A. J. ERICSSON.

CENTRIFUGAL MACHINE FOR DRYING.

APPLICATION FILED JULY 28, 1906.

905,860. Patented Dec. 8, 1908.

4 SHEETS—SHEET 1.

Fig: 1.

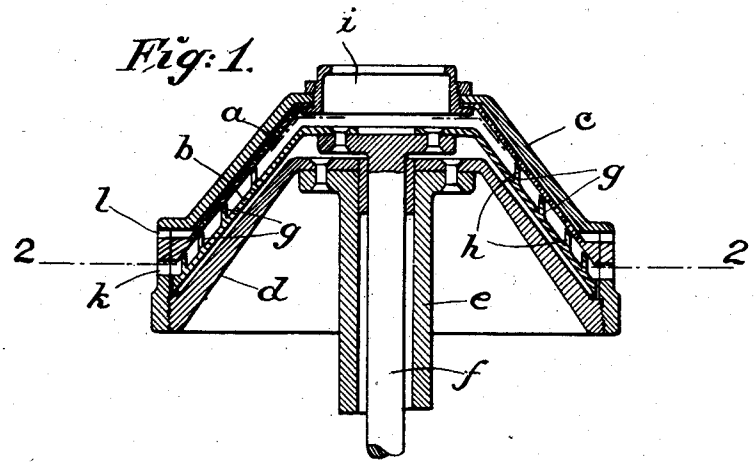
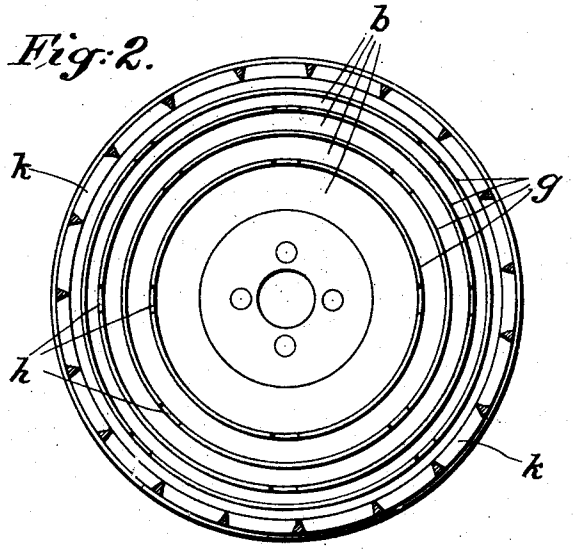


Fig: 2.



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4 SHEETS—SHEET 2.

Fig. 3.

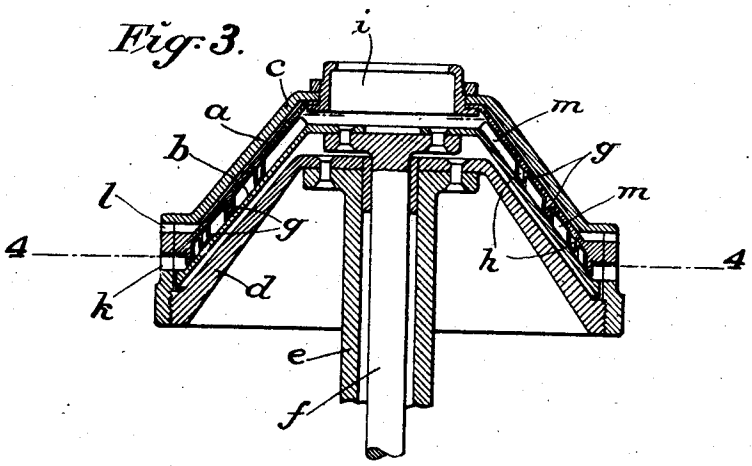
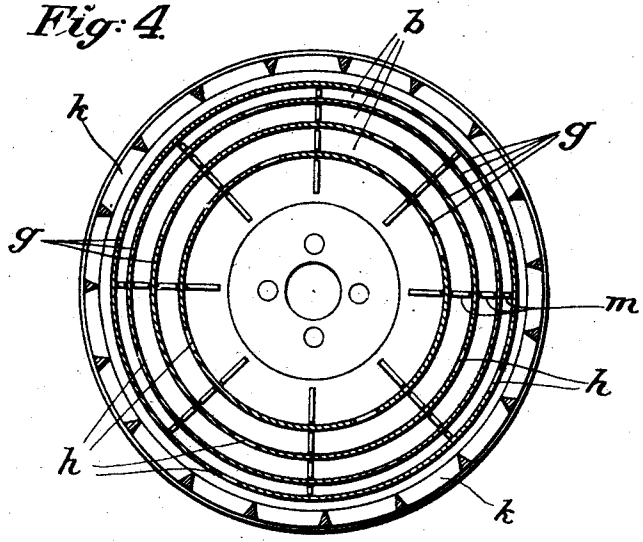


Fig. 4.



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4 SHEETS—SHEET 3.

Fig. 5.

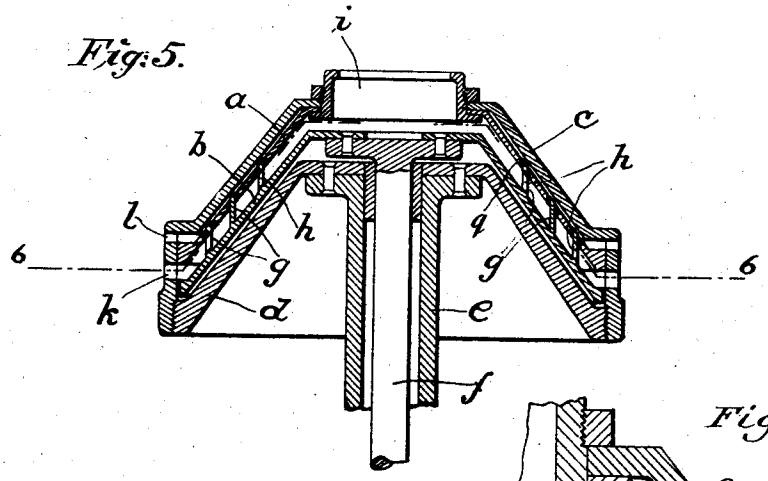


Fig. 6a

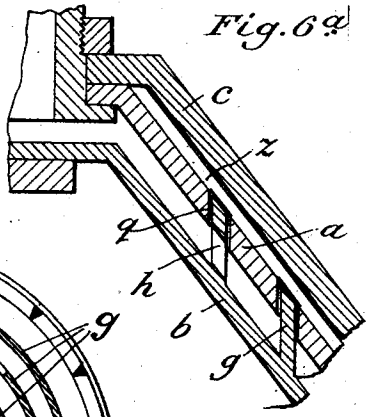
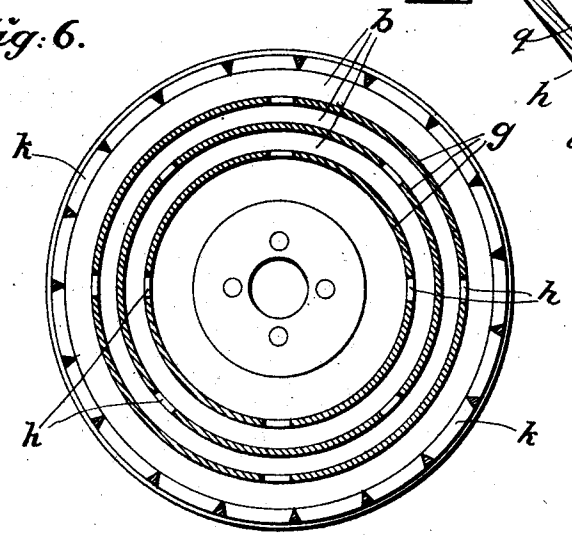


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 7.

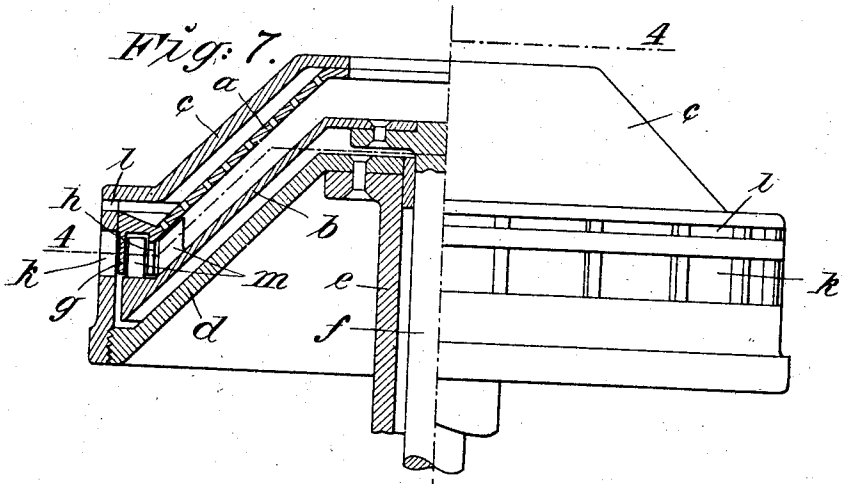
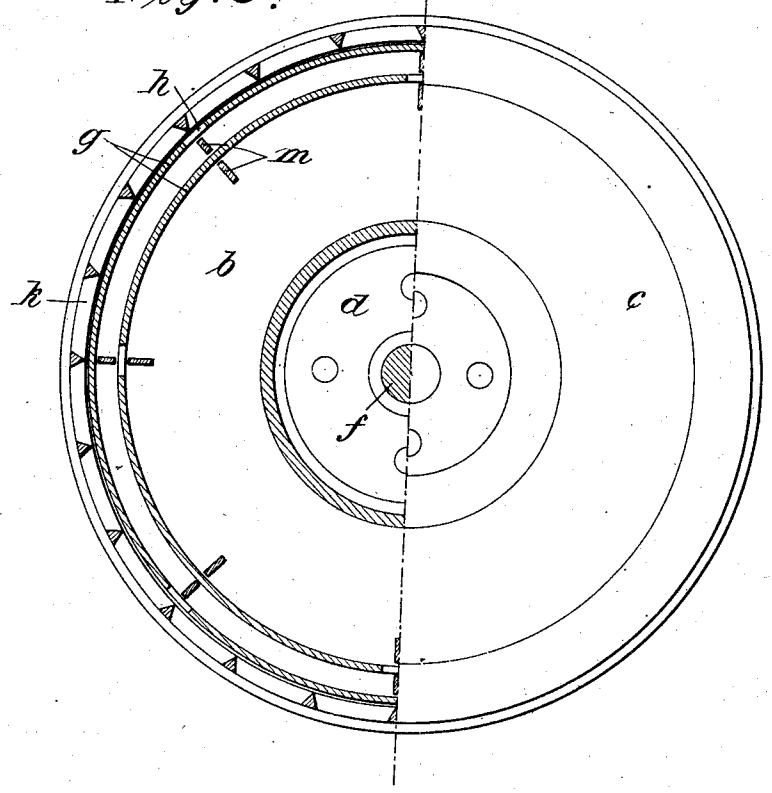


Fig. 8.



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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL MACHINE FOR DRYING.

No. 905,860. Specification of Letters Patent. Patented Dec. 8, 1908.

Application filed July 26, 1906. Serial No. 327,887.

To all whom it may concern:

Be it known that I, ANDERS JOHAN ERICSSON, a subject of the King of Sweden, and residing at Stocksund, Stockholm, Sweden, engineer, have invented certain new and useful Improvements in Centrifugal Machines for Drying Purposes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

In order to dry solids, as for instance sugar or salt crystals, sand, etc., and withdraw the liquid separated therefrom it is usual to place the mass in a rotary bowl, which is rotated at a high rate of speed, whereby on account of the centrifugal force the liquid is forced towards the inner wall of the bowl and escapes through holes or perforations in the said wall, while the solids remain in the bowl. Centrifugal machines of such kind are, however, discontinuous, as the machines after having run for some time, must be stopped and emptied. They are then filled with the mass to be separated and rotated for awhile and so on. It is evident that this operation is not economical, as the machine must be frequently stopped and rotated again. On account of this inconvenience attempts have however been made to make the process continuous by making the bowl of a conical shape, whereby the solids have slid between two conical plates, the upper of which has been perforated. Then the mass has slid from the inlet to the outlet along the perforated conical wall and during its passage from inlet to outlet the liquid has been separated from the solids and has escaped through the perforations. It has however proved necessary to insert obstacles to the movement of the mass so as to prevent it passing from inlet to the solids' outlet with such a speed, that the complete separating process has no time to take place. Usually a screw is used which is located in the space between the two conical plates and has a motion relatively to the outer one. In other apparatus the space between the plates is partially filled with pins or brushes, projecting from one of the plates. Both these constructions however are complicated and the latter also cannot work in a perfect way, as parts of the mass can pass from inlet to the solids' outlet meeting no obstacles.

The present invention relates to a device for regulating the speed of the mass, in passing from inlet to the solids' outlet. This device consists of rings, which are arranged in the path of the mass concentrically with each other and preferably in the spaces between the plates. These rings have a motion relatively to one of the conical plates. The said rings are provided with openings, and the opening or openings of each ring is displaced in relation to the opening or openings in the adjacent ring. The mass will then slide along the wall of the outer plate until it is stopped by the first ring. On account of the ring having a motion relatively to the mass, the opening in the ring will successively turn around the face of the conical plate, whereby at every moment a part of the mass can pass through said opening down towards the next ring. This process is repeated from ring to ring and finally the mass escapes through the hole in the outermost ring.

Several embodiments of this invention are illustrated in the accompanying drawings.

Figure 1 shows, in vertical section, a machine containing one embodiment of my invention. Fig. 2 is a section on line 2—2, Fig. 1. Fig. 3 is a view similar to Fig. 1 of another embodiment of my invention. Fig. 4 is a section on the line 4—4, Fig. 3. Fig. 5 is a view similar to Fig. 1, showing another embodiment of my invention. Fig. 6 is a section on the line 6—6, Fig. 5. Fig. 6^a is an enlarged detail view of a portion of Fig. 5. Fig. 7 is an elevation, partially in section, of another embodiment of my invention. Fig. 8 is a section on line 8—8, Fig. 7.

In Figs. 1 and 2 *a* is the outer perforated plate *b* and the inner non-perforated plate, between which the mass to be separated is fed. Over the plate *a* there is a cover *c* which is secured to the said plate and to the bowl *d*, mounted on the top of a hollow shaft *e*. The parts *a*, *c* and *d* receive their rotary motion from the shaft *e*, while the plate *b* receives its motion from a solid shaft *f*, on the top of which it is mounted. The shafts *e* and *f* are rotated at different speeds. From the plate *b* rings *g* project into the space between the plates *a* and *b*, which

rings are provided with openings *h*. The said openings are displaced relatively to each other as shown in Fig. 2. The mass which is to be separated, is fed in through the opening *i*.

The operation is as follows:—Under the action of centrifugal force, the mass is forced against the plate *a* and outward toward the periphery of the bowl and against the first ring *g*. When the said ring rotates relatively to the plate *a* it will also rotate relatively to the mass pressed against the said plate by the centrifugal force, whereby the opening *h* will move relatively to the mass, which will on that account successively flow out through the said opening and against the second ring *g*. This operation is repeated from ring to ring and finally the solids escape through the solids' opening *k* in the cover *c*. The liquid, which has escaped through the perforations in the plate *a* flows along the inner wall of the cover *c* and escapes through the openings *l*. In this way the mass cannot pass directly from inlet to solids' outlet, thereby prolonging the time in which the mass is under the action of centrifugal force. The mass will therefore have a relatively slow motion through the centrifugal machine, and on that account there is time enough for thorough drying to take place.

The embodiment of my invention shown in Figs. 3 and 4 differs from that shown in Figs. 1 and 2 in that the rings *g* are secured to the perforated plate *a* instead of to the solid plate *b*. In this construction, also, scrapers *m* are secured to the solid plate *b*, which scrapers, by the relative movement of the plate *b* with respect to plate *a*, convey the mass to the openings *h*.

In Figs. 5 and 6 the construction differs from that of Figs. 1 and 2 in that instead of the plate *a* being perforated it is formed in sections, leaving between the sections openings *q* into which the rings *g* enter. In this construction the rings not only act to retard the movement of the mass, but also form practically a movable outlet for the liquid. Any solid which might tend to clog or block the openings *q are*, on account of the relative movement of rings *g*, caused to escape. The sections of plate *a* are held together by ribs *z* (see Fig 6[a]).

In the embodiment of my invention shown in Figs. 7 and 8, the rings *g* are not located in the space between the plates *a* and *b*, but in an annular extension thereof and they project from the perforated plate *a*. As in Figs. 3 and 4 scrapers or wings *m* are arranged on the plate *b* for transporting the mass in a circumferential direction along the plate *a* to the openings *h* in rings *g*.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:—

1. In centrifugal machines for drying purposes, the combination with the superimposed plates, forming a pair of plates, between which the material is adapted to pass, the upper plate of which pair being provided with openings for the passage of the liquid, of rings, in line of travel of the material and between the inlet for the material and solids' outlet, forming compartments, and means to allow the material to intermittently pass from compartment to compartment.

2. In centrifugal machines for drying purposes, the combination with superimposed plates, forming a pair of plates, between which the material is adapted to pass, the upper plate of which pair being provided with openings for the passage of the liquid, of rings, in line of travel of the material and between the inlet for the material and solids' outlet, said rings having openings, and means to bring the material and openings in line with each other.

3. In centrifugal machines for drying purposes, the combination with superimposed plates, forming a pair of plates, between which the material is adapted to pass, the upper plate of which pair being provided with openings for the passage of the liquid, said plates being independently rotatable, of rings, in line of travel of the material and between the inlet for the material and solids' outlet, said rings having openings, said rings being connected to one of the plates.

4. In centrifugal machines for drying purposes, the combination with superimposed plates, forming a pair of plates, between which the material is adapted to pass, the upper plate of which pair being provided with openings for the passage of the liquid, said plates being independently rotatable, of rings, in line of travel of the material and between the inlet for the material and solids' outlet, said rings having openings, said rings being connected to one of the plates, and scrapers connected to the other plate.

5. In centrifugal machines for drying purposes, the combination with superimposed plates, forming a pair of plates, between which the material is adapted to pass, the upper plate of which pair being provided with openings for the passage of the liquid, of rings, in line of travel of the material and between the inlet for the material and solids' outlet, adapted to retard the movement of the material to be dried, said rings having openings, the openings in successive rings being out of alinement with each other, and means to bring the material and openings in line with each other.

6. In centrifugal machines for drying purposes, the combination with superimposed plates forming a pair of plates, between which the material is adapted to pass, the upper plate of which pair being provided with openings for the passage of the liquid,

of rings in the space between the plates of said pair whereby the said space is divided into several compartments, and means to allow the material to intermittently pass from compartment to compartment.

7. In centrifugal machines for drying purposes, the combination with superimposed plates forming a pair of plates, between which the material is adapted to pass, the upper plate of which pair being provided with openings for the passage of the liquid, of rings in the space between the plates of said pair whereby the said space is divided into several compartments, said rings being provided with openings, and means to bring the material and openings in line with each other.

8. In centrifugal machines for drying purposes, the combination with superimposed plates forming a pair of plates, between which the material is adapted to pass, said plates being independently rotatable, the upper plate of which pair being provided with openings for the passage of the liquid, of rings in the space between the plates of said pair whereby the said space is divided into several compartments, said rings being secured to one of the plates.

9. In centrifugal machines for drying purposes, the combination with superimposed plates forming a pair of plates, between which the material is adapted to pass, said plates being independently rotatable, the upper plate of which pair being provided with openings for the passage of the liquid, of rings in the space between the plates of said pair whereby the said space is divided into several compartments, said rings being secured to one of the plates, and scrapers secured to the other of said plates.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

ANDERS JOHAN ERICSSON.

Witnesses:
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HJALMAR ZETEERSTRÖM.