No. 736,298. PATENTED AUG. 11, 1903.

C. J. REED.

MEANS FOR SEPARATING MAGNETIC PARTICLES FROM PAPER PULP.

APPLICATION FILED AUG. 15, 1902.

NO MODEL.

Fig. 3.

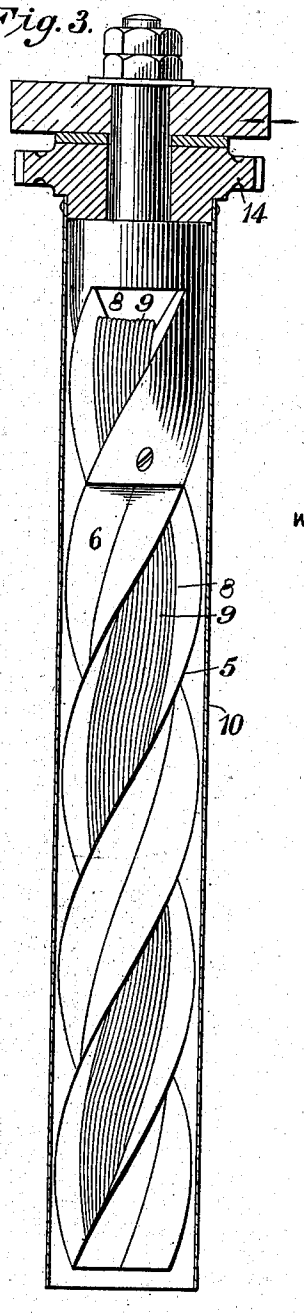


Fig. 1.

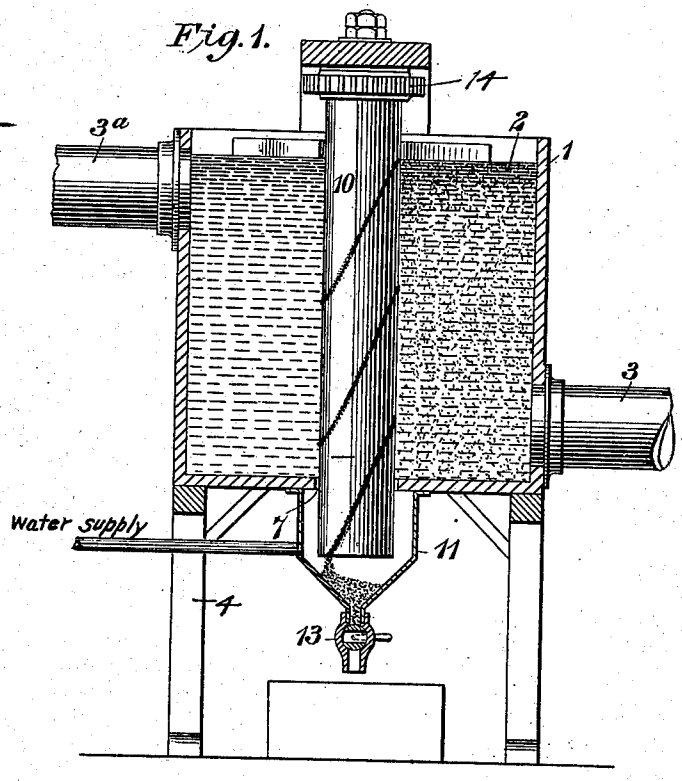
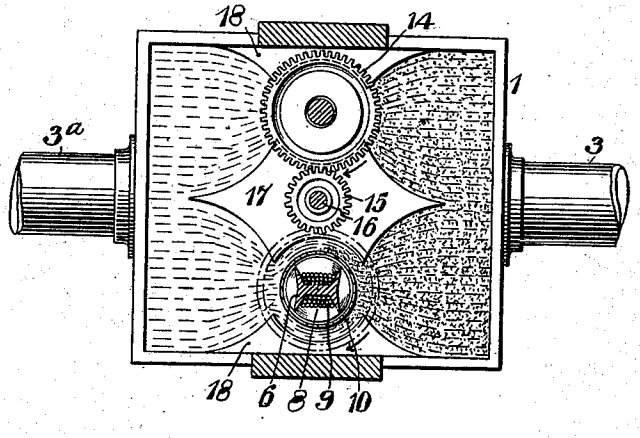


Fig. 2.



WITNESSES:

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No. 736,298. Patented August 11, 1903.

UNITED STATES PATENT OFFICE.

CHARLES J. REED, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO SECURITY INVESTMENT COMPANY, A CORPORATION OF PENNSYLVANIA.

MEANS FOR SEPARATING MAGNETIC PARTICLES FROM PAPER-PULP.

SPECIFICATION forming part of Letters Patent No. 736,298, dated August 11, 1903.

Application filed August 15, 1902. Serial No. 119,762. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. REED, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Means for Separating Magnetic Particles from Paper-Pulp, of which the following is a specification.

My invention relates to magnetic separators, and particularly to devices of this general character which are employed for separating magnetic particles from paper-pulp and similar liquid materials.

The object of my invention is to provide comparatively simple and inexpensive apparatus which shall be free from liability to disarrangement and excessive wear and which shall serve to effectively remove all of the magnetic particles from the material treated by it.

My invention is susceptible of various embodiments as regards mechanical details of construction; but I have shown an effective combination and arrangement of apparatus in the accompanying drawings, in which—

Figure 1 is a view, partially in side elevation and partially in section, and Fig. 2 a plan view, of the entire apparatus employed in practicing my invention. Fig. 3 is a detail sectional view of one of the magnets and the rotating screen and driving-gear therefor.

The trough or tank 1 may be of any suitable form and dimensions and may be supplied with paper-pulp 2 through the pipe 3 from a grinding mill or reservoir, and the treated material may flow out through the pipe 3^a, which, as shown, may be at a higher level than the pipe 3. The tank or trough may be supported by any suitable framework 4 in either a horizontal or a slightly-inclined position and may itself be of such form and dimensions as to constitute the sole conduit between the source of supply and the receiving vessel, or it may be of such dimensions as to serve merely to guide the material and make sure that it all passes in close proximity to the separating devices.

I locate in the tank 1 one or more electromagnets 5, the cores 6 of which are suspended from the top of the tank 1 or from any suitable support and project through openings 7 in the bottom of the tank. I have shown two magnets in the present instance, and ordinarily two or more will probably be found desirable, although the invention is not limited to any specific number. Each core 6 is provided with one or more grooves 8, which may be of any desired shape in cross-section and be disposed at any suitable angle to the axis of the core. The coil or coils 9, located in the groove or grooves 8, may be supplied with current from any suitable source (not shown) to magnetize the core 5, so as to produce a field of force which extends from one end to the other of the core at an angle to its axis. In order to conduct the magnetic particles which are attracted to this core through the openings 7, I surround each core with a cylindrical shell 10 and so support it that it may be rotated continuously in a clockwise direction, looking downward, preferably at slow speed. The rotation of the shell 10 will obviously serve to convey the magnetic particles through the openings 7, since these particles will follow the field of force until the lower end of the magnet is reached, when they will drop off the end of the shell. I provide a cup or pocket 11 below the openings 7, which preferably has inclined sides, so that the magnetic particles will gravitate toward the central opening, from which they may be withdrawn at intervals by means of a cock 13 or other suitable device.

The shells 10 may be driven by any suitable means—such as worm-gearing, belt and pulleys, or a pinion and gears, as indicated—the drawings showing each shell as fastened to the hub of a gear-wheel 14, with which meshes a pinion 15, the shaft 16 of which is propelled by any suitable means. (Not shown.)

In order that all of the pulp may be subjected to the action of the magnet, I provide suitable guides which project within a certain distance of the cylinders 10, a distance of approximately an inch between the guides and the cylinders being suitable for the purpose. I have indicated a central double guide 17 and two outer or single guides 18, which

may be made of sheet metal and fastened in position either permanently or removably by any suitable means. The form and dimensions of these guides are obviously not material, provided they are such as to insure the passage of the entire amount of material within such distance of the magnets that all of the magnetic particles shall be removed therefrom.

Instead of causing the material to flow into the separator at one end or side and out at the other it will be understood that the guides and inlets may be otherwise constructed and arranged, provided only that the construction and arrangement shall be such as to insure subjection of all of the material to the action of the magnet or magnets as it passes through the separator.

Other modifications may be made in the apparatus without departing from the invention, and I therefore desire it to be understood that limitations are not to be imposed otherwise than by the prior art and the terms of the claims.

I claim as my invention—

1. In apparatus for separating magnetic particles from liquid material, the combination with a trough or tank containing one or more relatively narrow passages through which the material flows, of a cylindrical shell having a substantially vertical axis and located in each passage so as to be submerged in the liquid for the greater portion of its length, means for rotating said shell or shells and a stationary magnet in each shell having a field of force that is disposed at an acute angle to the shell-axis.

2. The combination with a tank or trough adapted to receive a body of liquid and having one or more restricted passage-ways through which said liquid flows and a pocket or receptacle below said passage-ways, of a magnet located in each passage-way and having an inclined field of force extending from end to end, a substantially vertical shell surrounding each magnet and projecting into said pocket or receptacle and means for rotating said shell or shells.

3. The combination with a trough or tank adapted to receive a body of liquid and having a plurality of restricted passage-ways through which said liquid flows and a cup or pocket below said passage-ways, of a plurality of magnets located in said passage-ways and having inclined fields of force extending from end to end, a cylindrical shell for each magnet having a substantially vertical axis and means for rotating said shells.

4. In apparatus for separating magnetic particles from paper-pulp, the combination with a tank or trough having a plurality of passage-ways and a cup or pocket below the same, of magnets located in said passage-ways and having inclined fields of force, substantially vertical shells surrounding said magnets and means for rotating said shells to convey the magnetic particles into the cup or pocket.

5. In apparatus for separating magnetic particles from paper-pulp and similar material, the combination with a tank or trough having a plurality of passage-ways and a pocket or cup below the same, of electromagnets centrally located in said passage-ways and having inclined fields of force, metallic shells surrounding said magnets and means for rotating said shells.

6. In apparatus for separating magnetic particles from liquid materials, the combination with a stationary electromagnet comprising a longitudinally-grooved core and a coil located in said groove to produce a magnetic field, of a substantially vertical shell surrounding said magnet, means for rotating said shell, means for causing the material to flow around the shell and in proximity thereto and a receptacle into which the lower end of said shell projects.

7. The combination with one or more electromagnets severally constructed to produce magnetic fields which extend angularly from end to end, a substantially vertical shell surrounding each magnet and means for rotating the same, of a tank or trough for liquid material in which said shell or shells are located, said tank or trough having an inlet adjacent to its bottom at one side and an outlet adjacent to its top at the other side of the rotary shell or shells and means for conducting and guiding all of said liquid material in proximity to said shell or shells as it flows through the tank or trough.

8. The combination with a stationary magnetizable core having one or more longitudinal and angularly-disposed grooves and a magnetizing-winding located in said groove or grooves, of a substantially vertical, non-magnetic shell of annular cross-section surrounding said core and winding, means for rotating said shell, means for guiding liquid material to be treated in proximity to said shell and a receptacle into which the lower end of said shell projects.

In testimony whereof I have hereunto subscribed my name this 6th day of August, 1902.

CHARLES J. REED.

Witnesses:
JAMES W. LAWS,
ROBT. B. FLETCHER.