

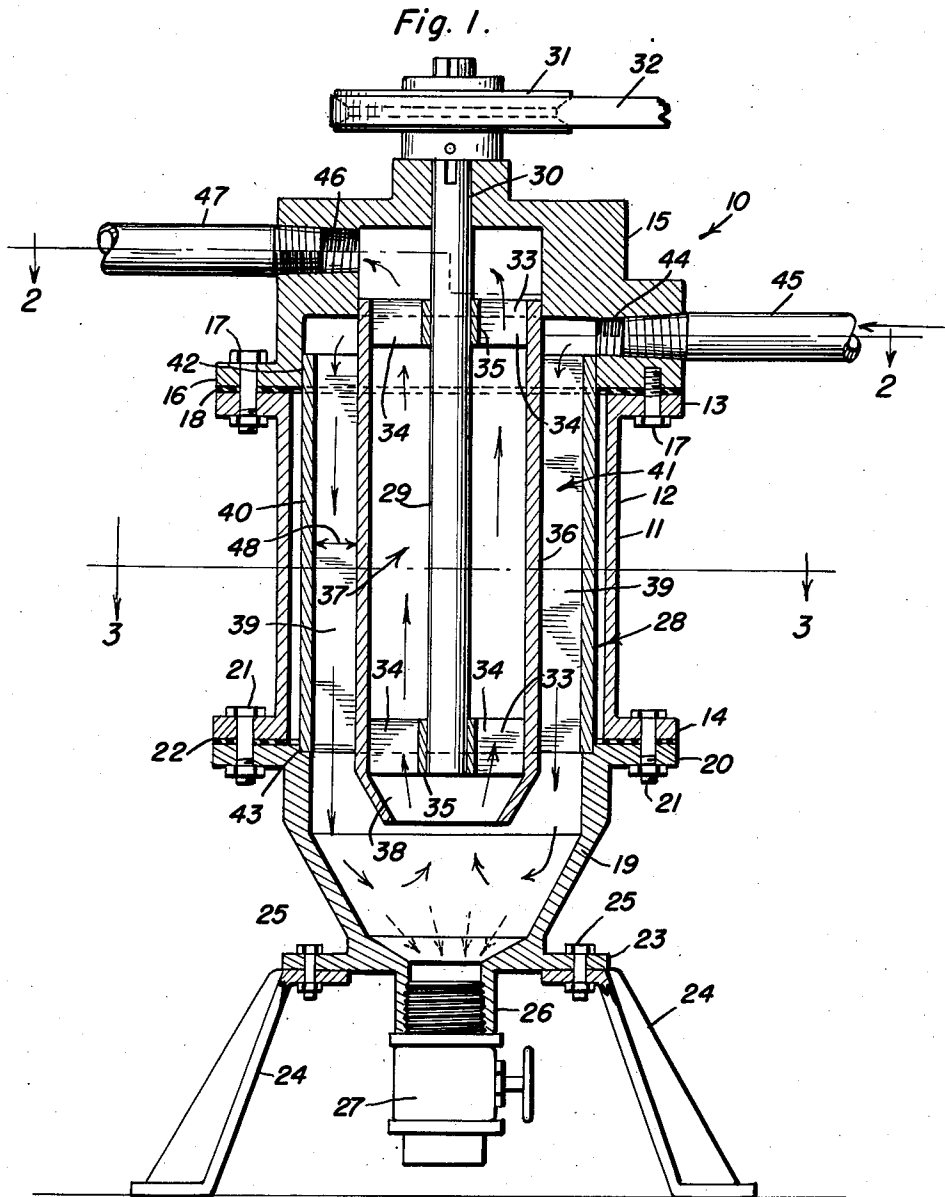
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C. W. HOWARD
CENTRIFUGAL SEPARATOR

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2 Sheets-Sheet 1



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Fig. 2.

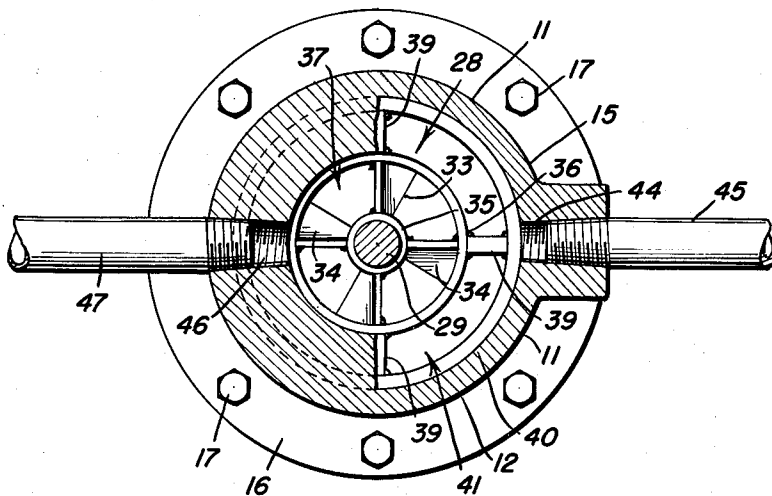
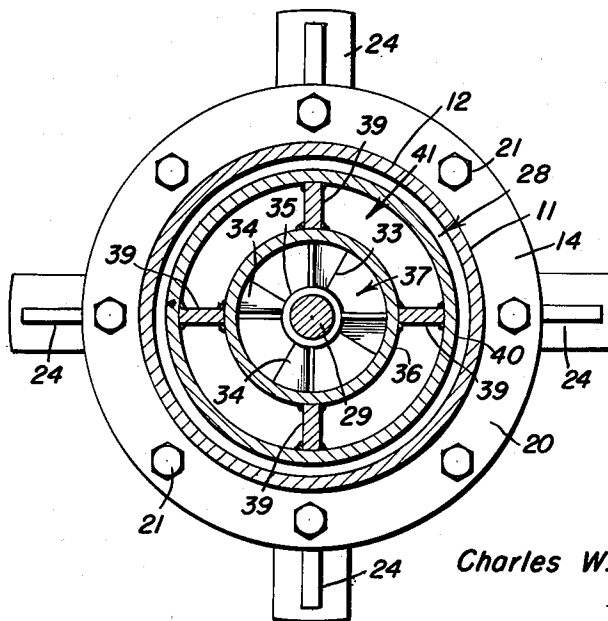


Fig. 3.



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CENTRIFUGAL SEPARATOR

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5 Claims. (CL 210—51)

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This invention relates to new and useful improvements and structural refinements in centrifugal separators, and the principal object of the invention is to provide a device of the character herein described, such as may be conveniently and effectively employed for the separation or removal of sand, metal, stones and other foreign material from wood pulp used in the manufacture of paper.

A further object of the invention is to provide a centrifugal separator which includes in its construction a rotatable centrifugal drum of novel design.

Another object of the invention is to provide a centrifugal separator which is simple in construction, which will function satisfactorily for a considerable period of time without attention, and from which the foreign matter or residue may be easily and conveniently extracted.

An additional object of the invention is to provide a centrifugal separator which will readily lend itself to economical manufacture and which is otherwise well adapted for the purpose for which it is intended.

With the above more important objects in view, and such other objects as may become apparent as this specification proceeds, the invention consists essentially of the arrangement and construction of parts as illustrated in the accompanying drawings, in which:

Figure 1 is a cross sectional elevational view of the invention;

Figure 2 is a cross sectional view, taken substantially in the plane of the line 2—2 in Figure 1, and

Figure 3 is a cross sectional view, taken substantially in the plane of the line 3—3 in Figure 1.

Like characters of reference are employed to designate like parts in the specification and throughout the several views.

Referring now to the accompanying drawings in detail, the invention consists of a centrifugal separator designated generally by the reference character 10, the same embodying in its construction a substantially cylindrical housing 11 comprising a tubular mid portion 12, the housing 11 being disposed in a substantially upright position and the mid portion 12 including upper and lower flanges 13, 14 respectively, as will be clearly apparent from the accompanying drawings.

The housing 11 also includes a head or cover member 15 which, being provided with an annular flange 16, is separably attached to the

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forementioned flange 13 by means of a plurality of bolts or studs 17, a suitable gasket 18 being interposed between the flanges 13, 16, for obvious reasons.

5 The housing 11 also includes what may be referred to as a sediment pit 19 equipped with an annular flange 20, this, in turn, being detachably secured by means of the bolts 21 to the aforementioned flange 14 of the housing portion 12. As is shown in Figure 1, a suitable gasket 22 is provided between the flanges 14, 20.

10 The lower end of the sediment pit 19 is formed integrally with an annular flange 23 which, in turn, is provided with a plurality of downwardly and outwardly extending legs 24, secured to the flange 23 as at 25. By virtue of this arrangement, the entire separator is supported in a substantially upright position, as shown.

20 A drain passage or tube 26 is provided in the lower end of the pit 19, the passage 26 being equipped with a drain valve 27, the purpose of which will be hereinafter more fully explained.

25 The essence of novelty in the invention resides in the provision of a rotatable separating drum designated generally by the reference character 28, this embodying in its construction a shaft 29 disposed concentrically in the housing and rotatably journaled in a suitable bearing 30 with which the head 15 is formed.

30 The shaft 29 is, of course, disposed in an upright position, and the upper end portion thereof carries a suitable drive pulley 31 which is connected by means of an endless belt 32 to an electric motor, or the like, by which the separator is driven.

35 Two sets or assemblies of propelling blades 33 are secured in spaced relation to the shaft 29, each of these sets or assemblies consisting of a plurality of radially projecting, angularly offset fins 34 which are rigidly secured by welding, or the like, to a collar 35 mounted upon the shaft 29.

40 What will be hereinafter referred to as the inner tube 36 is rigidly secured to the fins or blades 34, the tube 36 being open-ended and defining what may be called an inner chamber 37. It should be noted that the lower end portion of the tube 36 terminates in a substantially frusto-conical member 38 which, in turn, communicates with the sediment pit 19.

45 A series of spaced, radially projecting agitator blades 39 are rigidly mounted on the outer surface of the inner tube 36, and an open-ended outer tube 40 is rigidly secured to the blades 39

substantially as shown in the accompanying drawings.

It will be apparent from the foregoing that the tubes 36 and 40 coact to form what may be referred to as an annular outer chamber 41 which is concentrically disposed with respect to the inner chamber 37. Moreover, it will be observed that the various components which comprise the drum 28 are secured together in such manner that the shaft 29, the propelling blades 33, the inner tube 36, the agitating blades 39 and the outer shell 40 are rotatable as a unit.

If desired, bearing surfaces 42, 43 may be provided in the housing 11 so as to facilitate free rotation of the drum assembly 28 in the housing.

An inlet 44 is provided in the head 15, the inlet 44 being screw threaded so as to receive a suitable delivery tube or pipe 45, and attention is particularly directed to the fact that this inlet communicates directly with the outer chamber 41.

Similarly, the inner chamber 37 communicates with an outlet 46 which is also formed in the head 15 and communicates with an outlet tube or pipe 47. However, it should be observed that both the chamber 37 as well as the chamber 41 communicate with the sediment pit 19 at the lower end of the housing 11, as is best shown in Figure 1.

When the invention is placed in use, the supply of wood pulp, or the like, is delivered through the inlet tube 45 into the outer chamber 41 while the drum assembly 28 is rotated by means of the pulley and belt drive 31, 32.

The "thickness" 48 of the chamber 1 is rather small, so that the pulp which is delivered into the chamber will assume the form of a thin annular layer, from which, when the drum assembly 28 rotates at high speed, particles of foreign matter will be extracted by centrifugal force and deposited on the inner surface of the outer tube 40.

In any event, both the wood pulp and the foreign matter will eventually gravitate downwardly into the sediment pit 19, and while the foreign matter, being somewhat heavier, will remain in the pit, the wood pulp will be urged upwardly into the inner chamber 37 by the rotating blades 33. In this inner chamber, the centrifugal extracting action will again take place, the foreign matter being "thrown" against the inner surface of the inner tube 36, and subsequently dropping into the pit 19, while the cleaned wood pulp will be delivered into the upper end of the chamber 37 and outwardly through the outlet tube 47.

Needless to say, the particles of foreign matter which are deposited in the sediment pit 19 may be periodically removed or extracted by simply opening the valve 27.

It is believed that the advantages and use of the invention will be clearly understood from the foregoing disclosure and accordingly, further description thereof at this point is deemed unnecessary.

While in the foregoing there has been shown and described the preferred embodiment of this invention it is to be understood that minor changes in the details of construction, combina-

tion and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

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

1. In a centrifugal separator, the combination of a vertically elongated housing, a rotatably mounted tubular member disposed in a substantially vertical position in said housing and defining an inner chamber having open upper and lower ends, a plurality of radial propelling blades provided in said inner chamber, a plurality of radial agitating blades provided on the outer surface of said member, an open ended outer tube secured to said agitating blades and coacting with the tubular member to provide an annular outer chamber, a material inlet and outlet provided on said housing and communicating with upper ends of the respective outer and inner chambers, a sediment pit provided in said housing and communicating with the lower ends of said chambers, and means for rotating said member.

2. The device as defined in claim 1 wherein said means include a drive shaft extending axially in said inner chamber, said propelling blades securing said member to said shaft.

3. The device as defined in claim 1 wherein said propelling blades are arranged in two spaced sets, each set being disposed in one end of said inner chamber.

4. The device as defined in claim 1 wherein said agitating blades extend longitudinally from one end of said outer chamber to the other.

5. In a centrifugal separator, the combination of a vertically elongated housing, an upright drive shaft rotatably mounted in said housing, two vertically spaced sets of radial propelling blades secured to said shaft, a tubular member surrounding said shaft and having its upper and lower end portions secured to said sets of propelling blades, said member defining an inner chamber having open upper and lower ends, a plurality of radial agitating blades extending longitudinally on the outer surface of said member, an open ended outer tube surrounding said member and secured to said agitating blades, said outer tube coacting with said member to provide an annular outer chamber, the upper end portion of said housing being provided with a material inlet and outlet communicating with the upper ends of the respective outer and inner chambers, a sediment pit provided in the lower end portion of said housing and communicating with the lower ends of said chambers, and means for rotating said shaft.

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