

2 Sheets—Sheet 1.

No. 585,936.

Patented July 6, 1897.

FIG:1.

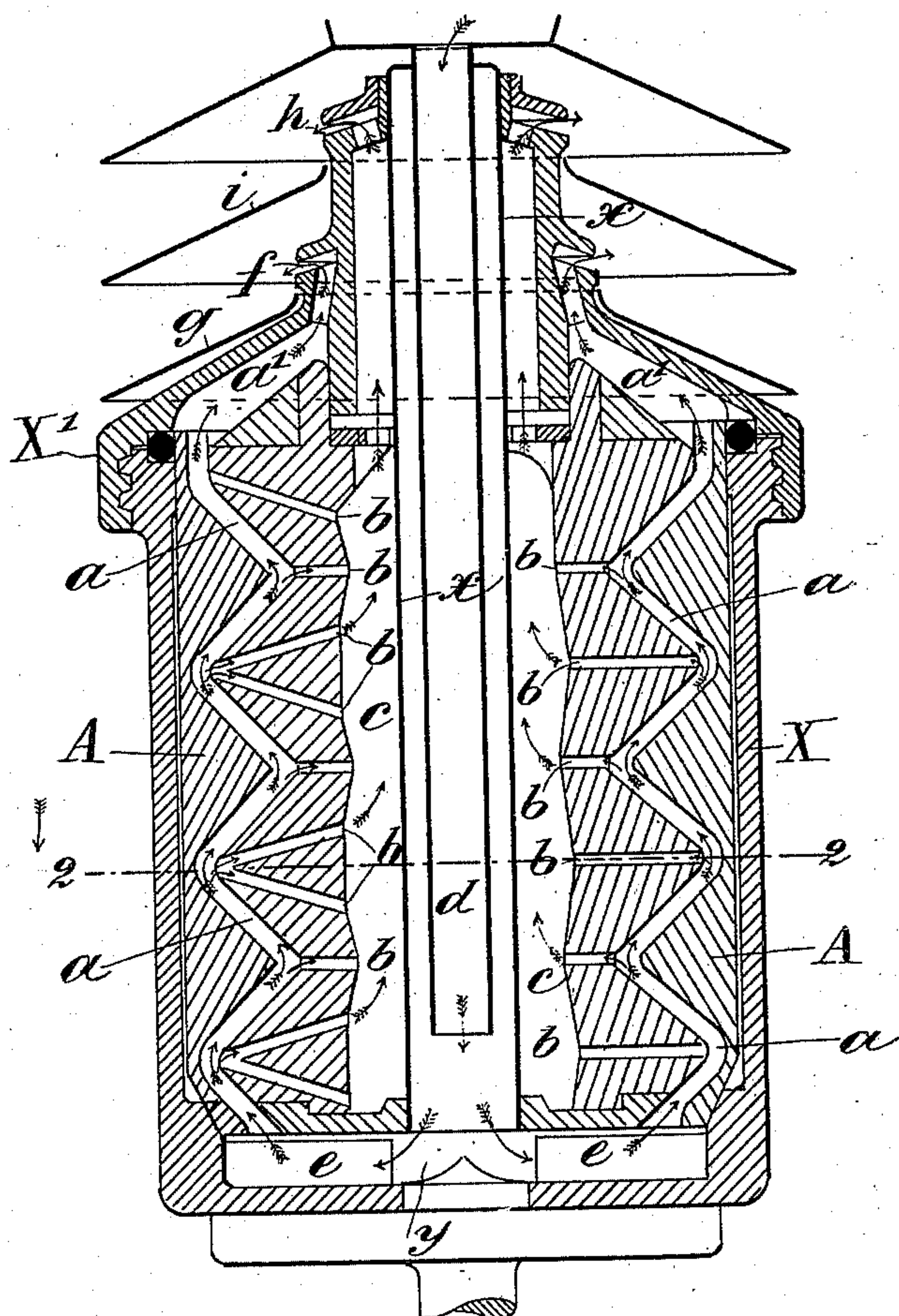
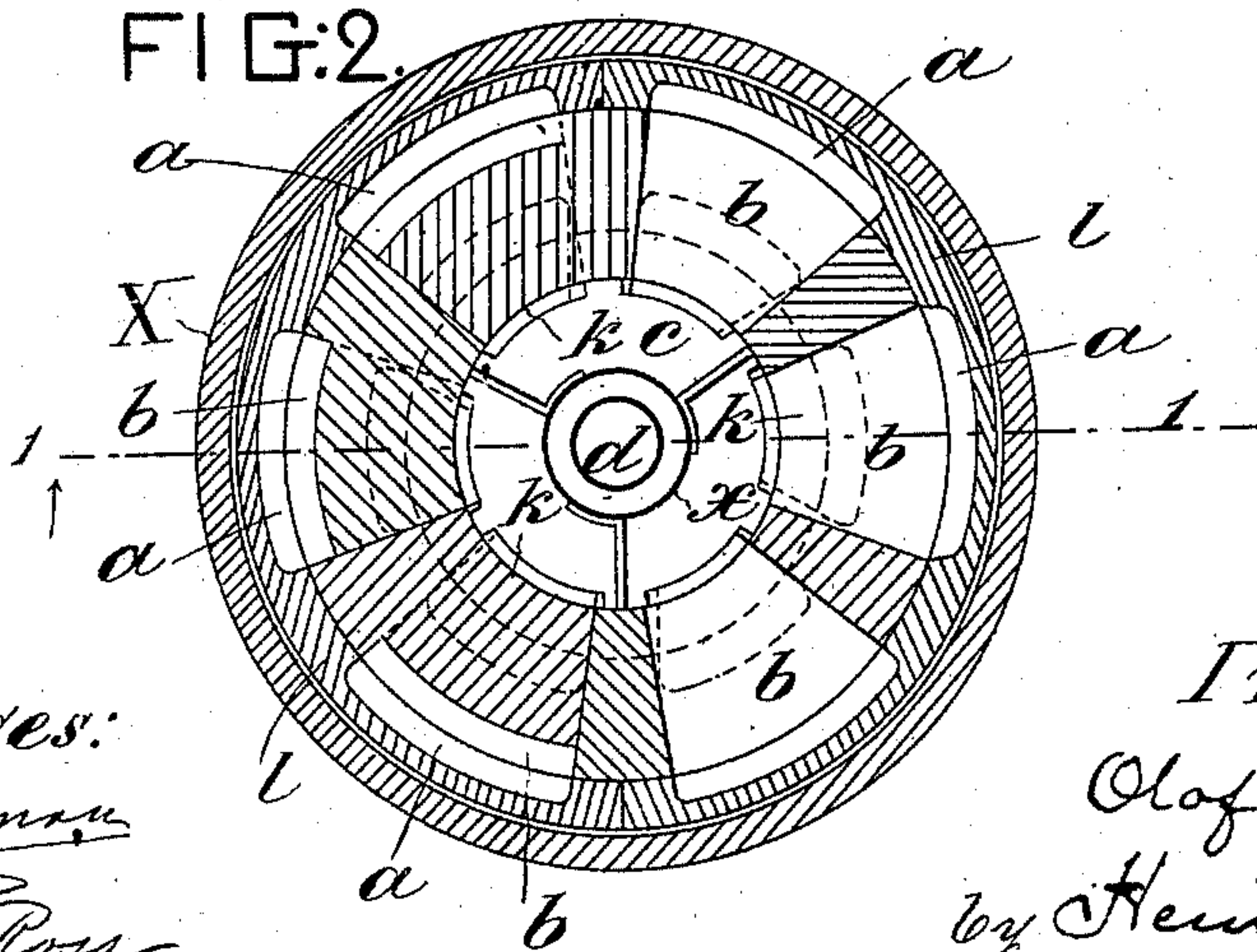


FIG:2.



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(No Model.)

2 Sheets—Sheet 2.

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CENTRIFUGAL SEPARATOR.

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FIG:3.

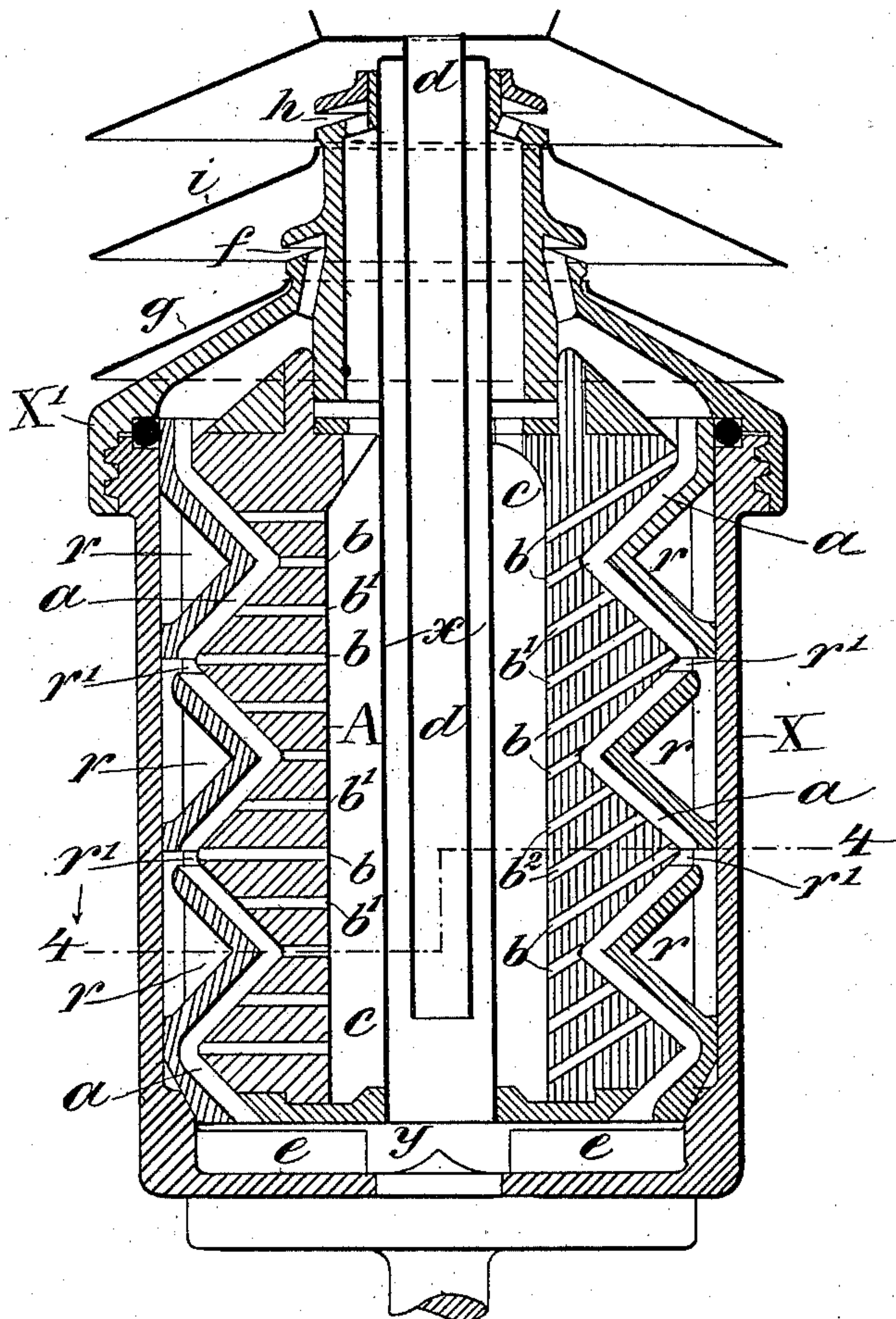
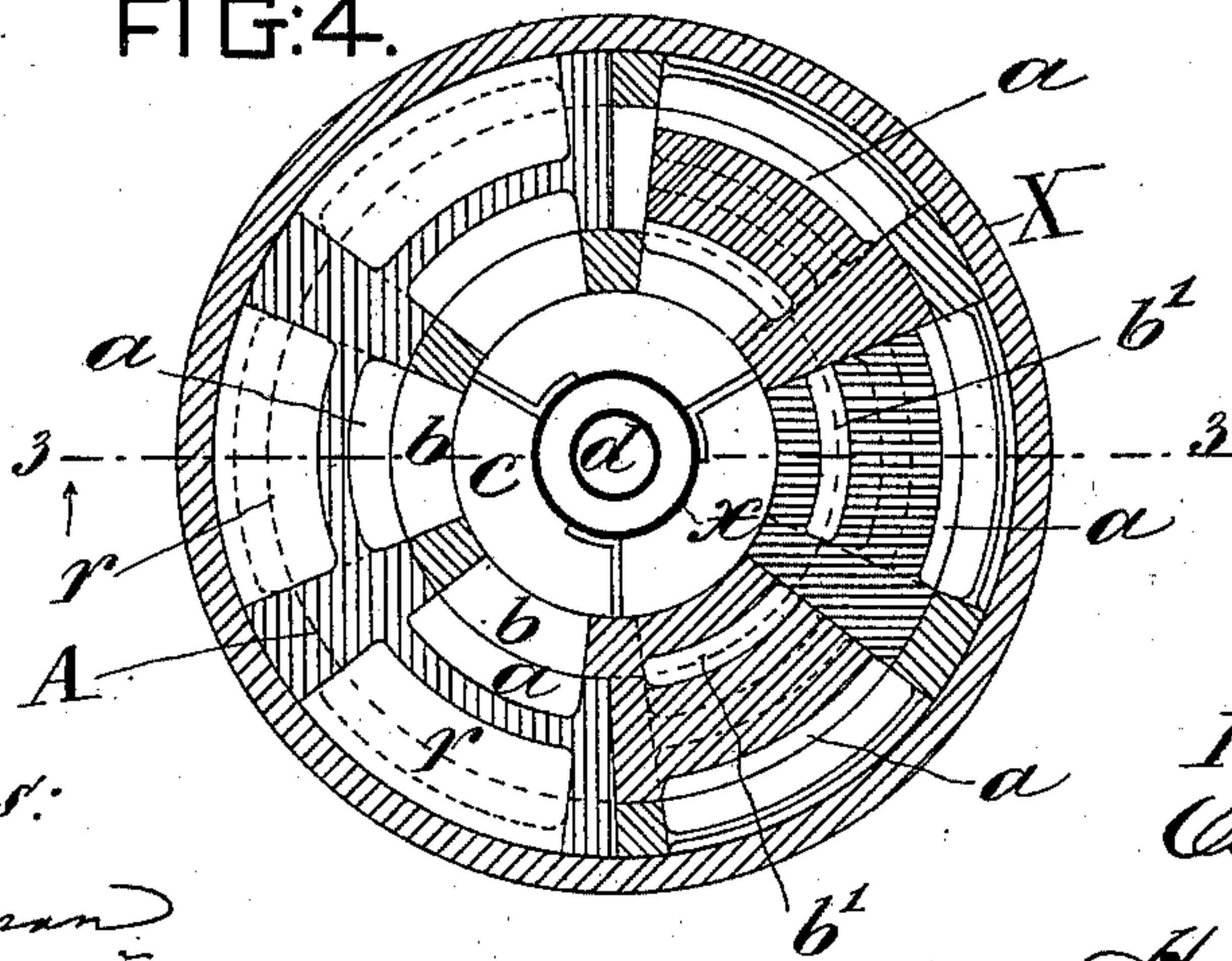


FIG:4.



Witnesses:

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Inventor:
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his Attorney

UNITED STATES PATENT OFFICE.

OLOF LINDERS, OF STOCKHOLM, SWEDEN.

CENTRIFUGAL SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 585,936, dated July 6, 1897.

Application filed June 30, 1894. Serial No. 516,144. (No model.) Patented in Sweden September 13, 1893, No. 5,436, and April 21, 1894, No. 5,719; in England May 15, 1894, No. 9,533; in Norway May 16, 1894, No. 3,793, and in Denmark May 15, 1895.

To all whom it may concern:

Be it known that I, OLOF LINDERS, a subject of the King of Sweden and Norway, residing at Stockholm, Sweden, have invented certain new and useful Improvements in Centrifugal Separators, (for which patents have been granted in Sweden, No. 5,436, dated September 13, 1893, and No. 5,719, dated April 21, 1894; in Great Britain, No. 9,533, dated May 15, 1894; in Norway, No. 3,793, dated May 16, 1894, and in Denmark dated May 15, 1895,) of which the following is a specification.

My invention relates to centrifugal apparatuses such as are employed for separating the heavier from the lighter constituents of a liquid, as milk, for example; and the object of the invention is to facilitate the separation of the constituent parts of the liquid and to collect the slime and heavy solid particles which may be present in the liquid subjected to centrifugal action.

The accompanying drawings illustrate an embodiment of the invention.

In the drawings, Figure 1 is a vertical axial section of the separator, and Fig. 2 is a horizontal section of the same in the plane indicated by line 2 2 in Fig. 1. Figs. 3 and 4 are similar views to Figs. 1 and 2, illustrating mainly slightly-different arrangements of the radial passages. The section Fig. 4 is taken on line 4 4 in Fig. 3.

Referring, primarily, to Figs. 1 and 2, X represents the drum of the separator, and X' its cover. A separating-tube *x* extends down through the axis of the drum and opens into a chamber *y* in the bottom of the drum. Down through this tube extends the supply-pipe *d*, which leads the liquid into the drum. In the chamber *y* are radial blades *e* to compel the mass of liquid to rotate with the drum. The outlet *f* for the heavier part of the liquid, as blue milk, discharges into a receiving vessel *g*, and the outlet *h* for the lighter part of the liquid or cream discharges into a receiving vessel *i*. Only parts of the receivers are shown, as they are well known. The arrows show the course of the liquid and its constituents.

Fitting rather snugly into the drum is a cylindrical body A, having a large bore through

its center, and in the solid portion of which are formed two sets of channels—namely, a series of channels *a*, which have the general direction of the drum-axis and are parallel thereto, but are of zigzag form, and several series of radial channels *b*, arranged in tiers and extending from the cream-space *c* in the body A outward to the several channels *a*.

The channels *a*, of which six are shown in Fig. 2, extend from the chamber *y* up through the body A and connect with an annular passage *a'* in the cover, which leads to the outlet *f*. These passages are for the blue milk.

The passages *b* may extend outward horizontally at different levels, as seen at the right in Fig. 1, or some of them may extend horizontally and others extend obliquely, converging to a junction at the channel *a*, as seen at the left in Fig. 1.

The operation is as follows: The milk entering chamber *y* through the pipe *d* rises in the channels *a* and the cream separates therefrom and flows inward through the channels *b* to the cream-space *c*. Eventually only the blue milk reaches the outlet *f*, and the cream collected in the annular cream-space *c* rises to the cream-outlet *h*. The separation is thus effected without the hampering effects of two currents of fluid of different densities meeting each other.

The hollow cylindrical body A may be constructed in any convenient manner, but I find it most convenient to construct it of segments *k*, as indicated in Fig. 2, embraced by two semicylinders *l*. Each segment contains a series or set of channels *b*, which are all open at the side of the segment which abuts against the opposite side of the adjacent segment. In the construction of Figs. 1 and 2 the channels *a* are formed in the outer cylinder *l*. Other mechanical constructions may be employed in building up the body A.

The construction illustrated in Figs. 3 and 4 has for its object to increase the number of radial channels and to form receptacles for the collection of slime and dirt that may accumulate and which would otherwise be likely to obstruct the separating-channels.

Respecting the radial channels *b*, these are shown at the left in Fig. 3 as horizontal, and

substantially as seen at the right in Fig. 1, except that there are in Fig. 3 intermediate channels, therein lettered *b'*, merely to distinguish them. On the right in Fig. 3 the radial channels all extend obliquely upward from the cream-chamber *c* to the zigzag channel *a*. In this arrangement there are two intermediate channels *b'* in excess of those seen at the right in Fig. 1. I may say here that the arrangements of the radial channels seen at the right and left in Fig. 1 and at the right and left in Fig. 3 are not merely alternative arrangements. One body A may contain them all, distributed among the six different segments of the body.

In the construction of Figs. 3 and 4 pockets *r* are formed exterior to the channels *a* and in communication therewith by way of passages *r'*, these latter being situated at the angles of the passages *a* where the latter approach nearest the drum-wall. The slime and dirt accumulates in these pockets *r*. On account of its weight this slime and dirt would otherwise tend to accumulate at the angles in the channels *a* farthest from the drum-axis.

By removing the cover of the drum the body A may be drawn out for cleaning. As it fits the drum snugly, by thus drawing it out it will take out the contents of the pockets *r* with it.

The form of apparatus illustrated in Figs. 1 and 2 is the simplest, but that of Figs. 3 and 4 is the preferred form. The pockets *r* may, however, be applied as well to the construction seen in Figs. 1 and 2.

I may say here by way of explanation that the inclinations of the zigzag passages *a* will be radial—that is, the inclination will be outwardly from the drum-axis and inwardly toward the same—and that this lengthens the channel *a*, while it varies the length of the different radial channels.

As shown in Fig. 3, the pockets *r* are formed by recessing the periphery of the body A, the drum-wall forming the outer wall of the pockets. This construction is well adapted for cleaning the pockets.

Having thus described my invention, I claim—

1. In a centrifugal separator the combina-

tion with the drum of a downwardly-extending supply-tube disposed centrally within said drum, and that is provided with a discharge-outlet near the bottom of said drum; and a body A, adapted to fit into said drum, said body having in it a central bore, forming a space C, for the lighter constituent of the fluid, and vertically-extending channels *a*, in the body A for the heavier constituents of the fluid and radially-extending channels that connect the space C with the channels *a*, substantially as described.

2. In a centrifugal separator the combination with the drum, of a downwardly-extending supply-tube disposed centrally within said drum and that is provided with a discharge-outlet near the bottom of said drum; and a body A adapted to fit into said drum, said body having in it a central bore forming a space C for the lighter constituent of the fluid and a series of vertically-extending zigzag channels *a*, for the upward flow of the heavier liquid and several series of radially-arranged channels, in tiers, and extending from the space C, to the channels *a*, at the points where the latter approach nearest to the drum-axis, and others where the latter recede farthest from the drum-axis, substantially as described.

3. In a centrifugal separator the combination with the drum of a downwardly-extending supply-tube disposed centrally within said drum and that is provided with a discharge-outlet near the bottom of said drum; and a body A, adapted to fit into said drum, said body having in it a central bore, forming a space C, for the lighter constituent of the fluid, and vertically-extending zigzag channels *a*, for the upward flow of the heavier liquid, radially-arranged passages that connect the space C with the channels *a*, and pockets *r* exterior to the channels *a* and communicating therewith, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

OLOF LINDERS

Witnesses:

ERNST SVANQVIST,
CARL TH. SUNDHOLM.