

No. 790,081.

PATENTED MAY 16, 1905.

E. SEGER.
CENTRIFUGAL SEPARATING APPARATUS.

APPLICATION FILED MAR. 18, 1904.

2 SHEETS—SHEET 1.

FIG. 1.

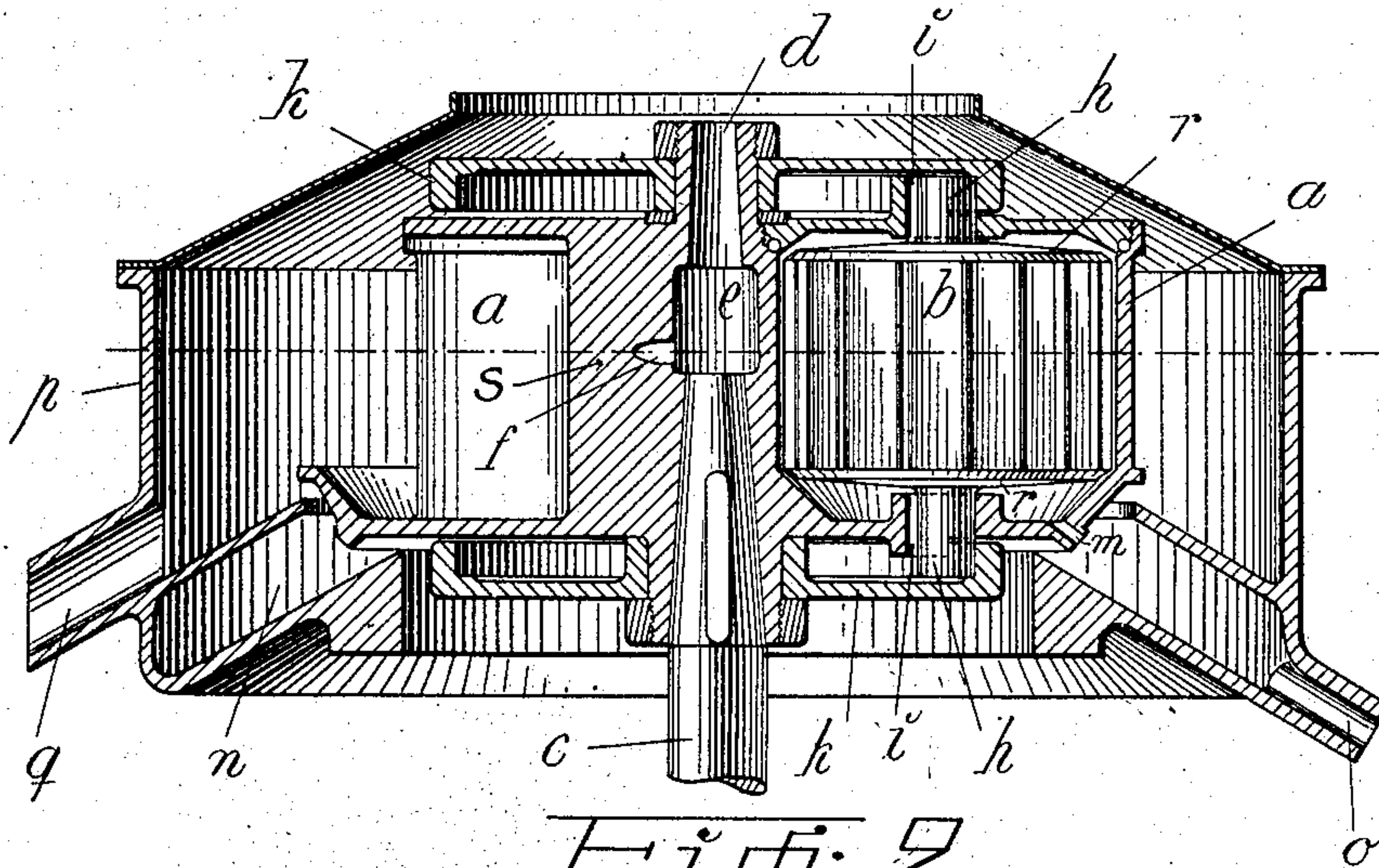
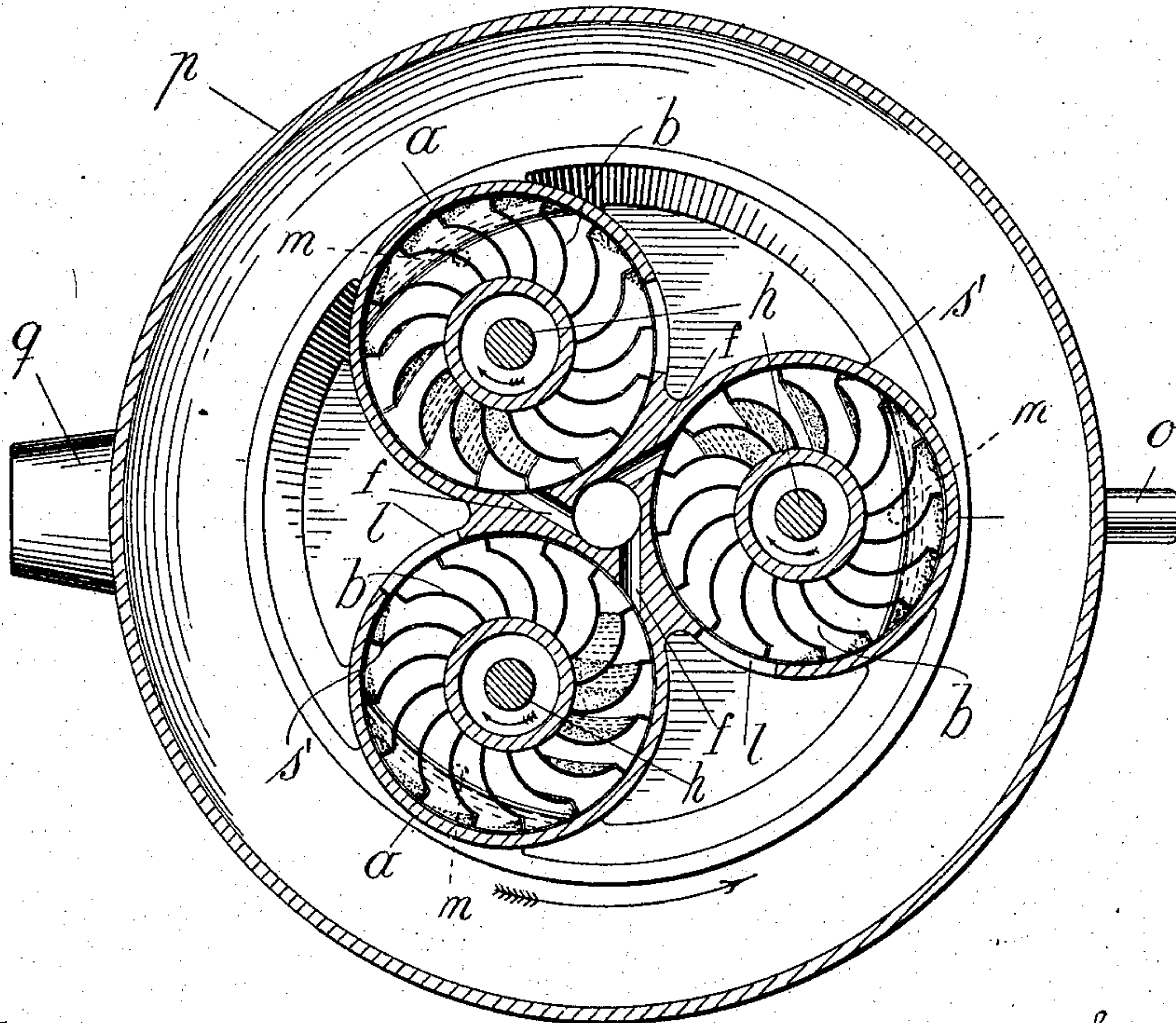


FIG. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

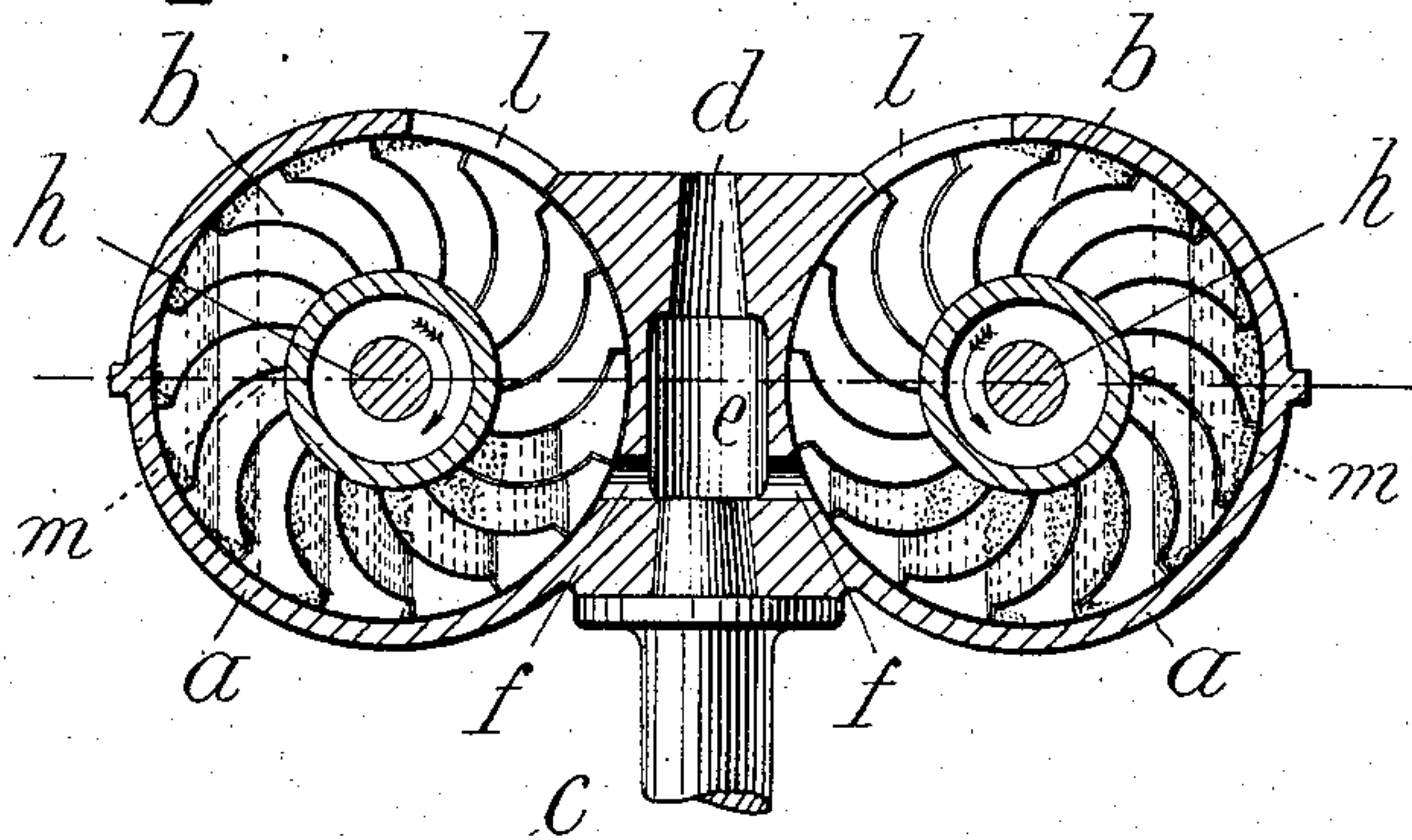
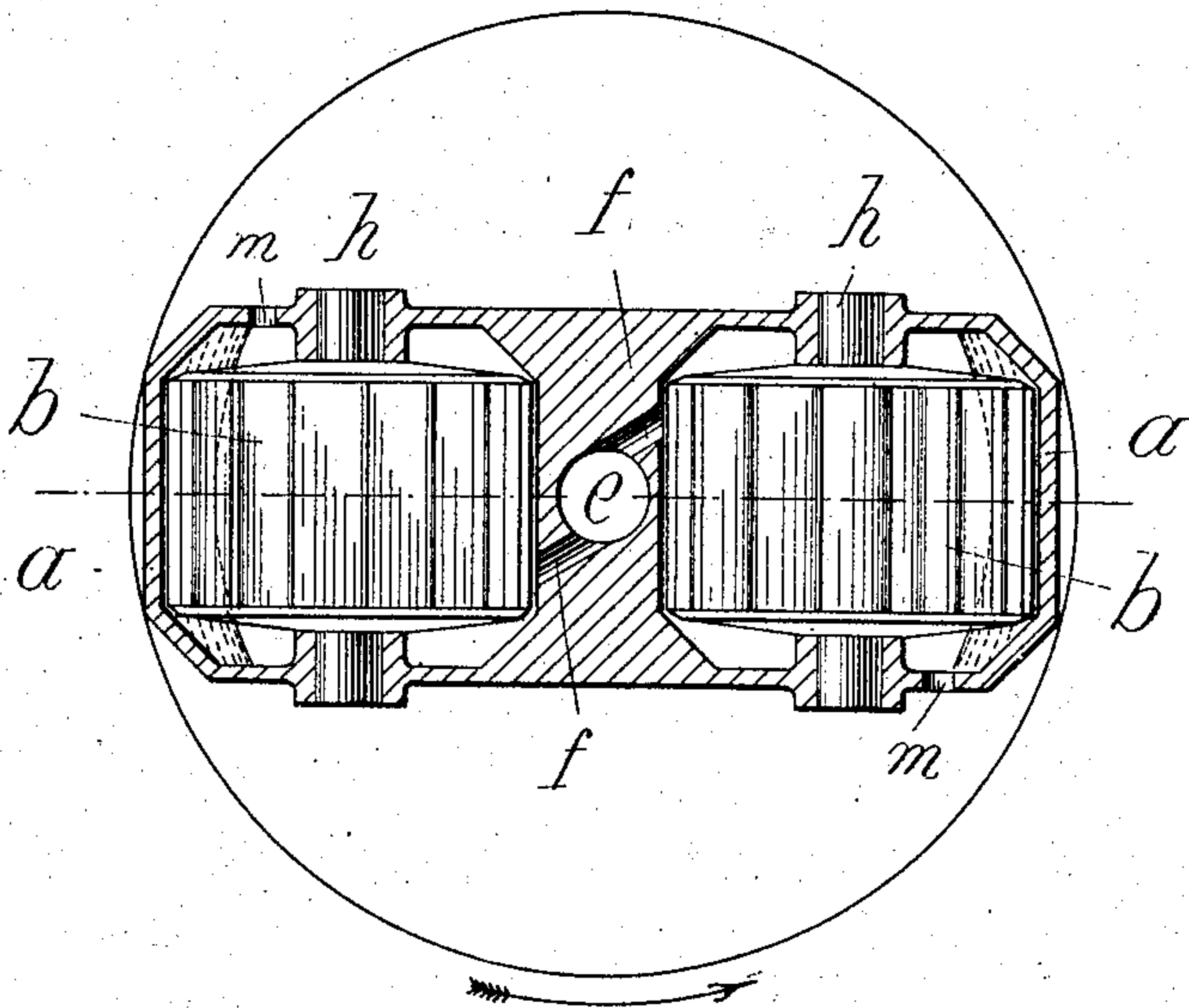


Fig. 4.



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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL SEPARATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 790,081, dated May 16, 1905.

Application filed March 18, 1904. Serial No. 198,781.

To all whom it may concern:

Be it known that I, EBERHARD SEGER, mechanical engineer, a subject of the King of Sweden and Norway, and a resident of Kamakaregatan 40, Stockholm, in the Kingdom of Sweden, have invented certain new and useful Improvements in and Relating to Centrifugal Separating Apparatus, of which the following is a specification.

10 This invention relates to a centrifugal apparatus for separating solid and liquid matter, which apparatus consists of one or several bucket-wheels, each arranged in a case or drum around the shaft of the apparatus and during
15 the rotation of the latter caused to revolve by the action of the centrifugal force on the mixture of solid and liquid matter introduced into the buckets for separation.

Hitherto it has been known to employ centrifugal apparatus for separating solid and liquid matter by means of bucket-wheels caused to rotate by the action of the centrifugal force on the mixture introduced into the buckets. The manner, however, in which this
20 separation takes place as well as the means employed for the purpose are essentially different, since the separation of the solids according to said patents is accomplished by means of perforated plates or strainers, thus
25 by filtration or straining, while in the present invention the separation is effected by the action of the centrifugal force on the mixture contained in the bucket-cells, the separation of the different constituents of the mixture
30 accordingly occurring in the said cells from which the respective constituents are independently discharged.

The constructions already known suffer from the disadvantage that the strainers are easily
40 clogged by the solid matter unless the strainers are made coarse; but if the latter be the case they will allow the solid matter to pass through and be lost, while at the same time the liquid separated will become turbid and
45 the separation imperfect. This inconvenience is not present in the centrifugal apparatus according to the present invention, since the separation is not accomplished by the aid of strainers.

In the accompanying drawings two forms 50 of this centrifugal apparatus are illustrated, Figures 1 and 2 having three bucket-wheels rotating about vertical shafts, Figs. 3 and 4 having two such wheels revolving about horizontal shafts. Figs. 1 and 3 illustrate vertical 55 sections, and Figs. 2 and 4 horizontal sections. In Fig. 3 the outer drum or casing is removed.

The apparatus illustrated in Figs. 1 and 2 consists of a central hub *s*, secured to the centrifugal shaft *c* and carrying three cylindrical 60 cases or drums *a*, each inclosing a bucket-wheel *b*. The central hub *s* is fitted upon the main shaft *c* and is provided at either end with a plate of suitable form, usually of that shown, 65 rigidly secured to such hub, so that the hub and plates form what may for convenience be termed a "double-ended spider" for holding in position the buckets, as hereinafter described. The upper end of the central hub 70 *s* is provided with a central supply-passage *d* for the fluid to be treated, said passage at the bottom preferably being provided with an enlargement *e*, communicating by means of other passages, *f*, with the interior of the 75 respective drums *a*. The bucket-wheels are provided with bottoms or end walls *r* and with open curved buckets or vanes, the outer edges *s'* of which should, preferably, be made to point radially and serve as scrapers. The 80 wheels revolve about gudgeons *h*, loosely journaled in bearings *i* and bearing against the smooth inside of the circular edge or reversed flange or rim of two wheels *k*, revolvable about the axis of the centrifugal apparatus, the gudgeons rolling on the said edges 85 in the operation of the apparatus. In consequence of the pairs of gudgeons of the wheels being at the same distance from each other and uniformly loaded during the rotation of 90 the apparatus the bucket-wheels will be balanced and the journal friction practically avoided. Each drum *a* has in its circumference near the shaft of the apparatus an aperture *l*, extending the whole height of the 95 bucket-wheel and serving as outlet for the solid matter separated. In the bottom of each drum *a* there are also outlets *m* for the liquid

separated, said outlets communicating with a surrounding receiver *n*, provided with a discharge-pipe *o*. A case *p*, surrounding the drums *a*, serves to receive the solid matter discharged through the apertures *l*, which matter is removed by means of the chute *q*.

In the centrifugal apparatus illustrated in Figs. 3 and 4 the bucket-wheels *b*, with their gudgeons *h*, are horizontal, the apparatus in other respects being arranged in the same manner as that just described. It is evident that the bucket-wheels need not revolve about either vertical or horizontal shafts, but may be located obliquely, and that their number may vary.

The apparatus operates as follows: On setting the apparatus in motion the mixture of liquid and solid matter to be treated is admitted through the passages *d*, *e*, and *f* to the drums *a* and flows to the bucket-cells adjoining the shaft *c*, and the bucket-wheels being set in motion owing to the action of the centrifugal force on the mixture fresh buckets will be repeatedly filled, so that the wheels obtain a uniform rotating motion. In the rotation of the apparatus the solid constituents of the mixture will be separated in the bucket-cells from the lighter liquid ones, and when the buckets occupy a comparatively remote position from the central axis of the apparatus the contents of each bucket will be poured over the edge of the bucket against the wall of the surrounding drum *a*, on which the solid constituent will be deposited when the buckets have reached their position farthest away from the axis of the apparatus, Figs. 2, 3, while the liquid remains inside. The solid matter is carried farther by the flat outer edges *S'* of the buckets acting as scrapers to the aperture *l* of the drum *a*, while the liquid within flows through the aperture between one of the wheel ends and the inside of the drum to the outlet *m* and the receiver *n*, whence it is discharged through the outlet *o*. The positions of the layers of liquid during the running of the apparatus are shown in Figs. 2 and 3. The comparatively dry matter thrown out through the apertures *l* is collected in the receiver *p*, from which it is discharged by the chute or pipe *q*.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In an improved centrifugal separating apparatus, bucket-wheels provided with curved open buckets or vanes adapted to be rotated by the centrifugal force of the mixture to be separated, a drum or casing surrounding each bucket-wheel provided with one or more end apertures for discharging the lighter liquid, and in its circumferential wall with an aperture for discharging the heavier matter, means for rotating the bucket-wheels around a common axis, and means for feeding the matter

to be separated to the bucket-wheels from the central axis of rotation.

2. In an improved centrifugal separating apparatus, bucket-wheels provided with curved open buckets or vanes adapted to be rotated by the centrifugal force of the mixture to be separated, a drum or casing surrounding each bucket-wheel provided with one or more end apertures for discharging the lighter liquid, and in its circumferential wall with an aperture for discharging the heavier matter, a gudgeon passing centrally through each of the bucket-wheels, a central hub, a reversely-flanged wheel at either end of the hub, a spider-plate at top and bottom of the hub in which the ends of the gudgeons are loosely journaled, means for rotating the double spider, means for rotating the hub so as to revolve the bucket-wheels around the common axis, and means for feeding the matter to be separated to the bucket-wheels from the central axis of rotation.

3. In an improved centrifugal separating apparatus, bucket-wheels provided with curved open buckets or vanes adapted to be rotated by the centrifugal force of the mixture to be separated on entrance into the buckets, a drum or casing surrounding each bucket-wheel provided with one or more end apertures for discharging the lighter liquid, and in its circumferential wall with an aperture for discharging the heavier matter, a gudgeon passing centrally through each of the bucket-wheels, a spider-plate at top and bottom in which the ends of the gudgeons are loosely journaled, means for rotating the spider-plates, and means for feeding the matter to be separated to the bucket-wheels from the central axis of rotation.

4. In an improved centrifugal separating apparatus, bucket-wheels provided with curved open buckets or vanes adapted to be rotated by the centrifugal force of the mixture to be separated, a drum or casing surrounding each bucket-wheel provided with one or more end apertures for discharging the lighter liquid and in its circumferential wall with an aperture for discharging the heavier matter, a gudgeon passing centrally through each of the bucket-wheels, a spider-plate at top and bottom in which the ends of the gudgeons are loosely journaled, an annular flanged bearing-wheel against the inner peripheral wall of which the ends of the gudgeons are centrifugally forced upon operation of the apparatus, means for rotating the double spider, and means for feeding the matter to be separated to the bucket-wheels from the central axis of the device.

In witness whereof I have hereunto set my hand in presence of two witnesses.

EBERHARD SEGER.

Witnesses:

JOHAN MARKMAN,
H. TELANDER.