

No. 882,043.

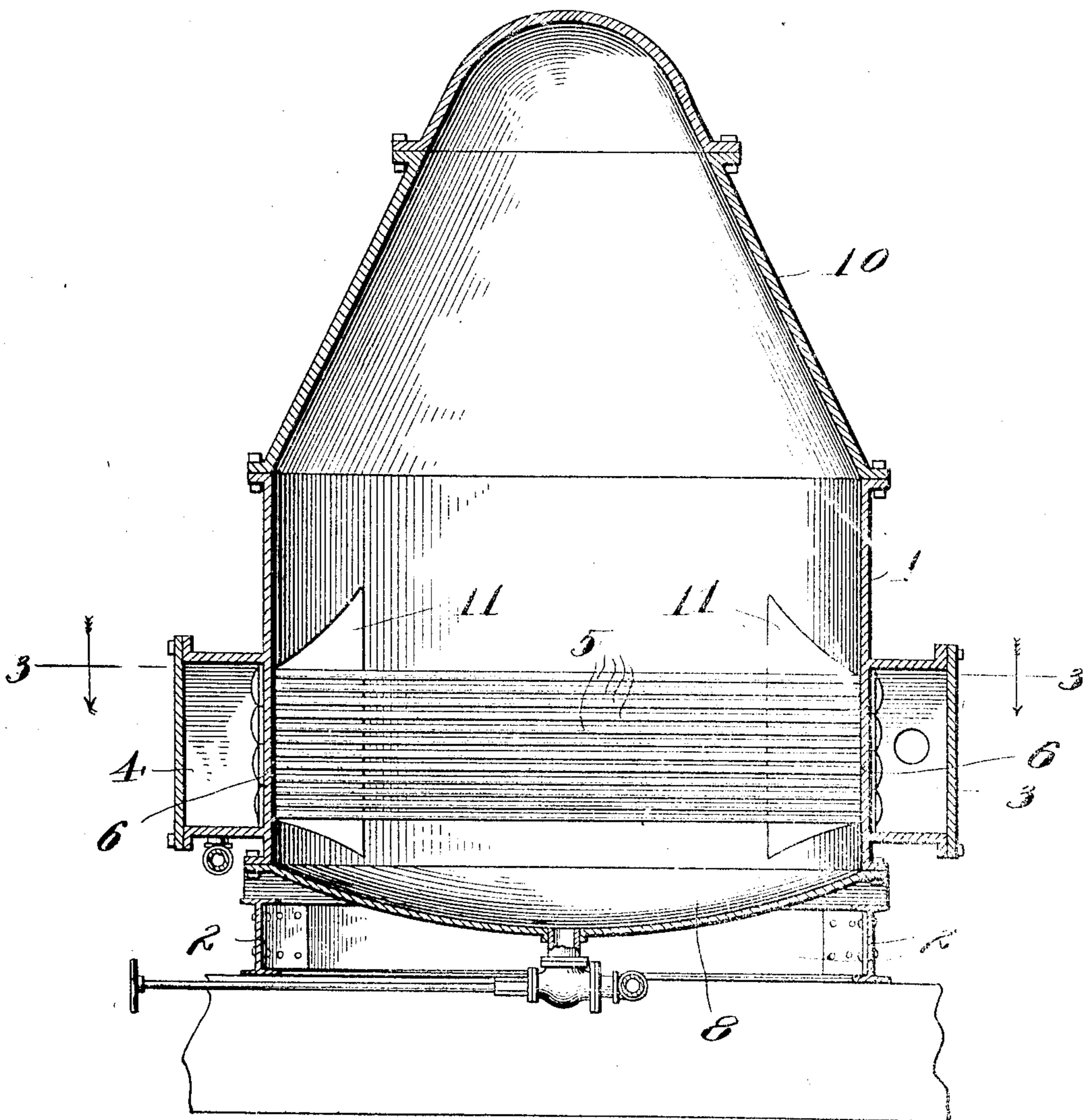
PATENTED MAR. 17, 1908.

E. ZAREMBA.
EVAPORATOR.

APPLICATION FILED NOV. 30, 1906.

3 SHEETS--SHEET 1.

Fig. 1.



Witnesses:

G. A. Paulschmidt
A. H. Heyke.

Inventor:

Edward Zarembo

By Geo. E. Baldo,

Att'y.

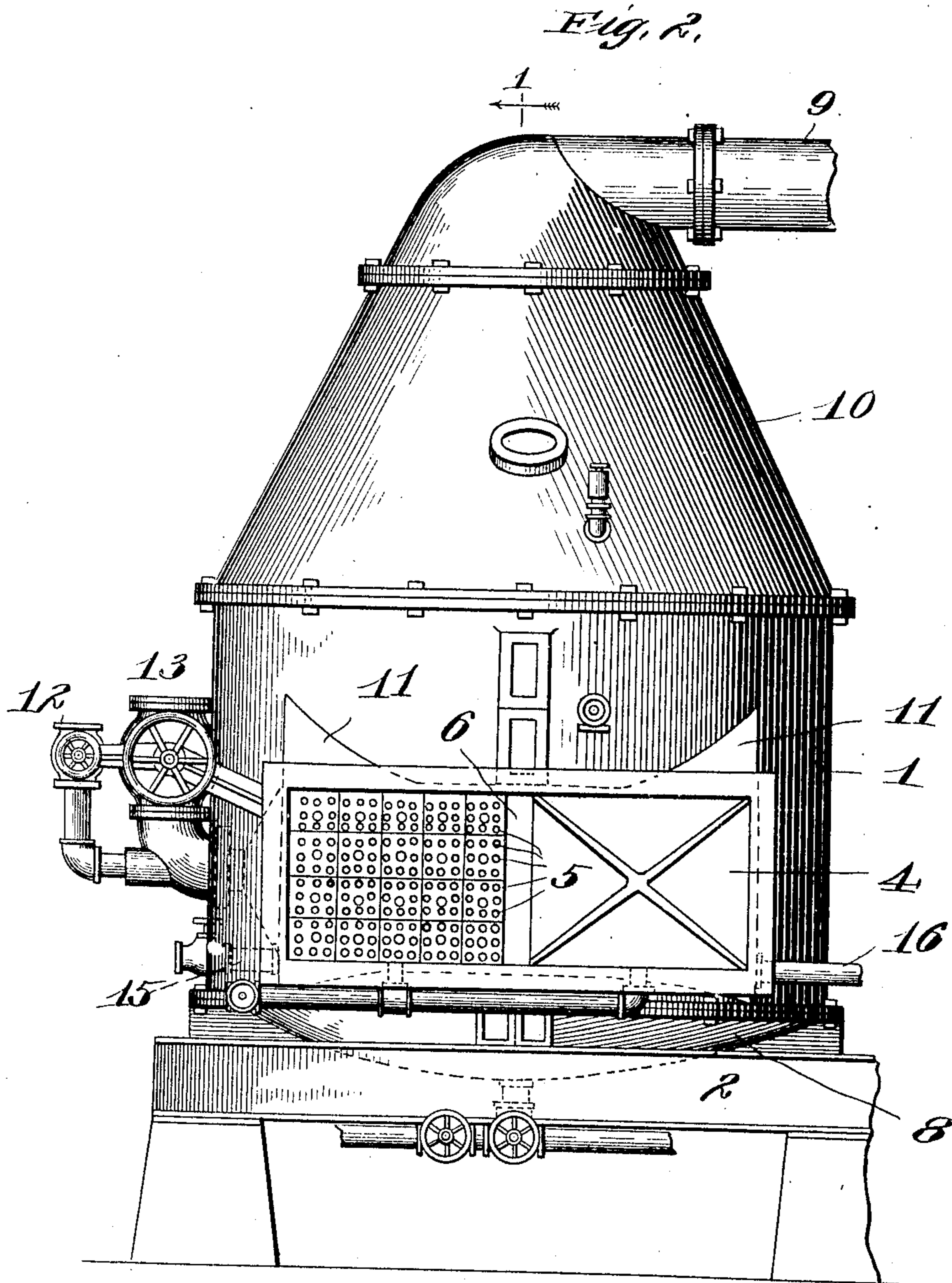
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3 SHEETS—SHEET 2.



Witnesses:

G. A. Neuberschmitt
A. H. Pycke

Inventor:

Edward Zaremba,

By *Geo. E. Valdo,*
Atty

No. 882,043.

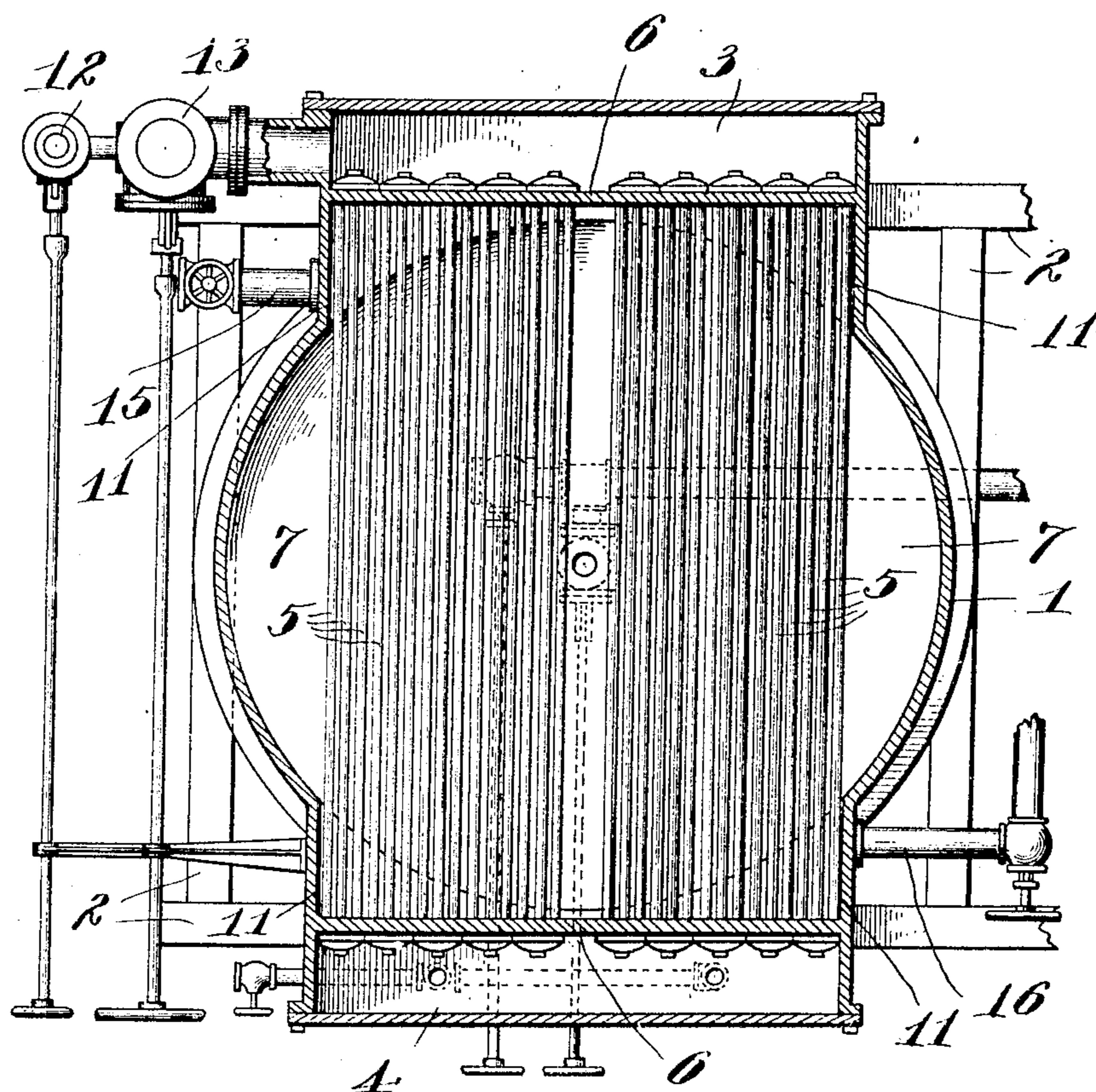
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3 SHEETS—SHEET 3.

Fig. 3.



Witnesses:

G. W. Pauberschmitt
A. H. Paycke

Inventor:

Edward Zaremba,

By

Geo. E. Baldo,

Att'y

UNITED STATES PATENT OFFICE.

EDWARD ZAREMBA, OF CHICAGO, ILLINOIS.

EVAPORATOR.

No. 882,043.

Specification of Letters Patent.

Patented March 17, 1908.

Application filed November 30, 1906. Serial No. 345,616.

To all whom it may concern:

Be it known that I, EDWARD ZAREMBA, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Evaporators, of which the following is a specification.

This invention relates to evaporators.

The objects of the invention are to increase the efficiency of evaporators and to reduce the cost thereof.

To this end the invention consists in providing means to improve the circulation within the evaporator of the liquor to be evaporated, thus, with a given amount of heating surface, increasing the efficiency or evaporative capacity of the evaporator or rendering it possible, where a given capacity is specified, to reduce the heating surface, that is, the number of heating tubes, and thus correspondingly reducing the cost of the evaporator.

The invention also consists of various other features, combinations of features and details of construction hereinafter described and claimed.

In the accompanying drawings, in which my invention is fully illustrated, Figure 1 is a sectional elevation of an evaporator embodying my improvements, taken on the line 1—1 of Fig. 2. Fig. 2 is a front elevation thereof, the cover being removed from one side of the steam chest; and Fig. 3 is a plan section on the line 3—3 of Fig. 1.

The evaporator shown in the drawings is of the type known as a "vacuum pan."

Referring now to the drawings, 1 designates the shell of my improved evaporator, which is cylindrical in form and is supported in upright position on a suitable base or foundation, consisting, as shown, of connected I-beams 2. Formed at the front and back of the shell 1 are steam chests 3 and 4 which are connected by means of horizontal pipes or tubes 5, the ends of which are secured in holes or openings formed in the walls 6 separating said steam chests from the interior of the evaporator. The covers of the steam chests 3 and 4 are removable, thus rendering the interiors thereof accessible for the purpose of inserting, removing and cleaning the tubes 5.

All of the heating tubes 5 are located below the designed level of the liquor in the

evaporator, when the evaporator is fully charged and in operation.

The steam chests 3 and 4 are shorter than the diameter of the evaporator shell 1, so that spaces 7 of considerable width are left at both sides of the evaporator between the tubes 5 and the shell 1.

The lower end of the evaporator is closed by a bottom 8 and, at its upper end, said evaporator is adapted to be connected with a vacuum pump or, in series, with other evaporators, by means of a pipe 9. To prevent the formation of dead spaces or pockets in the evaporator, the upper portion 10 of the shell 1 tapers or converges upwardly to the discharge opening thereof with which the pipe 9 communicates. In like manner to prevent the formation of dead spaces or pockets at the points where the shell 1 is extended to form the steam chests 3 and 4, the tops of said extensions are inclined upwardly, as shown at 11, from the inner walls 6 of the steam chests.

My improved evaporator is provided with the usual connections, comprising independent steam connections 12 and 13 through which, respectively, live and exhaust steam may be admitted to the steam chest 3; an admission pipe 15 for supplying the liquor, to be evaporated, to the evaporator and a discharge pipe 16 for discharging the evaporated liquor therefrom; drain pipes and wash-outs, as will be readily understood by persons familiar with the art without a detailed description thereof.

The increased efficiency of my improved evaporator is attributable, primarily, to what may be termed the non-heating spaces 7 between the heating tubes 5 and the shell of the evaporator, the liquor passing upwardly among the heating tubes 5 and downwardly through the spaces 7 in a continuous cycle, a much better circulation being secured than in the old types of evaporators in which the heating tubes occupied substantially the entire transverse space within the evaporator, thus leaving no, or at most a very limited, non-heating space or down-take for the downward passage of the liquor and that at the center of the evaporator. The downward circulation is enhanced by the fact that the spaces 7 are located adjacent to the shell 1, which is relatively cool, owing to contact with the external atmosphere, thereby op-

erating to retard the heating of the liquor therein and causing it to descend more rapidly.

Owing to the improved circulation, an evaporator with a given amount of heating surface will obviously have an increased efficiency or capacity for evaporation, so that where a given capacity is specified, it is possible to reduce the number of the heating tubes 5, thus effecting a material saving in the cost of the evaporator.

A further great advantage of my improved evaporator is in the evaporation of liquors which foam excessively on the application of heat. With any evaporators of which I have any knowledge, it is a frequent experience that, owing to imperfect circulation, practically the entire charge of the evaporator is converted into foam, which rises to such a height in the evaporator that portions thereof are caught in the draft of the vacuum and carried off with the vapor, thus causing considerable loss. And it sometimes happens that the entire charge of the evaporator will be carried off and lost in this manner. Due to the large down-takes of my improved

evaporator, located adjacent to the relatively cool shell thereof, I find that this objectionable feature is almost entirely overcome.

I claim:—

An evaporator comprising a vertical cylindrical shell, two steam chests at opposite sides of the shell and exterior thereto, a transverse group of heating tubes connecting the steam chests and lying in the liquor space of the shell, said group of tubes being arranged centrally of the shell, leaving an unobstructed space above the group and a segmental unobstructed space between each side of the group and the adjacent shell wall whereby a constant upward circulation of the liquid in the center and a constant downward circulation of the liquid at each side of the group is maintained.

In testimony, that I claim the foregoing as my invention, I affix my signature in presence of two subscribing witnesses, this 27th day of November, A. D. 1906.

EDWARD ZAREMBA.

Witnesses:

THOMAS HENRY LEWIS,
E. M. KLATCHER.