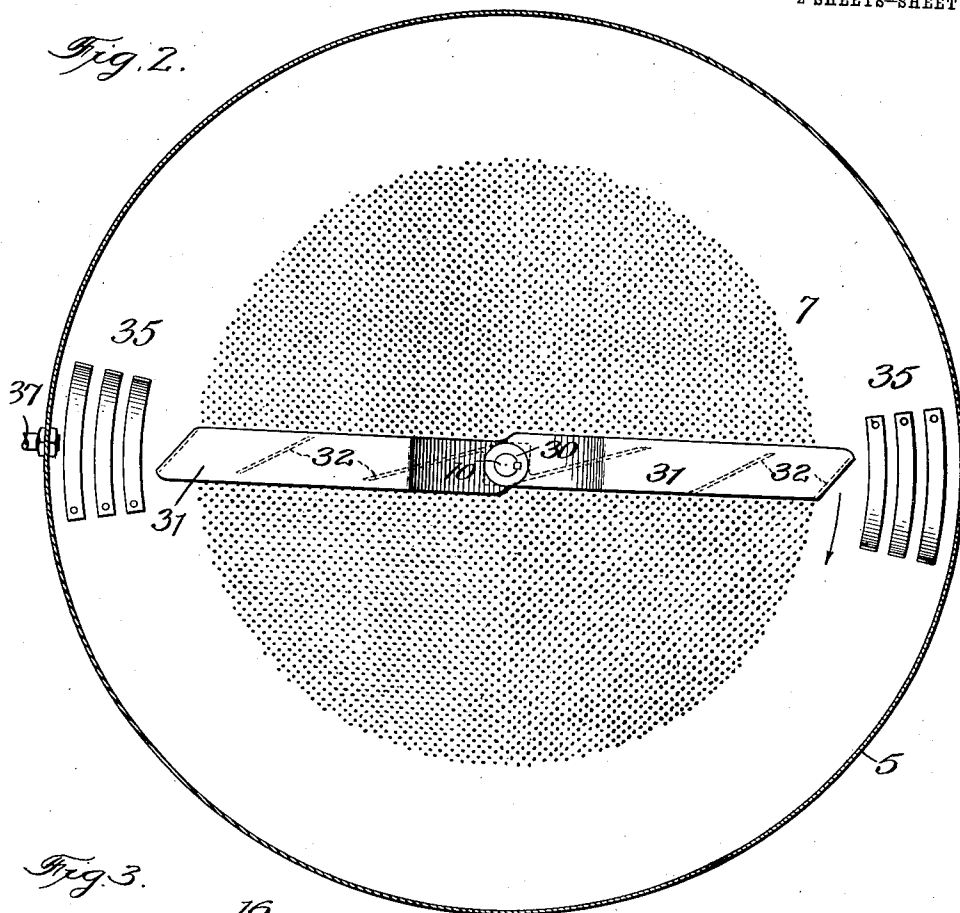


Fig. 3.

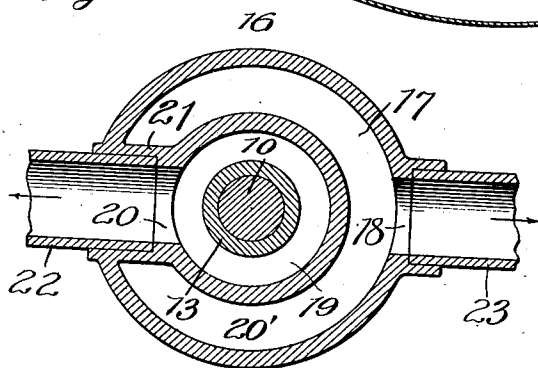
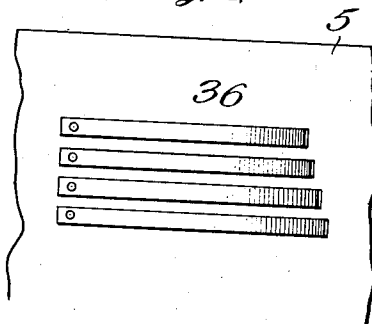


Fig. 4.



Witnesses:

E. C. Chafford.
Chas. H. Buell

Inventor:

Joseph Schneible,
By Dymally, Lu, Chittum & White,
Attys.

UNITED STATES PATENT OFFICE.

JOSEPH SCHNEIBLE, OF CHICAGO, ILLINOIS.

PULP-WASHING MACHINE.

1,111,408.

Specification of Letters Patent.

Patented Sept. 22, 1914.

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To all whom it may concern:

Be it known that I, JOSEPH SCHNEIBLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Pulp-Washing Machines, of which the following is a specification.

My invention relates to an improvement in the class of machines used for washing fibrous material, such as filter-pulp to renovate it after being employed as the filtering mass in a filter, and thereby adapt it for use after each washing.

In the accompanying drawings, Figure 1 shows my improved machine, with parts broken away, by a view in vertical sectional elevation; Fig. 2 is a section on line 2, Fig. 1; Fig. 3 is an enlarged section on line 3, Fig. 1, and Fig. 4 is a view of a broken portion of the machine viewed in the direction of the arrow on line 4, Fig. 1, and showing one of the two upper sets of guide-vanes.

A tank 5, shown to be supported on pillars 6, has a hopper-shaped, numerous-perforated bottom 7 and, spaced from it, a similarly-shaped imperforate bottom 8 closed about its outer edge at 9. At the apex, or lowest point, of the hopper-shaped bottoms, they are open for discharge at that point. A vertical shaft 10, journaled at its lower end in a bearing at 11 and carrying a beveled gear 12, passes through a stuffing-box 13 into the center of the tank through the central opening in the aforesaid hopper-shaped bottoms, where the tank fits against and is secured to the flanges 14 and 15 of a chambered fitting 16. This fitting is a casting formed with an outer chamber 17 closed at its lower end and having a flanged opening 18 in one side, and an inner concentric chamber 19, having an opening 20 diametrically opposite the opening 18, with an internally shouldered nipple 21 extending from it across the outer chamber and the stuffing-box, which extends within the inner chamber, coöperates at its expanded section, with the bottom-closure to seal the bottom of that chamber. From the opening 20 extends a valved discharge-pipe 22 for the pulp, which gains access to the pipe at the tank-

bottom opening, by way of the fitting 16, at its inner chamber; and from the opening 18 extends a discharge-pipe 23 for the used washing-water, which passes through the perforated bottom into the space between it and the imperforate bottom and runs down that space. For supplying the washing-water to the tank, a valved pipe 24 is shown to be coupled to the pipe 23, which is shown to be provided, beyond the coupling, with a valved spout-like extension 25, through which to empty the tank, when desired, of all its contained washing-water. A valved branch-pipe 26 extends upwardly to the top of the tank from the pipe 23, and is open at its upper end to atmospheric pressure; and below its upper end it has coupled with it a depending discharge-spout 27 to discharge, as to a sewer, the used washing-water as it leaves the tank during the operation of the machine.

An impeller 28 is mounted on the end of the shaft 10 in the tank and is composed, preferably, of two similar arms extending diametrically across the tank, as shown. It is formed, with the parts integral, as by casting, of a frame comprising a shield-forming base-plate 29 extending from a central sleeve 30, where its sections are shown (Fig. 2) to be slightly offset, one with relation to the other, the sleeve fitting about and being keyed to the end of the shaft 10, the opposite plate-sections conforming in inclination to the angle of the bottom 7 and extending into close proximity thereto; a top-plate 31 having outer horizontal sections meeting at a central V-shaped, or depressed section, and a plurality of blades 32 extending between the upper and lower plates at intervals forming passages 33 between the blades. These blades, of which any desired number may be provided, and which preferably incline relatively to the parallel lateral edges of the top and bottom frame-plates, as or substantially as indicated in Fig. 2, decrease in area from the center of the impeller outwardly along each arm thereof, for the purpose hereinafter explained.

In the tank, on the bottom thereof, are provided guide-vanes 35, spaced apart to

form passages between them and extending upwardly in the direction of rotation of the impeller. Directly above these vanes is another vertical series of vanes 36, spaced 5 apart to form passages between them and extending from the tank-wall just below the height to which the water attains in the tank, these vanes curving inwardly toward the vertical center of the tank and in the 10 direction of rotation of the impeller. I prefer to provide the respective sets of these vanes 35 and 36 at diametrically opposite points in the tank, as shown in Fig. 1, to balance the action therein on its contents.

15 A valved pipe 37 is shown for introducing steam into the tank to heat the water; and while the machine is in operation, by driving the shaft 10 by a shaft 10' carrying a beveled gear 12' meshing with the gear 12, the tank is constantly replenished with 20 water through a sprinkling pipe 38 supported within it at its upper end.

Filter pulp to be washed being introduced into the tank, as also washing water through 25 the pipes 24 and 26 (the valves in the other pipes being closed, except the pipe 37, which may be open to admit steam), and with water entering the tank from the pipe 38, for washing the pulp in my improved machine, the impeller may be rotated at a comparatively slow rate of speed (say, about 30 30 to 30 revolutions per minute) with the advantage of saving power; but where the condition of the material operated on requires, 35 higher speed may be had without agglomerating the pulp into knots or balls by impact. The rotation of the impeller tends to throw the contents radially in the outward direction from the center of rotation, and causes 40 a thorough mixture of the water and pulp to take place in passing through the passages 33, thereby enhancing the washing action of the water; and the areas of the radially-successive blades, which decrease in the outward direction, as aforesaid, are proportioned 45 to their relative speed of rotation, thereby to afford to all the blades the same, or approximately the same capacity in impelling the contents of the tank. In thus 50 impelling the contents, wherein there is a total avoidance of dead points therein, and whereby the entire body of the mass is kept in constant circulation, the vanes 35, which are provided as a matter of preference, guide 55 the mass upwardly, and its passage between these vanes tends to enhance the mixing and the washing action of the water. In thus guiding the mass upwardly, it encounters the vanes 36, also provided as a matter of preference, in passing between which the mixing 60 of the water and pulp and the washing action of the latter are still further enhanced; and the upper vanes guide and direct the mass, as indicated by the dotted curved lines

at 39 in Fig. 1, centripetally or toward the 65 center of the tank, to be subjected over again, and repeatedly in the same way, to the action of the interstitial or perforate impeller. Meantime, the dirty water constantly discharges through the pipe 23, the opened 70 branch pipe 26 and the outlet-pipe 27, which by being coupled to the branch-pipe 26 between the ends of the latter, maintains the desired water-level in the tank in line with the coupling. 75

The loss of the pulp undergoing washing in my improved machine is very little; and it does not clog the perforations in the bottom 7, which has smooth surfaces through which the holes extend, and which is to be 80 distinguished from the wire-screen more usually employed for the water-separating purpose in machines of the present class and tends to gather the pulp in its reticulations. Moreover, the wideness of the base-plate 29 85 of the impeller-frame tends to prevent the deposit of pulp on the perforated bottom, the plate acting as a shield tending to prevent the centrifugal action of the impeller on the mass from forcing pulp into the perforations and clogging them. 90

It will be observed that the drainage in my improved machine takes place wholly by gravity, the water-outlet, as well as the pulp-outlet, being provided centrally at the lowest 95 point in the tank; and the depression between the two innermost impeller-blades 32 provides a comparatively unobstructed course for the mass in descending centrally toward the bottom of the tank. Also, that 100 the action of the impeller-blades not only thoroughly mixes and subdivides the pulp, but the impeller operates smoothly without exerting any churning action, which would tend to ball and knot the same. Further- 105 more, the machine is very economical in the water used, requiring a tank-capacity of only about 2 gallons of water for each pound of dry pulp; and the scrubbing is so thorough, that the clean water constantly 110 supplied from the pipe 38 acts very quickly on the mass. When the washing of a batch of pulp is completed, the water-supply to the pipe 38 is shut off, and the valve in the pipe 22 is opened to discharge through the 115 latter the mass from the tank.

I realize that considerable variation is possible in the details of construction thus specifically shown and described, and I do not intend by illustrating a single, specific or 120 preferred embodiment of my invention to be limited thereto; my intention being in the following claims to claim protection upon all the novelty there may be in my invention as broadly as the state of the art will permit. 125

What I claim as new and desire to secure by Letters Patent is:

1. In a pulp-washing machine, a tank for

holding the pulp and water, provided with an outlet for the water and having a numerously-perforated bottom, and a vertically-bladed impeller having a base-plate forming a shield to prevent the liquid from being impelled through the bottom-perforations by the action of the impeller.

2. In a pulp-washing machine, a tank for holding the pulp and water, provided with an outlet for the water, and an impeller supported in the tank to extend radially and rotate horizontally therein and provided with vertical non-radial blades forming passages between them, said blades decreasing successively in area outwardly in the radial direction.

3. In a pulp-washing machine, a tank for holding the pulp and water, having an inner numerously perforated hoppered bottom and an outer imperforate bottom forming an interposed drainage-space with a central outlet for the wash-water, and an impeller comprising vertically-bladed arms extending from a center at which the impeller is rotatably supported in the tank, and having a base-plate extending parallel with and close to the surface of said bottom and forming a shield to prevent the liquid from being impelled through the bottom-perforations by the action of the impeller.

4. In a pulp-washing machine, a tank for holding the pulp and water, having an inner numerously-perforated hoppered bottom and an outer imperforate bottom forming an interposed drainage-space with a central outlet for the wash-water, and an impeller comprising a frame forming arms extending from a center at which the impeller is rotatably supported in the tank, said frame having a base-plate extending parallel with and close to the surface of said perforated bottom and an upper plate, and blades connecting said plates and forming passages between them.

5. In a pulp-washing machine, a tank for holding the pulp and water, having an inner numerously-perforated hoppered bottom and an outer imperforate bottom forming an interposed drainage-space with a central outlet for the wash-water, and an impeller comprising a frame forming arms extending from a center at which the impeller is rotatably supported centrally in the tank, said frame having a base-plate extending parallel with and close to the surface of said hoppered bottom and an upper plate depressed between its ends toward said center, and blades connecting said plates, inclining relatively to the plate-edges and forming passages between them.

6. In a pulp-washing machine, a tank for holding the pulp and water, having an inner numerously-perforated hoppered bottom and an outer imperforate bottom forming

an interposed drainage-space, a chambered fitting in the apex of said hoppered bottom having an outer chamber open to said space and provided with an outlet having a discharge-pipe extending from it and provided with an upwardly-extending valved branch having a discharge-spout depending from between its ends, said fitting also having an inner chamber open to the tank and provided with an outlet having a valved discharge-pipe for the pulp extending from it, and an impeller rotatably supported centrally in the tank-bottom.

7. In a pulp-washing machine, a tank for holding the pulp and water, having an inner numerously-perforated bottom and an outer imperforate bottom forming an interposed drainage-space with a central outlet for the wash-water, a drive-shaft journaled to extend upwardly through said outlet into the tank, an impeller comprising a vertically-bladed frame journaled between its ends on said shaft to sweep over the surface of said inner bottom, and means for driving said shaft at a slow rate of speed.

8. In a pulp-washing machine, a tank for holding the pulp and water, having an impeller rotatably supported in the tank and comprising a frame forming arms provided with spaced non-radial passage-forming blades and spaced guide-vanes projecting inwardly from the wall of the tank.

9. In a pulp-washing machine, a tank for holding the pulp and water, an impeller rotatably supported in the tank and comprising a frame forming arms provided with spaced non-radial passage-forming blades and spaced guide-vanes on the bottom of the tank adjacent to the path of the impeller-arms.

10. In a pulp-washing machine, a tank for holding the pulp and water, an impeller rotatably supported in the tank and comprising a frame forming arms provided with spaced non-radial passage-forming blades, spaced guide-vanes projecting from the tank-bottom, and spaced guide-vanes projecting inwardly from the wall of the tank over said bottom vanes.

11. In a pulp-washing machine, a tank for holding the pulp and water, an impeller rotatably supported in the tank and comprising a frame forming arms having a central depression at the axis of rotation and provided with spaced non-radial passage-forming blades, spaced guide-vanes projecting upwardly from the tank-bottom, and spaced guide-vanes projecting inwardly from the wall of the tank over said bottom vanes.

12. In a pulp-washing machine, a tank for holding the pulp and water, and an impeller comprising a frame forming arms extending from a center at which the impeller is rotatably supported in the tank, said frame

having a base-plate extending parallel with and close to the surface of said perforated bottom, and an upper plate containing a central depression, and blades connecting
5 said plates, inclining relatively to the plate edges and forming passages between them, said blades decreasing in surface-area successively toward the outer ends of the arms, spaced guide-vanes projecting upwardly from the tank-bottom, and spaced guide- 10 vanes projecting inwardly from the wall of the tank over said bottom-vanes.

JOSEPH SCHNEIBLE.

In presence of—

L. HEISLAR,

A. J. FLOYD.