

March 16, 1954

T. M. WALTERS

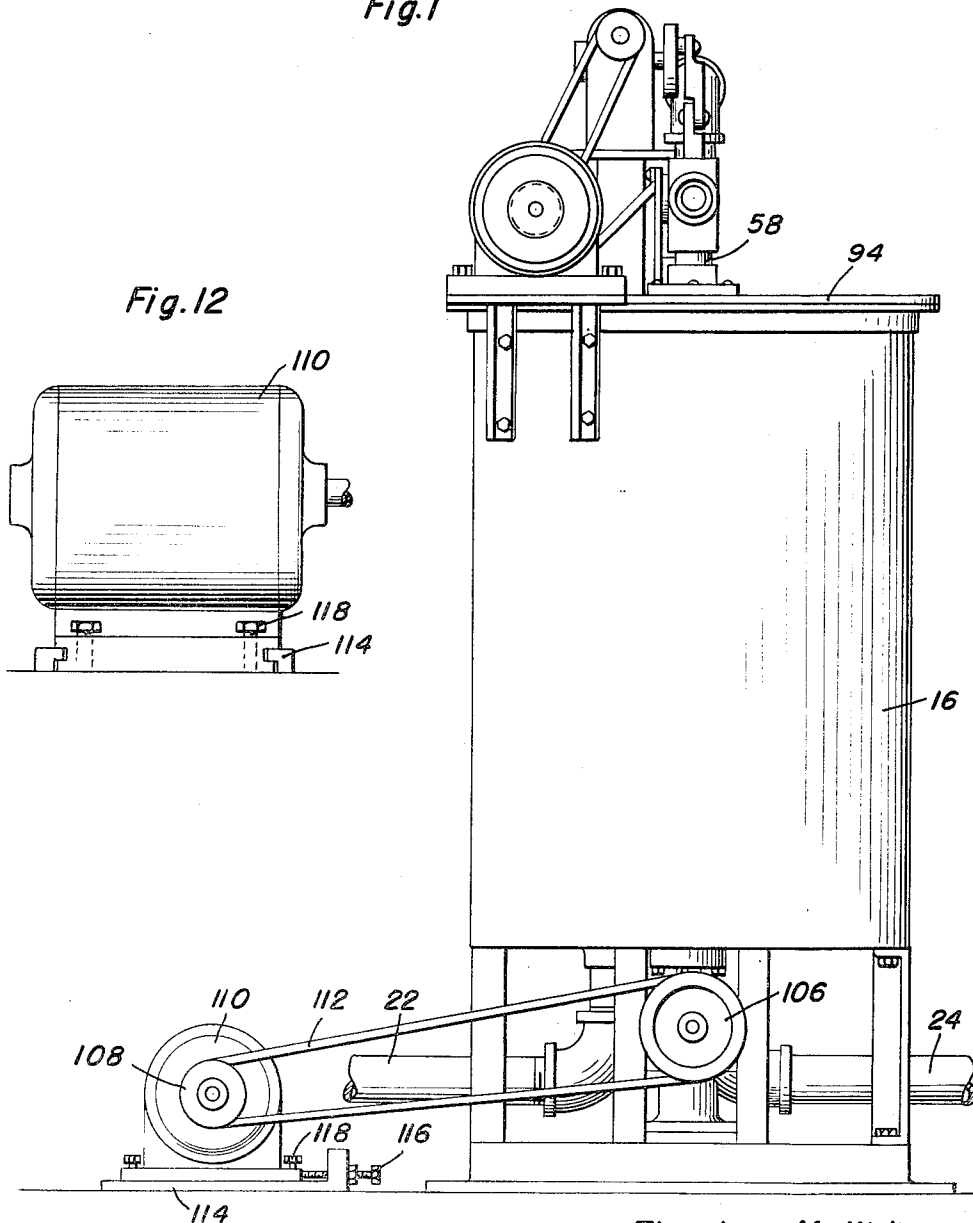
2,672,238

CENTRIFUGAL PULP CLEANING AND SCREENING APPARATUS

Filed May 14, 1952

5 Sheets-Sheet 1

Fig. 1



Theodore M. Walters
INVENTOR.

BY *Oliver A. Bissell*
and *Harvey B. Jackson*
Attorneys

March 16, 1954

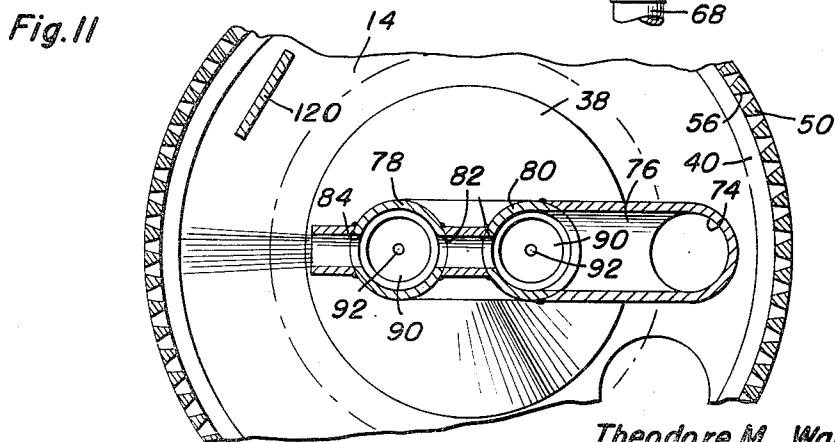
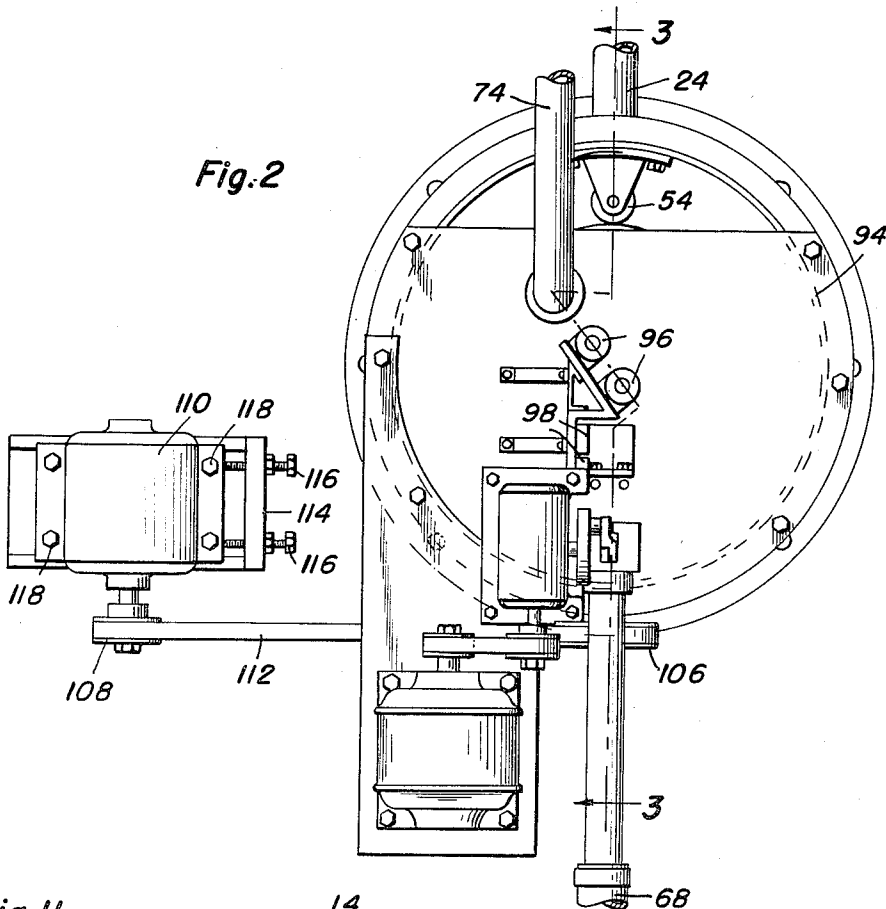
T. M. WALTERS

2,672,238

CENTRIFUGAL PULP CLEANING AND SCREENING APPARATUS

Filed May 14, 1952

5 Sheets-Sheet 2



Theodore M. Walters
INVENTOR.

BY *Almon A. O'Brien*
and Harvey B. Jackson
Attorneys

March 16, 1954

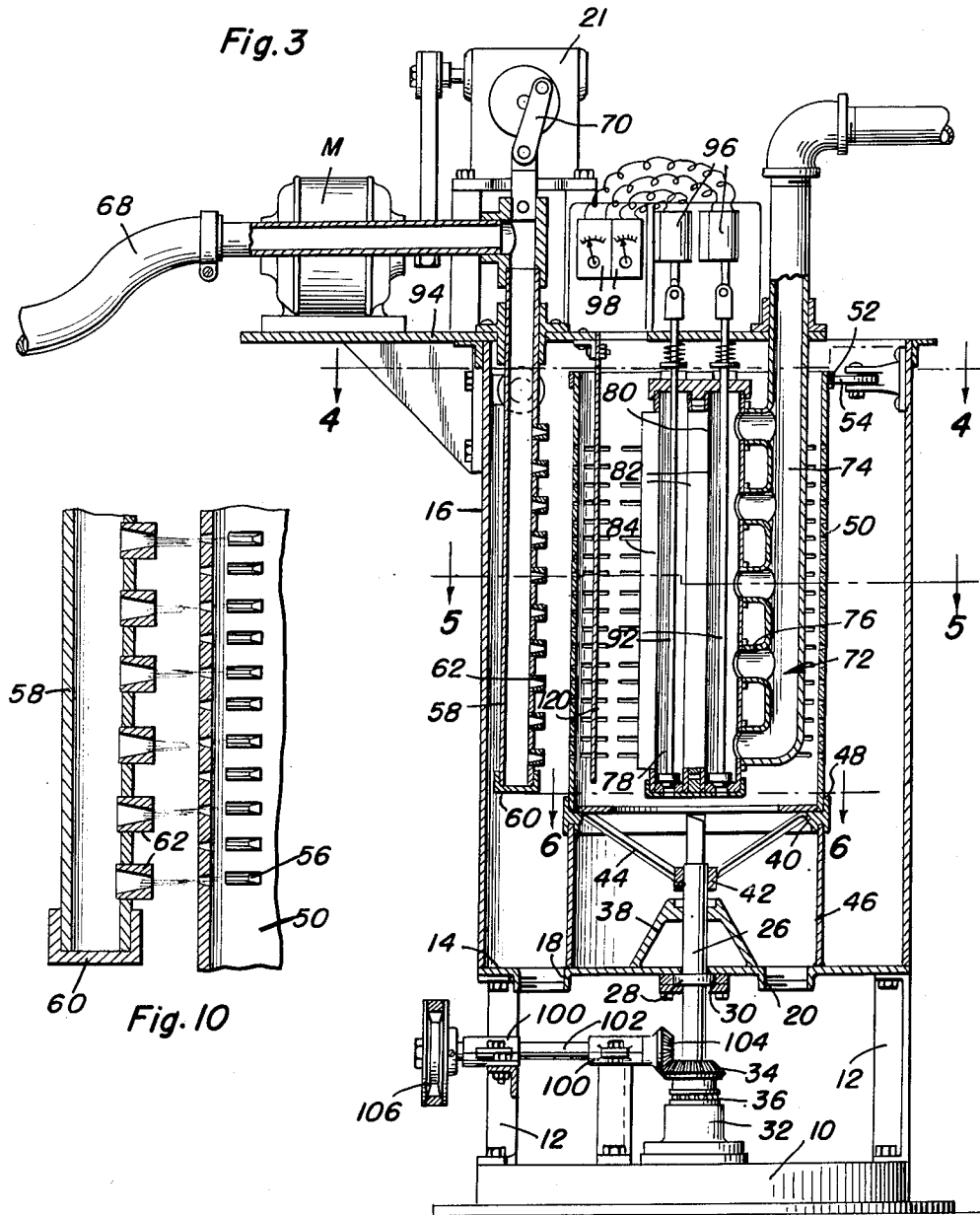
T. M. WALTERS

2,672,238

CENTRIFUGAL PULP CLEANING AND SCREENING APPARATUS

Filed May 14, 1952

5 Sheets-Sheet 3



Theodore M. Walters

INVENTOR.

BY *Chance A. O'Brien*
and Harvey B. Jacobson
Attorneys

March 16, 1954

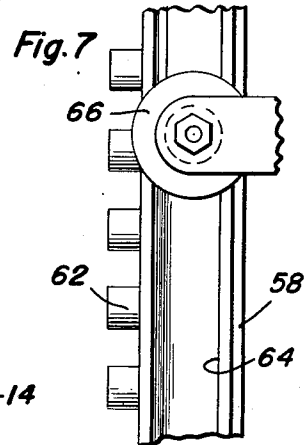
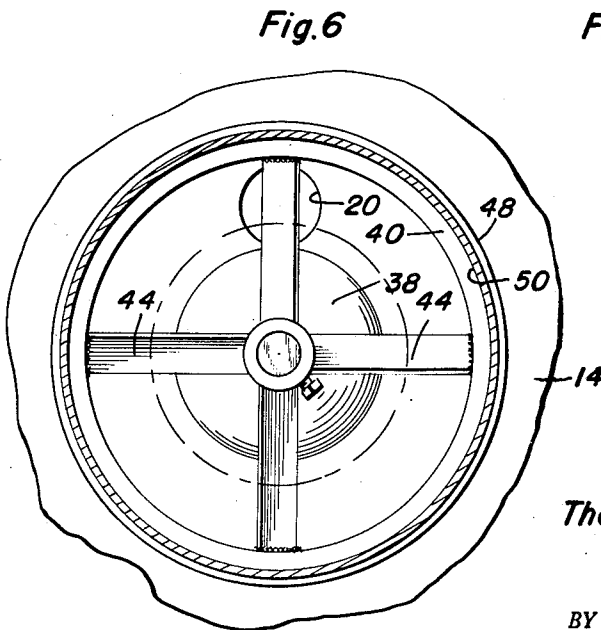
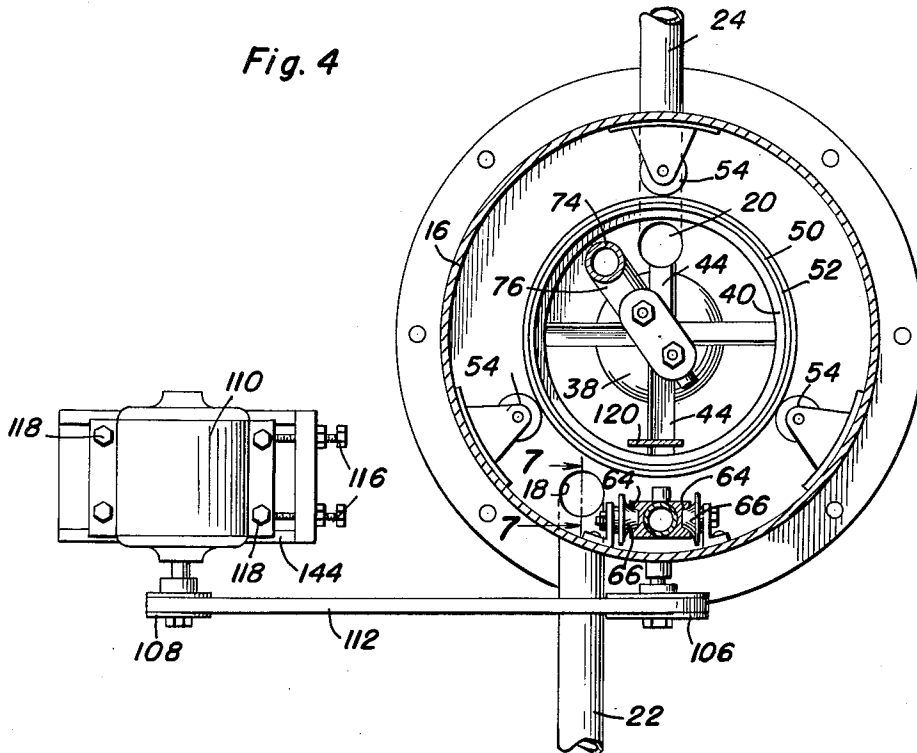
T. M. WALTERS

2,672,238

CENTRIFUGAL PULP CLEANING AND SCREENING APPARATUS

Filed May 14, 1952

5 Sheets-Sheet 4



Theodore M. Walters
INVENTOR.

BY *Alma A. O'Brien*
and Harvey B. Jackson
Attorneys

March 16, 1954

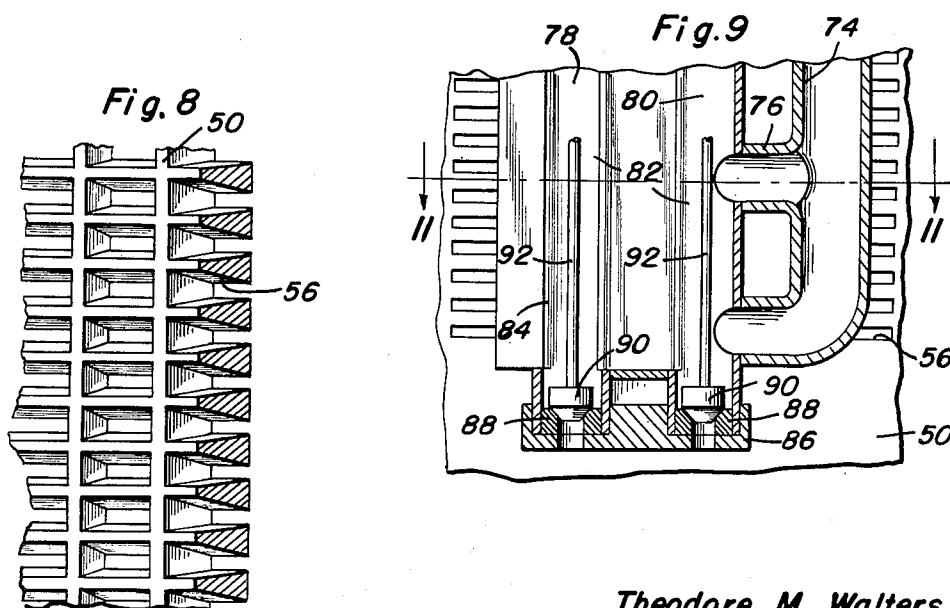
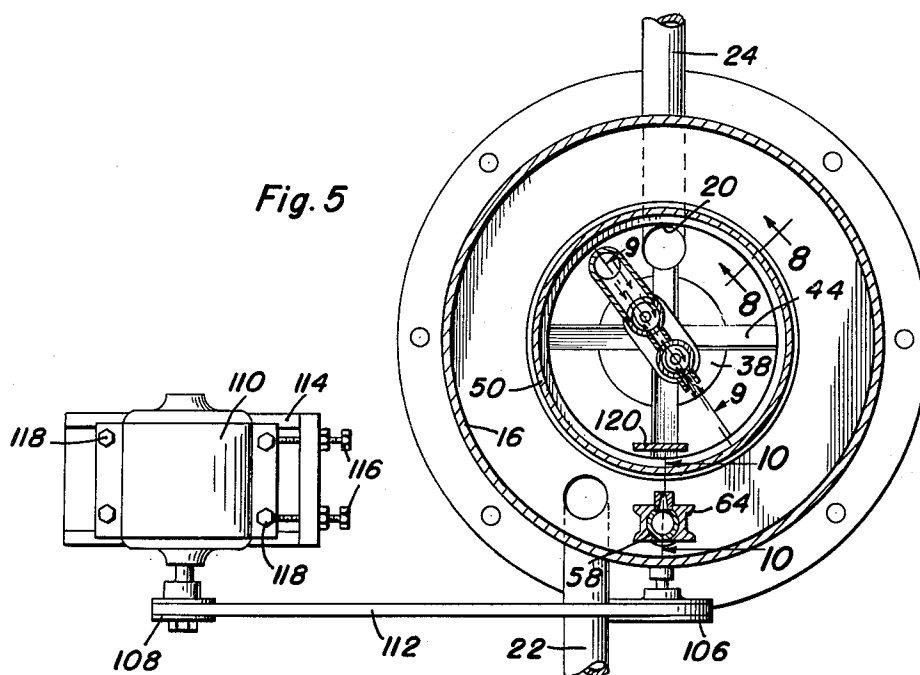
T. M. WALTERS

2,672,238

CENTRIFUGAL PULP CLEANING AND SCREENING APPARATUS

Filed May 14, 1952

5 Sheets-Sheet 5



Theodore M. Walters
INVENTOR.

BY *Alvanice A. Olson*
and *Harvey B. Jacobson*
Attorneys

UNITED STATES PATENT OFFICE

2,672,238

CENTRIFUGAL PULP CLEANING AND
SCREENING APPARATUS

Theodore M. Walters, Easton, Pa.

Application May 14, 1952, Serial No. 287,693

6 Claims. (Cl. 210-67)

1

This invention relates to new and useful improvements in cleaning apparatus and more particularly apparatus for cleaning and screening pulp fibers.

The primary object of the present invention is to provide a pulp cleaning and screening apparatus wherein pulp fibers are first introduced into a cleaner where all grit and large particles are removed and after which the thin sheet of pulp fiber and water is introduced into a power driven cylindrical screen so that small fibers will be directed, by centrifugal action, through the perforations in the screen to remove larger lumps and screen the pulp to the desired thickness.

Another important object of the present invention is to provide an apparatus for screening and cleaning pulp fibers and involving a reciprocating spray head having orifices facing the screen for directing a liquid against the screen in order to clear the perforations in the screen.

Yet another important object of the present invention is to provide a device of the aforementioned character wherein the perforations in the screen comprise slots that are progressively reduced in thickness from the inner periphery of the cylindrical screen to the outer periphery thereof, in order to increase the volume of pulp fibers passing through the slots as the screen is rotated.

A further object of the present invention is to provide a fiber cleaning and collecting apparatus involving a manifold for cleaning the mixture of pulp fibers and water and wherein a thin sheet of the pulp fibers is formed, the sheet passing into a power driven cylindrical screen where the pulp is screened to a desired thickness, said manifold including vertical tubes having lower outlet ends that are selectively opened and closed by solenoid actuated valves, whereby grit and large particles collecting in the tubes may be discharged therefrom.

A still further aim of the present invention is to provide a fiber treating apparatus that is extremely simple and practical in construction, strong and reliable in use, efficient and durable in operation, inexpensive to manufacture, install, service and maintain, and otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

2

Figure 1 is an elevational view of the present invention;

Figure 2 is a top plan view of Figure 1;

Figure 3 is a longitudinal vertical sectional view taken substantially on the plane of section line 3-3 of Figure 2;

Figure 4 is a transverse horizontal sectional view taken substantially on the plane of section line 4-4 of Figure 3;

Figure 5 is a transverse horizontal sectional view taken substantially on the plane of section line 5-5 of Figure 3;

Figure 6 is a transverse horizontal sectional view taken substantially on the plane of section line 6-6 of Figure 3;

Figure 7 is an enlarged fragmentary detail view taken substantially on the plane of section line 7-7 of Figure 4;

Figure 8 is an enlarged detail vertical sectional view taken substantially on the plane of section line 8-8 of Figure 5;

Figure 9 is an enlarged detail vertical sectional view taken substantially on the plane of section line 9-9 of Figure 5;

Figure 10 is an enlarged detail vertical sectional view taken substantially on the plane of section line 10-10 of Figure 5;

Figure 11 is a transverse horizontal sectional view taken substantially on the plane of section line 11-11 of Figure 9; and

Figure 12 is an end view of the power supply means for the screen and the mount therefor.

Referring now to the drawings in detail, wherein, for the purpose of illustration, there is disclosed a preferred embodiment of the present invention, the numeral 10 represents a preferably metallic base to which the lower ends of legs 12 are removably secured. The upper ends of the legs 12 are bolted to the bottom wall 14 of an outer casing or cylinder 16.

Bottom wall 14 is provided with an outlet nipple 18 for relatively fine pulp particles and bottom wall 14 is also provided with an outlet nipple 20 for foreign matter and relatively large pulp particles. Conduits 22 and 24 are suitably coupled to the nipples 18 and 20.

A shaft 26 extends upwardly through a central opening in the bottom wall 14 and is formed with a shoulder 28 that is held in a packing gland 30 under the bottom wall. The lower end of shaft 26 enters a bearing unit 32 on base 10 and carries a bevelled gear 34 riding upon bearing race 36. A conical bearing and sealing element 38 rises from the wall 14 and receives the upper portion of shaft 26.

An inverted channel-shaped ring 40 is connected to a collar 42 held on the upper end of shaft 26 by rigid spokes or arms 44. The channel in ring 40 receives the upper edge of a cylindrical dirt and tailings collector chamber 46 whose lower edge is fixed to the bottom wall 14 to guide and support the ring 40. A peripheral flange 48 extends upwardly from the ring 40 and embraces the lower end of a cylindrical screen 50. The lower end of screen 50 is secured to the flange 48 by fasteners or the like so that the screen will rotate with shaft 26.

A ring element 52 is fixed about the upper end of the screen 50 and rides against a plurality of circumferentially spaced horizontal rollers 54 on the inner periphery of the cylinder 16 to guide the screen and to prevent lateral movement of the screen as the screen is rotated.

Screen 50 is formed with circumferentially and longitudinally spaced slots 56 that are progressively reduced in thickness from the inner periphery of the screen to the outer periphery of the screen, as shown in Figure 10, to increase the volume or quantity of fibers passing through the screen as the latter rotates and the slots determine the thickness of the screened fibers.

Means is provided for cleaning the slots 56 in the screen and this means comprises a vertically disposed spray tube 58 whose lower end is closed by a cap 60. Longitudinally spaced spray nozzles or orifices 62 project laterally from the tube 58 and face the screen. The openings in the nozzles 62 are tapered to direct a fine spray toward the screen.

Tube 58 is provided with longitudinal grooves or parallel guide tracks 64 that slidably receive guide rollers 66 mounted on the inner periphery of the cylinder 16, as shown best in Figures 4 and 7. The upper end of the tube 58 is coupled to a supply conduit 68 that will direct liquid into the tube 58. The upper end of tube 58 is also connected to a power driven crank 70 in order that the tube 58 will reciprocate to effectively cover the entire length of the screen for cleaning the slots 56.

A manifold and cleaning apparatus 72 enters the screen 50 for effectively cleaning and supplying a mixture of pulp and water introduced therein. The manifold consists of a vertical supply tube portion 74 having a plurality of vertically spaced horizontal discharge nipples 76. A pair of vertically disposed, side by side tubular elements 78 and 80 are positioned in the screen and are fixed together with slots 82 in the tubular elements being in registry with each other. The tubular element 80 is provided with longitudinally spaced apertures in which the nipples 76 are fixed, and the element 78 is provided with an outlet slot 84 that faces the screen.

The lower ends of the tubular elements 78 and 80 are connected by a cross member 86 having apertures in registry with valve seats 88 in the lower ends of the elements 78 and 80. Valves 90 are disposed within the elements 78 and 80 for movement toward and away from the seats 88. The valves 90 include vertical stems 92 that extend upwardly through a mounting plate 94 secured to the upper end of cylinder 16 and are coupled to solenoids 96 which in turn are operatively electrically connected to suitable time clock mechanisms 98 so that the valves will be opened periodically.

Horizontal bearings 100 carried by the base 10 rotatably support a shaft 102 having a bevel gear 104 at its inner end that meshes with the

gear 34. The outer end is connected to a pulley 108 on the armature shaft of an electric motor 110 by a pulley belt 112. Motor 110 is slidably supported on a base plate 114 having means 116 for adjusting the motor relative to the pulley 108 to vary the tension of belt 112 and the speed of the screen. Adjusting screws 118 retain the motor slidably adjusted.

A vertical baffle 120 is supported by mounting plate 94 and extends into the screen 50 in registry with the nozzles 62 to direct the cleaning spray liquid and particles removed from the slots 56 by the cleaning fluid downwardly where this fluid and particles are removed by the outlet 20.

In practical use of the present invention, a mixture of pulp fibers and water is admitted into the tube 74 and passes into the tubular element 80. The larger particles which cannot pass through the passage between tubes 80, 78 settle to the bottom of the manifold over the valves 90.

The sheet of pulp fiber and water that now passes through part 84 moves directly across tube 78. As this sheet passes across tube 78 to opening in part 84 more particles of finer dirt and tailings which are on the sides of the sheet of pulp fiber and water are discharged against the side of manifold tube 78 and settle to the bottom of tube 78 over valves 90.

The then thin sheet of pulp fiber and water mixture passes outwardly through part 84 and contact screen 58. The light fibers are carried with the thin sheet of pulp fibers and water across the space between screen 58 and port 84 and the heavier dirt particles drop out of the sides of this thin sheet of pulp fiber and water, and are carried away into the dirt and tailings collector chamber 46. The farther across space the thin sheet of pulp fiber and water can be carried before contacting the revolving screen 58, the better the cleaning results are.

Valves 90 are operated periodically by use of the solenoids through an electrical timing device which opens the valves for a very short period of time, long enough to discharge the dirt and fiber tailings that have settled over valves 90.

It should be noted that the pulp cleaner, which is employed for removing grit and large particles from the pulp, may be employed independently of the screen whose function is to screen the thickness of the pulp fiber and take out larger lumps.

Having described the invention, what is claimed as new is:

1. A centrifugal pulp screening and cleaning apparatus comprising an outer casing having a discharge opening, a cylindrical screen disposed vertically within the casing, discharge means for material passing downwardly within the screen, means operatively connected to the screen for rotating the screen to direct material entering the screen outwardly through the perforations in the screen, a vertical supply pipe entering the screen and having longitudinally spaced laterally projecting horizontal outlet nipples, a pair of longitudinally split conduits connected together and disposed in the screen, one of said conduits being connected to the nipples whereby pulp fibers passing from the nipples will pass through the conduits before entering the screen, the split in the other of said conduits forming a restricted outlet for pulp fibers directed to the screen, and means within the casing for cleaning the perforations in the screen.

2. The combination of claim 1 and solenoid actuated valves at the lower ends of the con-

5

duits to permit the escape of pulp fibers collected in the conduits.

3. A centrifugal pulp cleaning and screening apparatus comprising a base, a hollow cylinder supported on the base and having a bottom wall with an outlet opening, a power driven perforated cylindrical screen supported longitudinally and axially within the cylinder, a dirt and tailings collector chamber supported on said bottom wall beneath said screen, said bottom wall also having an outlet opening in communication with the interior of the screen through the chamber, rollers supported in the cylinder riding against the screen to guide the screen during rotation of the screen, means entering the screen for admitting pulp fibers into the screen to be directed through the perforations in the screen and including a manifold for cleaning pulp fibers before the same are directed toward the screen, the pulp fibers failing to pass through the screen gravitating into the chamber, a vertical spray tube supported in the cylinder alongside of the screen and having a plurality of vertically spaced orifices facing the screen to direct a fluid through the perforations in the screen, power means connected to the tube for reciprocating the tube, said tube having a pair of longitudinal channeled grooves in diametrically opposite sides thereof, and rollers supported within the cylinder received in the grooves to guide the tube as the latter is reciprocated, said means for admitting pulp fibers into the screen comprising a vertically disposed supply pipe entering the screen and having a plurality of vertically spaced horizontally disposed outlet nipples, a pair of spaced parallel vertical tubes having registering slots of a width less than the diameter of the tubes, one of said tubes having openings receiving the nipples and the other of said tubes having a vertical slot of a width less than the diameter of said other tube facing the screen.

4. The combination of claim 3 wherein each of said tubes includes a discharge opening at its lower end, and solenoid actuated valves for selectively opening and closing the discharge openings in the lower ends of the tubes.

5. A centrifugal pulp cleaning and screening apparatus comprising a base, a hollow cylinder supported on the base and having a bottom wall with an outlet opening, a power driven perforated cylindrical screen supported longitudinally and axially within the cylinder, a cylindrical dirt and tailings collector chamber supported on said bottom wall, said bottom wall also having an outlet opening in communication with the interior of the screen through the chamber, rollers supported in the cylinder riding against the screen to guide the screen during rotation of the screen, means entering the screen for admitting pulp fibers into the screen to be directed through the perforations in the screen, the pulp fibers failing to pass through the screen gravitating into the chamber, and means mounted in the cylinder alongside of the screen for cleaning the perforations in the screen, said means for admitting pulp fibers into the screen comprising a vertical-

6

ly disposed supply pipe entering the screen and having a plurality of vertically spaced horizontally disposed outlet nipples, a pair of spaced parallel vertical tubes having registering slots of a width less than the diameter of the tubes, one of said tubes having openings receiving the nipples and the other of said tubes having a vertical slot of a width less than the diameter of said other tube facing the screen, and a spray tube supported in the cylinder for directing a fluid against the screen to clean the perforations in the screen.

6. A centrifugal pulp cleaning and screening apparatus comprising a base, a hollow cylinder supported on the base and having a bottom wall with an outlet opening, a power driven perforated cylindrical screen supported longitudinally and axially within the cylinder, a cylindrical dirt and tailings collector chamber supported on said bottom wall, said bottom wall also having an outlet opening in communication with the interior of the screen through the chamber, rollers supported in the cylinder riding against the screen to guide the screen during rotation of the screen, means entering the screen for admitting pulp fibers into the screen to be directed through the perforations in the screen, the pulp fibers failing to pass through the screen gravitating into the chamber, and means mounted in the cylinder alongside of the screen for cleaning the perforations in the screen, said means for admitting pulp fibers into the screen comprising a vertically disposed supply pipe entering the screen and having a plurality of vertically spaced horizontally disposed outlet nipples, a pair of spaced parallel vertical tubes having registering vertical slots of a width less than the diameter of the tubes, one of said tubes having openings receiving the nipples and the other of said tubes having a vertical slot of a width less than the diameter of said other tube facing the screen, and a spray tube supported in the cylinder for directing a fluid against the screen to clean the perforations in the screen, and means connected to the tube for reciprocating the tube longitudinally of the screen to effectively clean the perforations in the upper and lower ends of the screen as well as the intermediate portion of the screen.

THEODORE M. WALTERS.

References Cited in the file of this patent UNITED STATES PATENTS

Number	Name	Date
695,754	Moore -----	Mar. 18, 1902
1,415,461	Lucas -----	May 9, 1922
1,415,939	Mabry -----	May 16, 1922
1,474,846	Parr -----	Nov. 20, 1923
1,749,368	Behr -----	Mar. 4, 1930
1,899,106	Richter et al. -----	Feb. 28, 1933
2,068,636	Roberts -----	Jan. 19, 1937
2,328,394	Neuman -----	Aug. 31, 1943
2,370,353	Howe -----	Feb. 27, 1945
2,532,885	Berges -----	Dec. 5, 1950
2,584,247	Anderson et al. -----	Feb. 5, 1952