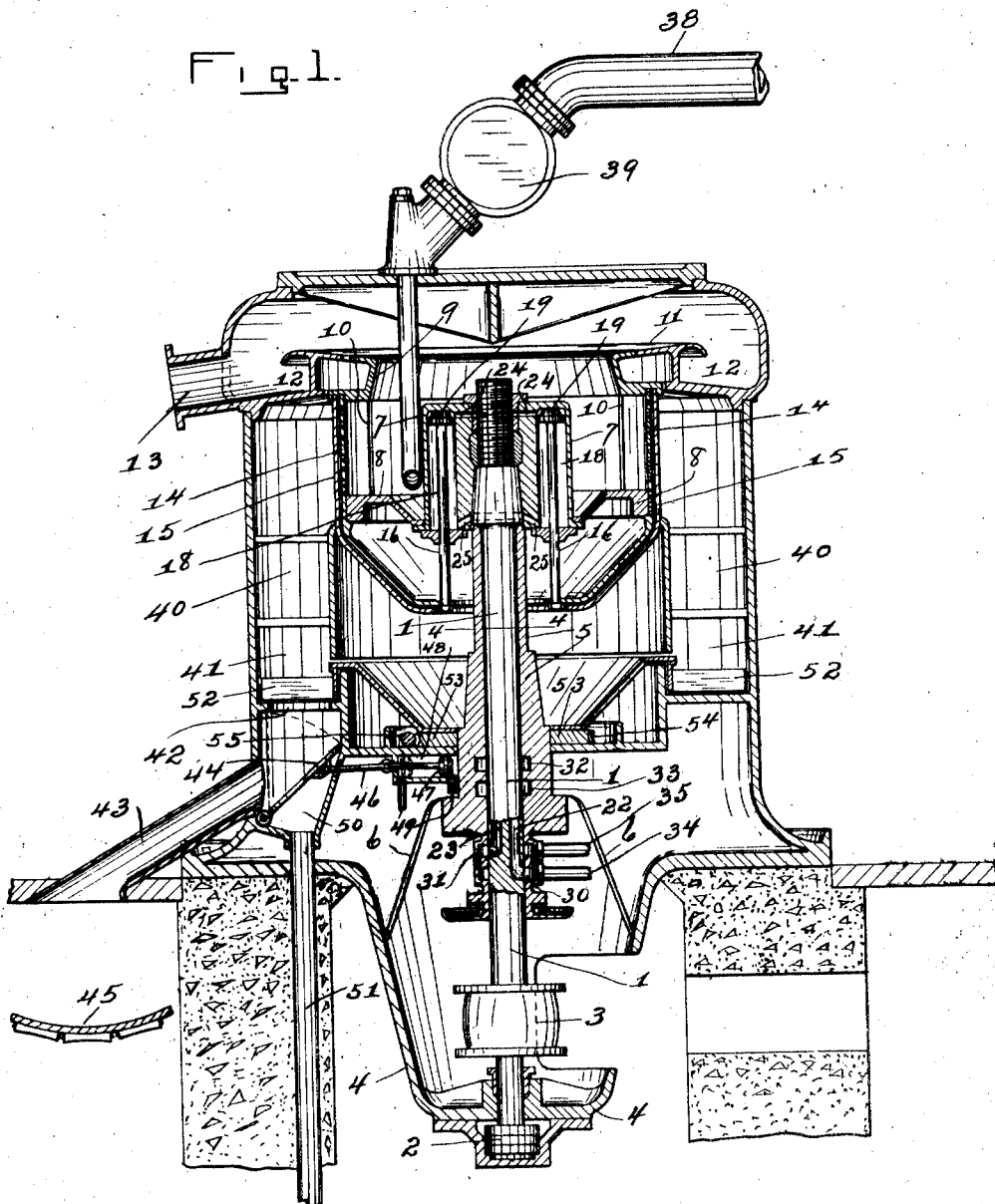


E. A. TOUCEDA.
CENTRIFUGAL MACHINE.
APPLICATION FILED NOV. 24, 1920.

1,401,291.

Patented Dec. 27, 1921.

3 SHEETS—SHEET 1.



Inventor:
Enrique A. Touceda
By
Frank C. Curtis
Attorney

E. A. TOUCEDA.
CENTRIFUGAL MACHINE.
APPLICATION FILED NOV. 24, 1920.

1,401,291.

Patented Dec. 27, 1921.

3 SHEETS—SHEET 2.

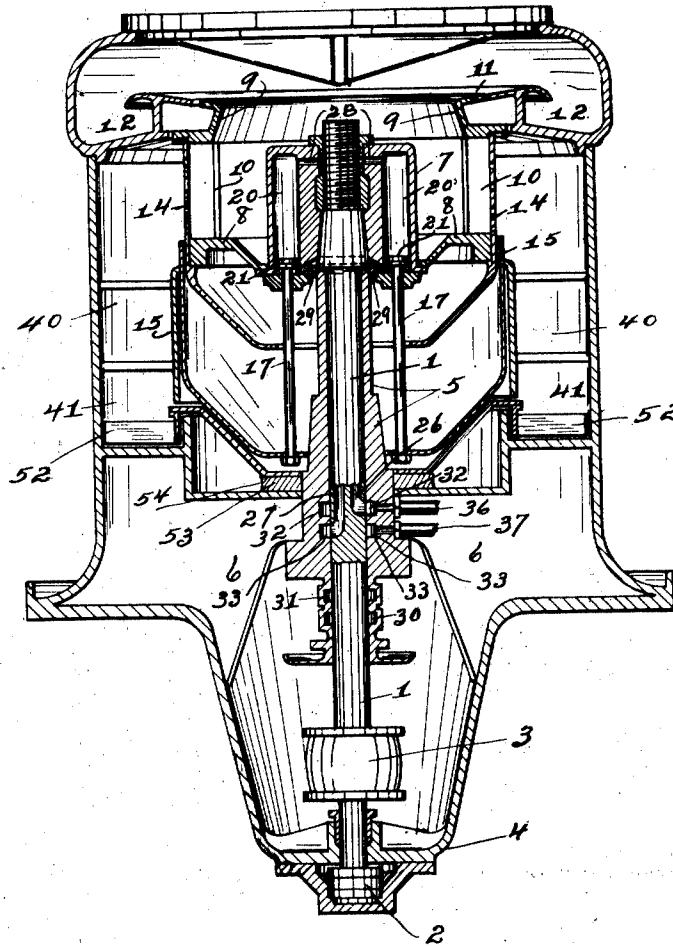


Fig. 2.

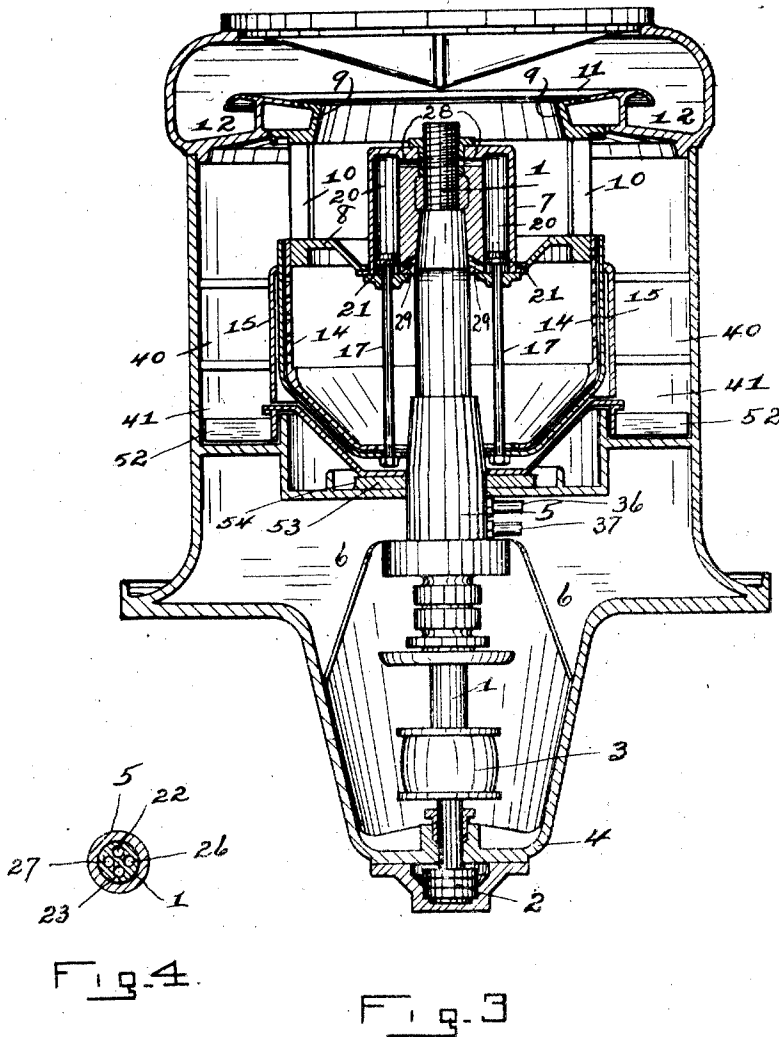
Inventor:
Enrique A. Touceda
By
Frank C. Curtis
Attorney

E. A. TOUCEDA.
CENTRIFUGAL MACHINE.
APPLICATION FILED NOV. 24, 1920.

1,401,291.

Patented Dec. 27, 1921.

3 SHEETS—SHEET 3.



Inventor:
Eugene A. Touceda
By
Frank L. Curtis
Attorney

UNITED STATES PATENT OFFICE.

ENRIQUE A. TOUCEDA, OF ALBANY, NEW YORK.

CENTRIFUGAL MACHINE

1,401,291.

Specification of Letters Patent. Patented Dec. 27, 1921.

Application filed November 24, 1920. Serial No. 426,202.

To all whom it may concern:

Be it known that I, ENRIQUE A. TOUCEDA, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented new and useful Improvements in Centrifugal Machines, of which the following is a specification.

Reference may be had to the accompanying drawings, and the reference characters marked thereon, which form a part of this specification. Similar characters refer to similar parts in the several figures therein.

Centrifugal machines for separating liquid from solid substances may be classified generally as of two types.

In one type, the separating chamber is inclosed by a substantially solid or imperforate circumferential wall against which the solid material is impacted by centrifugal force, while the liquid is by centrifugal force and the form of the chamber caused to rise and overflow from the chamber.

In this type of machine a large proportion of the liquid may be very quickly separated from the solid material but a thorough separation of the liquid from the solid material cannot be accomplished.

In the other type of machine the separating chamber is inclosed by a perforate circumferential wall against which the solid material is impacted by centrifugal force, while the liquid passes by centrifugal force outwardly through the perforations of said wall.

In this type of machine the perforations are almost immediately obstructed by the building up upon the inner side of the inclosing wall of a layer of solid material so that the elimination of the liquid is greatly retarded in passing through said layer of solid material, although eventually the liquid can be more effectively separated from the solid material than with the type of machine first above described.

The principal object of the present invention is to combine in a single centrifugal machine the substantial advantages of the two types of centrifugal machine above described.

Other objects will appear in connection with the following description.

Figure 1 of the drawings is an axial section of a centrifugal machine embodying my invention, showing both the perforate

circumferential wall and the imperforate circumferential wall in position to inclose the separating chamber.

Fig. 2 is a similar section taken on a plane at right angles to the plane of the section of Fig. 1, showing the imperforate circumferential wall moved down below the plane of the separating chamber.

Fig. 3 is a view similar to Fig. 2, showing both the perforate circumferential wall and the imperforate circumferential wall moved down below the plane of the separating chamber.

Fig. 4 is a cross section taken on the broken line 4—4 in Fig. 1.

Referring to the drawings in which the invention is shown in preferred form, the main rotating parts of the machine are carried by a central vertical shaft, 1, supported at its lower end in any suitable form of step-bearing, 2, which shaft has suitable driving connections as a pulley, 3, whereby power may be transmitted to drive the shaft at a high speed. The step-bearing, 2, is located in a base-portion, 4, of the casing of the machine.

Above the pulley, 3, the shaft, 1, is further rotatively supported by a sleeve-bearing, 5, which bearing is carried by the casing of the machine through the medium of a plurality of braces, 6, in the form of a spider.

Upon the upper end of the shaft, 1, is fixedly mounted a hub, 7, upon which is fixedly mounted the bottom, 8, of the separating chamber of the machine.

The upper open end of the chamber is surrounded by a circular lip, 9, supported from the bottom, 8, by means of upright ribs, 10.

Surrounding the open mouth of the separating chamber is an apron, 11, over which liquid forced upwardly out of the separating chamber over the lip, 9, overflows into a gutter, 12, the gutter and apron, 11, being formed as part of the casing.

The liquid escapes from the gutter, 12, through an outlet, 13.

The separating chamber is inclosed by two circumferential walls, 14 and 15, the inner wall, 14, being a perforate wall while the outer wall, 15, is imperforate. These circumferential walls are separately movably mounted upon and carried by the hub, 7, the inner wall, 14, by means of two piston-rods, 16, and the outer wall, 15, by means of two piston-rods, 17.

The piston-rods, 16, are located diametrically opposite each other, and extend within the respective cylinders, 18, formed in the hub 7, and have fixed upon their upper ends
 5 pistons, 19, fitting the respective cylinders, 18.

The piston-rods, 17, are located diametrically opposite each other in a plane at right angles to the plane of the piston-rods, 16,
 10 and they extend within the respective cylinders, 20, formed in the hub, 7, and have fixed upon their upper ends pistons, 21, fitting the respective cylinders, 20.

By vertical movement of the pistons, 19, the perforate inner wall, 14, can be moved to and from a position inclosing or surrounding the separating chamber, and by similar movements of the pistons, 21, the outer imperforate wall, 15, can be moved to
 20 and from a position surrounding or inclosing the separating chamber.

The circumferential walls, 14 and 15, of the separating chamber may be separately moved to and from a position inclosing or
 25 surrounding the chamber in any known manner.

I prefer however to operate them by means of liquid pressure applied under suitable control to the pistons, 19 and 21. For
 30 this purpose I provide in the shaft, 1, two longitudinal ducts, 22 and 23, communicating, the duct, 22, through laterals, 24, with the upper ends of the respective cylinders, 18, and duct, 23, through suitable laterals,
 35 25, with the lower ends of said cylinders respectively; and I also provide the shaft, 1, with two other longitudinal ducts, 26 and 27, communicating, the duct, 26, through laterals, 28, with the upper ends of the
 40 respective cylinders, 20, and the duct, 27, through suitable laterals, 29, with the lower ends of said cylinders, respectively.

The lower end of the duct, 22, opens laterally into an angular oil chamber, 30, and lower end of duct, 23, opens into a similar annular oil chamber, 31, these oil chambers being formed within the sleeve-bearing, 5.

The lower end of duct, 26, opens laterally into an annular oil chamber, 32, and the lower end of duct, 27, opens laterally into a similar oil chamber, 33, said oil chambers being also formed within the sleeve-bearing, 5.

Pipes, 34, 35, 36 and 37, communicate respectively with the oil chambers, 30, 31, 32 and 33, which pipes communicate with a supply, not shown, of liquid, preferably oil, under pressure, and which pipes are controlled by suitable valves or other controlling mechanism not shown.

It will be seen that by properly controlling or regulating the supply of oil under pressure to the respective oil chambers, 30,
 65 31, 32 and 33, the inner and outer circum-

ferential walls, 14 and 15, of the separating chamber may be raised and lowered to and from a position in which they inclose the chamber.

Mixed liquid and solid matter to be separated is supplied to the separating chamber by means of a supply-pipe, 38, controlled by a valve, 39.

The operation of the apparatus is as follows:

Oil under pressure being supplied to the oil chambers, 31 and 33, causes both sets of pistons 19 and 21, to be forced to the upper ends of their respective cylinders in the hub, 7, and thereby causes both circumferential walls, 14 and 15, to be raised and be maintained raised to a position circumferentially inclosing the separating chamber.

The shaft, 1, being rapidly rotated, a supply of mixed liquid and solid matter is fed into the separating chamber through the pipe, 38, and is immediately acted upon by centrifugal force which throws the solid matter outwardly against the inner perforate wall, 14, while the liquid matter tends to rise within the separating chamber as it cannot escape through the imperforate circumferential wall, 15.

The water is thus caused by the centrifugal force to pass upwardly over the lip, 9, and aproh, 11, into the gutter, 12, from which it escapes through the outlet, 13.

When the capacity of the separating chamber has been reached the supply through the pipe, 38, is shut off; and when as much of the liquid as possible has been expelled through the open upper end of the chamber, the outer circumferential wall, 15, is forced downward to the position shown in Fig. 2, by applying the oil pressure through the oil chamber, 30, and withdrawing it from the oil chamber, 31, thus applying the oil pressure to the upper ends of the cylinders, 20, and forcing the pistons, 21, downward, thereby withdrawing the imperforate circumferential wall, 15, below the plane of the separating chamber.

The operation of the machine is thereafter continued causing the remaining water to be expelled by centrifugal force out through the mass of solid material previously impacted against the inner side of the perforate circumferential wall, 14.

When the moisture has been thus extracted to the desired degree the circumferential wall, 14, is forced downward by applying the oil pressure to the oil chamber, 32, and withdrawing it from the oil chamber, 33, thereby withdrawing said perforate wall below the plane of the separating chamber to the position shown in Fig. 3.

As the solid matter which was impacted against the perforate wall, 14, is thus freed from the support of said wall it is thrown outwardly into the space, 40, between the in-

70

75

80

85

90

95

100

105

110

115

120

125

130

ner and outer walls of the casing and falls into a trough, 41, at the lower end of said space from which it escapes through a bottom opening, 42, in said trough, and an outlet-pipe, 43, into which it is guided by a chute, 44, and from which it is delivered upon a conveyer, 45, or other receptacle.

The chute, 44, can be moved by means of a link connection, 46, with a piston, 47, reciprocatory in a cylinder, 48, to the opposite ends of which cylinder oil or other fluid under pressure is supplied through pipes, 49, to move the piston in the desired direction.

Beneath the opening, 42, a well, 50, is formed in the casing from the bottom of which leads an outlet-pipe, 51, for the escape of water from the well.

During the separating operation the chute, 44, is moved out of the path of matter falling through the opening, 42, to permit the free escape of any water which may find its way into the trough, 41.

After the water is extracted and it is desired to deliver the solid material from the separating chamber, the chute is moved to a position extending obliquely beneath the opening, 42, to receive the solid material and direct it into the pipe, 43.

The solid material which falls into the trough, 41, is carried around the trough to the opening, 42, by means of paddles or sweeps, 52, carried by a hub, 53, in fixed relation to a worm-wheel, 54, in engagement with a worm, 55, which may be operated in any known manner.

It will thus be seen that during the first part of the separating operation I am able to extract a large proportion of the liquid with the same facility as with a separating machine having an imperforate circumferential wall, and that I am then able to complete the separating operation to the same degree as with a machine having a perforate circumferential wall.

I am thus able to greatly expedite the separation of liquid from solid matter to a high degree because the operation can be completed in a single machine much more quickly than the same degree of separation could be accomplished with the perforate-cylinder machines heretofore used, and without the time and expense required to transfer wet stock from an imperforate-cylinder machine to a perforate-cylinder machine to complete the separation to the same high degree.

The machine can be continuously operated as successive supplies of mixed liquid and solid matter are delivered to the separating chamber, separated and delivered from the separating chamber.

The imperforate wall, 15, forms in effect a blind for the openings in the perforate wall, 14; and for certain purposes of the invention, blind-mechanism of any known

form may be employed for temporarily closing the openings through the perforate wall, 14.

The walls, 14 and 15, are preferably of complete circular form in horizontal section, but the extent of the perforate and imperforate areas is immaterial for certain purposes of the invention provided the perforations can be temporarily closed or blinded to permit the extraction of the liquid by vertical displacement when desired.

A further feature of my invention consists in the method of separation above disclosed whereby a wall of solid material is centrifugally built-up while escape of the liquid through the wall is prevented and some liquid is centrifugally separated and removed by vertical displacement, and completing the separation by centrifugally expelling additional liquid through said built-up wall of solid material.

By the term perforate applied to the circumferential wall of the separating chamber, I mean of such construction as to freely permit the passage of liquid therethrough while obstructing the passage of solid material carried by the liquid; and by the term imperforate applied to such a wall, I mean of such construction as to prevent or substantially prevent the passage of liquid therethrough whereby said imperforate wall is adapted to serve as a blind to substantially prevent the passage of liquid through the neighboring perforate wall.

For certain purposes of the invention it is immaterial which of the perforate and imperforate walls is the inner wall and which the outer wall of the separating chamber; but for convenience of construction I prefer to have the perforate wall located within the imperforate wall whereby both walls can be moved into and out of position by like movements, thus leaving one end of the separating chamber practically unimpeded by wall-operating-mechanism, and permitting free escape for the water separated by vertical displacement.

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

1. A centrifugal machine having a rotatory container with two circumferential walls, one perforate and the other imperforate, and means for moving the imperforate wall out of the plane of rotation of the chamber of the container.

2. A centrifugal machine having a rotatory container with two circumferential walls, one perforate and the other imperforate, and means for moving each of said walls out of the plane of rotation of the chamber of the container.

3. In a centrifugal machine, and in combination, a container with two circumferential walls, one perforate and the other imperforate; piston-mechanism for moving

said walls separately into and out of position to inclose the chamber of the container; a rotatory shaft carrying said container with its two walls and said piston-mechanism; and
5 ducts within said shaft for supplying fluid under pressure to said piston-mechanism.

4. In a centrifugal machine and in combination, a rotatory container with two circumferential walls one perforate and the
10 other imperforate; means for moving each of said walls out of the plane of rotation of the chamber of the container; means for delivering from the machine liquid centrifugally separated by vertical displacement
15 from the container; and means for delivering from the machine liquid centrifugally separated through said perforate wall, and solid matter centrifugally forced from the container when said walls are moved out of
20 the plane of rotation of the chamber of the container.

5. In a centrifugal machine and in combination, a rotatory container with two circumferential walls, one perforate and the
25 other imperforate; means for moving each of said walls out of the plane of rotation of the chamber of the container; means for delivering from the machine liquid centrifugally separated by vertical displacement

from the container; a receptacle surrounding the container provided with a liquid outlet and an outlet for solid material; and valve-mechanism whereby said outlets can be alternately opened. 30

6. That improvement in the art of separating liquid from solid substances which consists in centrifugally building up a wall of solid material while preventing the passage of liquid therethrough and centrifugally separating and removing liquid by
35 vertical displacement, and completing the separation by centrifugally expelling additional liquid through said built-up wall of solid material. 40

7. That improvement in the art of separating liquid from solid substances which consists in centrifugally impacting a body of solid material upon a perforate wall while escape of liquid through the wall is prevented and liquid is centrifugally separated and
45 removed by vertical displacement, and completing the separation by centrifugally expelling additional liquid through the impacted body of solid material and the perforate wall. 50

In testimony whereof, I have hereunto set my hand this 18th day of November, 1920. 55

ENRIQUE A. TOUCEDA.