Feb. 14, 1933. H. D. WELLS 1,897,156

PULP AND DIRT SEPARATOR

Filed Sept. 26, 1931 2 Sheets-Sheet 1

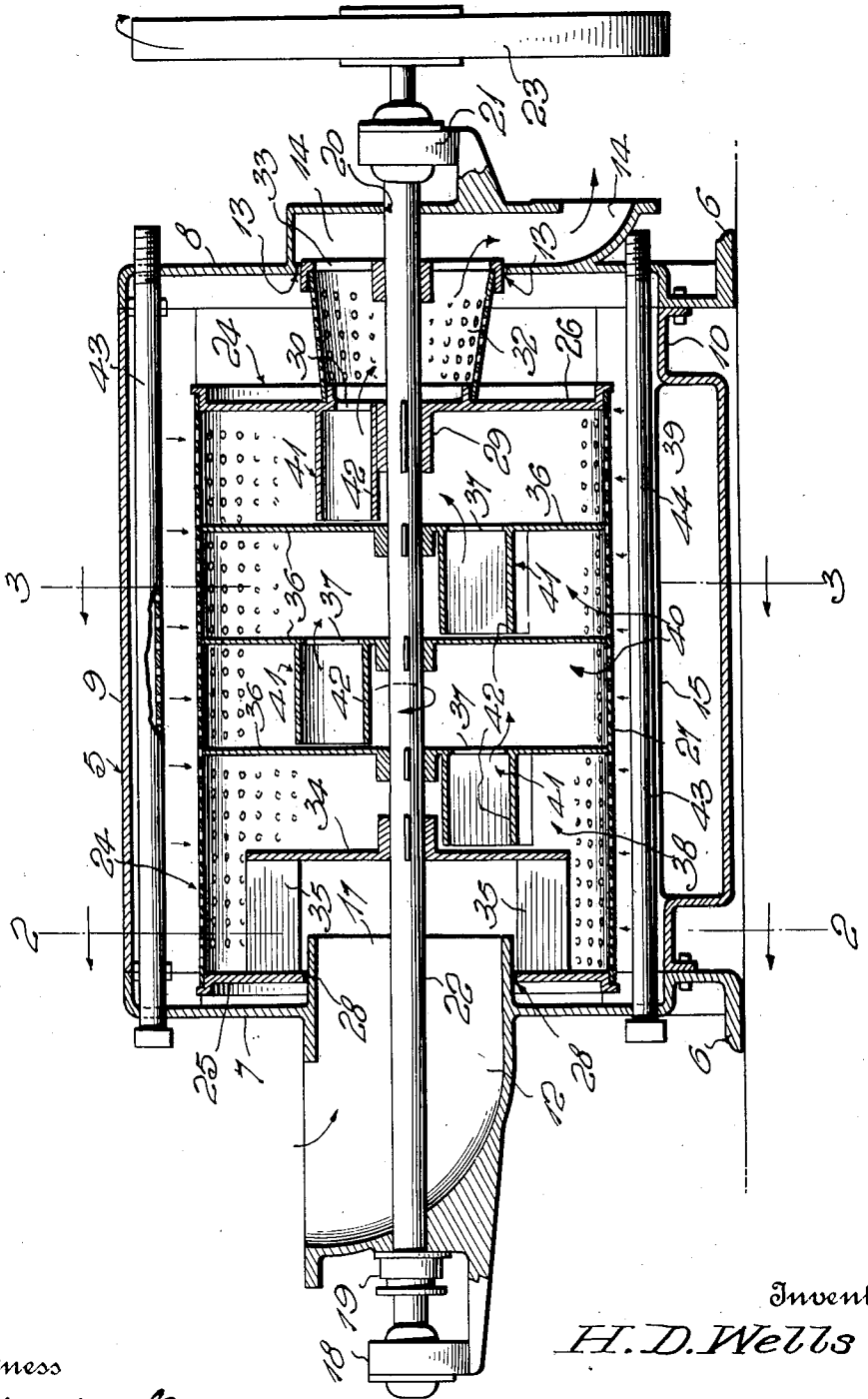

Fig. 1.

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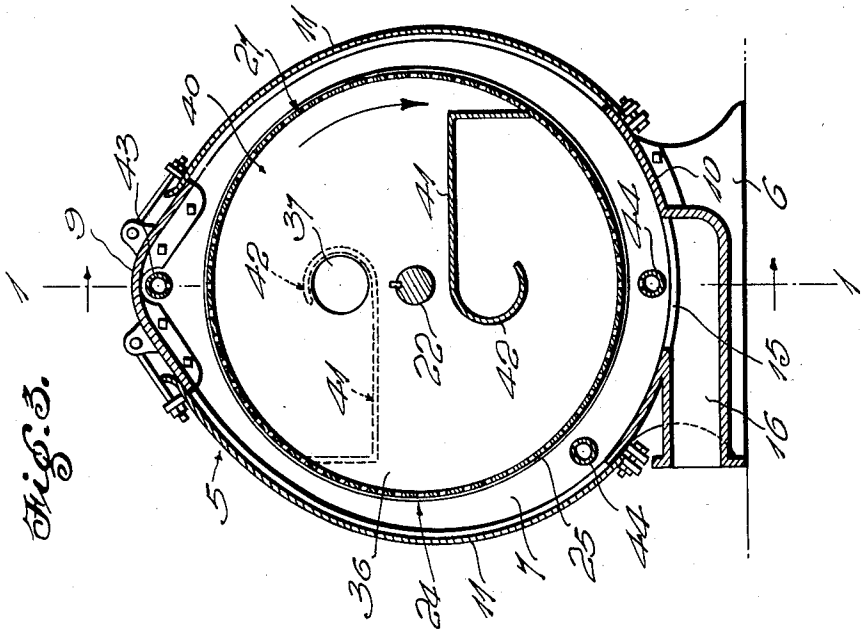

Fig. 3.

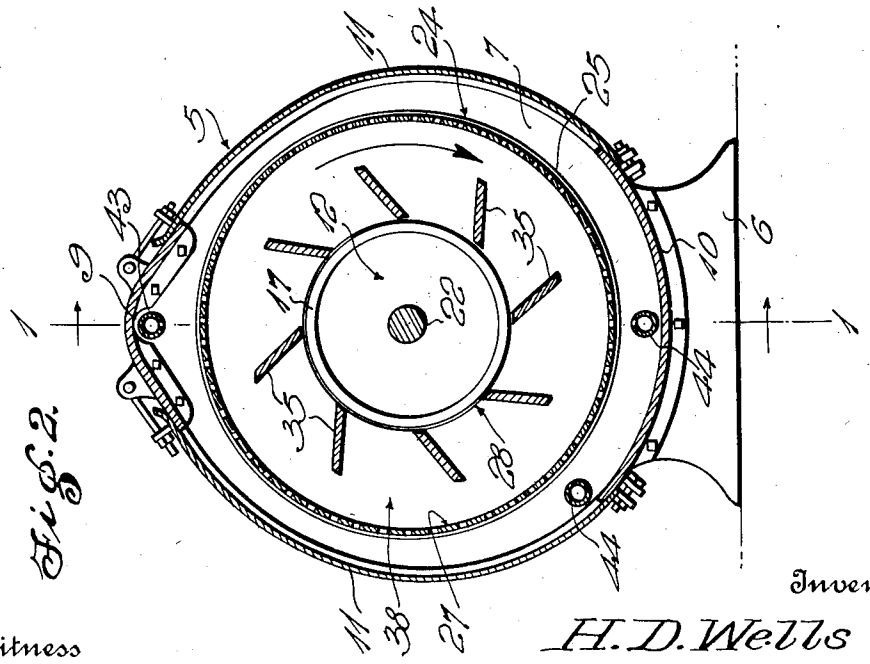

Fig. 4.

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UNITED STATES PATENT OFFICE

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PULP AND DIRT SEPARATOR

Application filed September 26, 1931. Serial No. 565,372.

The invention relates to a machine designed to provide a pulp and dirt separator for accomplishing three operations; namely, separation of the dirt from the pulp, washing chemicals from chemical pulp, and de-watering the pulp for storing.

The invention further relates to a machine designed to provide a pulp and dirt separator for handling a wide variety of pulps, such as sulphite pulp, sulphate pulp, rag pulp, paper stock, soda pulp, wood pulp, defibered waste paper, cotton pulp, etc. It is further designed to produce cleaner pulp than rifflers, screens and centrifugal separators, by gently sifting the dirt from the pulp in the presence of a gentle shower of water.

Objects of the invention are to provide a separator which discharges only the cleanest quality fibre and thoroughly cleanses the stock; to provide a completely enclosed separating apparatus preventing the entrance of foreign matter into the stock and overcoming any danger of spilling during the separating operation; to provide an apparatus which operates continuously and in which the dirt is continuously ejected; to provide an apparatus requiring no concrete platform and one which may be installed directly upon the floor of a mill; to provide a separator in which the motion is entirely rotary, one which is practically clog-proof, and one in which the power consumption is extremely economical; one which is durable, trouble free and dependable, and one of extremely simple, practical construction which will be rugged and efficient and well suited to the requirements of economical operation, convenient manipulation and ready accessibility for repair purposes.

With the foregoing and minor objects in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a central vertical longitudinal sectional view through the machine, cut on the plane indicated by the lines 1—1 of Figs. 2 and 3, looking in the direction of the arrows.

Figs. 2 and 3 are vertical transverse sectional views on lines 2—2 and 3—3 of Fig. 1, looking in the direction of the arrows.

The preferred construction has been illustrated and will be specifically described, with the understanding however, that within the scope of the invention as claimed, variations may be made.

The numeral 5 denotes a horizontally disposed cylindrical casing having supporting feet 6. This casing is composed of end castings 7 and 8, a top casting 9 and a bottom casting 10 all bolted together, and a flexible removable side wall 11 secured in place by conventional means. The end wall 7 is provided with a pulp inlet 12 for connection with a conducting spout or pipe, the end wall 8 is formed with a central outlet opening 13 communicating with a discharge chute 14 which may be coupled to another conducting pipe or chute, and the bottom casting 10 is provided with an elongated outlet slot 15 for dirt and water, said slot communicating with a discharge neck 16 whose width is preferably the same as the length of the slot, said neck being designed for connection with a waste chute or conduit.

The inlet 12 is in the form of an elbow extending downwardly and inwardly, and the inner end of this elbow projects at 17 from the inner side of the end wall 7, in the form of a continuous annular flange. At its outer end, the elbow 12 is provided with an appropriate bearing 18 and with a stuffing box 19. In alinement with these elements 18 and 19, the casing end 8 is provided with an opening 20 and a bearing 21. A central longitudinal shaft 22 passes through the stuffing box 19 and the opening 20 and is rotatably mounted in the bearings 18 and 21, being provided with any desired means whereby it may be driven. A belt pulley 23 is shown upon the

rear end of the shaft for engagement with a suitable driven belt.

A cylindrical drum 24 is carried by the shaft 22 within the casing 5, said drum and casing being preferably co-axial. The drum 24 embodies two end walls 25 and 26 and a cylindrical side wall 27, the latter being in the form of a screen. The end wall 25 is provided with a central opening 28 which surrounds the flange or the like 17, and the end wall 26 is provided with a hub 29 secured on the shaft 22, and with a discharge opening 30 near said hub. Projecting outwardly from and secured to the end wall 26 around the opening 30, is a substantially cylindrical discharge screen 32 having an openwork outer end 33 which is rotatable within the opening 13 of the casing end wall 8.

Secured centrally upon the shaft 22 and disposed in inwardly spaced opposed relation with the inlet 12, is a disk 34, and extending between this disk and the end wall 25 of the drum 24, are a number of pitched blades 35 which are spaced apart around the flange or the like 17, the ends of said blades being integral with or otherwise rigidly secured to the parts 25 and 34. The blades 35 are pitched in such a direction as to co-act with the ingoing pulp as it leaves the inlet 12, for the purpose of assisting in rotating the drum 24, the expenditure of less power for drum rotation, being therefore possible.

A number of transverse partitions 36 are secured in the drum 24 and to the shaft 22, said partitions each having an opening 37 spaced inwardly from the drum wall 27, the openings being so positioned that the opening of any one partition is out of alinement with the opening of the next adjacent partition. The partitions 36 divide the interior of the drum 24 into a pulp-receiving chamber 38, a pulp-discharge chamber 39, and a plurality of intermediate chambers 40. In these chambers and secured to the partitions, are scoops 41 whose outer ends are secured to the drum side wall 27, while their inner ends are provided with return bends 42 partly circumscribing the openings 37 and 30.

An upper water spray pipe 43 and two lower water spray pipes 44, extend longitudinally between the side walls of the casing 5 and the drum 24 for directing gentle jets of water inwardly against the wall or screen 27 to assist in preventing clogging of the latter and to gently wash the pulp.

As the drum 27 is driven, the wet pulp enters through the inlet 12 and in impinging upon the blades 35, assists in rotating said drum. The pulp is discharged into the receiving chamber 38 in which the first screening operation takes place, the pulp in this chamber being continually agitated by the first of the scoops 41, and upon each revolution of the drum 24, this scoop elevates a quantity of pulp and directs it through the first of the openings 37, into the first intermediate chamber 40. The same operations take place in this chamber and the pulp is gradually fed into the next succeeding chamber and so on, until it reaches the final chamber 39 and discharges through the screen 32 into the outlets 14. During travel of the pulp through the machine in this manner, it is gently sprayed with water and all dirt and the like which can pass through the screened wall 27, will do so, and due to the successive screening actions, the remaining foreign matter in the pulp is only negligible, by the time it reaches the outlet. Moreover, any acids in the pulp are effectively washed from it and during discharge through the screen 32, most of the water drains out, leaving the pulp relatively dry for storage.

It will be seen from the foregoing that a novel and advantageous machine has been provided for the purpose described. It is to be understood however that the machine is not restricted to use in the particular field herein before mentioned, for it has been found that when it is equipped with screens having perforations one-fourth inch in diameter, it makes an excellent coarse screen. The screened material passes through the plates and discharges through the outlet 15, and the coarse rejected material passes out the discharge chute 14.

I claim:—

1. A machine of the class described comprising a horizontal cylindrical casing having a pulp inlet in one end wall, a clean pulp outlet in its other end wall, and a liquid and dirt outlet in the lower portion of its side wall; a driven rotatably mounted drum within and unidirectional with said casing, said drum having its side wall of screen form, one end of said drum communicating centrally of the latter with said pulp inlet to receive pulp therefrom, the other end of said drum communicating centrally of the latter with said pulp outlet; and pitched blades secured in said drum and spaced apart in the path of the pulp entering through said inlet, said blades being pitched in a direction to co-act with the ingoing pulp in assisting to rotate the drum.

2. A machine of the class described comprising a horizontal cylindrical casing having a pulp inlet in one end wall, a clean pulp outlet in its other end wall, and a liquid and dirt outlet in the lower portion of its side wall; a driven rotatably mounted drum within and unidirectional with said casing, said drum having its side wall of screen form, one end of said drum communicating centrally of the latter with said pulp inlet to receive pulp therefrom, the other end of said drum communicating centrally of the latter with said pulp outlet; pitched blades secured to and projecting inwardly from one end wall of said drum, said blades being spaced apart

around said pulp inlet, and a disk spaced inwardly from said one end wall of the drum and secured to the inner ends of said blades, the peripheral edge of said disk being spaced from said side wall of the drum, said blades being pitched in a direction to co-act with the incoming pulp in assisting to rotate the drum.

3. A machine of the class described comprising a horizontal cylindrical casing having a pulp inlet in one end wall, a clean pulp outlet in its other end wall, and a liquid and dirt outlet in the lower portion of its side wall; a driven rotatably mounted drum within and unidirectional with said casing, said drum having its side wall of screen form, one end of said drum communicating centrally of the latter with said pulp inlet to receive pulp therefrom, the other end of said drum communicating centrally of the latter with said pulp outlet; transverse partitions secured in said drum and dividing its interior into compartments, said partitions each having an opening spaced inwardly from the side wall of the drum, and scoops carried by said partitions adjacent said openings in position to elevate the pulp in any compartment and direct it through the adjacent opening into the next compartment.

4. In a machine of the class described, a rotatably mounted drum having a central pulp inlet in one end wall and a pulp outlet, and pitched blades secured in said drum in the path of the ingoing pulp entering through said inlet, said blades being helically pitched with respect to the direction of flow of the ingoing pulp, whereby the latter and said blades co-act in assisting to rotate the drum.

5. In a machine of the class described, a rotatably mounted drum having a central pulp inlet in one end wall and a pulp outlet, a disk in said drum in opposed relation with said inlet, said disk being fixedly mounted and having its edge spaced from the side wall of said drum, and pitched blades fixedly mounted between said end wall and said disk, said blades being spaced apart around said pulp inlet and being pitched in a direction to co-act with the ingoing pulp in assisting to rotate said drum.

6. In a machine of the class described, a rotatably mounted drum having its side wall of screen form, said drum having a central pulp inlet in one end wall and a pulp outlet in its other end, a disk in said drum in opposed relation with said inlet, said disk having its edge spaced from the side wall of said drum, and pitched blades between and secured to said end wall and disk, said blades being spaced apart around said pulp inlet and being pitched in a direction to co-act with the ingoing pulp in assisting to rotate said drum.

7. In a machine of the class described, a rotatable horizontal drum whose side wall is of screen form, said drum having a pulp inlet in one end and a pulp outlet in its other end, transverse partitions secured in said drum and dividing its interior into compartments, said partitions each having an opening spaced inwardly from the side wall of the drum, and scoops carried by said partitions adjacent said openings in position to elevate the pulp in any compartment and direct it through the adjacent opening into the next compartment.

In testimony whereof I affix my signature.

HAROLD D. WELLS.