No. 750,079. PATENTED JAN. 19, 1904.

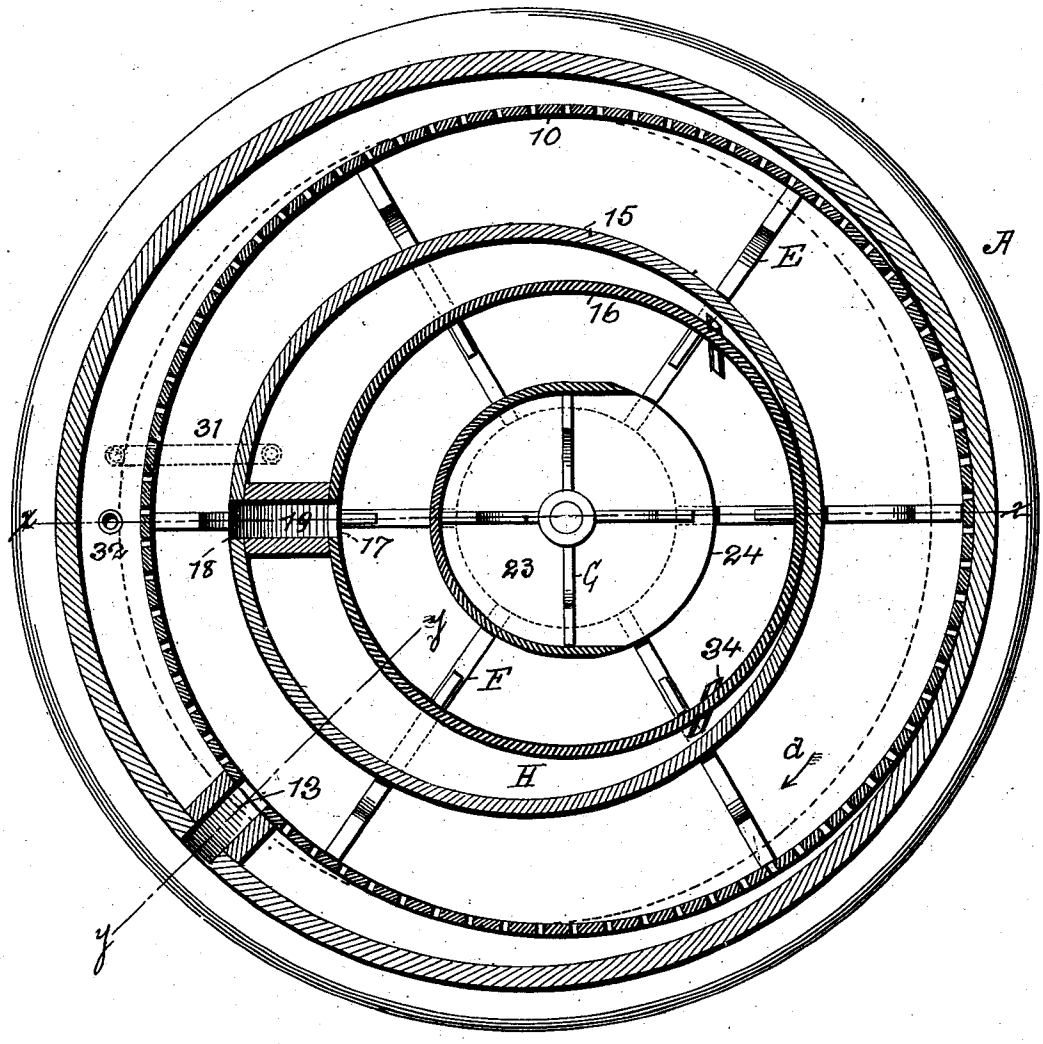
J. J. BERRIGAN.

CENTRIFUGAL MACHINE.

APPLICATION FILED APR. 30, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

FIG. 1.



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NO MODEL. 2 SHEETS—SHEET 2.

FIG. 2.

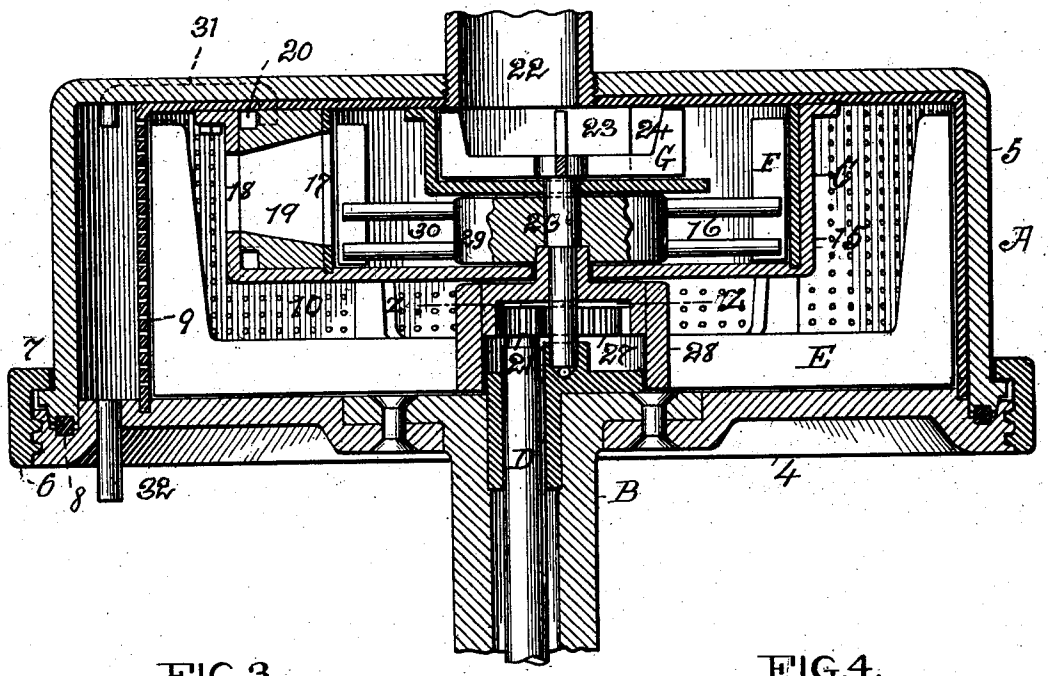


FIG. 3.

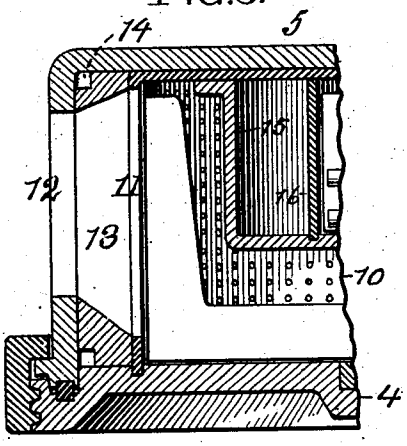
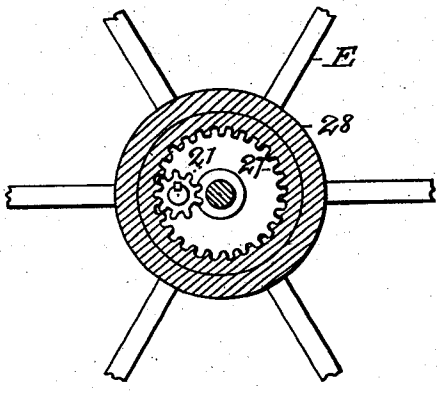


FIG. 4.



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No. 750,079. Patented January 19, 1904.

UNITED STATES PATENT OFFICE.

JOHN JOSEPH BERRIGAN, OF ORANGE, NEW JERSEY, ASSIGNOR TO FRANCIS J. AREND, OF NEW YORK, N. Y., AND JOHN BERNSTROM, OF STOCKHOLM, SWEDEN.

CENTRIFUGAL MACHINE.

SPECIFICATION forming part of Letters Patent No. 750,079, dated January 19, 1904.

Application filed April 30, 1903. Serial No. 155,005. (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 for Separating Solids and Liquids, of which the following is a specification.

The invention relates to a centrifugal apparatus for the separation of solids and liquids, and more particularly to the type of apparatus disclosed in United States Letters Patent No. 677,926, granted to me July 9, 1901.

My present invention consists in a machine in which two separations of the combined materials successively occur, the first separation delivering the solid material with some small residue of moisture and the second separation operating to remove this residue. In this machine the combined materials are treated in two eccentrically-disposed separating vessels arranged one within the other and both placed in a suitable receptacle. The material entering the first vessel undergoes the first separation above noted, and the product of this first separation, passing into the second vessel, undergoes the second separation.

In the accompanying drawings, Figure 1 is a diametral transverse section of the operating parts of my device. Fig. 2 is a vertical section on the line *x x* of Fig. 1. Fig. 3 is a section on the line *y y* of Fig. 1. Fig. 4 is a horizontal section on the line *z z* of Fig. 2.

Similar letters and numbers of reference indicate like parts.

The outer receptacle A is composed of a circular bottom plate 4 and an inverted cup 5. The lower edge of cup 5 is flanged, and the circumference of the bottom plate 4 is threaded to receive a threaded ring 6, the upper flange 7 of which extends over the cup-flange. By means of ring 6 the cup and bottom plate are tightly drawn together, and the joint is packed by a gasket 8 between them.

The receptacle A is centrally supported upon the hollow shaft B, and this shaft is in turn supported upon any suitable standard and rotated by mechanism, all substantially as shown in Letters Patent No. 677,926, granted to me as aforesaid, in connection with the hollow shaft 6 of the apparatus therein disclosed.

Eccentrically disposed within receptacle A and with its edge received in a recess in the bottom plate 4 is an inverted cup 9, the circular wall 10 of which is perforated and forms a partition in said receptacle.

Between opening 11 in cup 9 and a smaller opening 12 in the inverted cup 5 of receptacle A there is a tapered passage 13, Fig. 3. In the radial partitions above and below said channel are openings 14, Fig. 3, to allow free flow of liquid around receptacle A.

Supported from the under side of the top of cup 9 is a second receptacle C. This is formed with a cup portion 15 and an annular inner portion 16, eccentrically disposed in said cup. In the partition is an opening 17, which communicates with a smaller opening 18 in the cup 15 by passage 19. In the radial partitions above and below this passage are openings 20 to allow free flow of liquid in the crescent-shaped space H between cup 15 and inner partition 16.

Disposed centrally within the receptacle A and in the top of cup 9 is a feed-inlet pipe 22, below which on the inner side of the top of cup 15 is supported the feed-receiving compartment 23. Said compartment is open on one side, 24. Within the hollow shaft B is the shaft D, which enters the receptacle A and carries at its upper end a pinion 21, which engages with the annular pinion 27, which is fast on the inside of the hub 28. Said hub carries the scrapers E. Fast in hub 28 is shaft 26, which is stepped in a suitable support at the bottom of receptacle A. Said shaft extends through the receptacle C into the feed-compartment 23, and in receptacle C it has an enlarged hub 29, from which extend the arms 30, carrying the scrapers F, the vertical edges of which are in proximity to the inner partition 16 of receptacle C. In the feed-compartment 23 the shaft 26 carries scrapers G, the vertical edges of which are in proximity to the wall of said compartment.

The crescent-shaped space H between the cup portion 15 and inner wall 16 of receptacle C

communicates with the space I between the perforated wall 10 and cup 5 of receptacle A by means of a pipe 31. In the bottom of plate 4 between wall 10 and cup 5 is an outlet-pipe 32.

The shafts B and D being set in rotation the operation of the apparatus is as follows: The combined solid and liquid material to be separated enters by inlet 22 to the feed-receiving compartment 23. Thence by the action of the centrifugal force and the scrapers G it is projected outward upon the portion of the inner wall 16 of receptacle C which is most eccentric with respect to the rotation axis of shaft B. The liquid escapes by the short tubes 34 in the inner partition 16 to the space H between said partition and the cup 15 and thence by pipe 31 to the space I, and so to outlet-pipe 32. The solid ingredient as fast as projected against the innner wall 16 of receptacle C is carried by the scrapers F from its place of deposit to and over a substantially dry portion of the surface of said wall (the formation of which is fully explained in my aforesaid Letters Patent) to the passage 19, whence by the action of centrifugal force of rotation it is projected against the inner surface of the perforated wall 10. This wall is here shown as concentric with the axis of rotation of receptacle A. Consequently, although the material coming from passage 19 is directly projected against that portion of the perforated wall which is nearest to the center of rotation, the effect of the centrifugal force will be to throw such material to that portion of the wall which is farthest from the center of rotation and which is on the right-hand side of the drawing Fig. 1. Meanwhile there will be formed a liquid ring (indicated by the circular dotted line in Fig. 1) which will intersect the perforated wall 10 and which will have its inner boundary outside of said wall limited by the position of the escape-pipe 32. Not only, therefore, will the liquid contained in the material coming from the passage 19 be free to escape through the openings in the wall 10, but the solid material projected against the eccentric portion of that wall will be carried by the scrapers E in their rotation in the direction of the arrow *a*, Fig. 1, to the outlet-passage 13, where it will be finally ejected.

From the foregoing it will be seen that the combined materials under treatment are practically twice separated, first in the receptacle C and then in the receptacle A. In the receptacle C it undergoes substantially the same separation as takes place in the machine described in my aforesaid Letters Patent, and in the receptacle A it goes through a similar separation, in both cases the entering material being thrown by the centrifugal force to the most eccentric portion of the inclosing wall.

As a matter of fact, two liquid rings are formed, one within the receptacle C, intersecting the inner partition 16 at the tubes 34, and the other, as already stated, in receptacle A and represented by dotted lines in Fig. 1. The solid material in receptacle C is taken, therefore, from the place of deposit and carried by the scrapers F around to the escape-orifice 19 and in so moving passes over a substantially dry surface, and then on entering the perforated cup 9 it is again thrown to the most eccentric portion of that cup, and from its place of deposit there is once more carried over a substantially dry surface to the final escape-orifice 13.

In treating sugar in this apparatus I find it advantageous after the material has undergone the first separation in receptacle C and has reached receptacle A to introduce water into that receptacle for the purpose of washing the sugar, the water escaping through the openings in the partition 10.

In another application for Letters Patent, Serial No. 132,875, filed November 26, 1902, I have described and claimed a centrifugal machine in which the separating vessels are concentrically disposed instead of eccentrically disposed, as herein set forth. The subject-matter of my aforesaid application I do not herein claim.

I claim—

1. In a centrifugal machine, a rotary receptacle for combined solid and liquid materials to be separated and two eccentrically-disposed separating vessels within the same, the said vessels being placed one within the other—whereby the combined materials are subjected to two successive separations in said vessels.

2. In a centrifugal machine, a rotary receptacle for combined solid and liquid materials to be separated and two eccentrically-disposed separating vessels within the same, the said vessels being placed one within the other and concentric—whereby the combined materials are subjected to two successive separations in said vessels.

3. In a centrifugal machine, a rotary receptacle for the combined solid and liquid materials to be separated and two eccentrically-disposed separating vessels within the same, the said vessels being placed one within the other and the outer vessel having a multiperforated wall—whereby the combined materials are subjected to two successive separations in said vessels.

4. In an apparatus for the separation of solids and liquids, a rotary receptacle and within the same an eccentrically-disposed strainer constructed to receive the materials to be separated; the said receptacle having an outlet at a distance from said strainer and between said strainer and the circumferential wall of said receptacle.

5. In an apparatus for the separation of solids and liquids, a rotary receptacle, an annular perforated partition eccentrically disposed within the same, a conduit between openings respectively in said partition and said recep-

tacle, means for delivering the material to be separated into the space inclosed by said partition and means for conveying the solid material deposited on said partition to said conduit; the said receptacle having an outlet between said partition and the inner circumferential surface of said receptacle.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN JOSEPH BERRIGAN.

Witnesses:
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I. A. VAN WART.