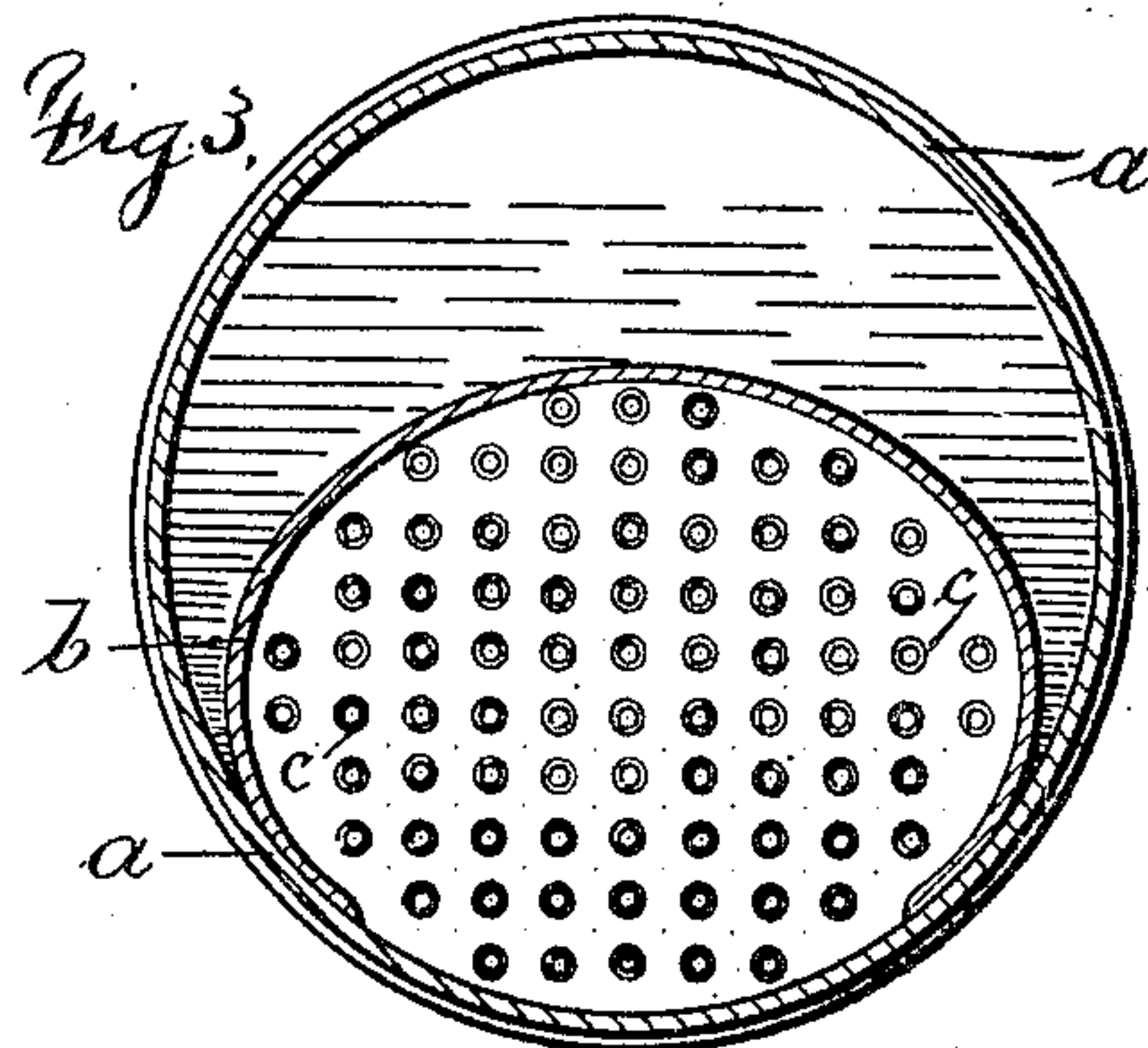
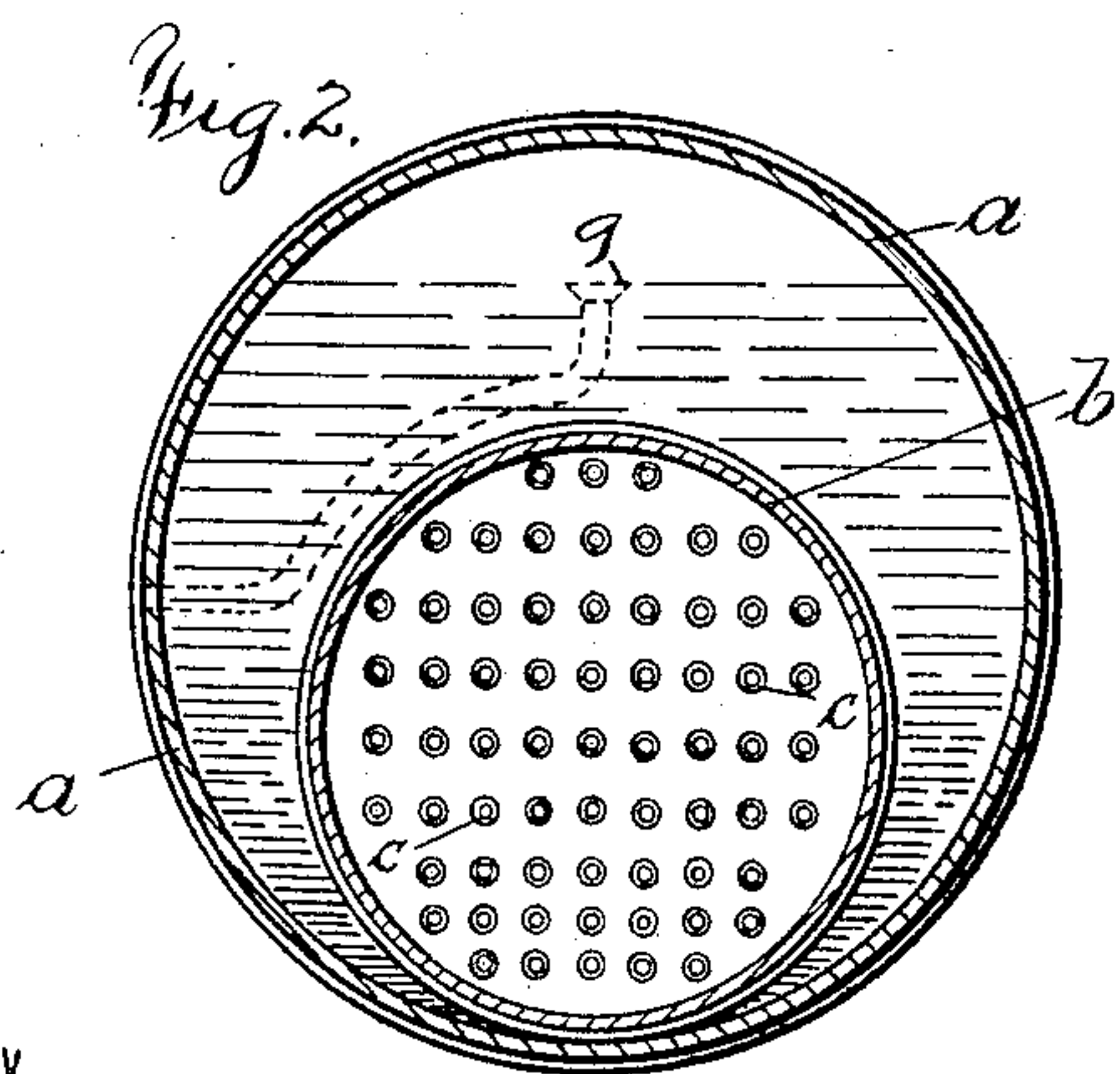
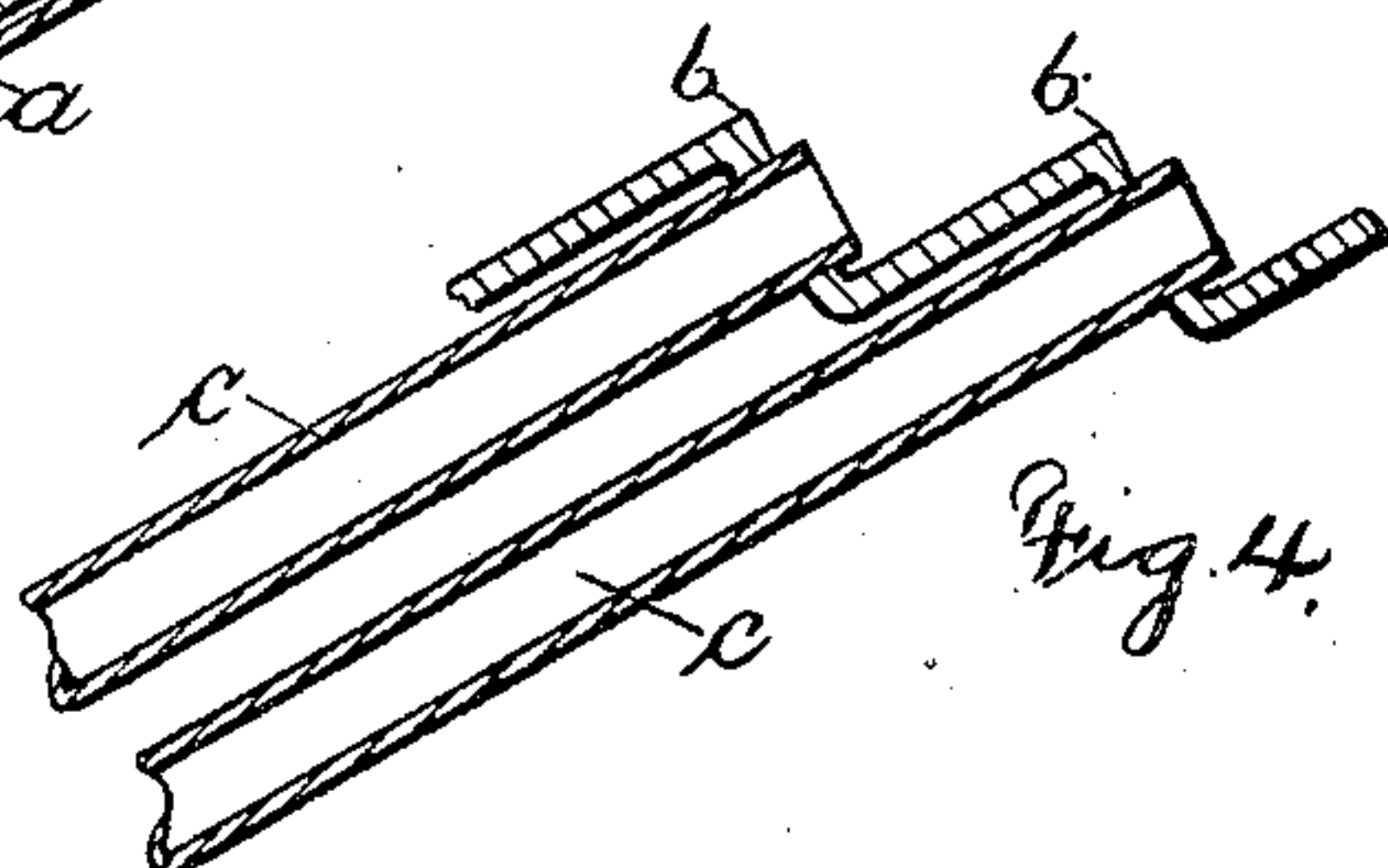
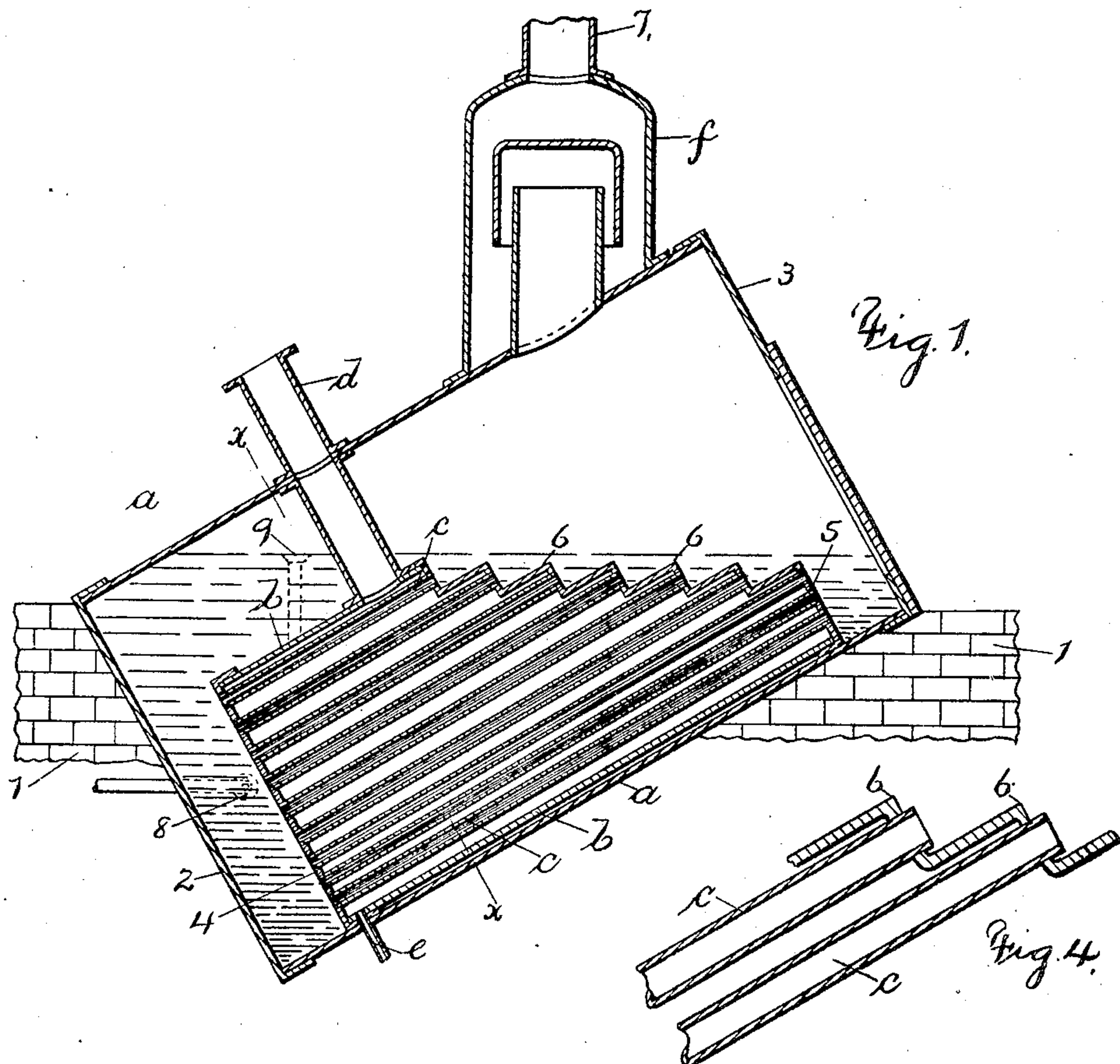


No. 828,685.

PATENTED AUG. 14, 1906.

F. SCHERR.  
EVAPORATOR.

APPLICATION FILED MAY 31, 1905.



WITNESSES  
*Wm. Scherr*  
*Chas. H. Smith*

INVENTOR  
Frederick Scherr  
PER *Harold Scherr*  
ATTY



# UNITED STATES PATENT OFFICE.

FREDERICK SCHERR, OF ROOSEVELT, NEW YORK.

## EVAPORATOR.

No. 828,685.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed May 31, 1905. Serial No. 263,044.

*To all whom it may concern:*

Be it known that I, FREDERICK SCHERR, a citizen of the United States of America, residing at Roosevelt, in the county of Nassau and State of New York, have invented an Improvement in Evaporators, of which the following is a specification.

My invention relates to evaporators applicable to various arts and manufactures, and especially to the manufacture of raw sugars, in which said evaporator may be advantageously employed in single or multiple effects; and the object of my invention is the production of an evaporator in which a natural and rapid circulation may be given to the liquid being concentrated.

In carrying out my invention the vessel or receptacle I employ for containing the liquid to be concentrated is arranged to stand at an inclination, and I employ means for admitting the liquid to and drawing the same off from the said vessel. A steam-drum comprising a shell and heads therefor is contained within said vessel, and banks of tubes run through the steam-drum and are secured to and terminate in the heads thereof. Means are also employed for admitting steam to the interior of the steam-drum and means for withdrawing the water of condensation from the interior of the steam-drum and other means for permitting the vapors which arise from the liquid being concentrated to pass from the vessel in which said liquid is contained.

In the drawings, Figure 1 is a central longitudinal section of my improved evaporator. Fig. 2 is a cross-section on line *x x*, Fig. 1. Fig. 3 is a view similar to Fig. 2, showing a modified construction of steam-drum; and Fig. 4 is a partial section through the upper head of the steam-drum.

In my improved evaporator I employ a vessel, preferably cylindrical, comprising a shell *a*, provided with heads 2 3, the said vessel being adapted to be set at an inclination in a suitable foundation 1 or otherwise mounted at an inclination as may be desirable. Within the vessel hereinbefore described I employ a steam-drum suitably secured therein and comprising a shell *b*, which also may be cylindrical and provided with head ends 4 5, the lower head end 4 being straight and the upper head end 5 provided with staggered or stepped portions or corrugations, as indicated at 6, the parts being so placed that the apices of such portions are

approximately in the line with the level of the liquid contained in the outer vessel. Extending between the head ends 4 5 of the steam-drum are series or banks of tubes *c*, whose ends are secured in the said heads.

It is manifest that instead of employing the steam-drum of circular cross-section I may employ, as indicated in Fig. 3, such a drum of elliptical cross-section, and instead of being self-contained, as indicated in Fig. 2, the shell of the steam-drum may be secured to the shell *a* of the outer vessel, as indicated in Fig. 3.

*d* designates a steam-pipe which passes through the shell *a* of the outer vessel and leads to the interior of the said steam-drum. *e* represents a pipe through which the water of condensation may be withdrawn from the interior of the steam-drum.

*f* represents a trap arranged on the upper surface of the outer vessel, through which and by means of the pipe 7 the vapors arising within the vessel from the liquid to be concentrated may be withdrawn, and 8 designates the nozzle secured to the outer surface of the casing *a* of the outer vessel, by means of which, through a pipe or other connection, the liquid to be concentrated may be conveyed to the interior of the said vessel.

In order to convey the liquid from one evaporator to another, as is customary in multiple effects, I employ a pipe 9, leading up from the interior of the outer vessel with its upper orifice on a level with the apices of the staggered portions of the drum-head 5. By so placing the orifice of the pipe 9 it will be apparent to those skilled in the art that the liquid within the outer vessel will be maintained at a practically constant level above the upper ends of the tubes.

It will be readily understood that upon the outer vessel being filled to the desired level with the liquid to be concentrated and steam being admitted to the interior of the steam-drum the liquid to be concentrated contained within the tubes *c* will be the first portion of said liquid to become vaporized, the vapors passing upward through the said tubes, tending to carry along with them that portion of the liquid which has not yet been vaporized, thereby creating both a rapid and a natural circulation of the liquid contained in said outer vessel.

I claim as my invention—

1. An evaporator comprising a vessel adapted to be set at an inclination, an inner



cylindrical shell independent of, contained therein and arranged parallel to the outer vessel, a head to the inner shell and at right angles thereto, a series of tubes extending  
5 through the inner shell and said head, and parallel with the shell, a head inclined to the inner shell and through which the tubes pass, so arranged that the ends of the series of tubes in the latter head are in substantially a  
10 horizontal plane when the vessel is set at an inclination.

2. An evaporator comprising an elongated cylindrical vessel, adapted to be set at an inclination, an inner elongated cylindrical shell  
15 independent of the outer vessel and arranged parallel thereto, a head to the inner shell at right angles thereto, a series of tubes extending through the inner shell and said head and parallel with the shell, a head inclined to the  
20 inner shell through which the tubes pass, so arranged that the ends of the series of tubes in the latter head are in substantially a horizontal plane, the fluid to be heated filling the outer vessel and the tubes of the inner vessel.

25 3. An evaporator comprising a vessel adapted to be set at an inclination, an inner cylindrical shell independent of, contained within and arranged parallel to the outer vessel, and also arranged eccentric to the outer  
30 vessel against the lower part of the shell thereof, a head to the inner shell at right angles thereto, a series of tubes extending through the inner shell and said head, and parallel with the shell, a head inclined to the  
35 inner shell through which the tubes pass, so arranged that the ends of the series of tubes are in substantially a horizontal plane.

4. An evaporator comprising a separate outer tubular vessel and inner cylindrical  
40 shell set at a common inclination, a series of tubes passing longitudinally through the inner shell, heads for the inner shell through which the tubes pass, with the higher head and higher ends of the tubes in substantially  
45 a horizontal plane.

5. An evaporator comprising a vessel adapted to be set at an inclination, a separate shell secured within the said vessel, a

straight head secured to one end of said shell a head having staggered portions secured to  
50 the opposite end of said shell, and both heads within the first vessel, tubes extending between the said heads of the separate shell, means by which the liquid to be concentrated may be conveyed to the interior of the  
55 said vessel and means by which the vapors in said vessel may escape therefrom.

6. An evaporator comprising a vessel adapted to be set at an inclination, a separate shell secured within said vessel, a  
60 straight head secured to one end of said shell, a head having staggered portions secured to the opposite end of said shell and both heads within the first vessel, tubes extending between the said heads of the shell, said separate shell and its heads comprising a steam-drum, a pipe by which steam may be conveyed to the interior of the said drum, a nozzle by which the water of condensation may  
70 be led away from the said drum, a pipe connection by which the liquid to be concentrated may be conveyed to the interior of said vessel and a pipe connection by which the vapors arising within said vessel may escape therefrom.  
75

7. In an evaporator and in combination, a vessel, a shell secured therein, a straight head secured to one end of said shell, a head having staggered portions, the apices of which  
80 are in a horizontal plane, secured to the opposite end of the shell and both heads within the said vessel, and tubes extending between the said heads of the shell.

8. In an evaporator and in combination, an outer vessel, an inner cylindrical vessel and a  
85 series of inclined tubes passing lengthwise through the inner vessel and its heads, and arranged parallel with the inner vessel, with all the higher open ends arranged in substantially a horizontal plane.  
90

Signed by me this 22d day of May, 1905.

FREDERICK SCHERR.

Witnesses:

GEO. T. PINCKNEY,  
B. M. ALLEN.