

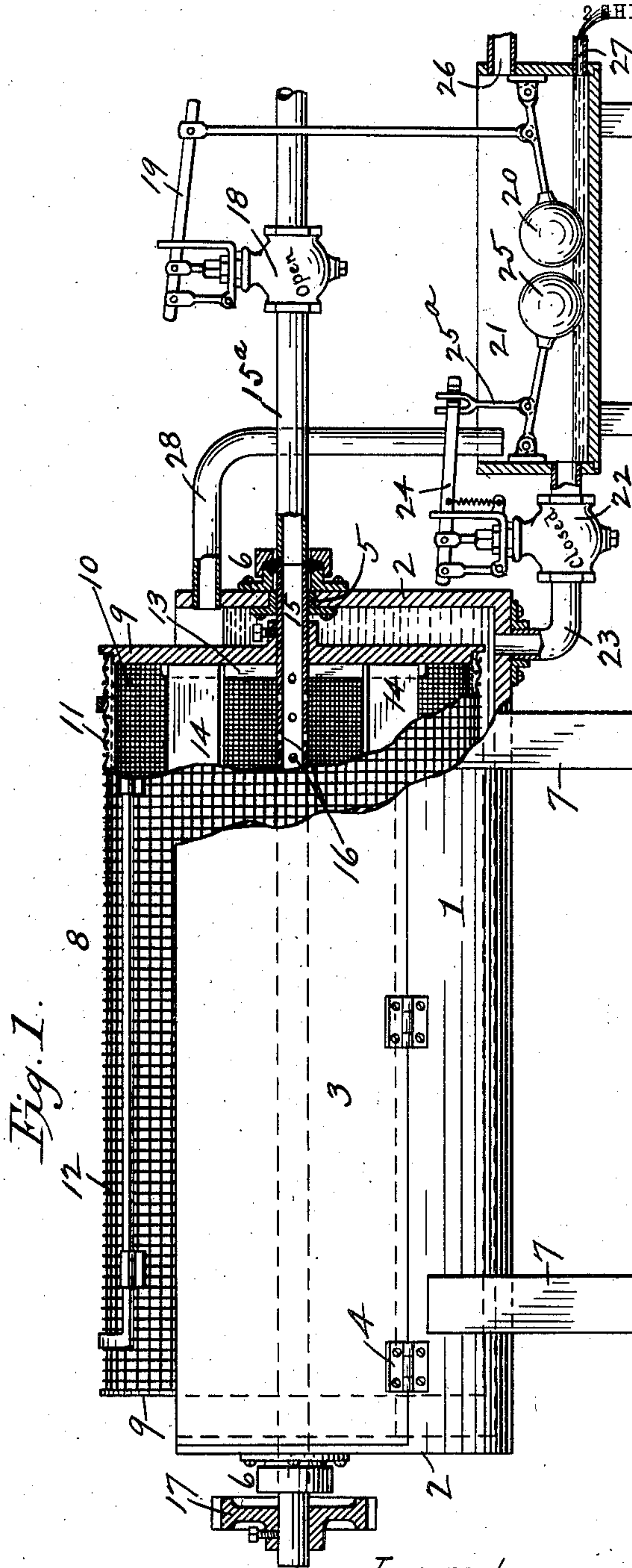
No. 850,657.

PATENTED APR. 16, 1907.

W. B. KLEIN.  
PULP WASHING APPARATUS.

APPLICATION FILED FEB. 23, 1906.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 3.

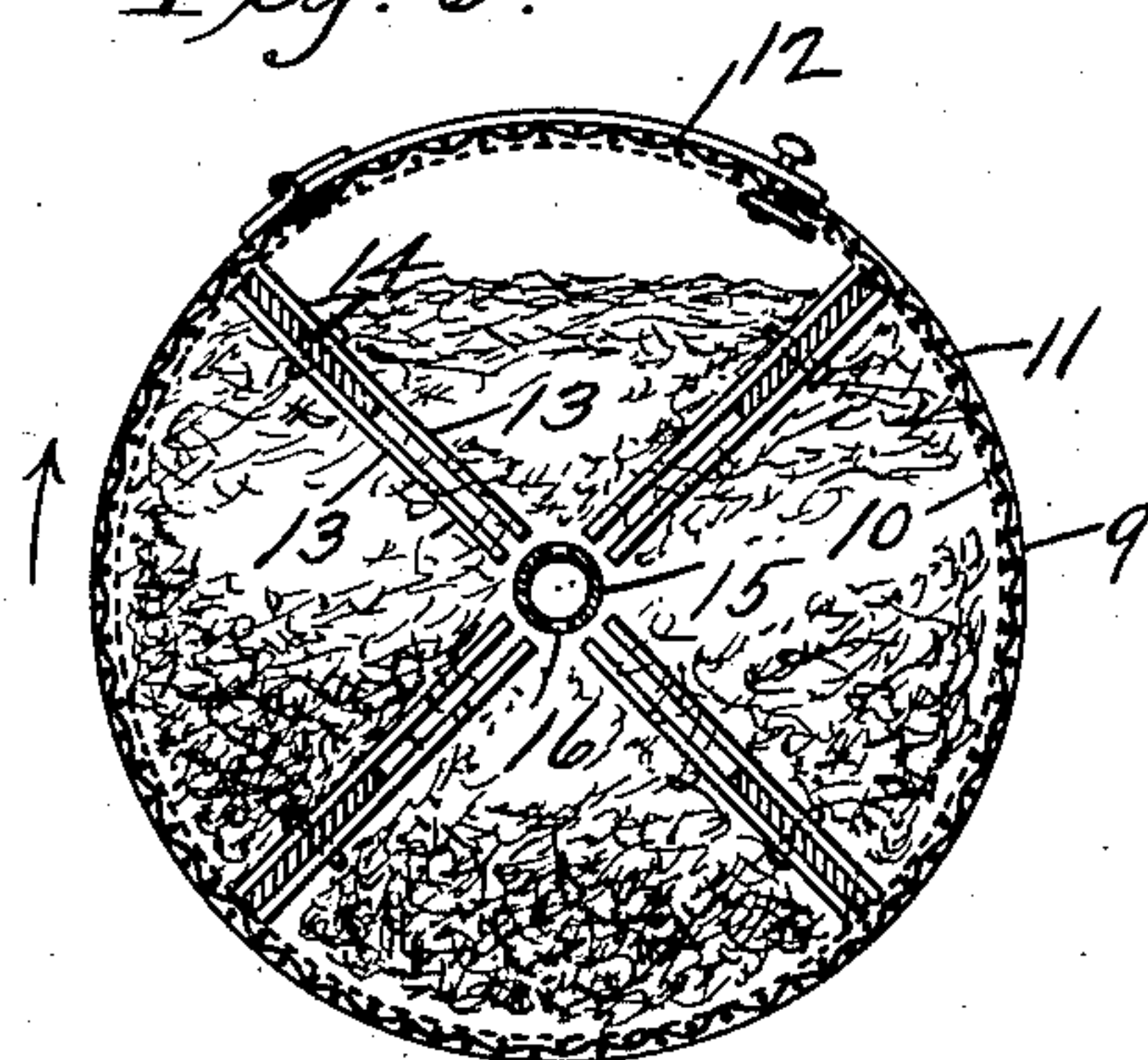


Fig. 2.

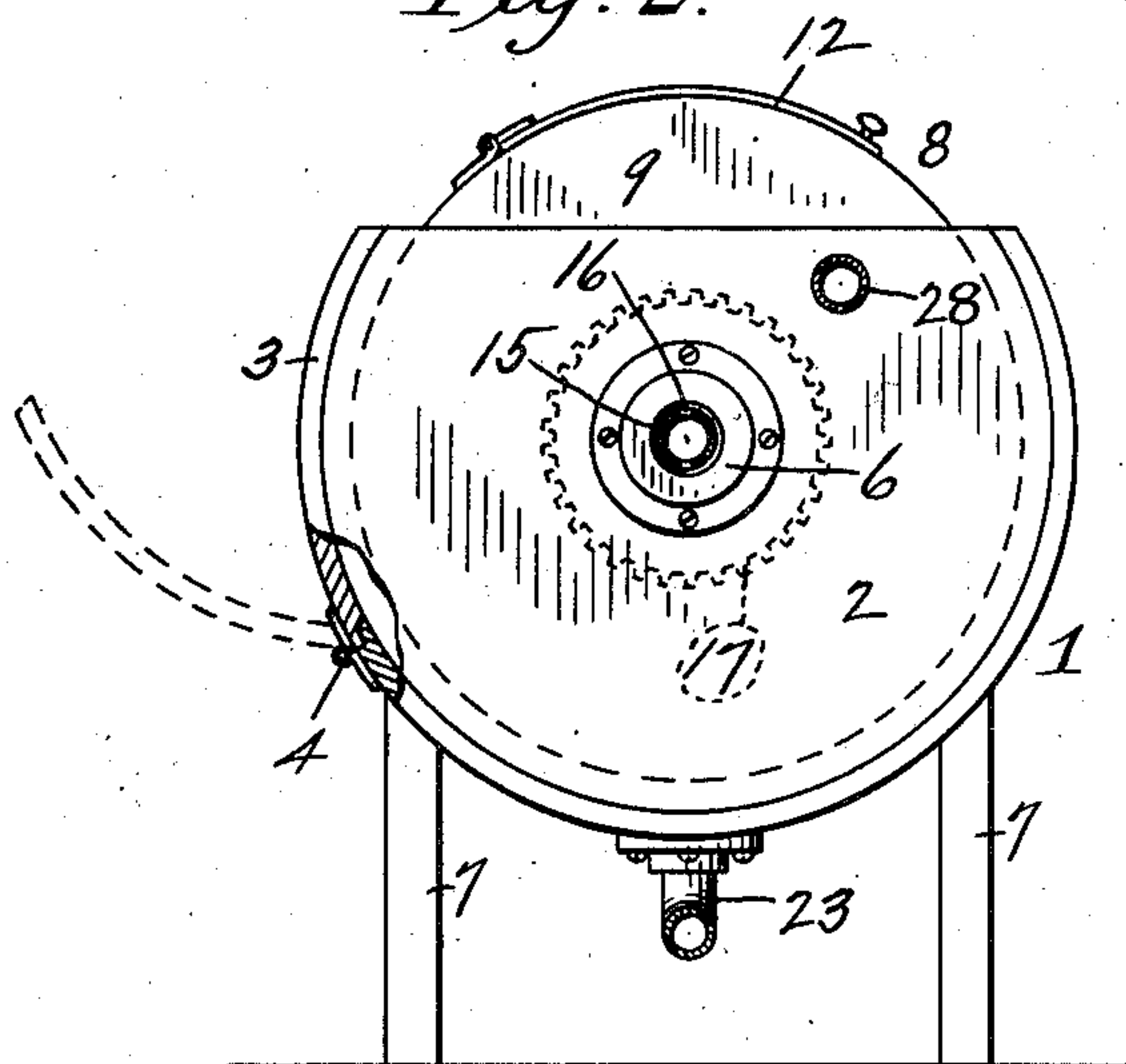
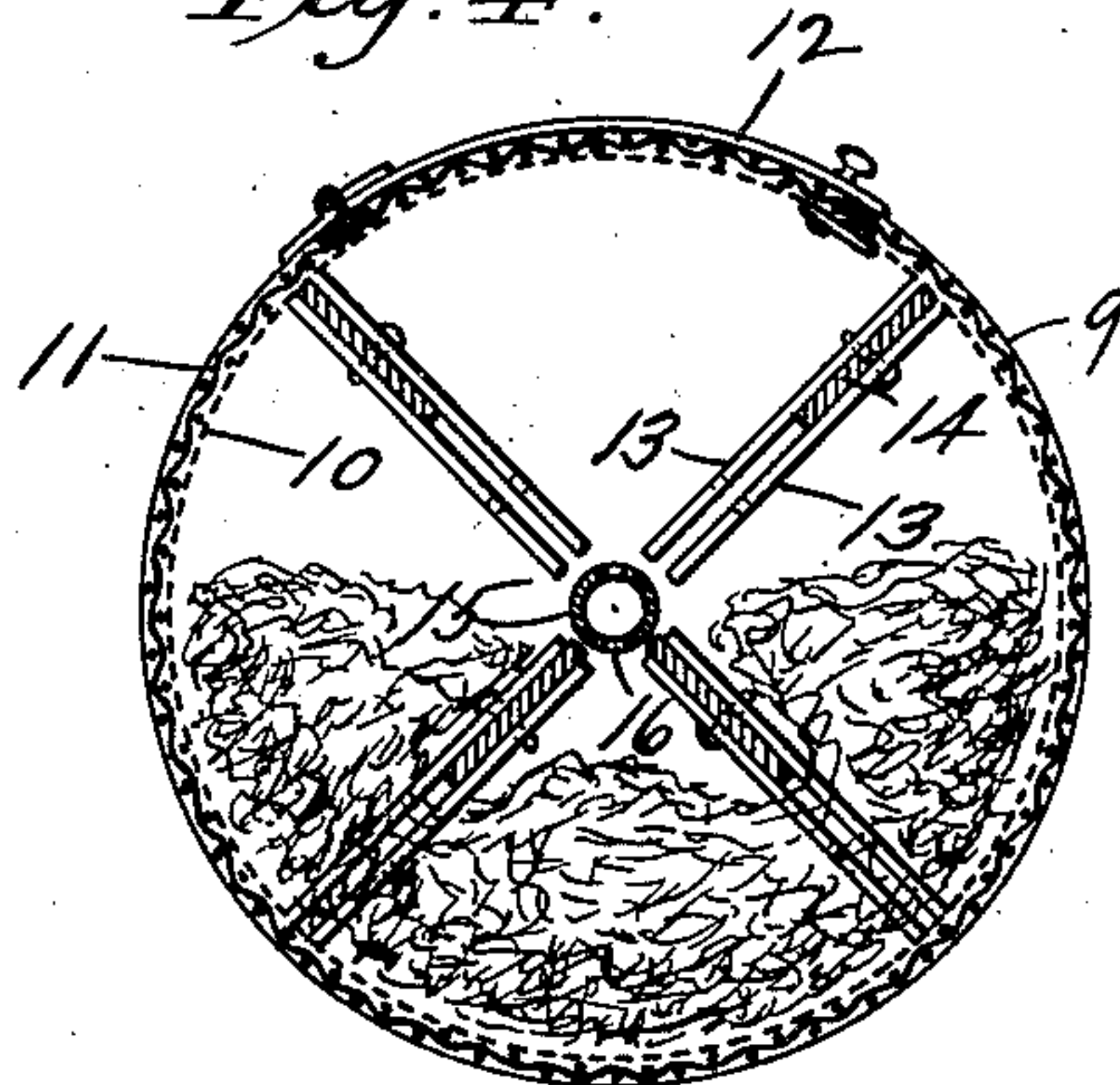


Fig. 4.



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# UNITED STATES PATENT OFFICE.

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## PULP-WASHING APPARATUS.

No. 850,657.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed February 23, 1906. Serial No. 302,345.

*To all whom it may concern:*

Be it known that I, WILLIAM B. KLEIN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Pulp-Washing Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to apparatus for washing pulp, and particularly such pulp as is employed in filters for beer and other liquids.

The object of the invention is to construct an apparatus of this kind which will permit of the easy insertion of the pulp thereinto before the washing operation, that will retain the pulp in the most suitable condition for washing during such operation, that will thoroughly cleanse the pulp, that will permit of the convenient removal of the pulp after the washing operation has been completed, and that may be easily and quickly cleansed after such operation has been finished.

Generally speaking, the invention may be defined as consisting of the combinations of elements for the purpose specified embodied in the claims hereto annexed.

Referring to the drawings, Figure 1 represents a side elevation, with parts broken away, showing an apparatus constructed in accordance with my invention. Fig. 2 represents an end elevation of such apparatus, the automatic flushing apparatus being removed for clearness of illustration and the door of the tank being indicated in open position by dotted lines. Fig. 3 represents a transverse sectional view of such apparatus, showing the paddles in outwardly-adjusted position; and Fig. 4 represents a view similar to Fig. 3, showing some of the paddles in inwardly-adjusted position to facilitate access to the pulp.

Describing the parts by reference characters, 1 represents a tank, which is in cross-section, preferably a segment of a circle greater than a semicircle. This tank is provided with heads 2 and a door 3, the upper edge of which constitutes the top of one side of the tank. This door forms a part of the body of the tank and is hinged at a convenient distance from the top of said tank, as at 4, to permit of ready access to the rotating washing-cylinder therein. The heads 2,

which are of similar construction, are each provided with suitable bearings 5 for the reception of the shaft by which the washing-cylinder is rotated. A suitable stuffing-box 6, of any preferred construction, is provided on the outside of each head, and supports 7 are provided for said tank.

Within the tank is the rotary washer 8. This washer is preferably cylindrical and comprises heads 9, of iron or similar suitable material, between which extends the screens 10 and 11, said screens forming a suitable perforated cage for retaining the pulp in place. The screen 10, which is the inner screen, is of fine mesh, while the screen 11 is of coarser mesh. This washing-cylinder is provided with a suitable door 12, said door being also composed of screens of the same character as those which constitute the body of the washing-cylinder. Each head 9 is provided with pairs of radially-extending ribs 13, between which are supported paddles 14, said paddles extending longitudinally of the washing-cylinder and being adjustably supported between said ribs for a purpose to be hereinafter set forth. The cylinder 8 is carried by a hollow shaft or pipe 15, provided with a suitable number of perforations 16. This shaft constitutes means for supplying water to the inside of the cylinder 8 and carries thereon a suitable drive-gear 17, by means of which it may be rotated.

As will appear from an inspection of the drawings, and particularly Fig. 1, the container is nearly submerged in the liquid in the tank, leaving only a small portion of the same unsubmerged. This small portion is sufficient to enable the atmosphere to strike the pulp as it is carried above the liquid and cause the loosening of the same, whereby the pulp may drop into the body of the container and be further subjected to the cleansing action of the liquid. Only a sufficient area of the container is exposed to the atmosphere to insure this action, which keeps the meshes of the fine wire-gauze lining open to allow the dirt in the water to pass through the container into the tank and at the same time the rapidity of washing the pulp is increased by reason of the fact that it is subjected to the action of the liquid during substantially the whole period of revolution of the container. Furthermore, by placing the fine wire-screen 10 within the coarser screen 11 the pulp is retained with-



in the container without the liability of any of the same working into the spaces between the two screens, and the container may be readily cleaned by turning a stream of water on the same from the outside.

In operation the doors 3 and 12 are opened and the pulp is inserted in a more or less loose condition into the cylinder 8, between the paddles 14 thereof. When a sufficient  
 10 quantity of such pulp has been inserted into the cylinder 8, the doors will be closed and water will be supplied to the pipe 15 through the valve 18 and pipe 15<sup>a</sup>. The water issues with considerable force through the per-  
 15 forations 16 and passes through the screens 10 and 11, carrying with it the sediment from the pulp, the screens retaining the pulp in place. The paddles 14, being in the out-  
 20 wardly-adjusted position, (shown in Fig. 3,) lift the pulp as the cylinder revolves and keep it in proper position to let the water pass freely therethrough. As the cylinder re-  
 25 volves the upper portion thereof is brought above the level of the water in the tank, and being then exposed to the atmosphere the pulp drops from the outer surface of the wire-gauze, as indicated in Fig. 3. With  
 30 water in the tank the pulp is in a semiliquid condition and nearly fills the cylinder. When water is withdrawn from the tank, the  
 35 water drains from the pulp, and the pulp then occupies less space in the cylinder, as indicated in Fig. 4. During each revolution of the cylinder the whole surface thereof  
 40 is exposed to the atmosphere, and the pulp drops continuously from the fine wire-gauze lining, thereby keeping the meshes open to allow the dirt in the water to pass through the cylinder-walls into the tank, whence it  
 45 may be removed, whereas if the cylinder were stationary or entirely immersed the pulp would adhere to the entire inner wall or lining and act as a filter to retain the dirt or sediment within itself. When the pulp  
 50 has been washed, the paddles may be moved inwardly to the position shown in Fig. 4, permitting the pulp in the adjoining compartments to drop into the lowermost compartment and facilitating the removal of  
 55 the pulp from the washing-cylinder. When the pulp has been removed, I may cleanse the cylinder by directing a stream of water upon the outside of the screen 11 through a suitable hose. When any sediment too  
 60 large to flow through the inner screen has been loosened, it may pass out readily by the door 12.

To facilitate the cleansing of the pulp, the water in which it is washed should frequently be entirely changed to prevent sub-  
 65 jecting it to soiled or discolored water. For this purpose I provide my tank with means for automatically removing the contents therefrom when the water supplied  
 70 thereto has nearly filled the same. In Fig.

1 I have shown an embodiment of means whereby this result may be accomplished. 18 designates a valve in the supply-pipe. This valve is preferably of the balanced  
 75 type and is provided with an operating-lever 19, said lever being connected to the stem of a float 20 in such a manner that when the float is in its lower position within the tank 21 the valve will be open. 22 designates a  
 80 quick-opening and cleaning valve, preferably of the balanced type, in the outlet-pipe 23, which leads from the bottom of the tank, said valve being provided with an operating-lever 24, connected with the stem of a float 25 by a forked link 25<sup>a</sup> in such manner that  
 85 when the float is in any position other than near the upper level of the water in the tank 21 the valve is closed. The tank is provided with a pair of outlet or overflow openings 26 and 27. 28 denotes an outlet-pipe  
 90 extending from the tank 1 near the top thereof and having its lower end in position to discharge into the tank 21.

With the arrangement of parts as above described, when the water supplied through 15  
 95 reaches the height of the pipe 28 the tank will overflow through said pipe into the tank 21. The areas of the pipes 28, 15, and 23 and of the outlet 26 should be substantially the  
 100 same area and the area of each of said pipes should be considerably greater than that of the lower outlet 27. When the water reaches the pipe 28, it will overflow through said pipe into the tank 21, and flowing through the  
 105 tank 21 in excess of the capacity of the outlet 27 it will back up in said tank until it reaches the overflow-outlet 26. As the level rises in the tank 21 the floats 20 and 25 also rise. The former float closes the valve 18 and the  
 110 latter, near the end of its upward movement, opens the valve 22. The tank 1 will now be quickly emptied through pipe 23, the overflow 26 taking care of the water emptied through said pipe. When the tank 1 has  
 115 been emptied the level of the water in 21 gradually falls until it reaches the outlet 27. The floats 20 and 25 fall with the level of the water and open the valve 18 and permit the quick closing of the valve 22. With this construction and arrangement of parts it will be  
 120 apparent that as soon as the tank 1 is filled it will be automatically emptied, with the result that the pulp is not caused to rotate for any material length of time in dirty water, thereby greatly facilitating the rapidity and  
 125 thoroughness of cleansing.

It will be apparent the details of construction herein described may be modified or departed from more or less without avoiding  
 130 the spirit of my invention, and I do not propose to be limited to such details except as they may be positively included in the claims hereto annexed or may be rendered necessary by the prior state of the art.

Having thus described my invention, what



I claim as new, and desire to secure by Letters Patent, is—

1. A pulp-washing apparatus comprising a container for the reception of the pulp, said container having an outer perforated wall and paddles extending longitudinally of said container and adjustable toward and from said wall, substantially as specified.

2. A pulp-washing apparatus comprising a cylindrical body provided with perforations for the flow of liquid therefrom and a plurality of paddles extending longitudinally of said body and adjustable toward and from the outer shell thereof, substantially as specified.

3. A pulp-washing container comprising a cylindrical body provided with means for supplying liquid centrally thereof and with a plurality of paddles extending longitudinally of said body and radially adjustable therein, substantially as specified.

4. In a pulp-washer, the combination of a perforated shaft, a hollow cylindrical perforated body mounted on said shaft, means for supplying liquid to said shaft, and a plurality of longitudinally-extending paddles in said body, said paddles being of considerably less width than the radius of said cylinder and being radially adjustable therein, substantially as specified.

5. In a pulp-washer, the combination of a shaft, a hollow cylindrical perforated body mounted on said shaft, means for supplying liquid to the interior of said body, and a plurality of longitudinally-extending paddles in said body, said paddles being of considerably less width than the radius of said cylinder and being radially adjustable therein, substantially as specified.

6. A pulp-washer comprising a rotatable cylinder having heads, paddles extending longitudinally of said cylinder and having their opposite ends adjustably engaging said heads, and a perforated cylindrical wall extending between said heads, substantially as specified.

7. A pulp-washer comprising a rotatable cylinder having heads, ribs on said heads extending radially thereof, paddles extending longitudinally of said cylinder and having their opposite ends slidably fitted between said ribs, and a perforated cylindrical wall extending between said heads, substantially as specified.

8. In a pulp-washing apparatus, the combination of an outer tank having a door therein, a pulp-container within said tank, said container comprising a cylindrical body of perforated material, said body being provided with a door of similar material, substantially as specified.

9. In a pulp-washing apparatus, the combination of an outer tank having a door therein, and a pulp-container rotatably supported within said tank, said container com-

prising a cylindrical body of perforated material, said body being provided with a door of similar material, substantially as specified.

10. In a pulp-washing apparatus, the combination of a tank, said tank being provided with a door, a rotatable pulp-container within said tank, said container comprising a casing of perforated material and a door in said casing, substantially as specified.

11. In a pulp-washing apparatus, the combination of a tank, said tank being provided with a door extending from the top edge of the same and being hinged a short distance above the bottom thereof, a rotatable pulp-container within said tank, said container having heads, an outer casing of perforated material extending between said heads, and a door in said casing, substantially as specified.

12. In an apparatus for washing pulp and like material, the combination of a tank, a container within said tank for said pulp, means for supplying water to said tank, and means for automatically emptying said tank when the water reaches a predetermined depth therein, substantially as specified.

13. In an apparatus for washing pulp and like material, the combination of a tank, a cylinder or container within said tank for said pulp, means for supplying water to said tank, means for rotating said cylinder, and means for automatically emptying said tank when the water reaches a predetermined depth therein, substantially as specified.

14. In an apparatus for washing pulp, the combination of a tank, a pulp-container mounted therein, said container being provided with perforations for the passage of liquid therethrough, means for supplying liquid to the interior of said container, and means for automatically emptying the tank when the water therein reaches a predetermined depth, substantially as specified.

15. In an apparatus for washing pulp, the combination of a tank, a perforated supply-pipe in said tank, a pulp-container mounted on said pipe, said container being provided with perforations for the passage of liquid therethrough, means for supplying liquid through said pipe to the interior of said container, and means for automatically emptying the tank when the water therein reaches a predetermined depth, substantially as specified.

16. In an apparatus for washing pulp and similar material, the combination of a tank, a hollow shaft journaled in said tank, a rotary container on said shaft, a pipe connected to said shaft and having a valve therein, a drain-pipe connected with said tank and having a valve therein, and means for automatically closing the former valve and for automatically opening the latter valve when the liquid in the tank has reached a predetermined depth, substantially as specified.

17. In an apparatus for washing pulp and



similar material, the combination of a tank, a container in said tank, a pipe extending into said container and having a valve therein, a drain-pipe connected with said tank and having a valve therein, and means for automatically closing the former valve and for automatically opening the latter valve when the liquid in the tank has reached a predetermined depth, substantially as specified.

10 18. In a pulp-washing apparatus, the combination of a perforated rotary cylinder for the pulp, a tank wherein said cylinder is mounted for rotation, and an overflow for said tank located at a slight distance below  
15 the upper surface of the cylinder, substantially as specified.

19. In a pulp-washing apparatus, the combination of a perforated rotary cylinder for the pulp, a tank wherein said cylinder is mounted for rotation, means for supplying water to said tank and cylinder, said tank having an outlet so arranged as to permit the cylinder to be nearly submerged in the water in said tank, substantially as specified.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM B. KLEIN.

Witnesses:

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J. B. HULL.