B. HOFFMAN.

CENTRIFUGAL SEPARATING MACHINE.

APPLICATION FILED OCT. 24, 1911.

1,101,549. Patented June 30, 1914.

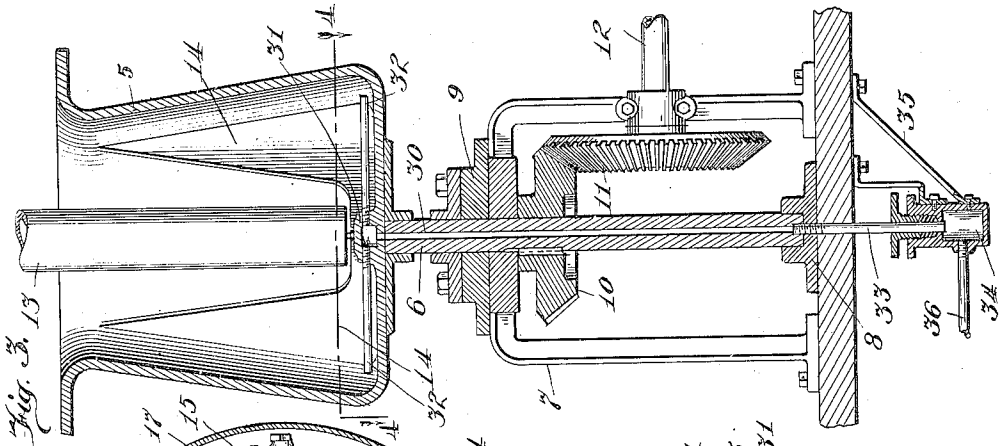


Fig. 3.

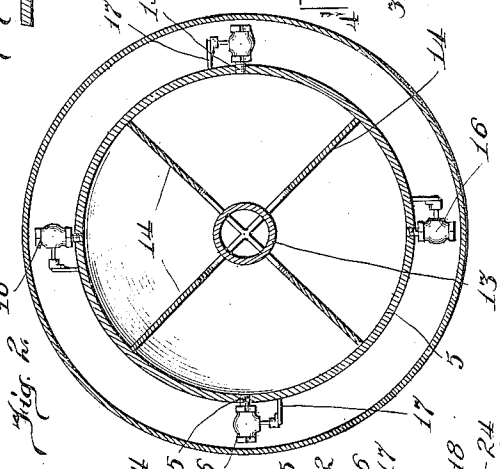


Fig. 2.

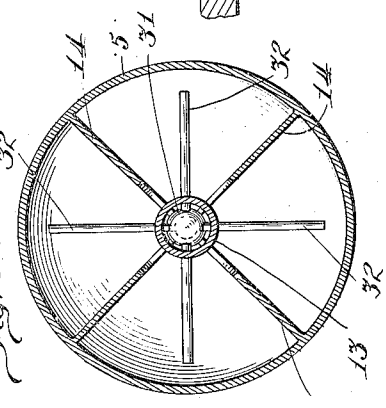


Fig. 4.

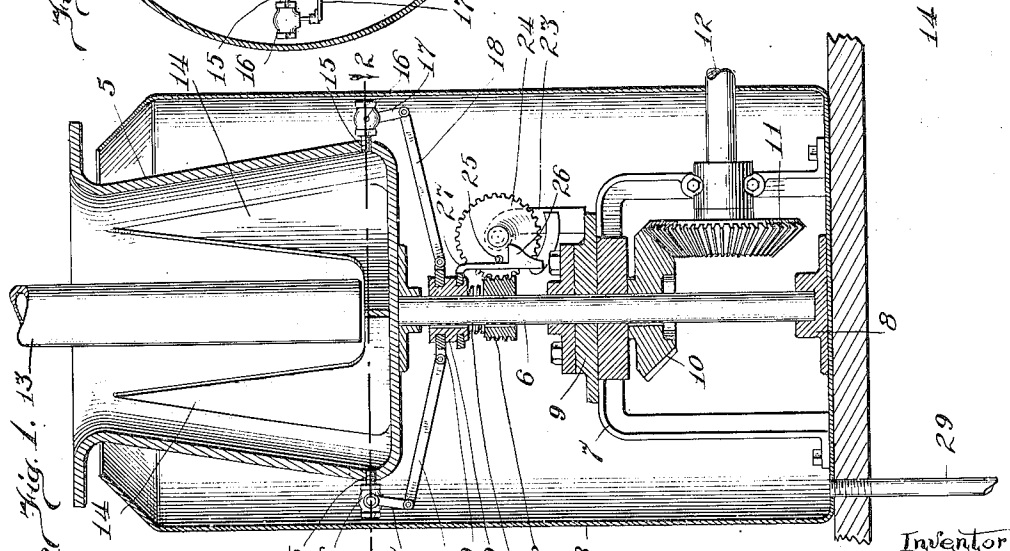


Fig. 1.

Witnesses
Milton Lencir
Florence A. Fisell

Inventor
Balthasar Hoffman,
By Heidman & Street.
Attorneys

UNITED STATES PATENT OFFICE.

BALTHASAR HOFFMAN, OF TOPEKA, KANSAS.

CENTRIFUGAL SEPARATING-MACHINE.

1,101,549. Specification of Letters Patent. Patented June 30, 1914.

Application filed October 24, 1911. Serial No. 656,351.

To all whom it may concern:

Be it known that I, BALTHASAR HOFFMAN, a citizen of the United States, and resident of Topeka, in the county of Shawnee and State of Kansas, have invented certain new and useful Improvements in Centrifugal Separating-Machines, of which the following is a description, reference being had to the accompanying drawing, which forms a part of my specification.

My invention relates to a machine whereby the constituents of a fluid mixture, which are of different specific gravity, may be separated by centrifugal force, and the separated elements or portions will be separately discharged therefrom, so that they may be conveyed to any suitable point; the machine being adapted to cause the separation of the heavier particles from the lighter, as for example, the separation of solids or sediment from water, oil from water, or in connection with any other fluids or gases wherein the different constituents vary in density or specific gravity, as will be more fully understood from the following detailed description.

In the drawing:—Figure 1 is a vertical sectional view of one form of my invention. Fig. 2 is a cross sectional view taken on the line 2—2 of Fig. 1, looking downward. Fig. 3 is a vertical sectional view of a modified form of my invention. Fig. 4 is a cross sectional view taken on the line 4—4 of Fig. 3.

My invention relates to a machine which may be continuously operated, and consists more particularly in providing a bowl or vessel 5, which is preferably pear or bell shaped and having an open top where the side walls are preferably flared outwardly at an angle to the sides as clearly shown in the drawing. In order that the material or matter, which will be thrown toward and against the inner periphery of the vessel by the action of centrifugal force, may be maintained adjacent to the periphery until the same is discharged, I prefer to shape the vessel as previously stated so that the greatest diameter of the vessel will be at the bottom thereof, with the side walls converging toward the open top, as clearly shown in the drawing. The vessel 5 is properly secured to a shaft 6 so as to rotate therewith, the shaft having suitable bearings in the bracket or standard 7 with the lower end of the shaft having proper bearing and support in the block 8; the bracket or standard 7 being provided with suitable blocks or collars as at 9 to afford proper bearing for the shaft. Keyed or otherwise secured to shaft 6 is a beveled gear 10, which meshes with a beveled gear 11, which latter is secured to a power shaft 12 which extends through and has bearing in the side of the bracket or support 7. Extending down into and terminating in proximity to the bottom of the vessel, is a pipe 13, whereby the fluid mixture to be treated is conveyed to the vessel 5.

The vessel 5 is provided with the triangular or wedged shaped webs or baffle members 14, the apex of the triangle being at the upper part of the bowl and against the side walls thereof as shown in Fig. 1; these baffle members are preferably placed in a radial manner about the vessel, see Fig. 2, and may be made integral with the side walls and bottom of the vessel. With the baffle members constructed as shown and described, the mixture discharged into the vessel through pipe 13 will be caused to revolve at the same or substantially the same speed as the peripheral velocity of the vessel. At the point of maximum diameter of the vessel, I provide it with orifices or ports as at 15, which are preferably provided with suitable valves 16 whereby the outflow of the material gathered at this point of the vessel can be controlled. In the construction shown in Fig. 1, I show the stems of the valves provided with links 17, which are pivotally secured to the levers 18, whose opposite ends are pivotally secured to a collar 19, which is preferably secured to a sleeve 20 by being inserted within a circumferential groove. It is understood, however, that the collar may be secured to the sleeve in any other suitable manner. The sleeve 20 is slidably mounted on the shaft 6 and is held upward in normal position by coil spring 21, which latter bears against a worm gear 22, which is keyed or properly secured to shaft 6 so as to rotate therewith. Mounted in a suitable bracket 23, which may rest on the standard or support 7, is a gear 24, which meshes with worm gear 22. The gear 24 is provided on its side and at a suitable point with a pin 25, which is adapted to engage with the lug 26, preferably formed integral with the depending arm 27. This arm may either be made integral with or otherwise secured to sleeve 20, so that when gear 24 is revolved sufficiently, pin 25 will engage lug 26 and thereby depress sleeve 20 against the

action of spring 21. By reason of the connection between sleeve 20 and collar 19, it is evident that the downward movement of sleeve 20 will draw levers 18 downwardly and cause links 17 to swing toward the vessel and thereby actuate valves 16.

In the operation of my machine, the impure mixture to be treated is fed through pipe 13, into the bottom of vessel 5, where the baffle members 14 will cause the mixture to revolve with the vessel. In addition to the separation of the constituents of different specific gravity, by the action of centrifugal force, these members will cause the mixture to assist in the rotation of the vessel. With the vessel revolving at a sufficient speed, the heavier constituents or portions of the mixture will move toward the bell or maximum periphery of the vessel, adjacent to the bottom thereof, while the lighter material will flow upward in closer proximity to the axis of the vessel and finally be discharged at the minimum periphery of the vessel through the open top. In order that the discharged or lighter material may be directed away from the vessel, I provide the top of the vessel with the flanged or flared rim as previously described, and surround the vessel beneath the flanged top with a casing 28 of any suitable construction, the upper end thereof being preferably contracted as shown in the figure so as to extend beneath the flanged top of the vessel and in proximity to the side walls thereof. The continuous operation of the machine will, of course, through the action of worm gears 26 and 24, compel pin 25 to force sleeve 20 downwardly and thereby actuate the levers 18 which in turn will open valves 16 and thus allow the heavier separated material, which has gathered in the vessel at the point of its greatest diameter, to be discharged through the valves.

Any suitable mechanism may be employed whereby the discharged heavier material may be concentrated and conveyed to any desired point; in the construction shown in the drawing, the heavier material will discharge against the side walls of casing 28 and fall to the bottom of the casing, from whence it may be conducted by pipe 29 to the point desired.

Where the vessel 5 is provided with the wedge shaped or triangular webs or baffle members, thus dividing the lower part of the vessel into different compartments, it will be necessary to employ as many outlets or valves as there are compartments in the vessel; a greater number of outlets may be used if desired. If desired, the lower part of the webs or baffle members need not be made contiguous with the side walls at the point of the greatest diameter of the vessel, but formed to produce a passage from one compartment to the other, so that the heavier material which will crowd at this point, may have independent or differential movement by a slight creeping of the material from one compartment to the other, and thus keep the heavier material sufficiently stirred up or agitated in order that a proper discharge thereof may be obtained.

Instead of using the means shown in Fig. 1, whereby the heavier material is discharged from the vessel, the method illustrated in Figs. 3 and 4 may be employed, which consists in providing shaft 6 either with a longitudinal opening as at 30, or with a concentric pipe leading therethrough and extending through the bottom of vessel 5 and into communication with the cup or coupling 31 which is provided with the radially extending tubes or pipes 32; the outer orifices of pipes or tubes 32 being in proximity to the side walls of the vessel at the point of its greatest diameter. The lower end of shaft 6, if the same is provided with a longitudinal opening therethrough, is provided with a discharge pipe 33, which in turn communicates with the chamber 34 of a stuffing-box of any suitable construction whereby a fluid tight joint can be obtained, and which may be secured to the under side of the platform by suitable brackets or hangers as at 35, and the material is discharged from chamber 34 through a suitable pipe 36. As more or less back pressure may be encountered, the heavier portions of the mixture can be drained or withdrawn through tubes or pipes 32 by the action of a pump connected to pipe 36; and pipe 36 may be provided with any suitable valve so as to regulate the outward flow of the heavier material if so desired.

The operation of the machine shown in Fig. 3 is identical with that disclosed in Fig. 1, with the exception of the method employed for the withdrawal of the separated heavier material.

It is apparent from the constructions shown and described that feed pipe 13 may have vessel 5 secured to it and pipe 13 constitute the revoluble shaft, thus obviating the necessity for the additional shaft shown, although I believe the constructions shown and described to be the preferable ones.

With the constructions shown and described, it will be seen that a continuous operating machine may be had, as the lighter material or purified water can be allowed to discharge and flow out at the top of the vessel, and drop into a suitable receptacle beneath the machine; for example, where my improved machine is intended to be used in connection with water tanks or reservoirs, the machine can be mounted on top of the tank or in the reservoir, so that the purified water discharged at the top of the vessel will flow into the tank or reservoir, while

the impure material or sediment will be discharged or withdrawn from the bottom of the vessel and conveyed to a suitable point.

I have shown and described what I believe to be the simplest and best forms of my invention, but the constructions shown and described may be altered in certain details without however departing from the spirit of my invention, and I do not wish therefore to be understood as limiting myself to the exact constructions shown and described, but

What I claim as my invention and wish to secure by Letters Patent is:—

1. A centrifugal separating machine, comprising a rotatable shaft, a vessel of varying diameter secured to the shaft so as to rotate therewith and provided with one or more openings at the point of maximum diameter and having an overflow at the minimum diameter thereof, means whereby the mixture to be treated is introduced into said vessel in proximity to the axis thereof, mechanism whereby the openings at the points of maximum diameter may be controlled, and rotatably mounted means having operative relation with said mechanism, a portion of said means being mounted on said shaft and arranged to move lengthwise thereof, a second portion being arranged to rotate about an independent axis and controlled by the rotation of said shaft, said last mentioned portion being adapted to have operative engagement with the first mentioned portion at predetermined points in the rotation of said last mentioned portion whereby the first mentioned portion will be given movement lengthwise of said shaft and the mechanism controlling the openings in the vessel intermittently operated.

2. A centrifugal separating machine, comprising a rotatably mounted vessel of varying diameter, provided with one or more openings at the point of maximum diameter and having an overflow at the minimum diameter thereof, means whereby the mixture to be treated is introduced into said vessel in proximity to the axis thereof, mechanism whereby the openings at the points of maximum diameter may be controlled, and means operatively connected with said mechanism, a portion of said means being arranged to rotate with the vessel and have movement lengthwise of the axis thereof, and a second portion arranged to rotate about an independent axis and operatively connected with the first mentioned portion whereby predetermined degrees of rotation of the second portion will cause the first mentioned portion to move lengthwise of the axis thereof and intermittently operate said mechanism to effect a discharge of the heavier material from the vessel.

3. A centrifugal separating machine, comprising a rotatably mounted vessel of varying diameter and provided with one or more openings at the point of maximum diameter and having an overflow at the minimum diameter thereof, means whereby the mixture to be treated is introduced into said vessel in proximity to the axis thereof, members radially arranged within the vessel and of widths varying with the diameter of the vessel, means whereby the openings at the points of maximum diameter may be controlled, and rotatably mounted mechanism, a portion whereof is arranged to rotate with the vessel and have operative engagement with said means whereby rotation of the vessel will cause a portion of said mechanism to intermittently operate said means and allow the heavier material to be discharged from the vessel.

BALTHASAR HOFFMAN.

Witnesses:
CLARENCE LESSELS,
E. E. CHAPMAN.