

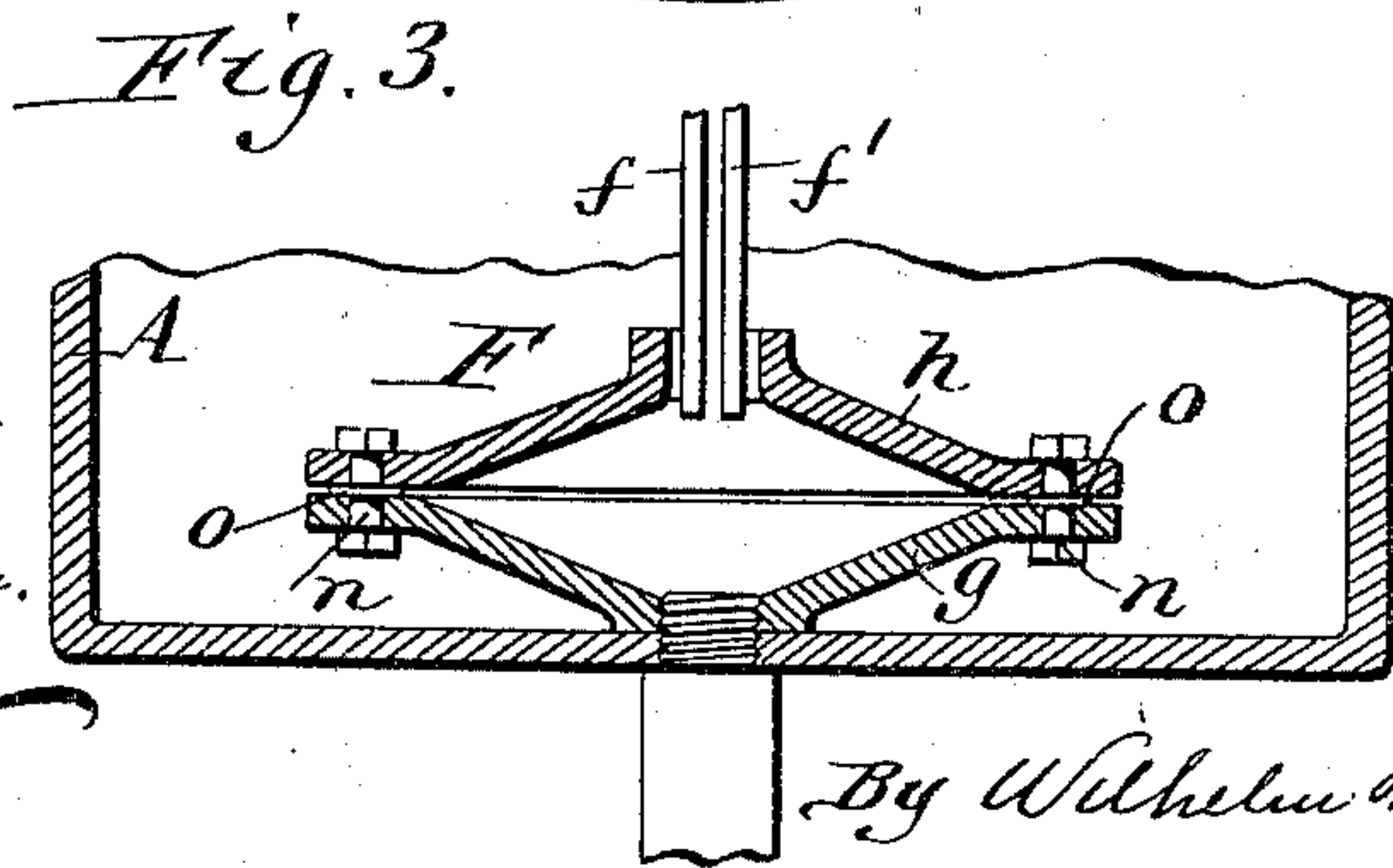
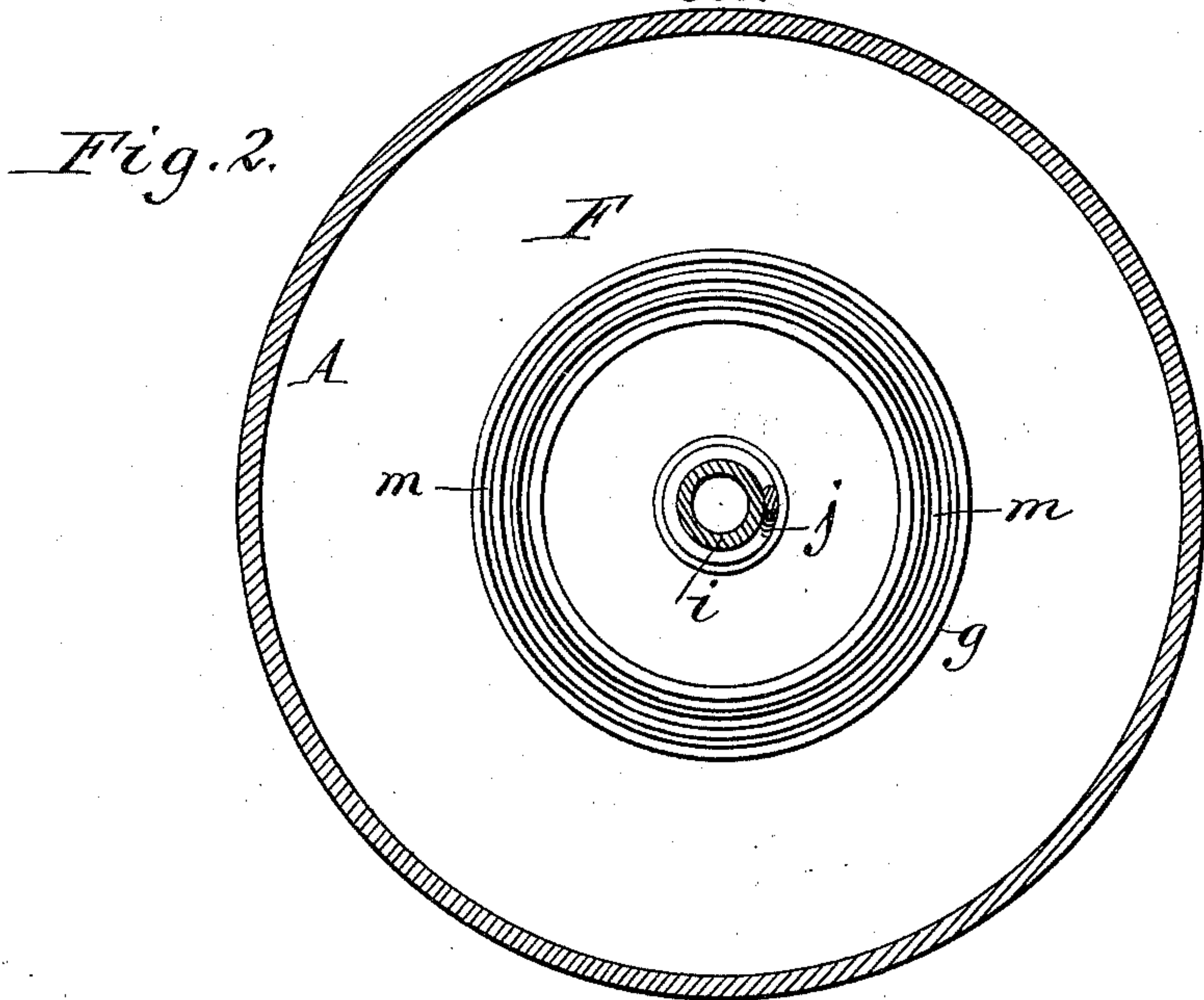
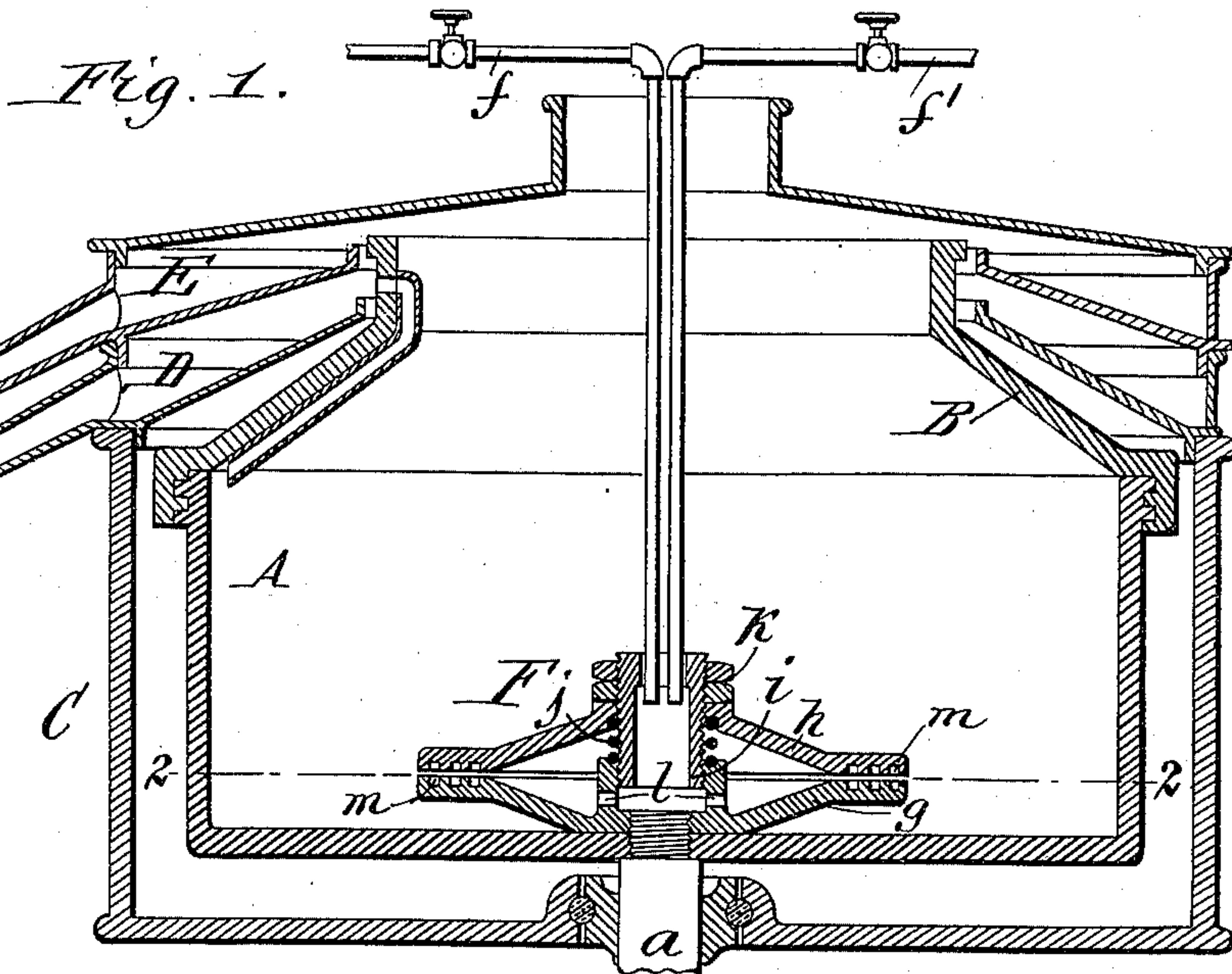
(No Model.)

M. EKENBERG.

COMBINED CENTRIFUGAL EMULSOR AND SEPARATOR.

No. 542,756.

Patented July 16, 1895.



Witnesses:  
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Theo. L. Opp.

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# UNITED STATES PATENT OFFICE.

MARTIN EKENBERG, OF STOCKHOLM, SWEDEN, ASSIGNOR TO THE AKTIE-  
BOLAGET SEPARATOR, OF SAME PLACE.

## COMBINED CENTRIFUGAL EMULSOR AND SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 542,756, dated July 16, 1895.

Application filed April 13, 1894. Serial No. 507,362. (No model.)

*To all whom it may concern:*

Be it known that I, MARTIN EKENBERG, a subject of the King of Sweden and Norway, residing at Stockholm, Sweden, have invented new and useful Improvements in a Combined Centrifugal Emulsor and Separator, of which the following is a specification.

This invention has for its object the production of a centrifugal machine by which two liquids of different kinds can be emulsified or intimately commingled, so as to form an emulsion, and be immediately thereafter and before leaving the machine separated from each other and then separately discharged from the machine.

In the accompanying drawings, Figure 1 is a vertical section of my improved emulsifying and separating machine. Fig. 2 is a horizontal section in line 2 2, Fig. 1. Fig. 3 is a fragmentary vertical section showing a different construction of the emulsifying part of the machine.

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

A represents the bowl of a centrifugal liquid-separator, mounted upon a vertical spindle *a* and provided with a cover B, which has a contracted neck and to which the discharge-pipe for the heavy separated liquid is attached in a well-known manner, the light separated liquid being discharged through the neck of the cover, also in a well-known manner. While these devices for discharging the separated light and heavy liquids are preferred, I do not wish to limit myself to the same, as other well-known and suitable devices may be employed for the purpose.

C represents a curb or stationary casing which surrounds the separating-bowl and its spindle, and which supports the receptacle D for the heavy separated liquid and the receptacle E for the light separated liquid in a well-known manner.

F represents an emulsion apparatus which is secured within the separator-bowl and rotates therewith. This emulsion apparatus receives the two liquids which are to be commingled or emulsified through two feed-pipes *ff'*, and operates upon these liquids in such a manner as to thoroughly commingle the

same and discharge them into the separator-bowl in the form of an emulsion.

In the construction of the apparatus represented in Figs. 1 and 2 the emulsion apparatus is composed of a lower upwardly-flaring vessel or cup *g*, which is secured to the bottom of the separator-bowl, and an upper downwardly-flaring cup or vessel *h*, which is made adjustable toward and from the lower vessel *g*, so that the width of the narrow annular slit or space between the marginal portions of the two vessels *g* and *h* can be nicely adjusted. For this purpose the lower vessel *g* is provided with an internal hub or collar *i* projecting upwardly from the bottom of the vessel and through a central opening of the upper vessel *h*. A spring *j* is interposed between a shoulder on this hub and the central portion of the upper vessel, so as to press the latter upwardly. The hub *i* is provided at its upper end with an external screw-thread, to which screw-nuts *k* are applied, which press upon the central portion of the upper vessel and by which the latter is forced down against the upward pressure of the spring, so that by tightening or releasing these nuts the upper vessel can be adjusted toward or from the lower vessel, as may be required.

The hub of the lower vessel is hollow and receives the lower ends of the feed-pipes *ff'* and is provided near the bottom of the lower vessel with one or more lateral openings *l*, through which the liquids pass from the cavity of the hub into the surrounding cavities of the vessels. The marginal portions of the vessels are provided with horizontal faces, or faces which are arranged at right angles to the axis of rotation, and these faces may be provided with concentric grooves *m*, forming mixing-chambers in which the liquids become intimately commingled. The horizontal faces of the two vessels constituting the emulsion apparatus are so adjusted with reference to each other that a very narrow annular space or slit is left between them, through which the liquids which are fed into the emulsion apparatus are forced out by centrifugal force and thereby converted into an emulsion.

Instead of an emulsion apparatus composed of two parts, one of which is adjustable to-



ward and from the other to regulate the width of the slit, as shown in Figs. 1 and 2, a construction may be used in which the slit is not adjustable and in which both parts of the emulsion apparatus are rigidly secured together by bolts *n* and intervening stay-pieces *o*, as shown in Fig. 3, or by other suitable means.

While the concentric grooves in the opposing faces of the two parts of the emulsion apparatus are preferred, on account of their superior efficiency, they are not indispensable and may be omitted and plane faces may be employed, as shown in Fig. 3.

In the operation of this machine the two liquids which are to be emulsified are fed into the emulsion apparatus in the desired proportion and are discharged from the same into the surrounding separator-bowl in the form of an emulsion. This emulsion is then immediately separated in the bowl into its constituent liquids, which are separately discharged from the bowl through the outlets provided therein for the discharge of the separated heavy and light liquids.

A machine of this character is useful for various industrial purposes in which it is desired to bring two different liquids in intimate contact with each other for the purpose

of causing a chemical or other action of one liquid upon the other in a finely-divided state and immediately separating the liquids again when the desired effect has been produced—as, for instance, in the treatment of oil with acid in the process of purifying oil.

I claim as my invention—

An apparatus for continuously emulsifying two liquids and then separating the emulsion, said apparatus consisting of a rotating separating bowl, provided with discharges for the separated liquids, and a centrifugal emulsor arranged within said bowl and rotating therewith, said emulsor being provided with a central feed pipe which receives the liquids to be emulsified, with a cavity which surrounds the feed pipe and receives the liquids therefrom, and with a peripheral discharge slit extending outwardly from said cavity, whereby the liquids are emulsified and discharged into the bowl, in which the emulsion is then separated, substantially as set forth.

Witness my hand this 16th day of March, 1894.

MARTIN EKENBERG.

Witnesses:

TH. WAWRINSKY,  
CARL A. HERZ.