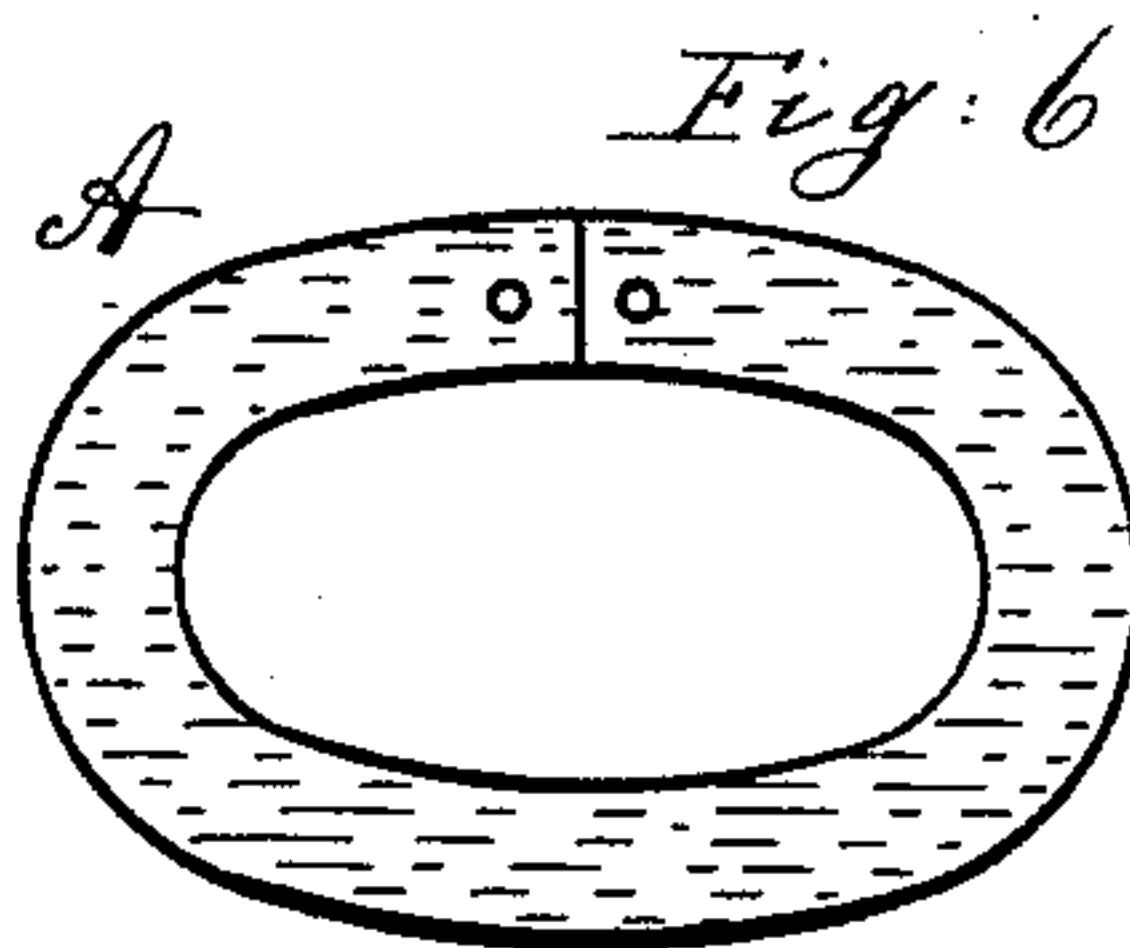
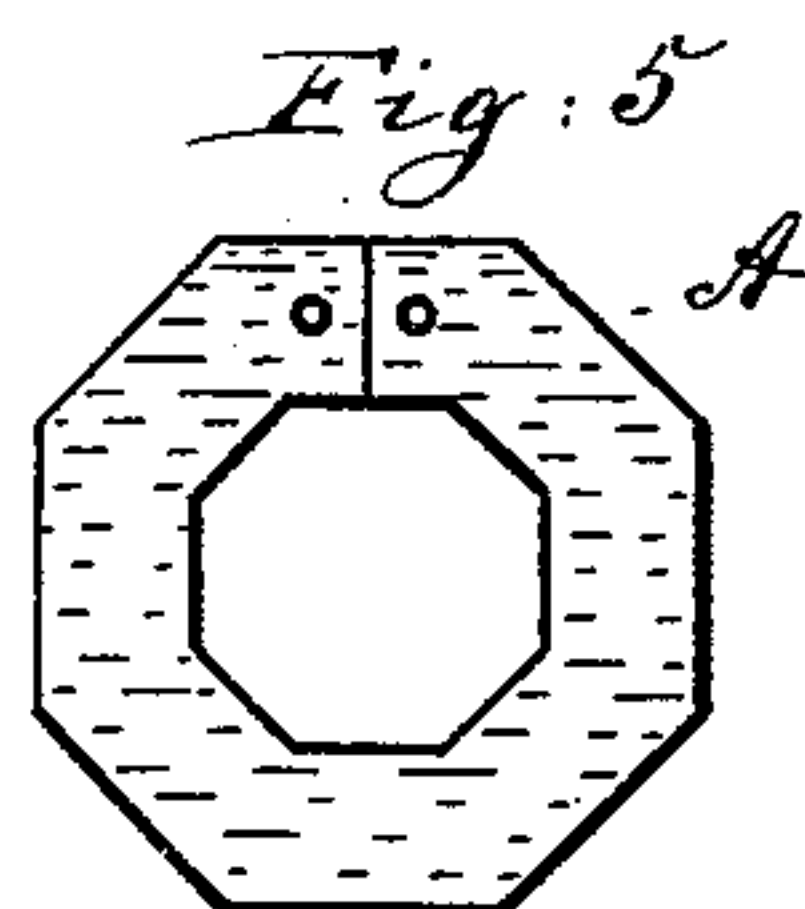
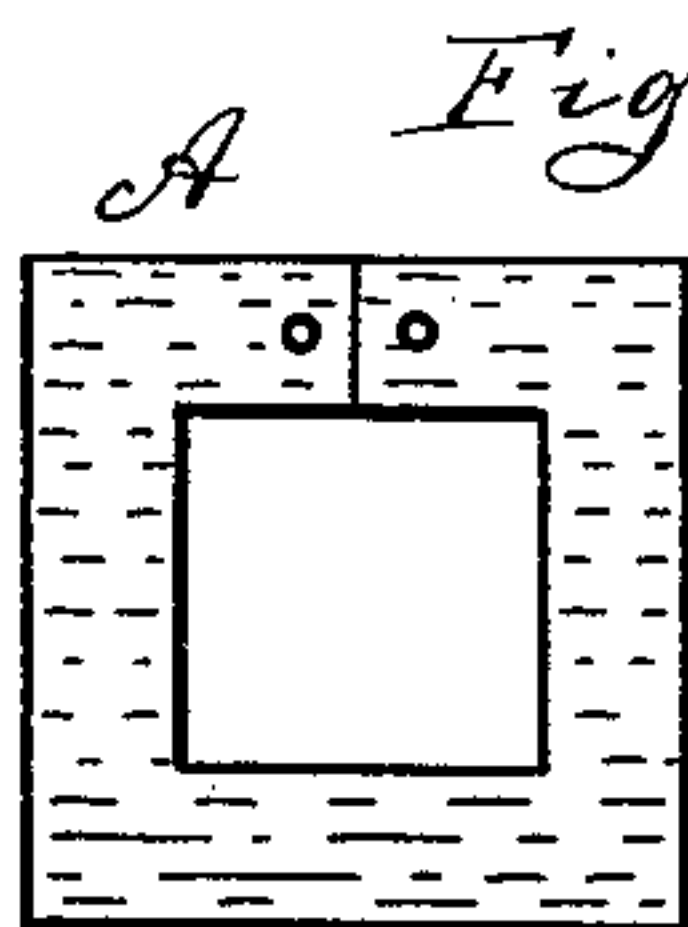
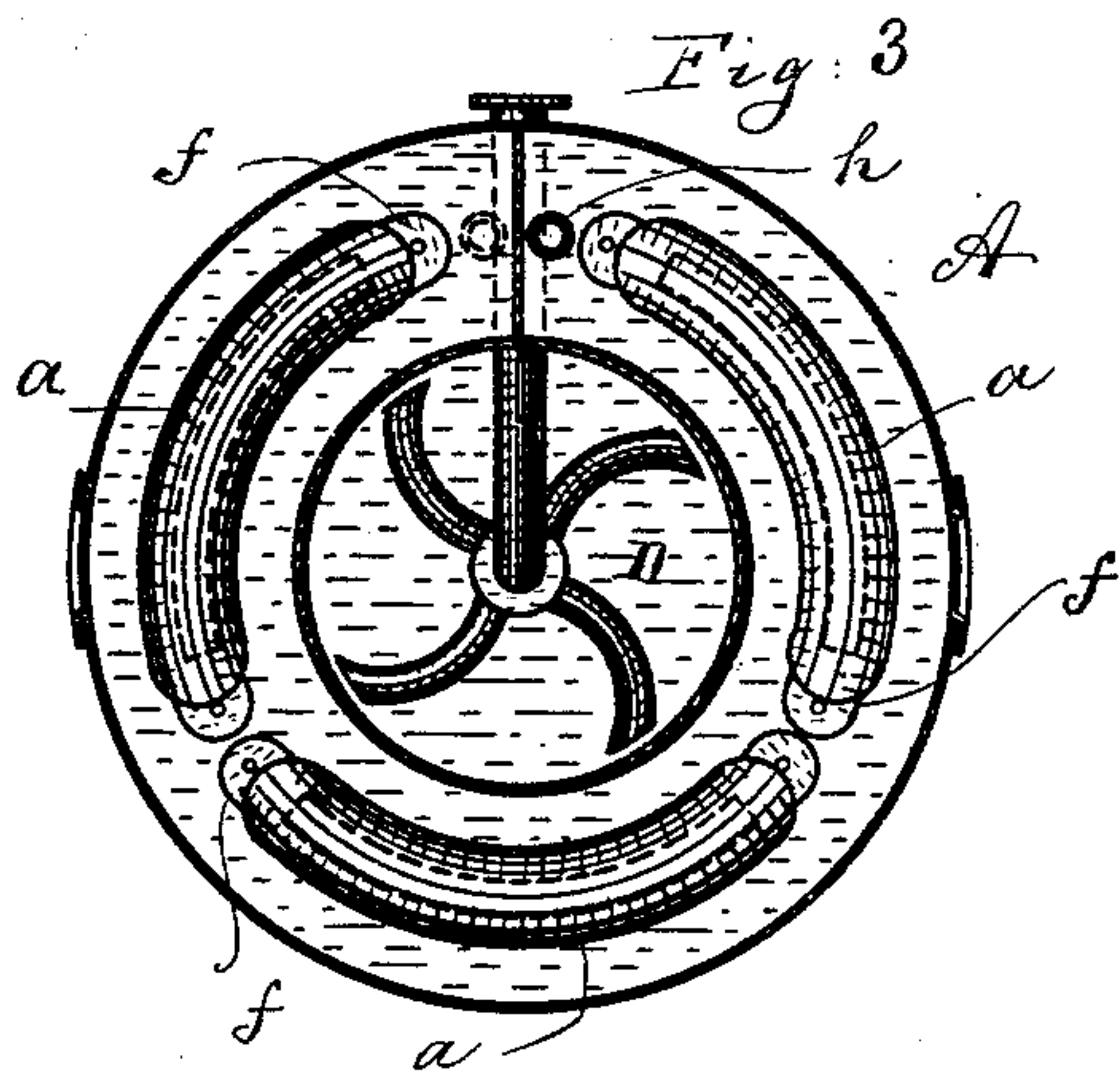
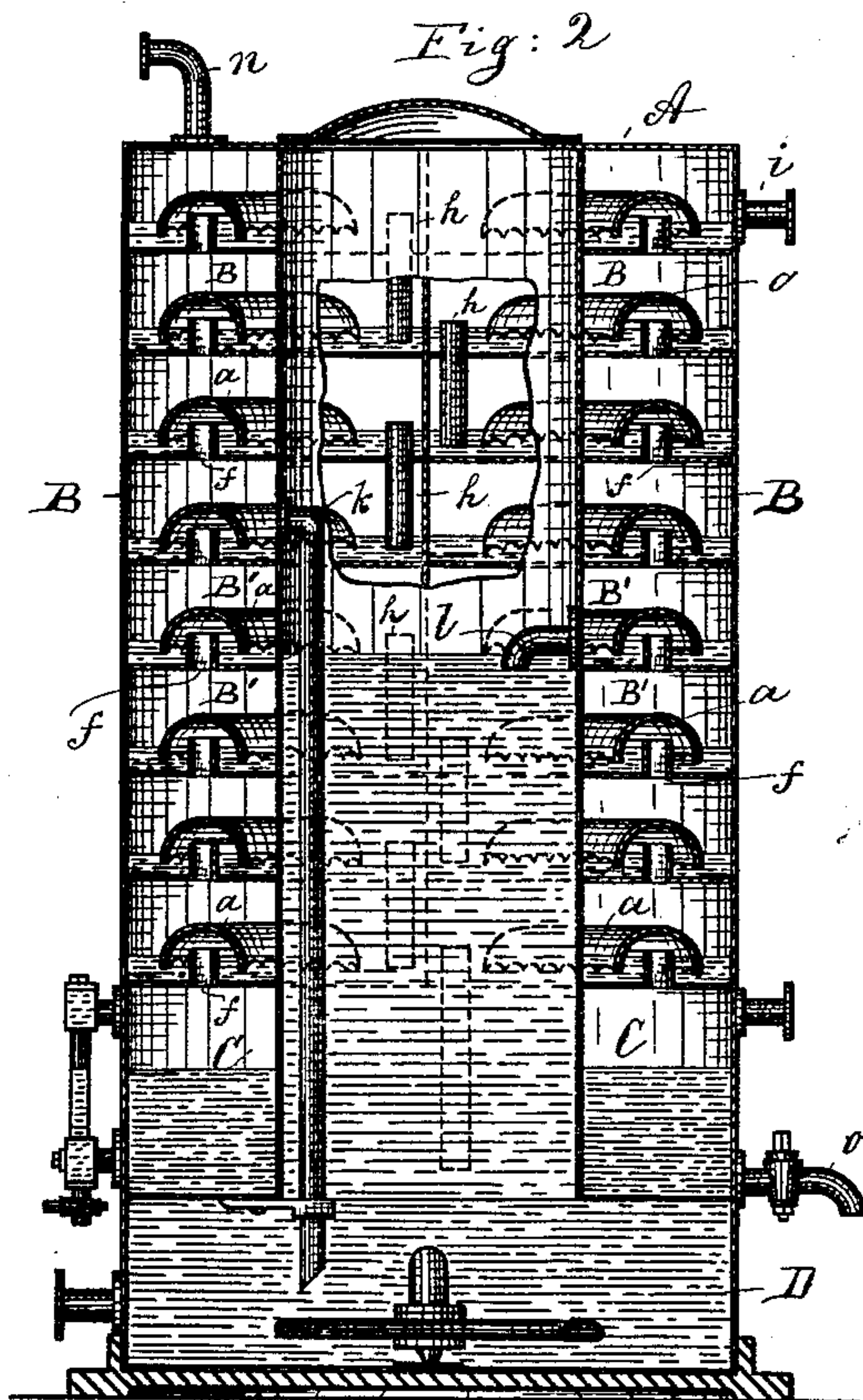
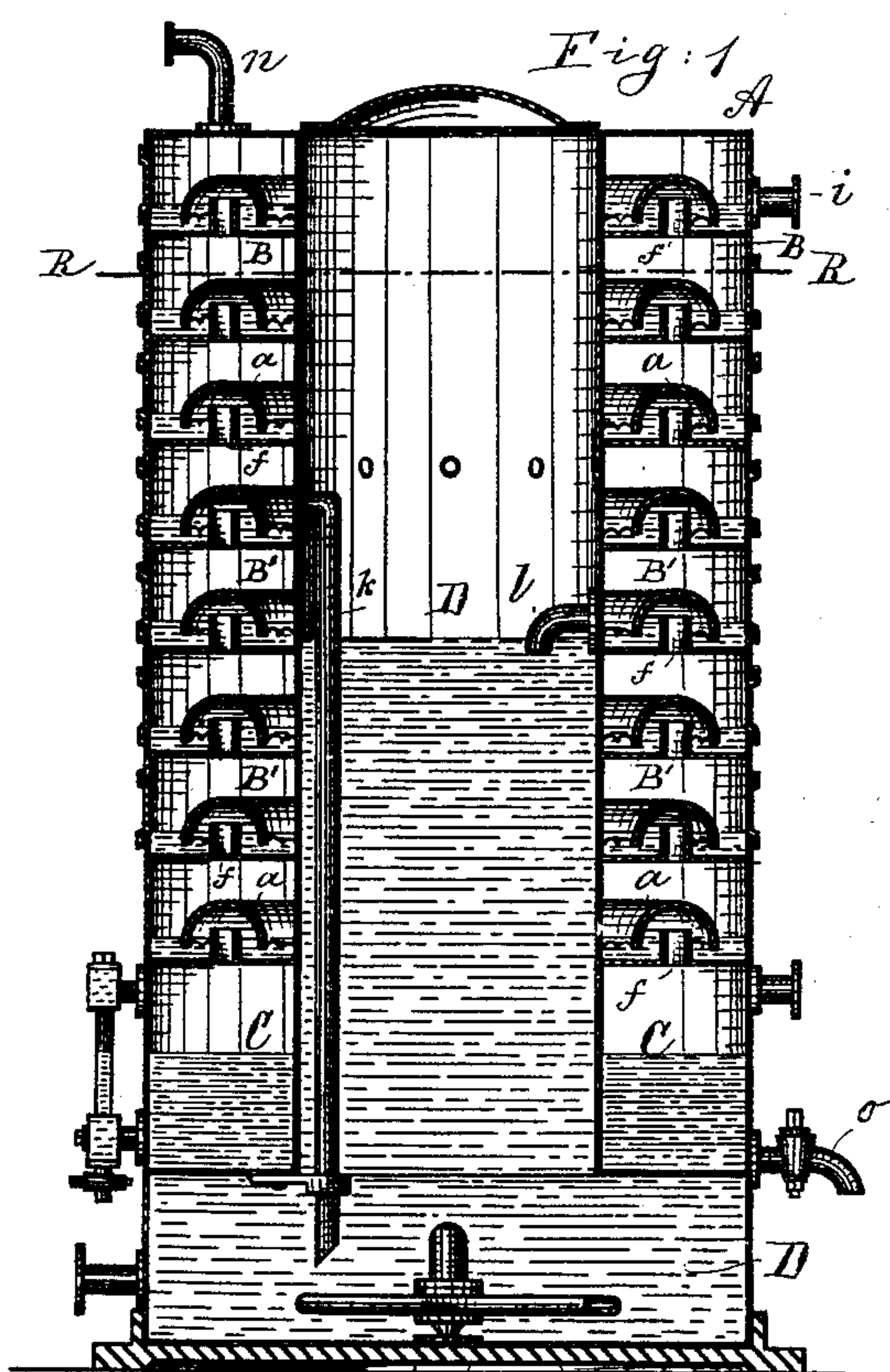


A. FELDMANN.
DISTILLING APPARATUS.

No. 480,842.

Patented Aug. 16, 1892.



Witnesses:
Wm. Schulz.
A. Goughmans

Inventor:
A. Feldmann
by his attorneys
Boeder & Priesner

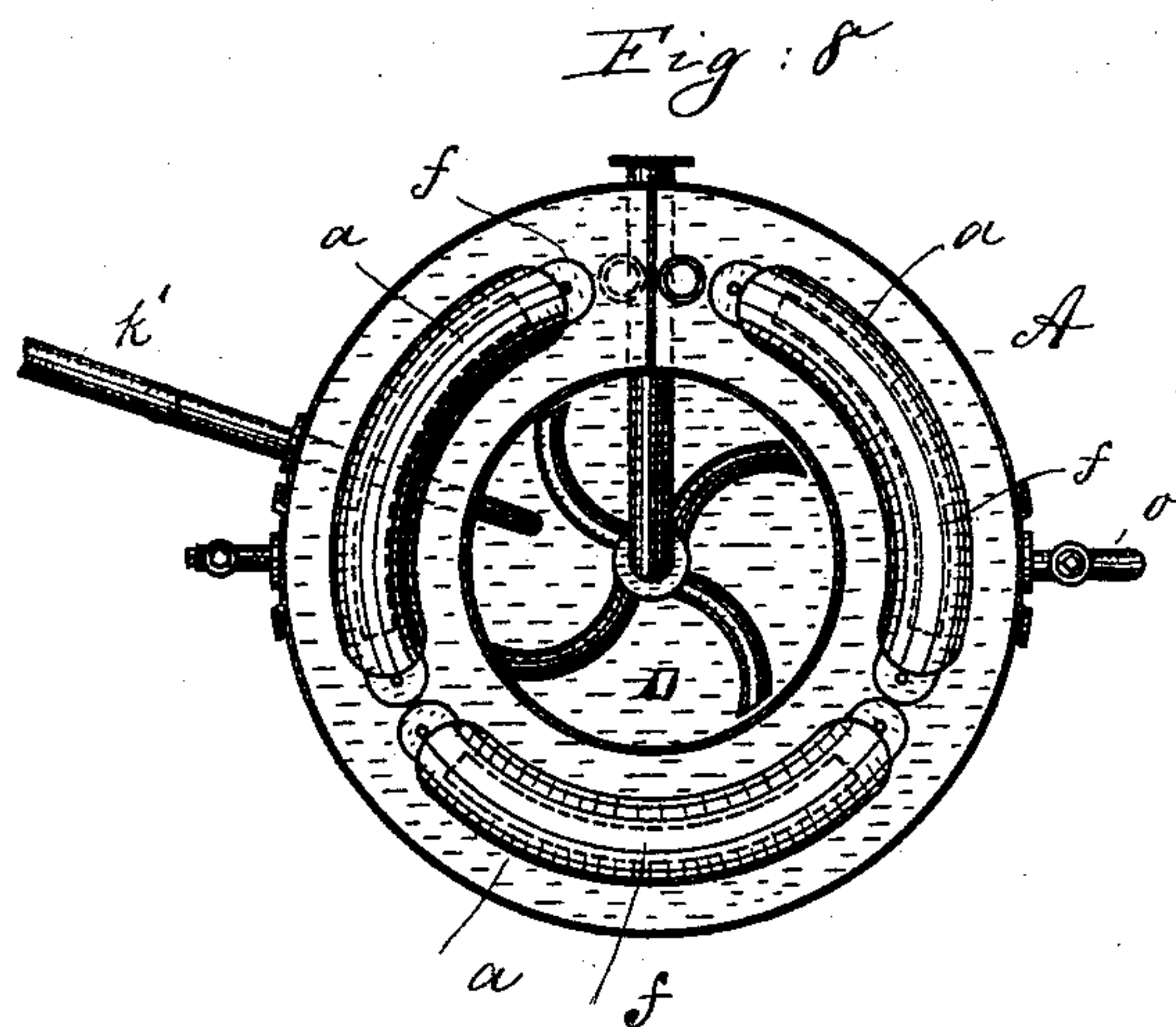
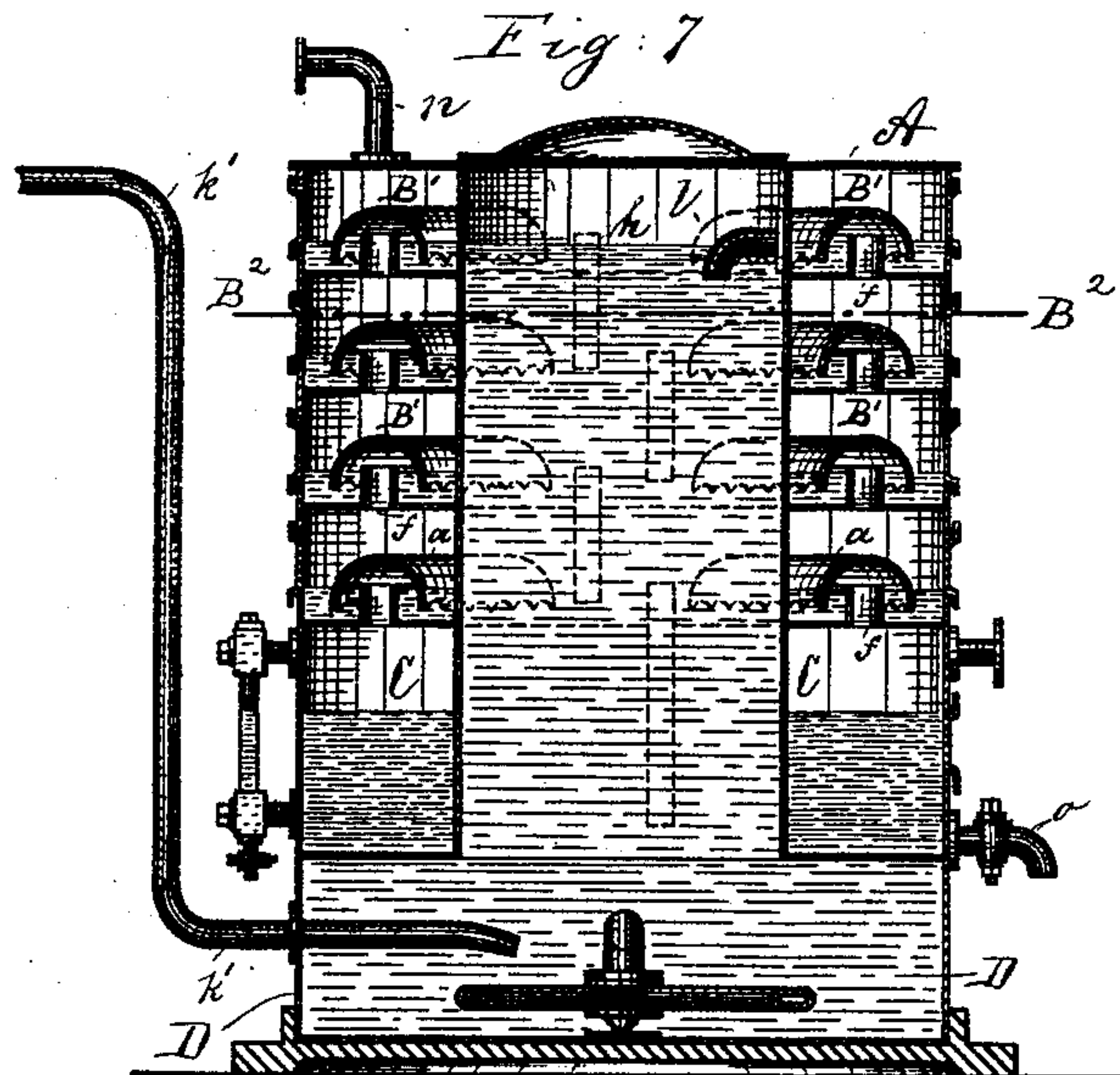
(No Model.)

2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

ALFRED FELDMANN, OF BREMEN, GERMANY.

DISTILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 480,842, dated August 16, 1892.

Application filed November 17, 1891. Serial No. 412,120. (No model.)

To all whom it may concern:

Be it known that I, ALFRED FELDMANN, a subject of the German Emperor, and a resident of Bremen, Germany, have invented a new and useful Improvement in Distilling Apparatus, of which the following is a specification.

This invention relates to an apparatus for distilling ammonia in which the liquid is brought into intimate contact with the steam-heated surface, is thoroughly acted upon by the steam, and has to traverse an extended course that surrounds the centrally-located lime-mixing chamber.

The invention consists in the various features of improvement more fully pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical central section of the apparatus. Fig. 2, a similar section taken to show the upright pipes *h*; Fig. 3, a horizontal section on line R R, Fig. 1. Figs. 4, 5, and 6 are cross-sections of different forms of the distilling-chamber. Fig. 7 is a vertical central section of a modification of the apparatus; and Fig. 8, a cross-section on line B² B², Fig. 7.

The letter A represents a vessel of round, square, oval, angular, or other cross-section and containing centrally the lime-mixing chamber D, which at the bottom of the apparatus is expanded, so as to occupy its entire width. The upper part of the chamber D is surrounded by annular channels or cells B, four of such cells being shown. Below the cells B, but disconnected therefrom, is arranged a series of similar cells B', and below the cells B' there is an accumulator C for the expelled residue of the liquid ammonia. The cells B are provided with steam-bells *a*, that are placed over steam-pipes *f*. All the cells B are connected by means of upright pipes *h*, that project some distance above the floors of the cells. The cells B' are also connected to each other by similar pipes *h*.

The liquid ammonia enters at *i* and rises in the uppermost cell to the mouth of pipe *h*, when it will flow into the second cell, where it rises to flow into the third and fourth cells. In each cell the liquid travels over a considerable ground and is put into intimate con-

tact with the steam entering through pipes *f* under bells *a*. The bells *a* should extend to within a short distance from the upright walls of the cells to render the action of the steam properly effective. The action of the steam upon the liquid ammonia in the cells will cause the volatile matter to escape, while the residue flows from the lowermost cell B through pipe *k* into the lime-chamber D. In this chamber an intimate admixture is effected by suitable stirrers, and the resultant mass enters through pipe *l* into the uppermost cell B'. Here the liquid is subjected to the same operation as has previously been described with relation to the cells B—that is to say, it flows from cell to cell and is constantly acted upon by the steam to be volatilized. The residue escapes into the accumulator C, from which it is drawn off by means of cock *o*. The volatilized particles of ammonia are conducted upward through a pipe *n*, that enters the top of the apparatus, and are thence subjected to further treatment.

If the liquid contains only ammonia combinations of non-volatile form or if all the ammonia is to be treated by the lime, I employ the apparatus shown in Figs. 7 and 8, in which the cells B are entirely omitted. Here the liquid enters the lime-chamber D directly through pipe *k'*, and after the proper intermixture it flows into the uppermost cell B' through pipe *l*, as already previously described.

The apparatus is compact and can be easily cleaned, the lime-chamber by its central location is protected against cooling, and the cells are readily accessible.

What I claim is—

1. The combination of a lime-chamber D with a series of annular surrounding evaporating-cells that communicate therewith, bells *a*, and steam-pipes *f*, entering such cells, substantially as specified.

2. The combination of a central lime-chamber D with a series of annular surrounding evaporating-cells connected with said chamber, tubes *h*, connecting the cells, steam-pipes *f*, entering the cells, and bells *a* above the steam-pipes, substantially as specified.

3. The combination, in a distilling apparatus, of the following elements: a lime-chamber, a series of annular distilling-cells, steam pipes and bells within the cells, an accumulator C, an inlet, an exit-pipe connecting the lime-chamber and the cells, and an exit-pipe
5 n, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

A. FELDMANN.

Witnesses:

TH. WILKENS,
D. HUTHOFF.