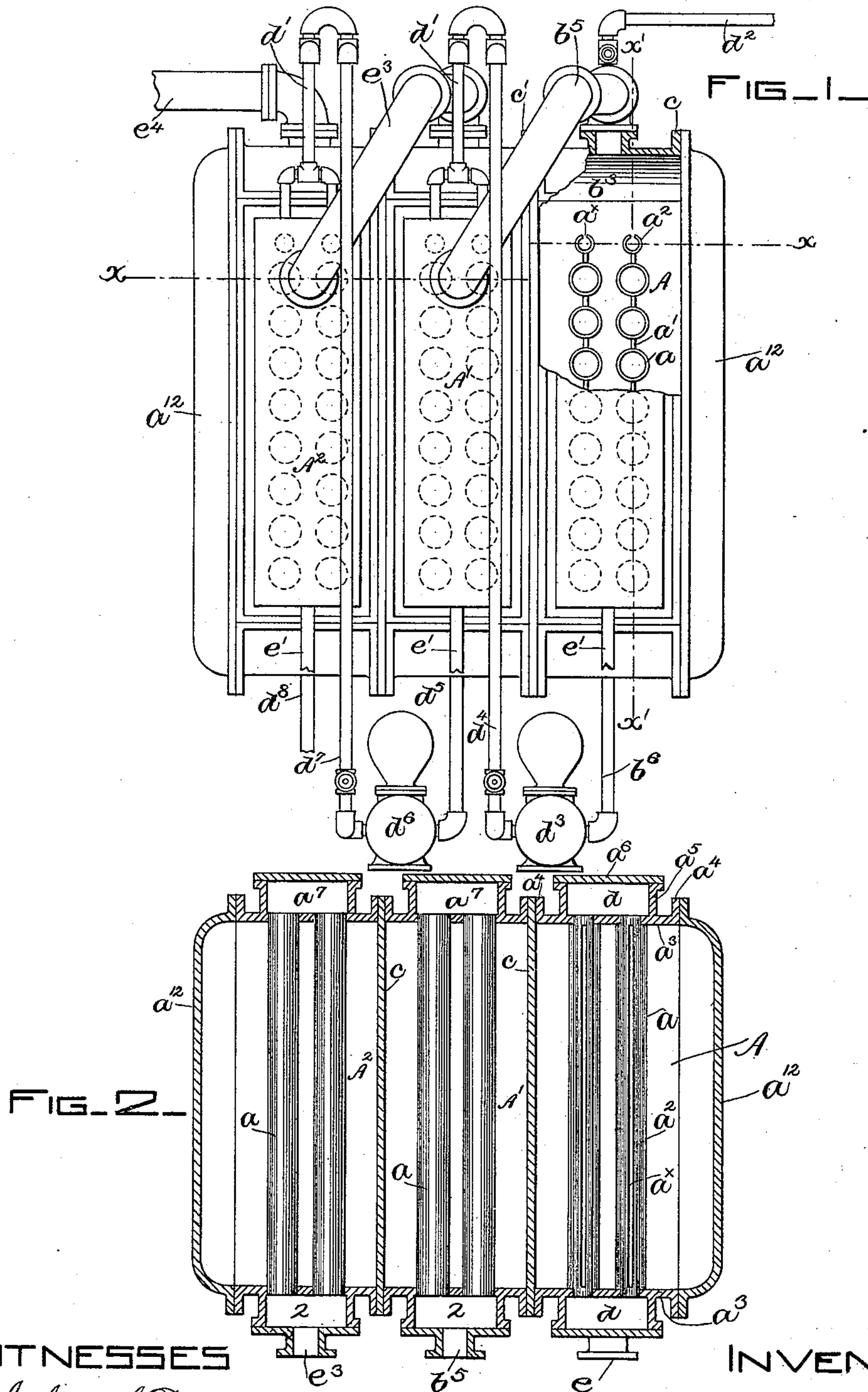


T. GAUNT.

MULTIPLE EFFECT EVAPORATING APPARATUS.

No. 447,816.

Patented Mar. 10, 1891.



WITNESSES

Arthur S. Davis
Frederick L. Emery -

INVENTOR

Thomas Gaunt,
by Embury & Gregory
Attys

(No Model.)

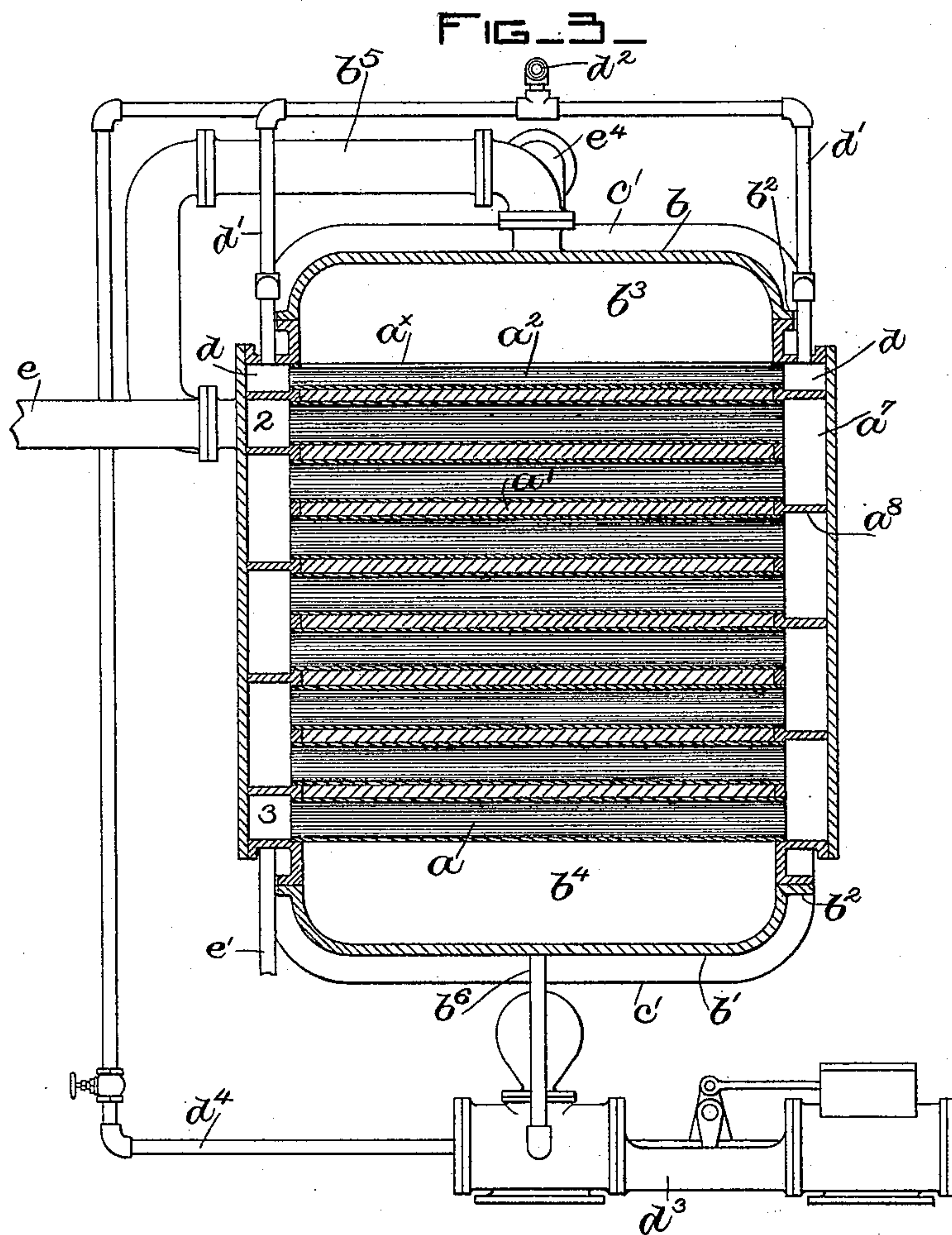
2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

THOMAS GAUNT, OF BROOKLYN, NEW YORK.

MULTIPLE-EFFECT EVAPORATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 447,816, dated March 10, 1891.

Application filed February 14, 1890. Serial No. 340,440. (No model.)

To all whom it may concern:

Be it known that I, THOMAS GAUNT, of Brooklyn, county of Kings, State of New York, have invented an Improvement in Multiple-Effect Evaporating Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 This invention relates to evaporating apparatus, and is an improvement upon evaporating apparatus substantially such as shown and described in United States Patent No. 409,572, granted to me August 20, 1889.

15 My present invention has for its object to provide a multiple-effect apparatus simple in construction, efficient in operation, and which may be constructed at a minimum expense.

20 My invention in an evaporating apparatus therefore consists in the combination, with an inclosing case, of one or more substantially vertical partitions dividing the said inclosing case into sections arranged side by side, a substantially vertical evaporating-surface composed of horizontally-arranged tubes or pipes, and a liquid-supply in each section located above said evaporating-surface to discharge the liquor upon the surface in thin sheet or film, substantially as will be described.

30 Other features of my invention will be pointed out in the claims at the end of this specification.

35 Figure 1 is a front elevation, partially broken out, of multiple-effect evaporating apparatus embodying my invention. Fig. 2 is a transverse section of the apparatus shown in Fig. 1 on the irregular line $x x$, and Fig. 3 is a vertical section of the apparatus shown in Fig. 1 on line $x' x'$, looking toward the left.

40 My improved apparatus is herein shown as composed of three sections $A A' A^2$, arranged and coupled together, as will be described, to form a triple-effect evaporating apparatus. 45 Each section of the apparatus consists of a substantially vertically-arranged evaporating-surface composed, as herein shown, of tubes or pipes a , connected by intervening bridges a' , and a liquid-supply (shown as a pipe a^2) located above the evaporating-surface and provided with a delivery slot or opening a^x to discharge the liquor upon the

evaporating-surface in thin sheet or film, the said pipes being supported at their opposite ends, as shown, by castings or headers a^3 , into which the ends of the tubes may be expanded or otherwise secured. Each header a^3 is provided with side flanges a^4 and projecting ribs a^5 , to which are bolted or otherwise secured covers a^6 , which form with each header a space subdivided into chambers a^7 by horizontal partitions a^8 , cast integral with the headers, substantially as in my patent referred to. The headers of each section support a top plate b and a bottom plate b' , provided, as herein shown, with flanges b^2 , by which the said top and bottom plates may be bolted or otherwise secured to the said headers. The top plate b and bottom plate b' are preferably made of such size as to leave a steam-space b^3 above the evaporating-surface and a liquid-collecting space or chamber b^4 below the evaporating-surface.

The flanges a^4 of the sections A' and A^2 have secured to them in any usual manner, as by bolts, (not herein shown,) side pieces or plates a^{12} .

The top plate b has connected to it a vapor-outlet pipe b^5 , and the bottom plate b' has connected to it a liquid-outlet pipe b^6 .

80 As herein shown, the headers of each section support two rows of tubes comprising the evaporating-surfaces.

The sections $A A' A^2$, arranged side by side, are separated from each other by partitions, herein shown as independent plates c , which are clamped between the flanges a^4 of the headers and between the flanges c' of adjacent top plates b and bottom plates b' . The partitions c cut off communication between the chambers or space surrounding the evaporating-surface of the sections.

The liquid-feed pipes a^2 communicate, as herein shown, with chambers d on opposite sides of the apparatus, and the chambers d of the section A have connected to them liquid-supply pipes d' , herein shown as joined to a common supply-pipe d^2 , which in practice is connected to the source of liquor-supply.

100 The liquor-outlet pipe b^6 of the section A is connected to a pump d^3 of any ordinary construction, and the outlet or discharge pipe d^4 of the said pump is connected to the liquid-

supply d' , communicating with the chambers d of the second section A' , and the liquid-outlet pipe d^5 for the section A' is connected to a pump d^6 , and the discharge-pipe d^7 for the said pump is connected to the liquid-supply pipes d' for the section A^2 , and the liquid-outlet pipe d^8 for the section A^2 may be connected to a discharge-tank or other receptacle. (Not herein shown.) The evaporating-surface of the first section A may be heated by steam or other agent, preferably admitted through the pipe e , communicating, as shown in Fig. 3, with the uppermost chamber a^7 (marked 2,) the water of condensation passing from the lowermost chamber a^7 (marked 3) by the pipe e' . The vapors or products of evaporation arising into the steam-space b^3 of the section A escape therefrom through the vapor-outlet pipe b^5 and pass into the chamber 2 of the second section A' , the said vapors constituting the heating agent for the evaporating-surface of the second effect. The vapors passing from the chamber b^3 of the second effect by the vapor-outlet e^3 , which is connected to the chambers 2 of the third effect A^2 , constitute the heating agent of the said third effect. The vapors from the chamber b^3 of the third effect pass off through the vapor-outlet pipe c^4 , which may be connected to a condenser, (not shown,) but which may be of any usual or well-known construction.

I have herein shown a triple effect; but it is evident that any other desired multiple effect may be made by adding or subtracting one or more sections and separating the remaining sections by the partitions c . By means of the partitions c a multiple-effect apparatus may be made much simpler in construction, and therefore much cheaper than heretofore.

It will be noticed that the headers, the top and bottom plates of the several sections, and the end plates a^{12} virtually form an inclosing case, which is subdivided into sections by the partitions c to form the multiple effect. So, also, I do not desire to limit myself to the particular form of evaporating-surface herein shown.

I claim—

1. In an evaporating apparatus, the combination, with an inclosing case, of one or more substantially vertical partitions dividing the said inclosing case into sections ar-

ranged side by side, a substantially vertical evaporating-surface composed of horizontally-arranged tubes or pipes, and a liquid-supply in each section, located above said evaporating-surface, to discharge the liquor upon the surface in thin sheet or film, substantially as described.

2. In an evaporating apparatus, the combination, with an inclosing case consisting of top, bottom, and end plates and headers, of one or more substantially vertical partitions dividing the said inclosing case into sections arranged side by side, and a substantially vertical evaporating-surface and liquid-supply in each section, located above said evaporating-surface, to discharge the liquor upon the surface in thin sheet or film, substantially as described.

3. In an evaporating apparatus, the combination, with an inclosing case consisting of top, bottom, and end plates and headers, of one or more substantially vertical partitions dividing the said inclosing case into sections arranged side by side, an evaporating-surface consisting of tubes or pipes secured to said headers and arranged in a substantially vertical row, and a liquid feed or supply for each evaporating-surface, located above the said surface, to discharge the liquid upon the said surface in thin sheet or film, substantially as described.

4. In an evaporating apparatus, the combination, with an inclosing case provided with a series of vertically-arranged evaporating-surfaces, and liquid-supplies for said surfaces, located above the same, to discharge the liquid upon the said surface in thin sheet or film, of a substantially vertical partition dividing the said inclosing case into sections arranged side by side, a vapor-outlet pipe for one section connected to the second section outside of the said case to constitute the heat-conducting pipe for said second section, and a pump connected to the liquid-outlet of one section and to the liquid-inlet of another section, substantially as described.

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

THOMAS GAUNT.

Witnesses:

JAS. H. CHURCHILL,
EMMA J. BENNETT.