No. 685,558. Patented Oct. 29, 1901.

J. J. BERRIGAN.

CENTRIFUGAL MACHINE.

(Application filed Dec. 26, 1900.)

(No Model.)

Fig. 1.

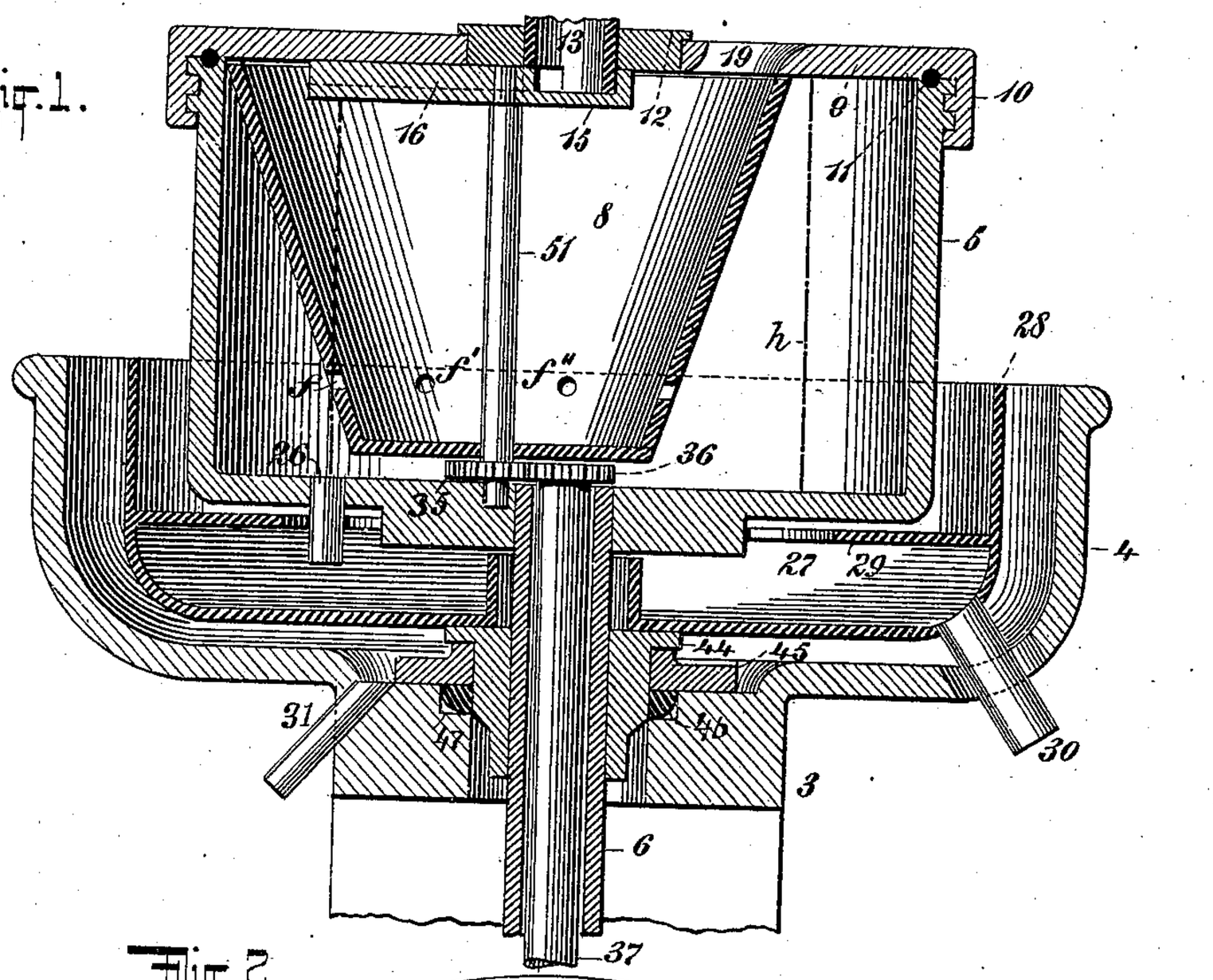
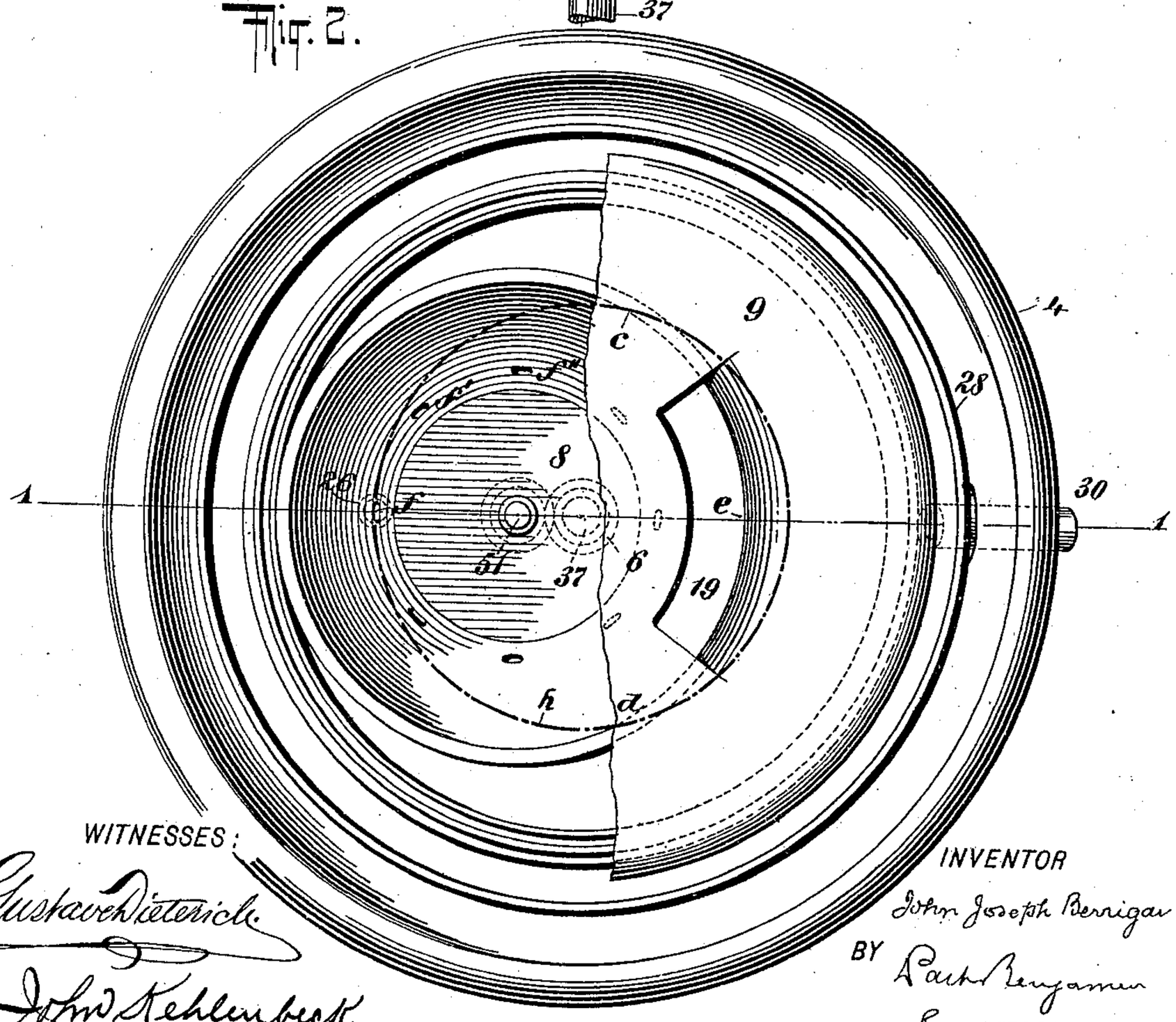


Fig. 2.



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CENTRIFUGAL MACHINE.

SPECIFICATION forming part of Letters Patent No. 685,558, dated October 29, 1901.

Application filed December 26, 1900. Serial No. 41,095. (No model.)

To all whom it may concern:

Be it known that I, JOHN JOSEPH BERRIGAN, of Orange, Essex county, New Jersey, have invented a new and useful Improvement in Centrifugal Machines, of which the following is a specification.

My invention relates to a machine for effecting by the action of centrifugal force the separation of the constituents of a fluid mass and the delivery thereof continuously from the machine during its operation.

My invention consists, broadly, of a centrifugal machine having a receptacle for the combined constituents to be separated rotary on a central axis and means for revolving said receptacle about a parallel axis located within its perimeter; also, in combination, with such a receptacle, of means for removing the combined constituents separately therefrom; also, in the construction of said receptacle in the form of an inverted conical frustum, whereby one constituent to be separated is removed over the upper edge of said frustum by the action of centrifugal force; also, in the combination of the rotary receptacle for the combined constituents to be separated, rotating on a central axis with a drum containing said receptacle and rotating on a parallel and different axis; also, in the various combinations hereinafter more particularly set forth.

In another application for Letters Patent, Serial No. 38,470, series of 1900, filed December 5, 1900, I have made certain claims which broadly cover and include the structure herein disclosed. It is therefore to be understood that the subject-matter of said claims in said application is not herein claimed by me.

In the accompanying drawings, Figure 1 is a vertical section, on the line 1 1, of the upper portion of a centrifugal machine embodying my invention. Fig. 2 is a top view of said machine, showing the cover 9 partly broken away.

Similar characters of reference indicate like parts.

3 is the upper portion of the standard on which the machine is supported, which standard is preferably cast in one piece with the cup 4. Within the cup 4 is the rotary drum 5, which is secured upon the hollow shaft 6. The shaft 6 extends through a gland 44, which rests upon an annular plate 45, secured to the top of standard 3. Beneath said plate is a packing-ring 46, which is received in a recess 47 and which bears against the exterior of the gland 44. The shaft 6, and with it the drum 5, are rotated by any suitable means. In the drum 5 is eccentrically placed the receptacle 8, which is in the form of an inverted conical frustum. The drum 5 and receptacle 8 are closed above by a cover 9, having a flange 10, which is internally threaded to engage with a thread formed on the drum periphery. A gasket 11 may be interposed between cover and drum to make a tight joint. In the cover 9 is a central opening to receive the flanged plug 12, which supports the inlet-conduit 13. Secured on the under side of the cover in any suitable way is a plate 15, having a longitudinal channel 16. (Indicated by dotted lines, Fig. 1.)

The combined constituents to be separated—as, for example, a solid and liquid in fluid mass—are introduced into receptacle 8 through the conduit 13 and thence pass to the channel 16, through which they are ejected (by centrifugal force due to the rotation of the drum 5) against the inner periphery of the receptacle 8, and preferably against that part of said periphery which is farthest from the axis of rotation of said drum. The liquid constituent of the material escapes from the receptacle 8 through one of the openings *f f'*, &c., which are perimetrically disposed in the wall of receptacle 8, and thence into the drum 5. It then flows through tube 26, which extends through the bottom of drum 5, to a stationary pan 27, the periphery 28 of which extends about up to the edge of cup 4. Just below drum 5 this cup has an annular partition 29, through an opening in which the tube 26 passes. The liquid escaping through the tube 26 is therefore delivered into pan 27, whence it flows from the outlet-pipe 30 into any suitable receptacle. The pipe 31, shown communicating with cup 4, serves to remove any liquid which may leak or drain into said cup.

The receptacle 8 is fast upon a shaft 51,

which at its upper end is journaled in the plate 15 and at its lower end in the bottom of drum 5. Between the bottom of the receptacle 8 and the bottom of drum 5 the shaft carries a gear 53, with which engages gear 36 on the upper end of the solid shaft 37, which, as shown, extends through the hollow shaft 6. The shaft 37 is to be rotated in the same direction as the shaft 6 by any suitable means. By reason of the gearing 53 and 36, interposed between shaft 51 and shaft 37, the receptacle 8 will be rotated in a direction relatively opposite to that in which the drum 5 is rotated. In the cover 9 is provided an opening 19, through which the solid separated from the liquid is ejected.

The operation of the machine is as follows: The receptacle 8 rotates on its own axis on shaft 51. That axis being journaled in the drum 5 revolves around the axis of rotation of said drum. The two axes are relatively parallel. The combined constituents, solid and liquid, to be separated being projected, as described, against the inner periphery of receptacle 8 at the part thereof farthest from the axis of rotation of drum 5, the liquid constituent then escapes through that aperture of the series *f f' f''*, &c., which likewise is farthest from said axis of rotation. The liquid then entering the drum 5 forms (by the action of the centrifugal force due to the rotation of said drum) a ring lying against the inner periphery of said drum. The inner boundary of this ring may be represented by the circle *h* in Fig. 2 and the vertical lines *h* in Fig. 1. From Fig. 2 it will be seen that the inner perimeter of said ring (the circle *h*) intersects the inner perimeter of the receptacle 8 at the points *c d* and also passes through the aperture *f*. It is therefore manifest that while the machine is in operation a part of the inner conical surface of the receptacle 8 is immersed in the ring—that is to say, that area of the surface which is measured vertically by the distance from the aperture *f* to the top of receptacle 8 and perimetrically by the arc *c f d*. It is also manifest that all of the remaining inner conical surface of the receptacle 8, and especially that portion which is measured perimetrically by the arc *c e d*, is not immersed in said ring, and hence is substantially dry when the machine is in operation. This area of the inner surface of the receptacle 8 which is measured perimetrically by the arc *c e d* I call hereinafter the "dry surface." When a fluid mass of combined solid and liquid is introduced in the manner above described into receptacle 8, the liquid only escapes through the aperture *f* into drum 5, leaving the solid deposited on that portion of the inner surface of said receptacle perimetrically measured by the arc *c f d*. The receptacle 8, however, has its own motion of rotation about the axis 51 and in the opposite direction to that of the drum 5. One effect of this motion is to constantly change that portion of the periphery of receptacle 8 which is immersed in the liquid ring, or, in other words, to cause the receptacle to rotate with respect to the ring, which with reference to said receptacle may be regarded as fixed. Therefore the solid which is constantly deposited from the ring is continuously carried out of the ring by the revolution of the surface upon which it is deposited, and this surface when it is included in the arc *c e d* becomes a dry surface. Another effect of the individual rotation of the receptacle 8 is that also due to the inclination of the inner periphery of the receptacle 8, whereby the deposited solid is caused by the centrifugal force to move toward the upper edge of the receptacle and when it comes opposite the opening 19 to escape therefrom and out upon the upper surface of the cover 9. This opening 19 is so placed that the solid reaches the dry surface in the receptacle 8 and is exposed thereon before it escapes from said opening. It may traverse any proportion of said dry surface as may be desired, and this proportion may be altered in various ways, as by enlarging or reducing the area of the escape-aperture 19 or varying the circumferential length or by placing it nearer to or farther from either the point *c* or the point *d*.

In order to avoid complication, I have here shown the solid constituent escaping by the opening 19 as simply delivered upon the cover 9.

I claim—

1. In a centrifugal machine, a receptacle for the combined constituents to be separated rotary on a central axis, and a support for said receptacle; the said support being constructed to rotate around an axis parallel to the axis of rotation of said receptacle and included within the perimeter thereof.

2. In a centrifugal machine, a receptacle for the combined constituents to be separated rotary on a central axis, means for introducing said constituents into said receptacle and a support for said receptacle; the said support being constructed to rotate around an axis parallel to the axis of rotation of said receptacle and included within the perimeter thereof.

3. In a centrifugal machine, a receptacle for combined constituents to be separated in the form of an inverted conical frustum rotary on a central axis, and a support for said receptacle; the said support being constructed to rotate around an axis parallel to the axis of rotation of said receptacle and included within the perimeter thereof.

4. In a centrifugal machine, a receptacle for combined constituents to be separated rotary on a central axis and provided with outlets located at points to permit ejection of the constituents separately by centrifugal force, and a support for said receptacle; the said support being constructed to rotate around an axis

parallel to the axis of rotation of said receptacle and included within the perimeter thereof.

5. In a centrifugal machine, a rotary drum and a rotary receptacle for the combined constituents to be separated disposed therein, the said drum and receptacle rotating on parallel and different axes and the said receptacle having an opening in its wall permitting fluid communication with said drum.

6. In a centrifugal machine, a rotary drum and a rotary receptacle for the combined constituents to be separated disposed therein, the said drum and receptacle rotating on parallel and different axes in opposite directions and the said receptacle having an opening in its wall permitting fluid communication with said drum.

7. In a centrifugal machine, a rotary drum and a rotary receptacle for the combined constituents to be separated disposed therein, the said drum and receptacle rotating on parallel and different axes both included within the perimeter of said receptacle, and the said receptacle having an opening permitting fluid communication with said drum.

8. In a centrifugal machine, a receptacle for the combined constituents to be separated, a central shaft supporting said receptacle, a support wherein said central shaft is pivoted, a hollow rotary shaft carrying said support, a rotary shaft extending through said hollow shaft and gearing between said hollow shaft and the central shaft of said receptacle.

9. In a centrifugal machine, the combination of the rotary drum 5 having outlet 26, the cover 9 therefor provided with openings 13 and 19 and the rotary receptacle 8 within said drum having peripherical openings and supported on an axis eccentric to the axis of said drum.

10. In a centrifugal machine, the combination of the drum 5 supported on the rotary hollow shaft 6 and having the outlet 26, the cover 9 for said drum provided with openings 13 and 19, the rotary shaft 37 within shaft 6, receptacle 8 supported on shaft 51 journaled in said drum and provided with peripherical openings, and gears 35 and 36 between shafts 37 and 51.

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Witnesses:
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