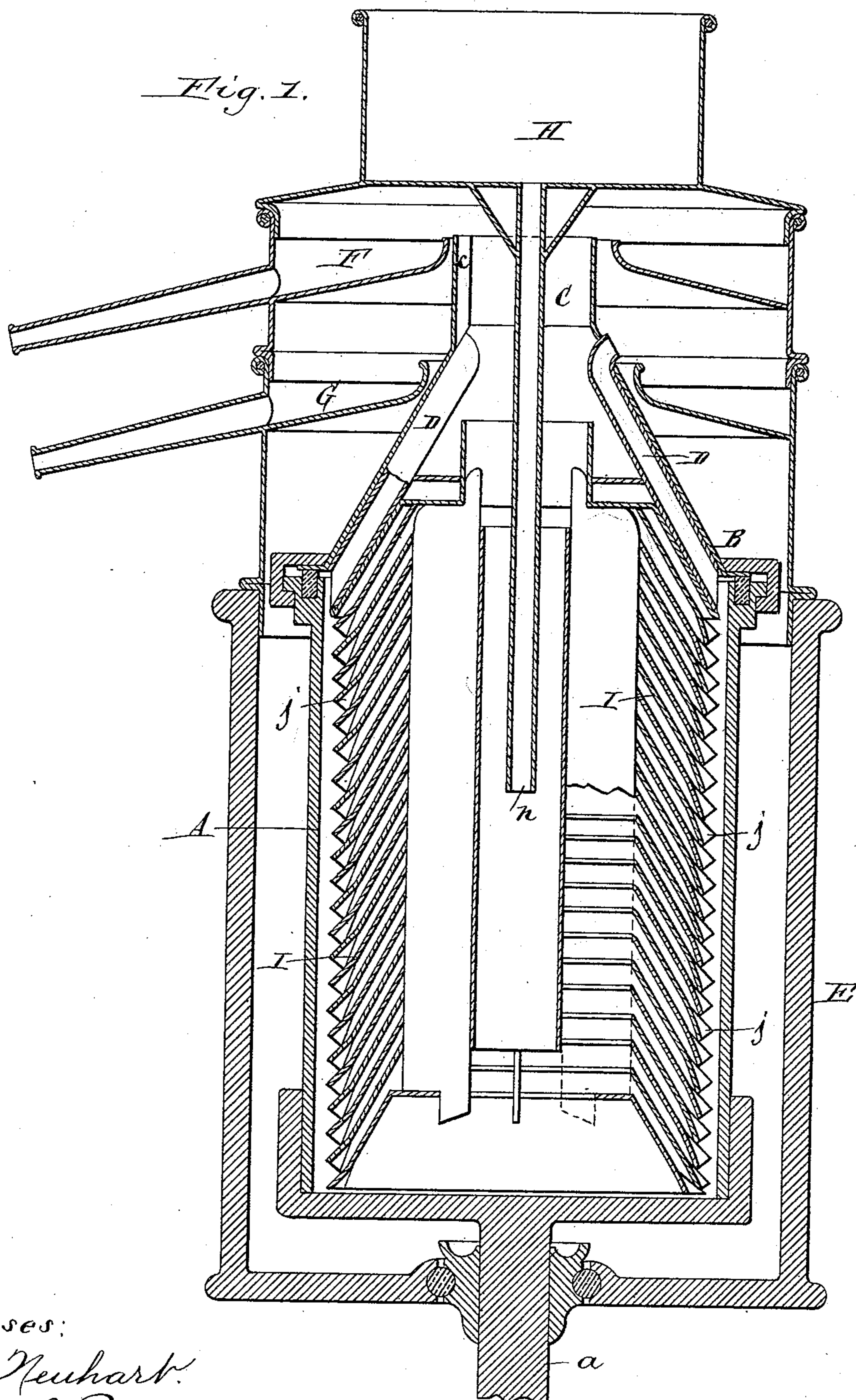


3 Sheets—Sheet 1.

No. 463,794.

Patented Nov. 24 1891.



Witnesses:

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Theo. L. Popp.

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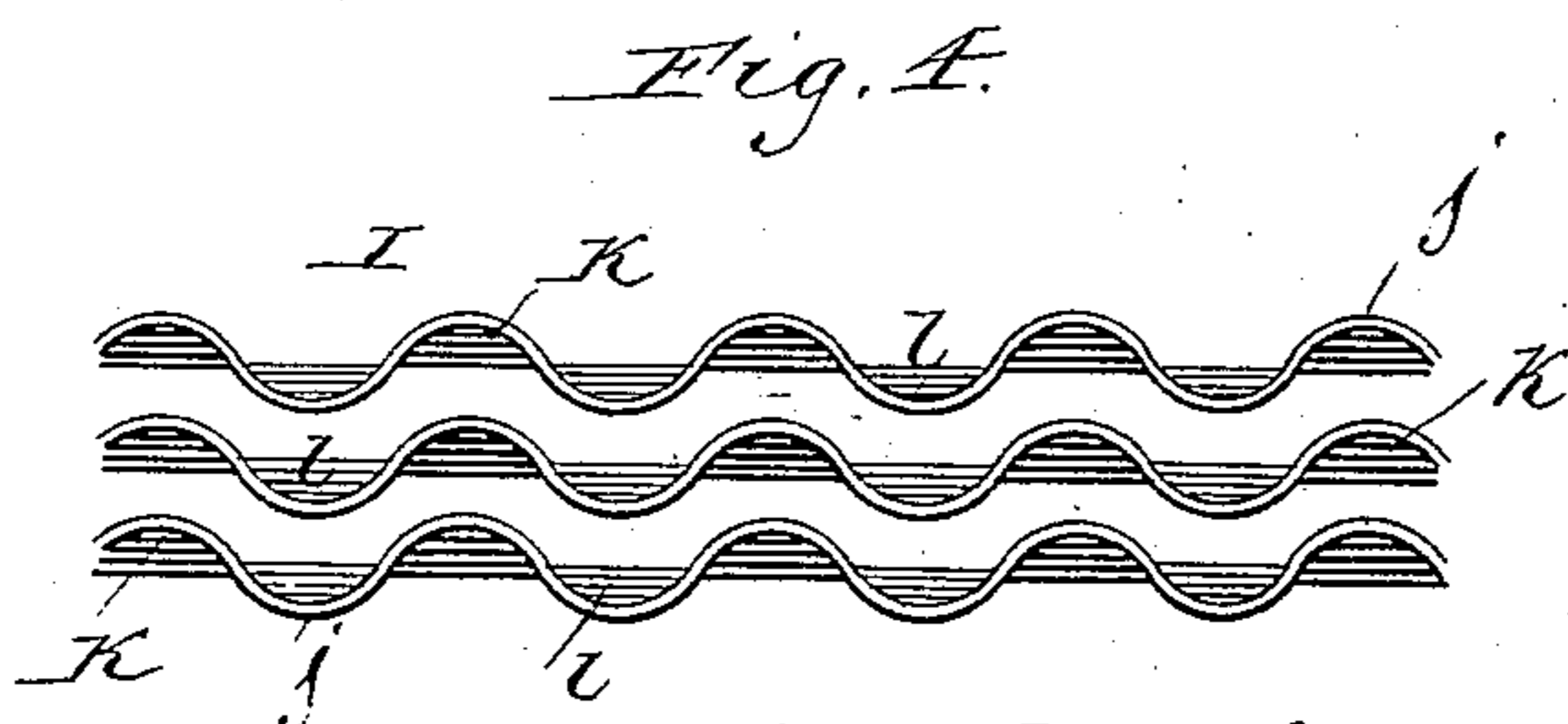
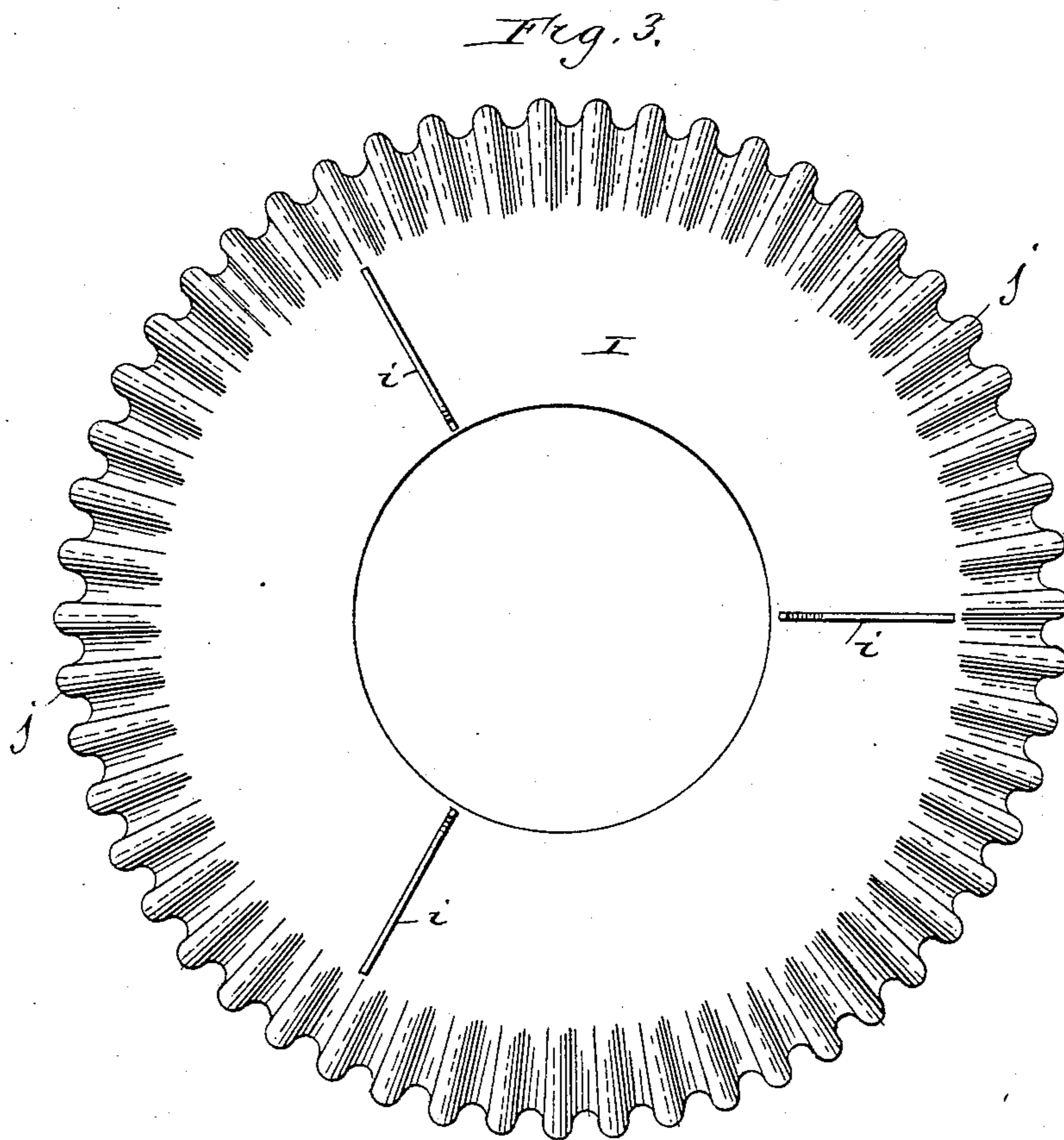
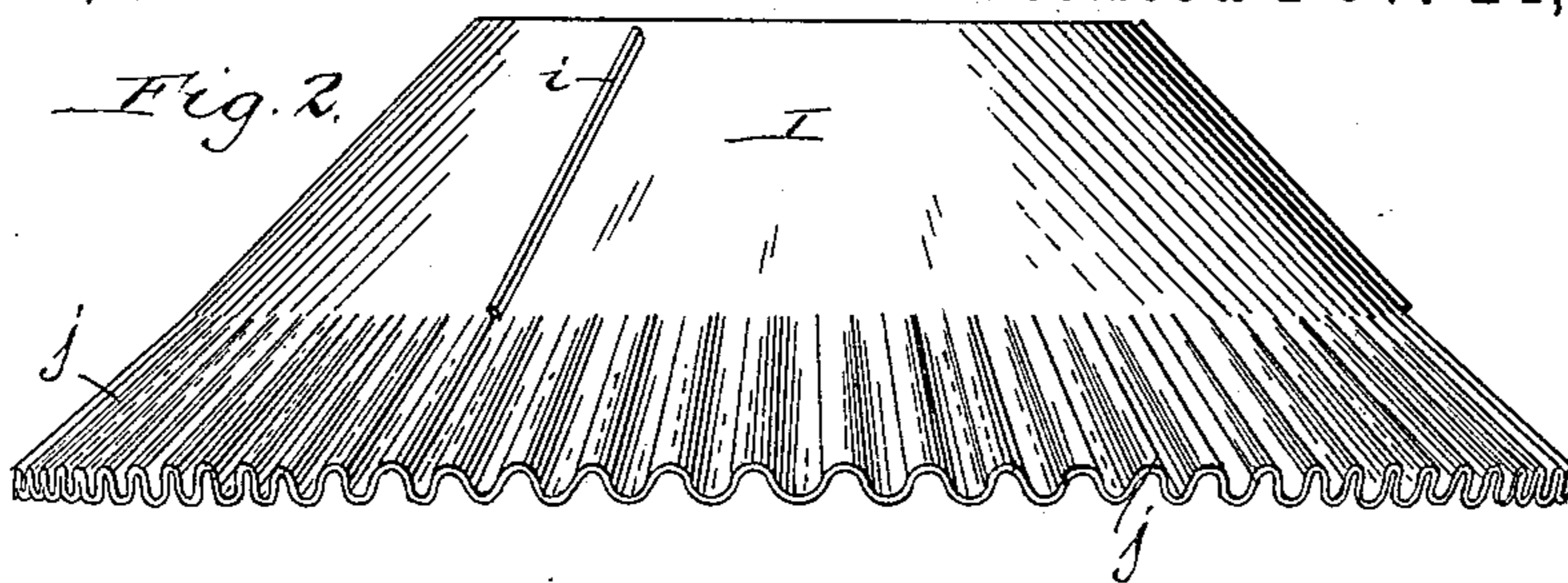
(No Model.)

3 Sheets—Sheet 2.

C. G. P. DE LAVAL.
CENTRIFUGAL SEPARATOR.

No. 463,794.

Patented Nov. 24, 1891.



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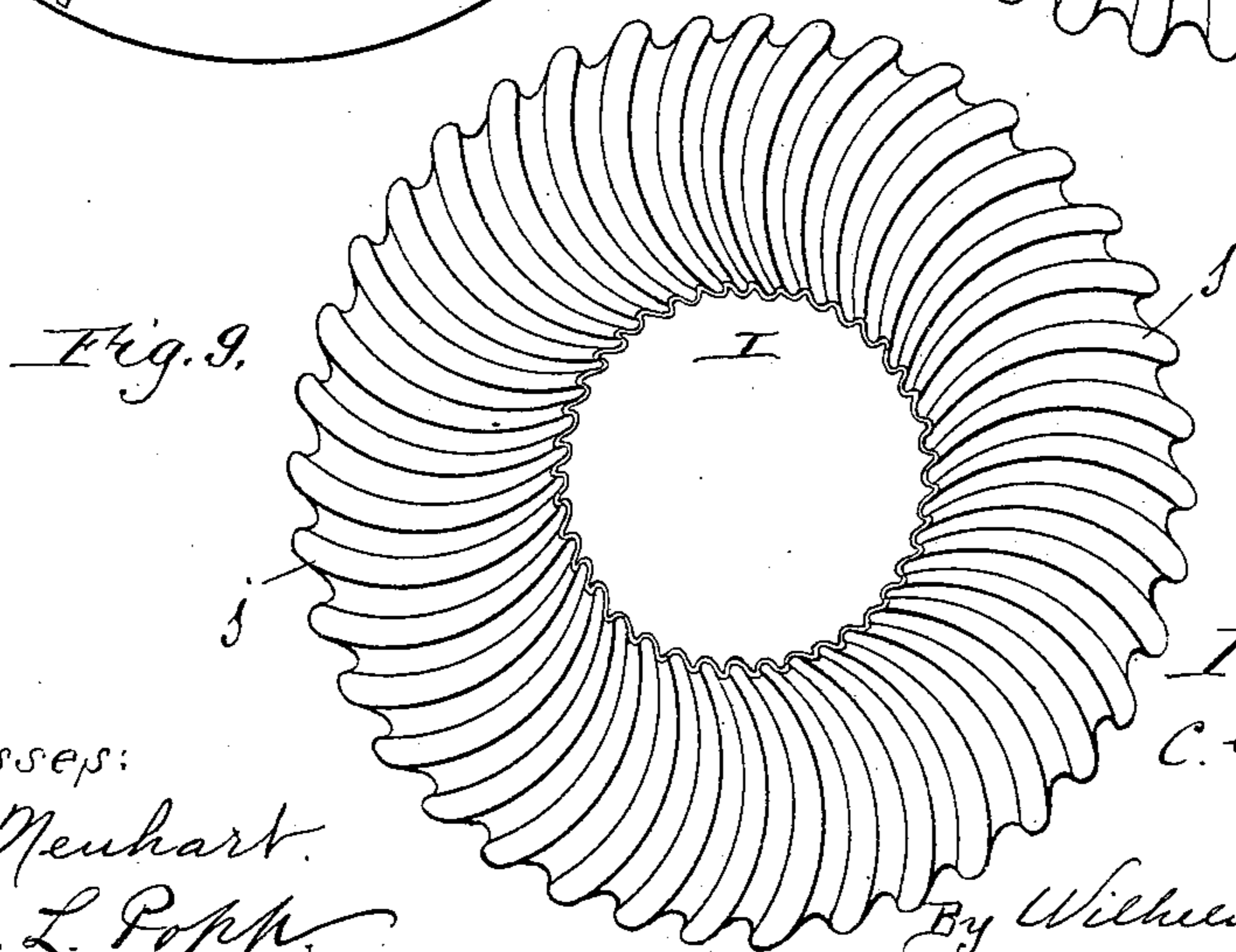
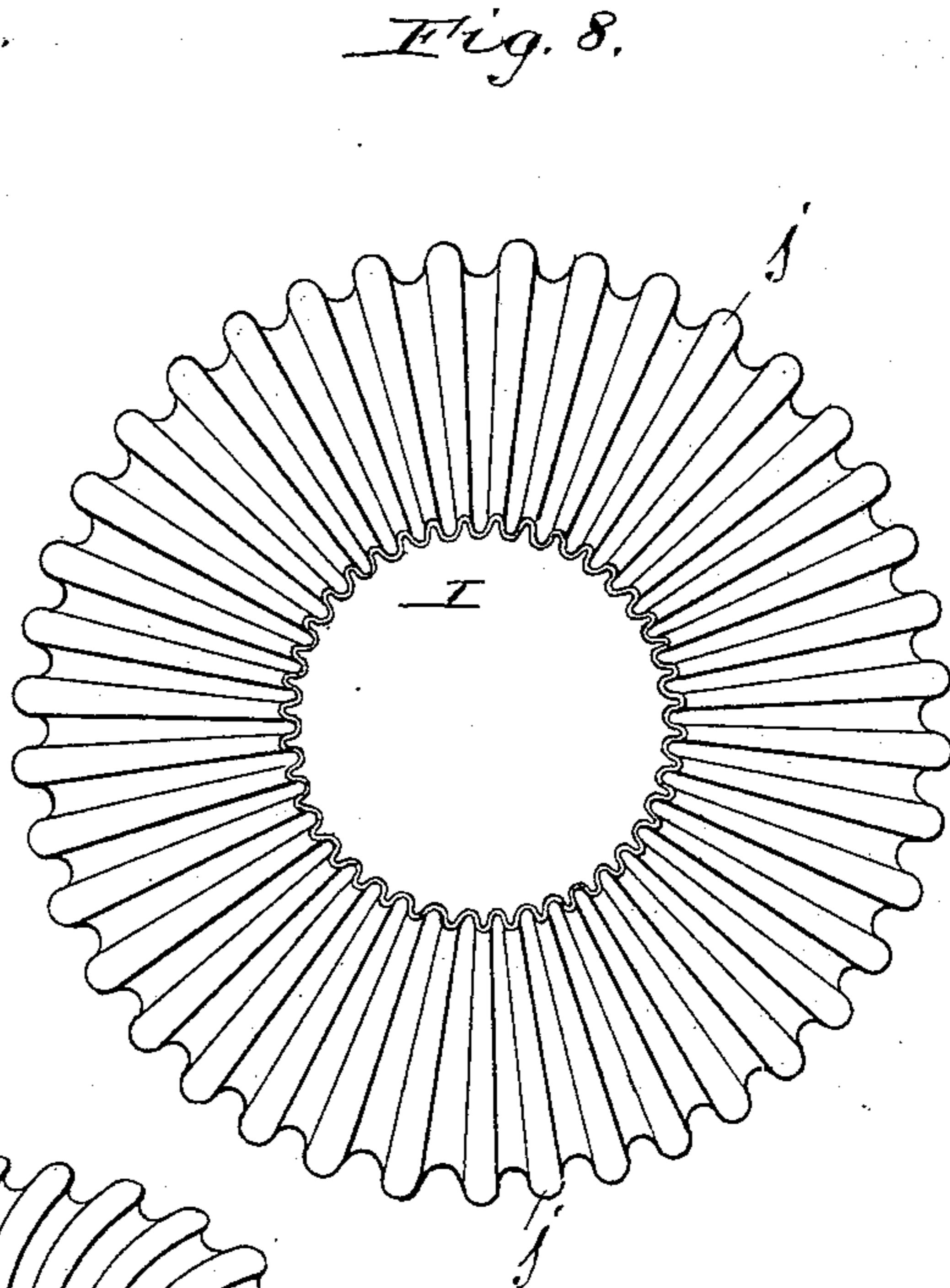
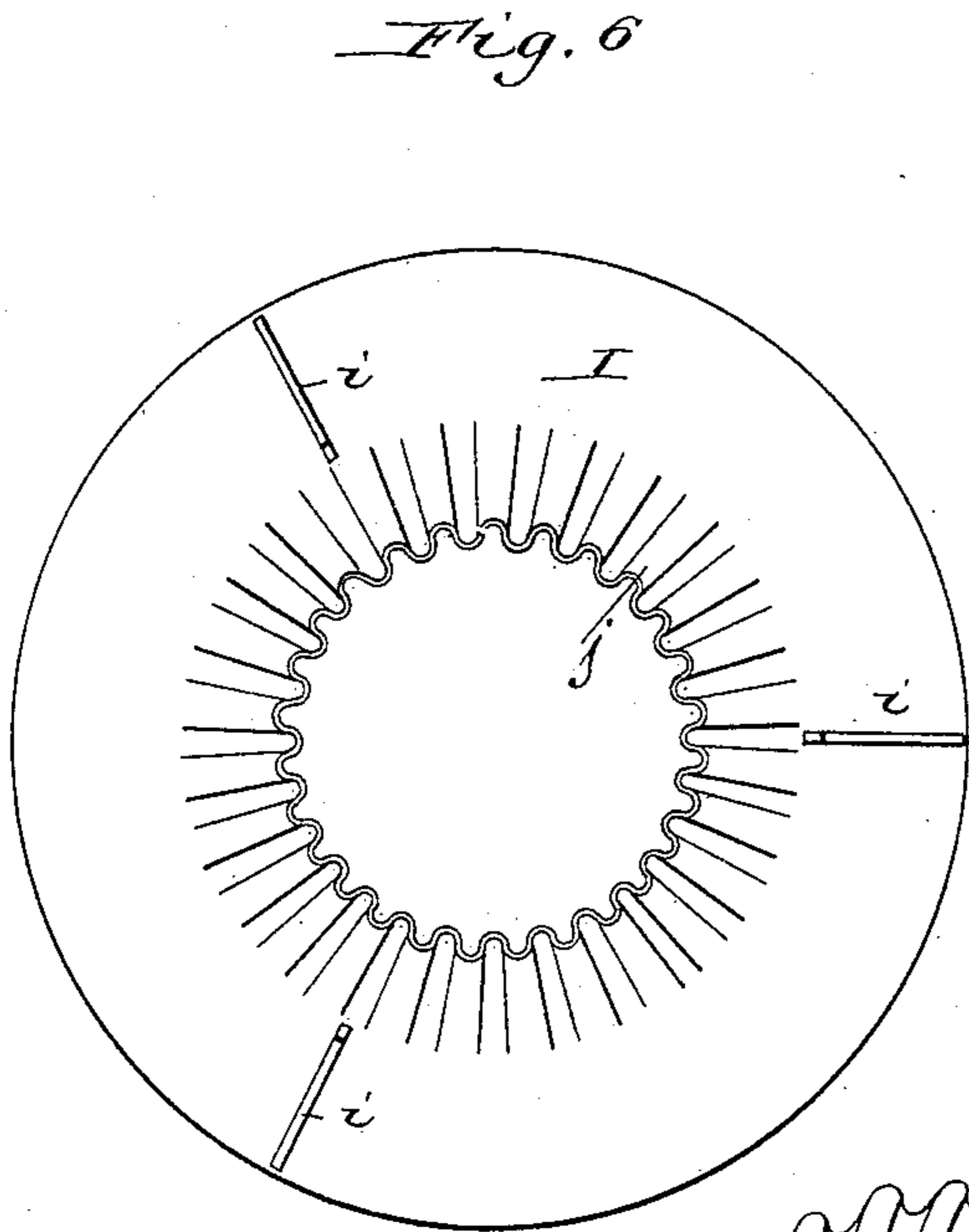
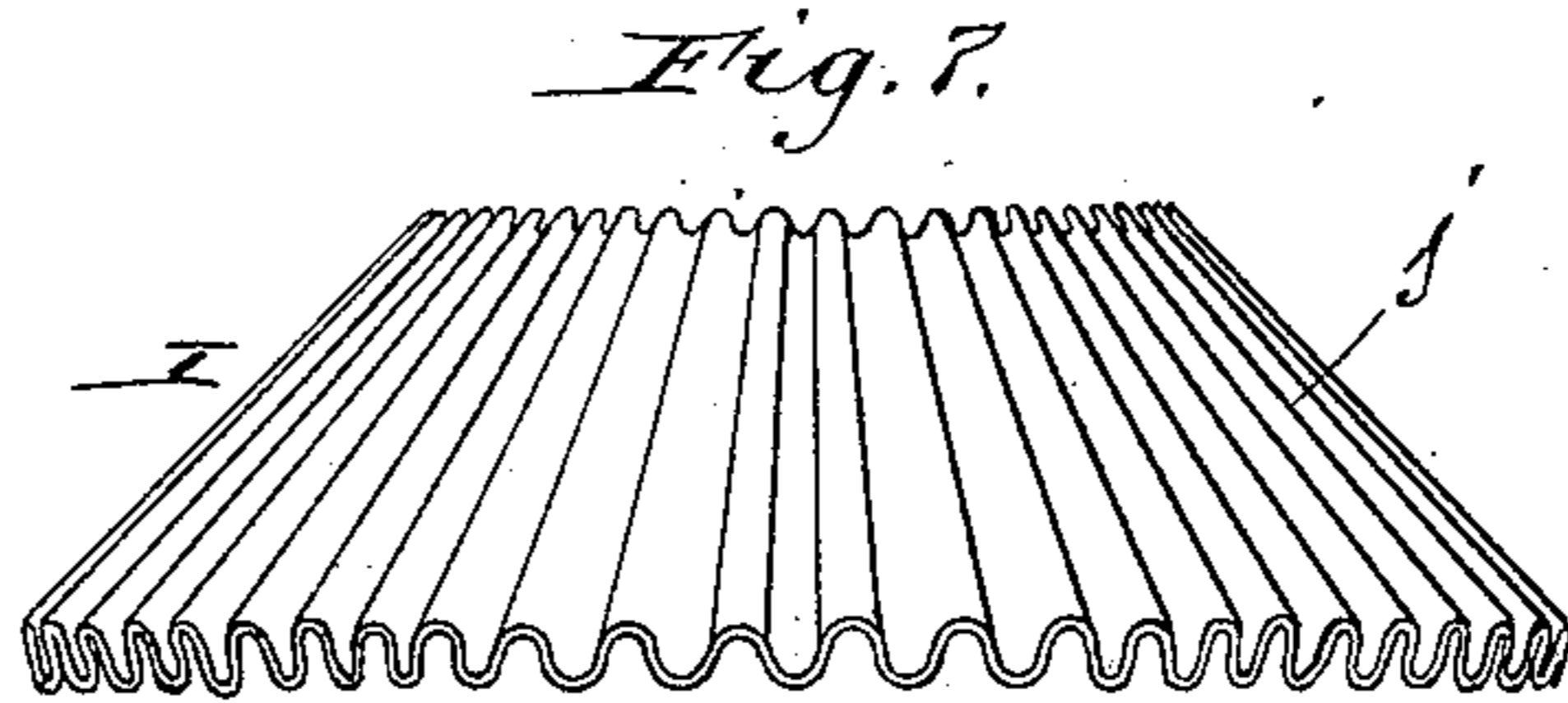
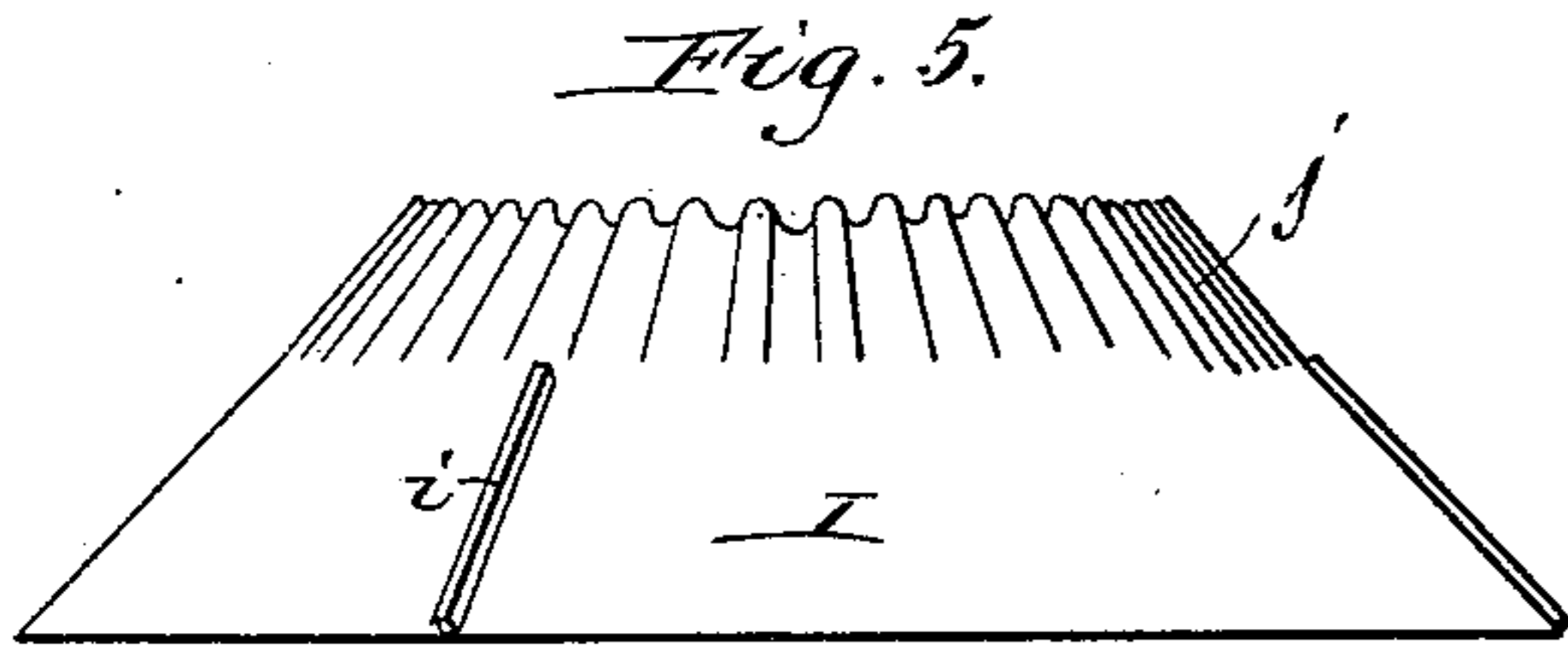
(No Model.)

3 Sheets—Sheet 3.

C. G. P. DE LAVAL.
CENTRIFUGAL SEPARATOR.

No. 463,794.

Patented Nov. 24, 1891.



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UNITED STATES PATENT OFFICE.

CARL GUSTAF PATRIK DE LAVAL, OF STOCKHOLM, SWEDEN, ASSIGNOR TO
THE AKTIEBOLAGET SEPARATOR, OF SAME PLACE.

CENTRIFUGAL SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 463,794, dated November 24, 1891.

Application filed April 3, 1891. Serial No. 387,506. (No model.)

To all whom it may concern:

Be it known that I, CARL GUSTAF PATRIK DE LAVAL, a subject of the King of Sweden, and a resident of Stockholm, Sweden, have
5 invented new and useful Improvements in Centrifugal Separators, of which the following is a specification.

This invention relates to that class of centrifugal separators which are provided with
10 imperforate bowls or drums and which are employed for separating compound liquids into liquids of different specific gravities—for instance, for separating milk into cream and skim-milk.

15 This invention has particular reference to a separator of this class in which the bowl is provided with numerous rings or conical plates, whereby the liquid in the bowl is divided into numerous thin layers, arranged
20 across the radial lines of the bowl. A separator of this kind is described and shown in Letters Patent No. 432,719, dated July 22, 1890. In the operation of the separator each thin layer of liquid is separated into two liquids
25 of different densities, forming two currents, which flow in opposite directions, the specifically heavier liquid flowing along the under side of the ring or plate above the layer to- ward the circumference of the bowl and the
30 specifically lighter current along the upper side of the ring or plate below the layer to- ward the axis of the bowl.

The object of this invention is to prevent these currents from meeting and interfering
35 with each other, whereby their movement would be retarded and a new emulsion or mixture would be formed. This object is attained by providing the rings or plates with corrugations or channels which receive the
40 separated liquid and prevent it from comingling with a different liquid.

In the accompanying drawings, consisting of three sheets, Figure 1 is a sectional elevation of a centrifugal separator provided with
45 my improvement. Fig. 2 is an elevation of one of the rings, having its peripheral portion corrugated. Fig. 3 is a top plan view thereof. Fig. 4 is a diagram showing the peripheral edges of several superposed rings
50 and the layers of liquid in the corrugations thereof. Fig. 5 is a side elevation of a ring

having its inner portion corrugated. Fig. 6 is a top plan view thereof. Fig. 7 is a side elevation of a ring provided with corruga-
55 tions extending from the inner to the outer edge. Fig. 8 is a top plan view thereof. Fig. 9 is a plan view of a ring provided with spiral corrugations.

Like letters of reference refer to like parts in the several figures. 60

A represents the separating bowl or drum; *a*, the spindle; B, the cover provided with a contracted neck C, which contains the cream-
65 discharge *c*.

D are the pipes through which the skim-
70 milk is discharged.

E represents the casing which surrounds the bowl; F, the cream-tray; G, the skim-milk tray, and H the feed-cup provided with the
75 feed-pipe *h*. All of these parts may be of any suitable or well-known construction.

I represents the inclined annular division-
80 plates or conical rings arranged in the liquid-space of the bowl and separated by spacing ribs or projections *i*, so that these rings divide the liquid into numerous thin layers,
75 which are arranged at a greater or less angle across the radial lines of the bowl. These rings are provided with corrugations *j*, forming channels in which the separated liquids
80 are received and by which they are conducted to the edge of the ring.

In the construction represented in Figs. 1, 2, 3, and 4 the corrugations are formed in the
85 outer or peripheral portion of each ring, and the outwardly-flowing heavy liquid is received in the channels in the lower side of the ring above each layer of liquid, as represented at
90 *k* in Fig. 4, while the light liquid, which flows inwardly, is received in the channels formed in the upper side of the ring below each layer, as represented at *l* in the same figure.

In the construction represented in Figs. 5 and 6 the corrugations are formed in the in-
95 ner portion of the ring, and in the construction represented in Figs. 7 and 8 the corruga- tions extend from the inner to the outer edges of the ring. The corrugations or channels are preferably arranged radially; but they may be arranged obliquely or spirally, as rep-
100 resented in Fig. 9. These corrugations form channels which receive the separated liquids

and conduct them in separate currents to the edges of the rings, thereby preventing the separated liquid from meeting a current of a different liquid flowing in the opposite direction, whereby a new emulsion would be formed and the separating operation would be correspondingly retarded. The corrugations in the rings therefore expedite the separating operation and effect a more thorough separation, whereby the separating capacity of the bowl is materially increased.

I claim as my invention—

The combination, with a separating-bowl,

of superposed division-plates arranged in the liquid-space across the radial lines of the bowl, provided with corrugations or channels through which the separated liquids flow and communicating at their outer edges with a passage for the heavy separated liquids, substantially as set forth.

Witness my hand this 17th day of March, 1891.

CARL GUSTAF PATRIK DE LAVAL.

Witnesses:

H. ZIMMER,

E. H. HAASE.