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PATENTED APR. 4, 1905.

B. LJUNGSTRÖM.
CENTRIFUGAL LIQUID SEPARATOR.

APPLICATION FILED DEC. 16, 1904

Fig. 1.

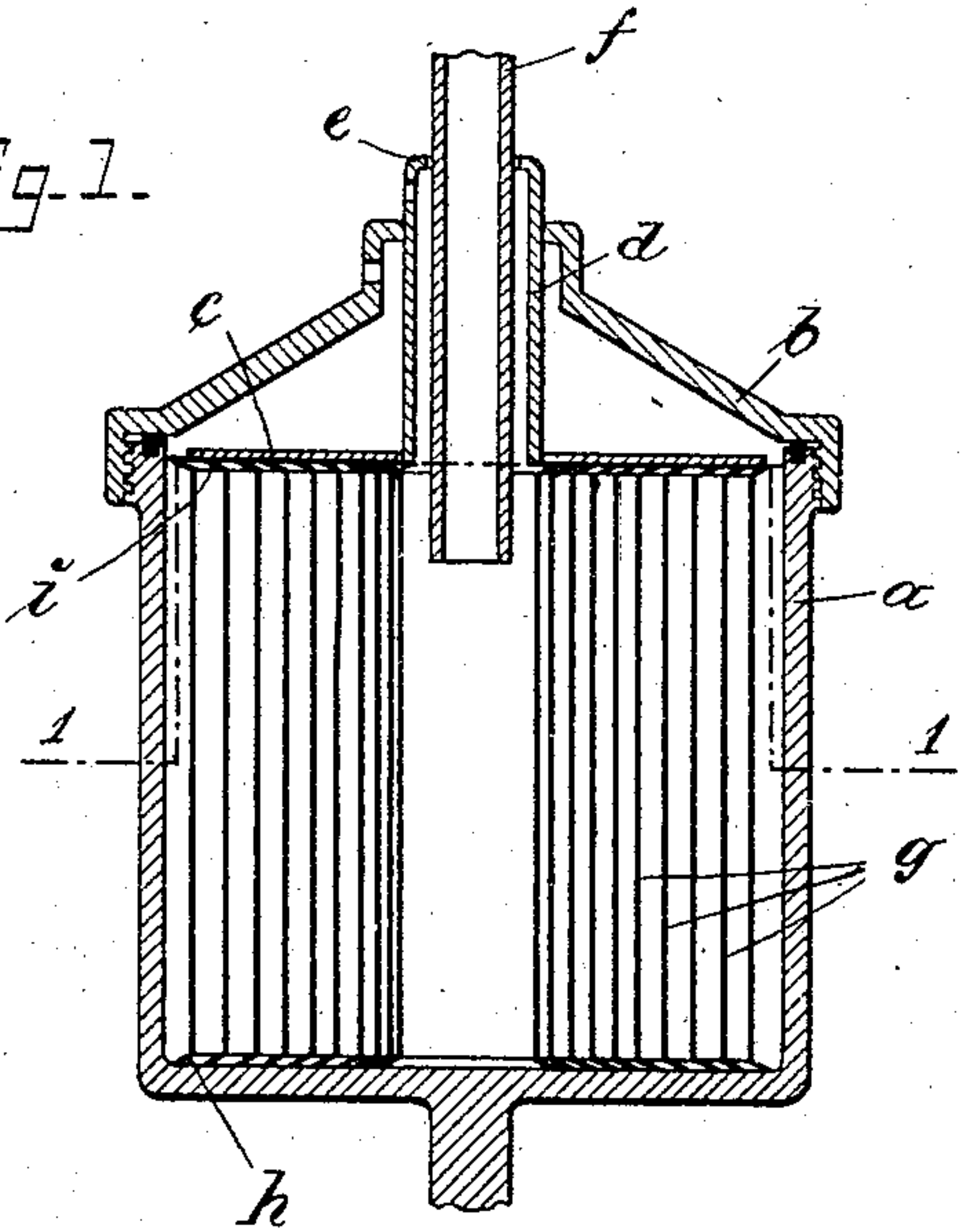


Fig. 3.

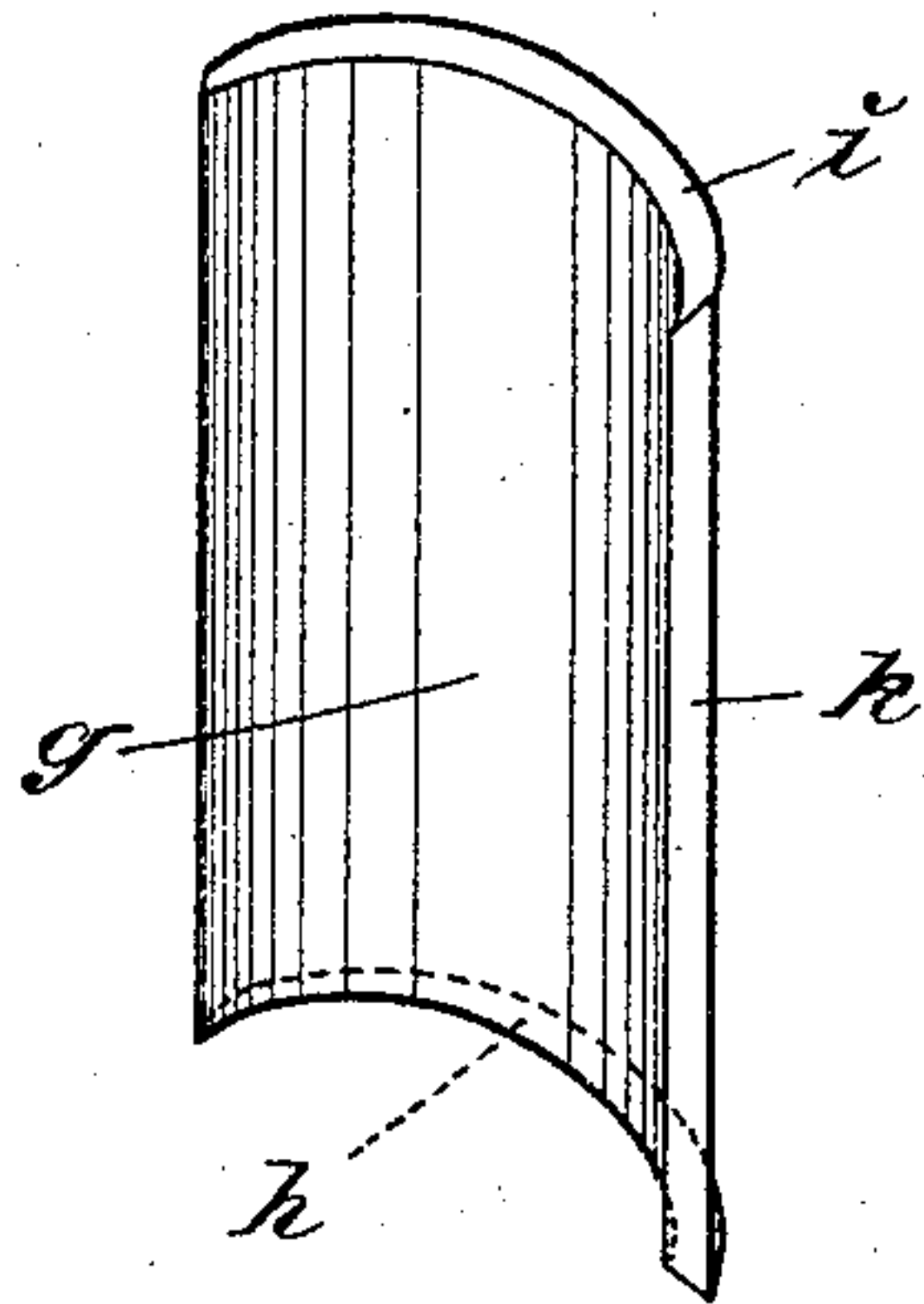
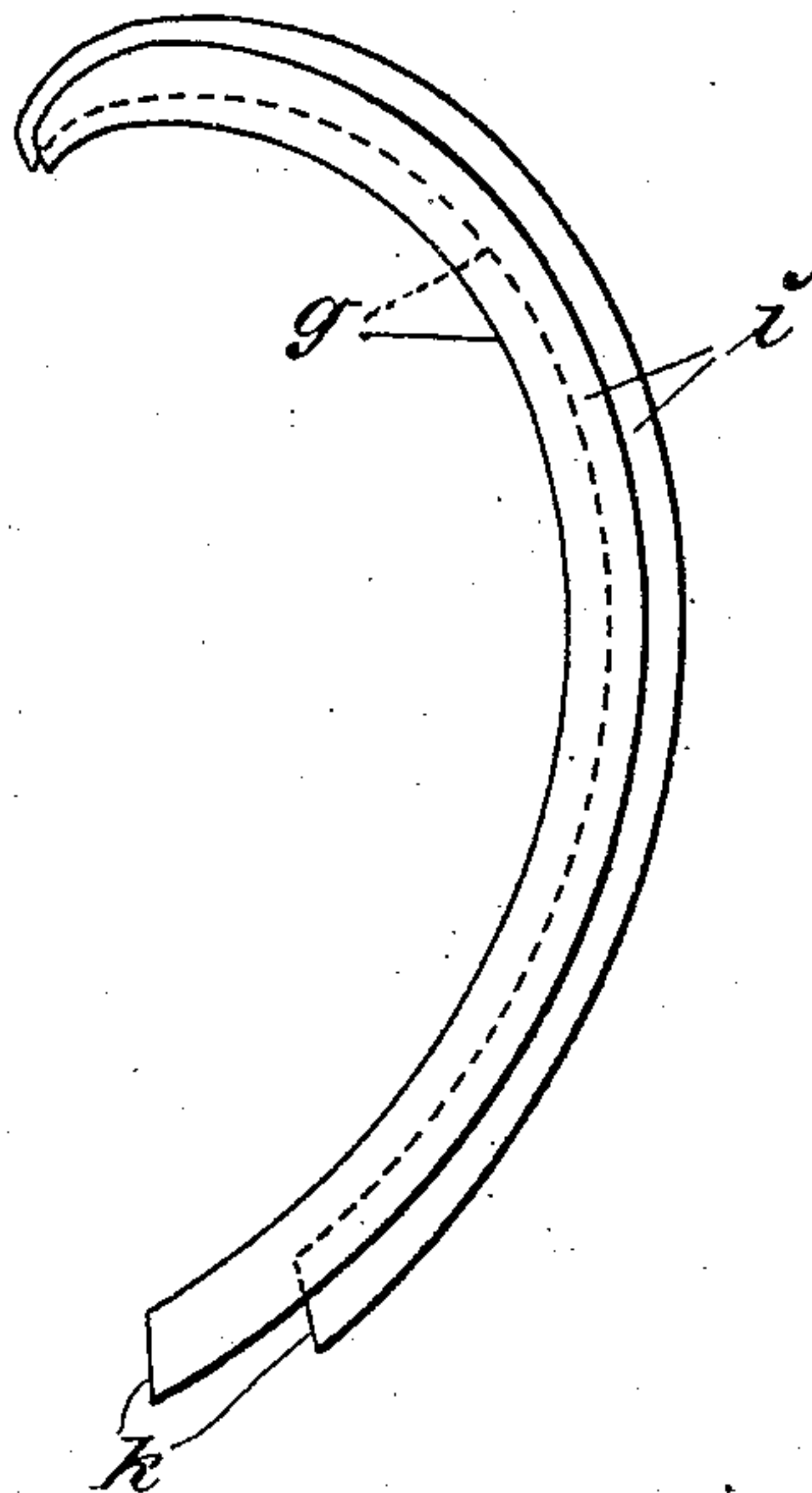
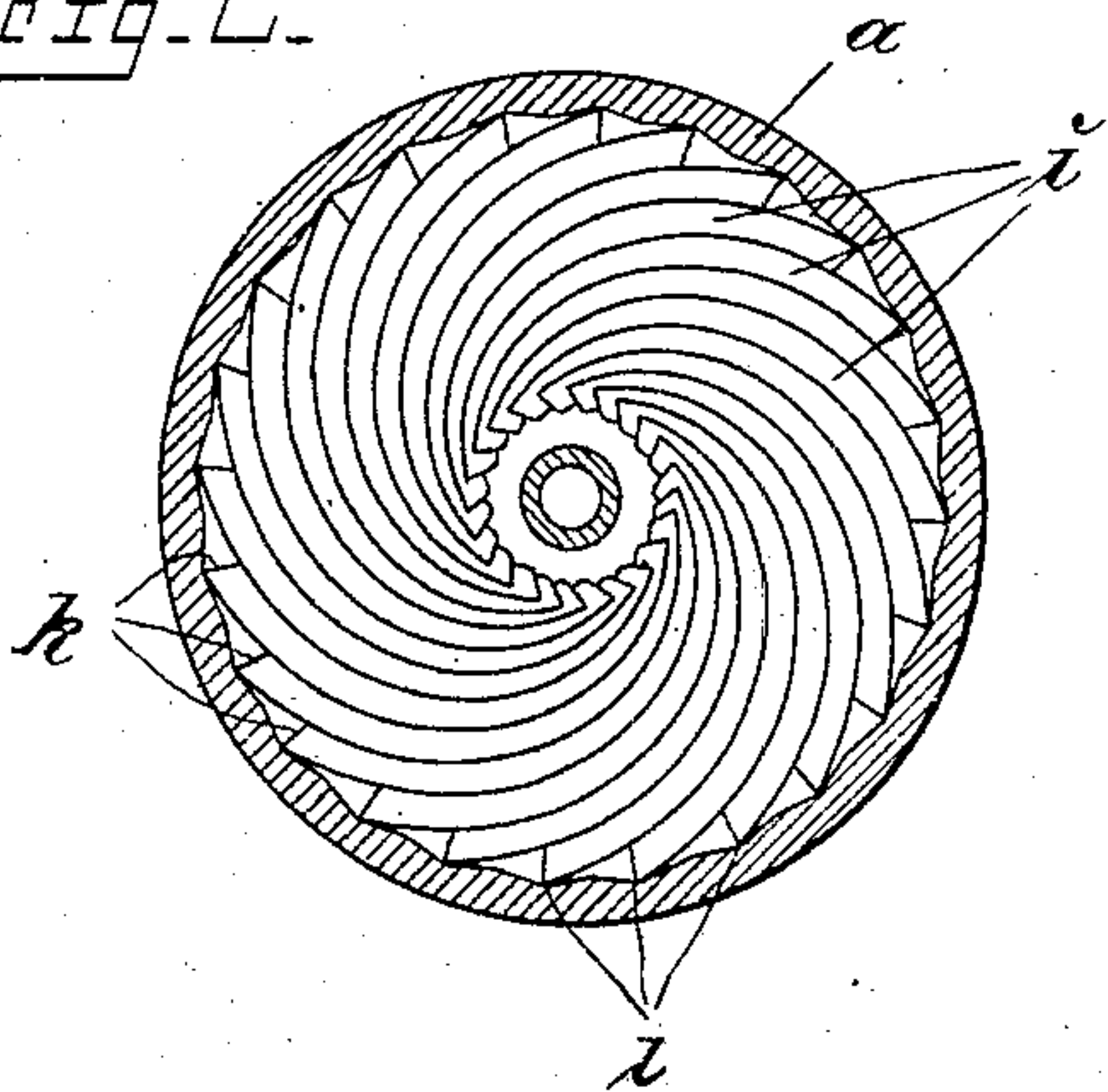


Fig. 4.

Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

BIRGER LJUNGSTRÖM, OF STOCKHOLM, SWEDEN, ASSIGNOR TO AKTIEBOLAGET SEPARATOR, OF STOCKHOLM, SWEDEN, A COMPANY.

CENTRIFUGAL LIQUID-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 786,369, dated April 4, 1905.

Application filed December 16, 1904. Serial No. 237,115.

To all whom it may concern:

Be it known that I, BIRGER LJUNGSTRÖM, a subject of the King of Sweden and Norway, residing at Stockholm, Sweden, have invented certain new and useful Improvements in Centrifugal Liquid-Separators; 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 of reference marked thereon, which form a part of this specification.

My invention relates to that class of centrifugal cream-separators in which there is in the liquid-space of the bowl a series of upright plates or blades which intersect the radial line of the bowl. With this class of separators there are some difficulties encountered in providing for a proper distributing of the incoming milk between the blades or plates, essentially depending on the fact that the separated liquids escape from the liner inward and outward as well as upward and downward if effective tightening devices are not provided for preventing the liquids to pass out in both the last-mentioned directions. Another difficulty by liners consisting of curved vertical plates is that they are easily deformed or buckled, partly on account of the action of the centrifugal force and partly on account of carelessness in cleaning them. If tightening devices are used, they will on account of this deformation be of no effect, and this, on the other hand, causes that the capacity of the liner will be decreased.

According to my invention the upper and lower edges of the plates and eventually also their outer edges are bent at angles at the one side in order to make them stiff and stable against being bent or deformed, and besides they are bent at their upper and lower edges in such a way that when the plates are placed by each other these flanges cover each other, so that a certain tightening is attained at the top and the bottom, or at least that the motion of the fluid in these directions is somewhat checked. If the edges are bent at an obtuse angle to the plate, the liquid will be subject to a continued

separating process when passing between these edges, whereby the skimming capacity of the liner is increased. It is, however, obvious that if the plates arranged in this way cannot in the usual manner be connected with a fixed part of the drum by a hinge-like connection they are to be fixed in another way, and this invention relates also to an improvement by which the plates without using hinges or the like can be maintained in the drum in a fixed position.

I will now describe the embodiment of my invention as illustrated in the accompanying drawings.

Figure 1 is a vertical section of a centrifugal bowl with my improved plates placed therein. Fig. 2 is a cross-section on line 1 1 in Fig. 1. Fig. 3 is a detail showing one of the curved plates in perspective view; and Fig. 4 is an enlarged plan view of a modified form of the plates, showing two plates placed in position to each other.

Taking up first Figs. 1 to 3, *a* is the bowl, and *b* is the cover. *c* is a disk or upper plate which presses on the liner and which is connected with a neck *d*, projecting above the edge of the cover *b*. The upper portion *e* of the neck is bent at right angles inward, whereby a circular opening is formed through which the fixed milk-supply pipe *f* passes. The plates *g* are at their upper and lower edges bent at angles outward, so that flanges *h* and *i* are formed, and the outer vertical edge is likewise bent at angles, and the flange *k* thus formed fits closely to and forms a single piece with the first-named flanges. When put in place, the flange *k* abuts to the inner wall of the bowl. As shown on the drawings, the flanges *h* and *i* are bent at obtuse angles to the plates, so that the same lap over each other when placed closely into each other, leaving only a small space for the passage of the liquid to be separated. They will on this account incline to the radius, and thus have a separating effect on the fluid that eventually escapes between them. In order to hold the plates at a fixed position from each other, they are, as usual, provided with calkings. (Not shown in the drawings.) Furthermore,

the inside of the drum is provided with notches or grooves *l*, whereby the plates are still better secured. The liner is pressed against the bottom of the drum by the disk *e*, that also serves for the separate conducting of the heavier fluid thrown out to the periphery of the bowl. The separated cream escapes in the usual manner by a hole in the neck-formed prolongation of the top disk.

10 A modification of the above-described improvement is shown in Fig. 4. According to this modification the plates *g* are curved very sharply, so that the inner edges grasp each other as hooks. The plates are then presumed
15 to be absolutely equal as to weight, dimensions, and curvature. Therefore when all the plates are placed by each other with spaces depending on the thickness of the calkings they will get a perfectly-fixed position in relation to each other that cannot be altered or
20 changed if some one of the plates has not been placed in the same position to the adjacent plates as it had before. As all the plates have the same dimensions and weight, their reciprocal position is of no importance. A displacement of the plates does not cause an alteration of the balancing of the drum, and special arrangements, as hinges or the like at
30 the inner edge or notches in the wall of the drum, need not be necessary. On account of the sharp curvature at the inner edges of the plates they cannot be removed in relation to each other; but the whole forms a solid immovable liner whose parts need not be joined
35 by special arrangements. The plates are placed and put together outside the bowl in a suitable tool and are then brought into the bowl, from which they can be brought out in the same manner for cleaning after finished
40 work.

I do not limit myself to any special curvature of the plates or to special angles of the flanges or to flanges connected with each other; but

45 What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a centrifugal liquid-separator a division contrivance consisting of a plurality of upright plates intersecting the radial line of

the bowl, the upper and lower edges of said 50 plates being bent at angles from the plate.

2. In a centrifugal liquid-separator a division contrivance consisting of a plurality of upright plates intersecting the radial line of the bowl, the upper and lower edges of said 55 plates being bent at angles at one side of the plate.

3. In a centrifugal liquid-separator a division contrivance consisting of a plurality of upright plates intersecting the radial line of the bowl, the upper and lower edges of said 60 plates being bent at obtuse angles at the plate.

4. In a centrifugal liquid-separator a division contrivance consisting of a plurality of upright plates intersecting the radial line of the bowl, the upper and lower edges of said 65 plates being bent at obtuse angles at one side of the plate.

5. In a centrifugal liquid-separator a division contrivance consisting of a plurality of upright plates intersecting the radial line of the bowl, the upper and lower as well as the outer edges of said plates being bent at obtuse angles at one side of the plate, without inter-
75 ruption.

6. In a centrifugal liquid-separator a division contrivance consisting of a plurality of upright plates intersecting the radial line of the bowl, the upper and lower as well as the outer edges of said plates being bent at angles 80 from the plate, the outer ends of which abut to the inner wall of the bowl entering grooves in said inner wall.

7. In a centrifugal liquid-separator a division contrivance consisting of a plurality of upright plates intersecting the radial line of the bowl, the upper and lower as well as the outer edges of said plates being bent at angles from the plate, said plates being sharply curved at their inner ends grasping each other as 90 hooks.

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

BIRGER LJUNGSTRÖM.

Witnesses:

TH. WAURINSKY,
HARRY ALBIHN.