

(No Model.)

3 Sheets—Sheet 1.

A. BREAR.  
EVAPORATING PAN.

No. 259,357.

Patented June 13, 1882.

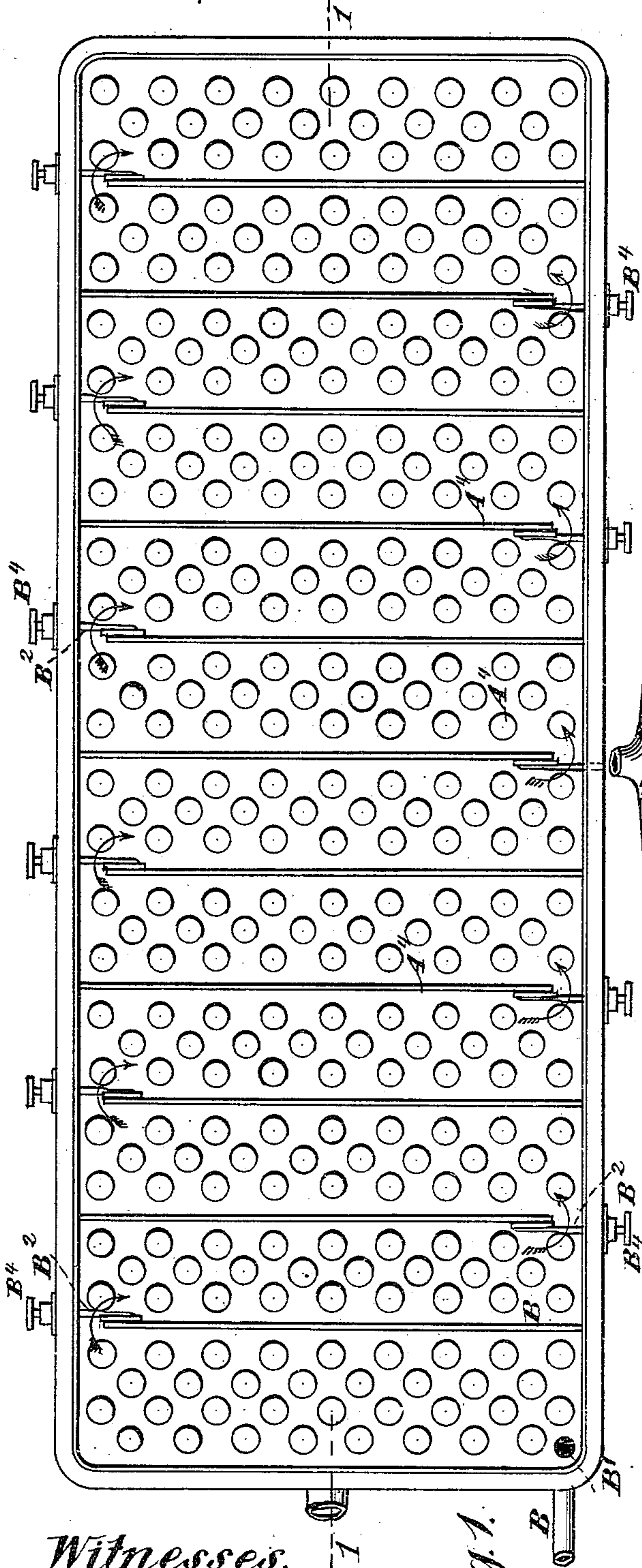


Fig. 1.

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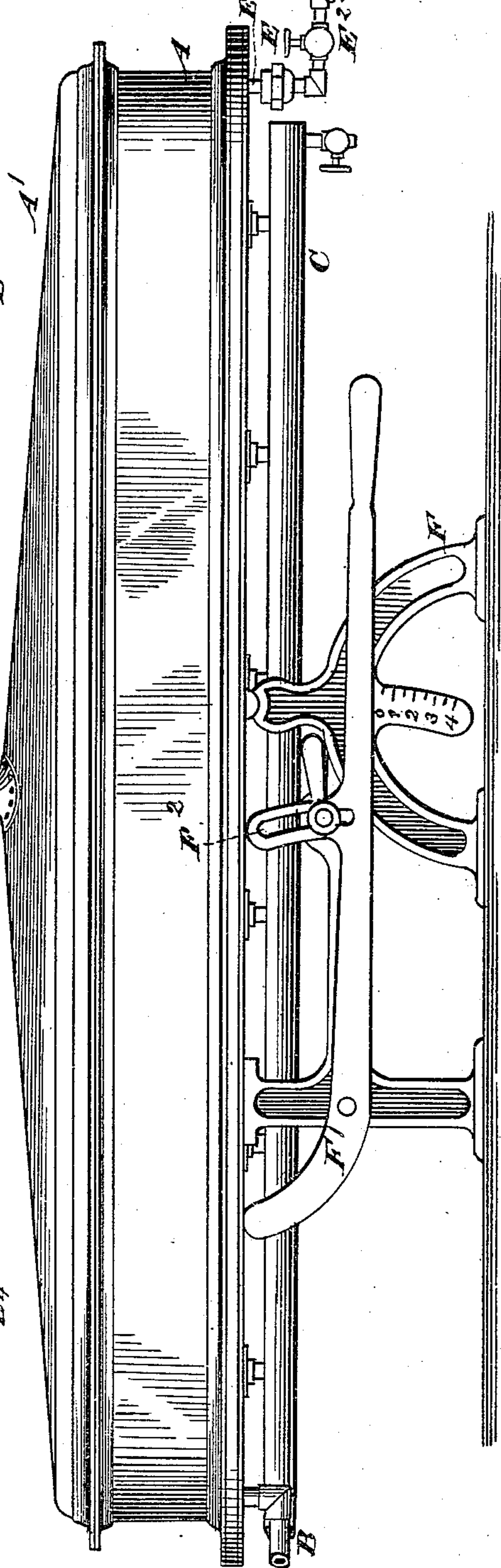


Fig. 2.

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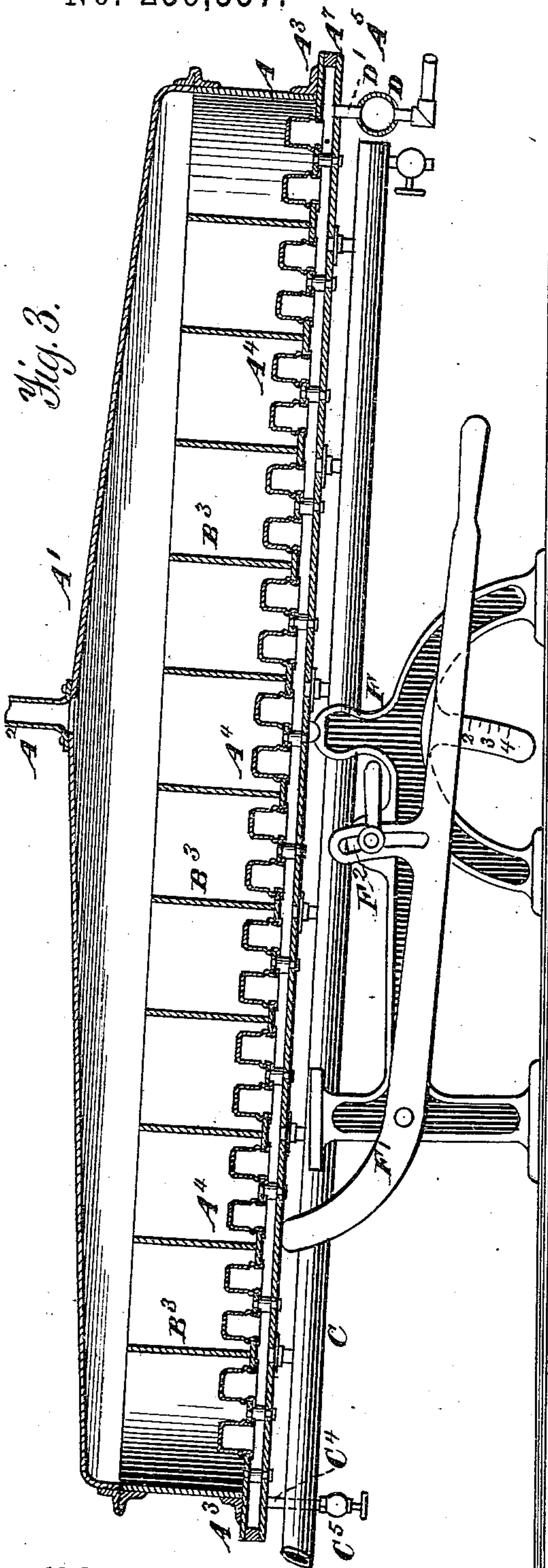
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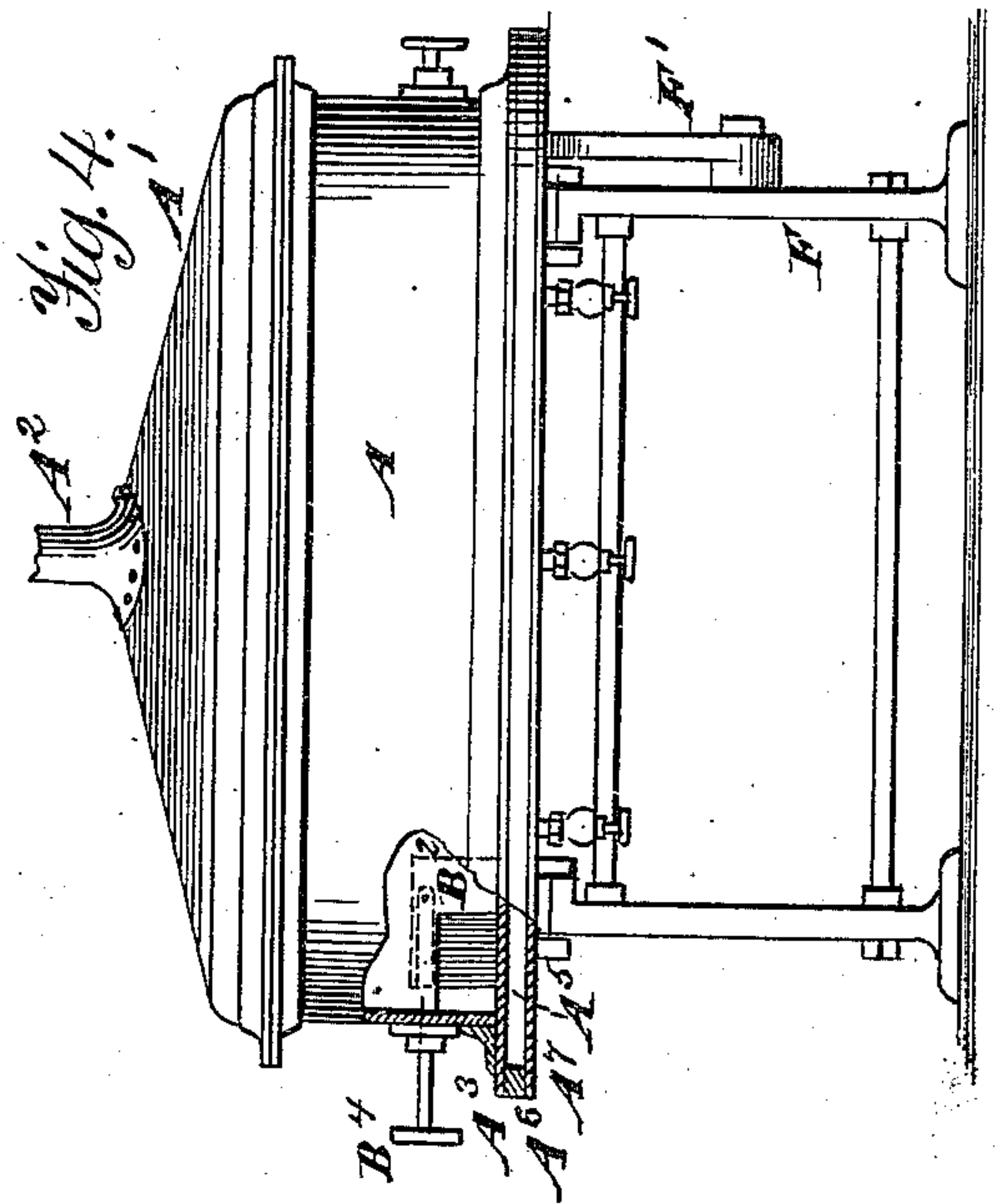
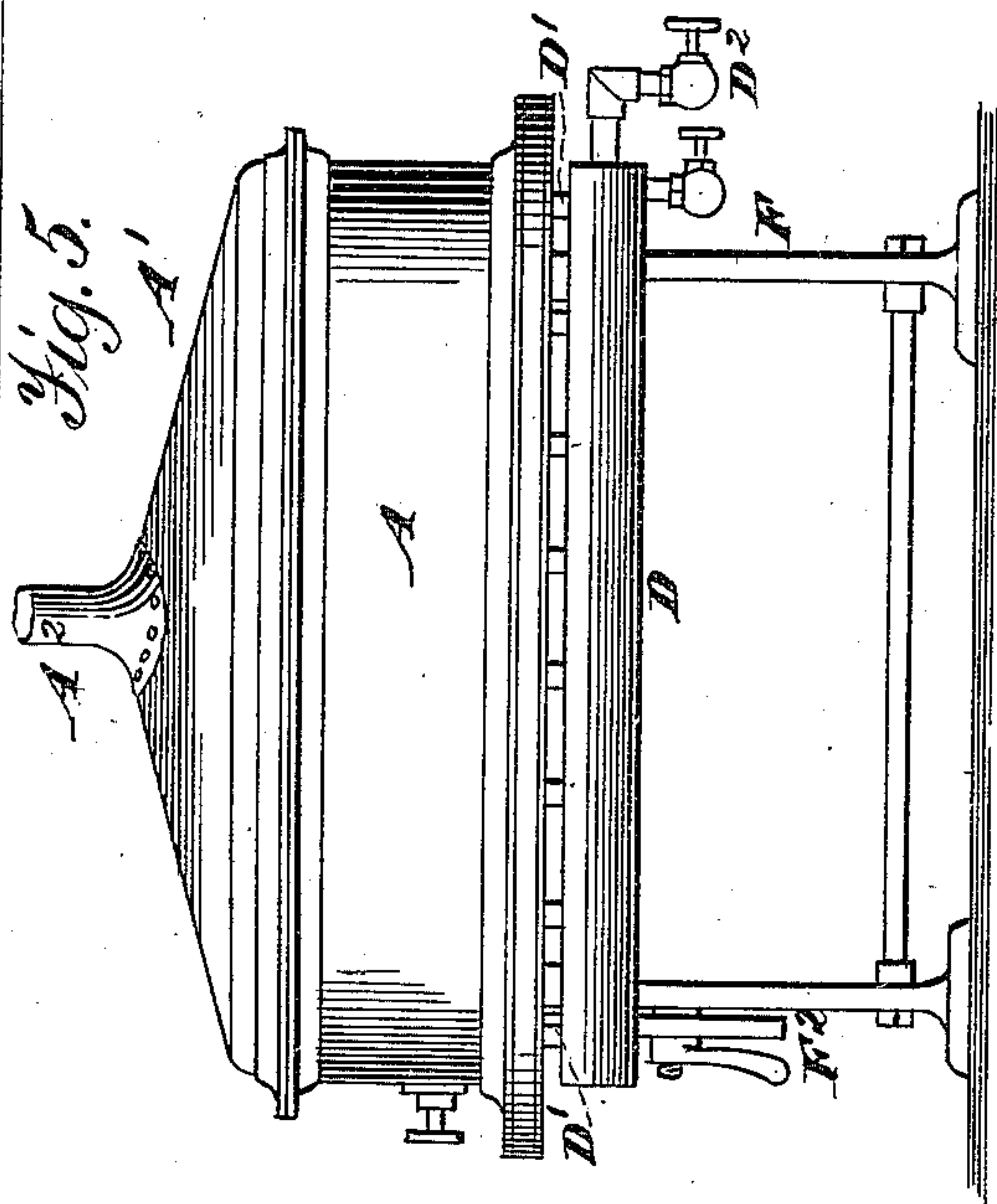
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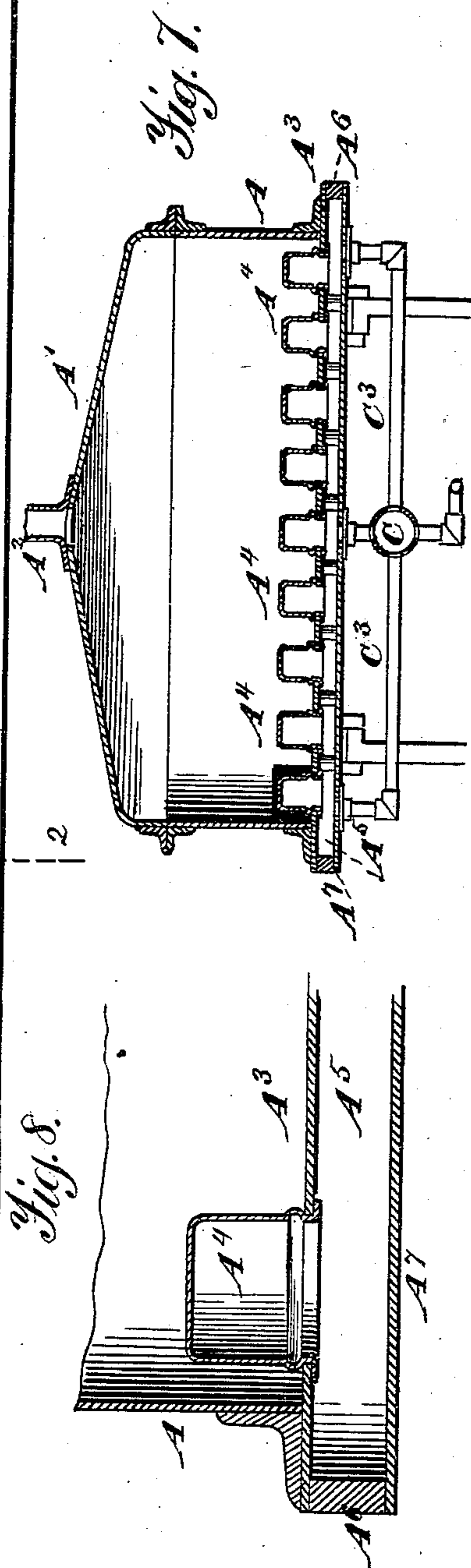
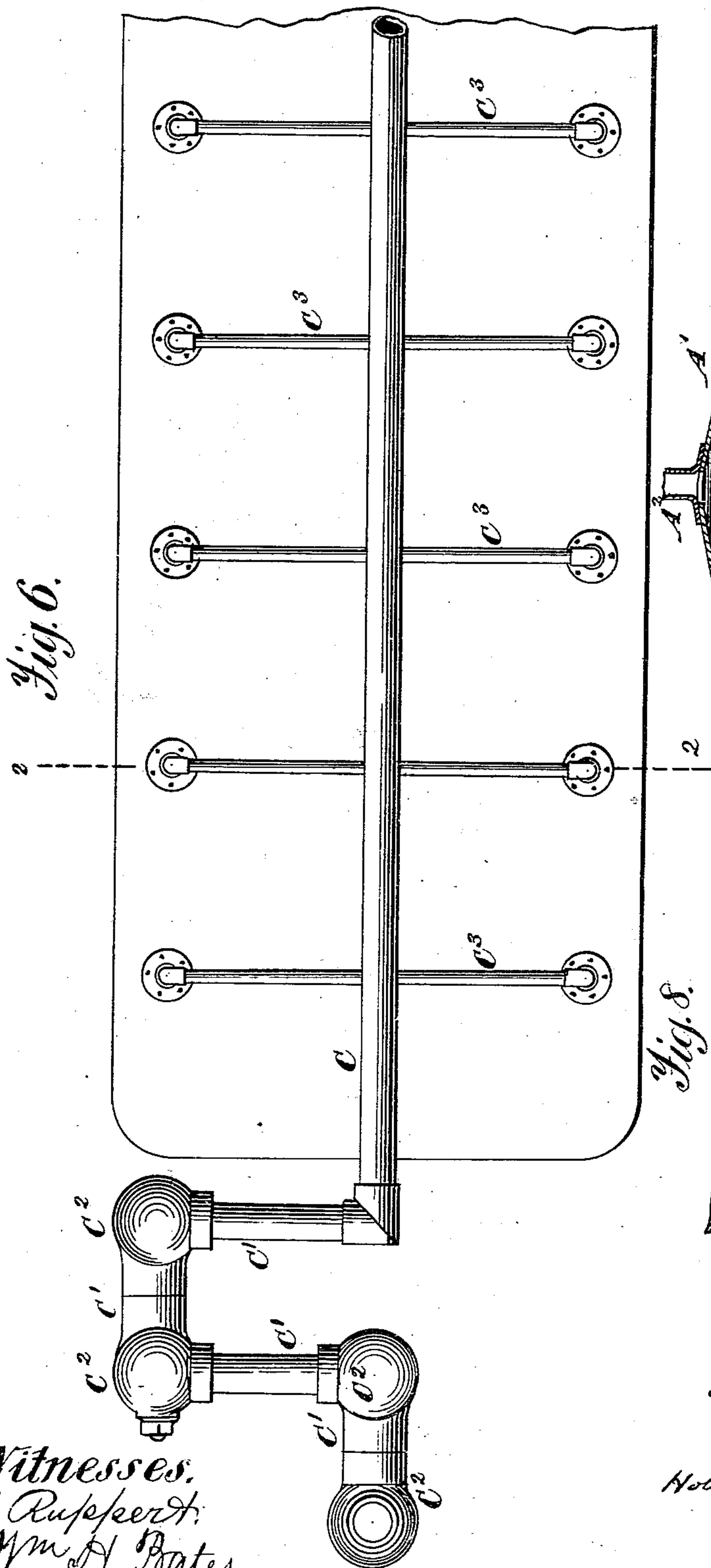
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3 Sheets—Sheet 3.

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# UNITED STATES PATENT OFFICE.

ABEL BREAR, OF SAUGATUCK, CONNECTICUT.

## EVAPORATING-PAN.

SPECIFICATION forming part of Letters Patent No. 259,357, dated June 13, 1882.

Application filed March 30, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, ABEL BREAR, a citizen of the United States, residing at Saugatuck, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Evaporating-Pans, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in that type of evaporating-pans in which saccharine and other substances are evaporated by steam or heated air, and in which a partial vacuum is maintained during the time the device is being used; and the objects of my improvements are to provide novel devices and novel combinations and arrangements of new and old devices, as will be more fully described hereinafter. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a vacuum evaporating-pan having my improvements combined therewith, the cap or cover being removed for the purpose of showing the cups into which the steam or heated air enters, the partition-plates for causing the material to pursue a zig-zag course through the pan, and valves or gates for dividing it into several separate and distinct compartments when desired. Fig. 2 is a side elevation, showing the pan with its cover on, a nozzle on its top for attaching a pipe which leads to some vacuum-producing device, a pipe for conducting steam or air to a chamber formed in the lower portion of the pan, a valve for drawing off the water of condensation therefrom, a pipe for admitting the material to be treated, a pipe for passing off the material from the pan, in which there is placed a valve which rises as a vacuum, or a partial vacuum is formed in said pan, and a valve for checking the flow of the finished material therefrom, and for admitting air to the under side of the valve, frame-work upon which the pan is placed, and mechanism for giving it an incline position in the direction of its length. Fig. 3 is an elevation partly in section, the sectional portion being on the horizontal line 1 1 of Fig. 1, it showing the parts above named, and also the steam or air chamber from which the steam or air enters the cups. Fig. 4 is an end view, showing the pan, its steam or air chamber, and the valve or gate

for shutting off communication between the sections of the pan, cocks or valves for allowing the air to pass out of the chamber in commencing the operation, and the frame-work upon which it is placed. Fig. 5 is also an end view, but of the opposite end to that shown in Fig. 4, it showing a cylinder into which the water of condensation enters from the steam-chamber, a valve for discharging it therefrom, and a portion of the frame-work. Fig. 6 is a plan view of the under side of the pan, showing the main steam or air induction pipe with its branches for admitting steam or air to the different compartments of the pan or into different parts when it is not divided into compartments, and an arrangement of pipes and joints for allowing the induction end of the steam or air pipe to be raised or lowered with the end of the pan when one of its ends is raised or lowered. Fig. 7 is a transverse section on line 2 2 of Fig. 6, showing the heating-cups, the steam-chamber, and the pipe for drawing off the water therefrom; and Fig. 8 is a view showing a portion of the pan of the steam or air chamber and an enlarged view of one of the heating-cups.

Similar letters refer to similar parts throughout the several views.

The importance of such a construction of an evaporating-pan as will enable the operator to treat saccharine and other substances without the risk of burning or scorching them is well known. It is also well known that steam is the active agent in heating such substances is the best; but that heated air can be substituted for it, if care is taken not to have it heated to too great a temperature, is equally well known. For the purpose of applying these and other heating agents various plans have been adopted—such, for instance, as the placing of one vessel within another, leaving a space between them for the occupancy of the heating agent. Another has been to form upon the under side of the pan a chamber, the lower sheet of which has been perforated with holes for the reception of tubes of greater or less lengths, into which the steam or air has entered, for the purpose of adding to the heating-surface exposed to the material to be treated. Partitions extending partially across the pan have been used for the purpose of giving to the material a zigzag direction in the pan, conse-



quently retaining it for a greater length of time in contact with the heating-surfaces. It is also true that tilting evaporating-pans have been used for the purpose of facilitating the flow of the material from the point where it is injected to the point where it is discharged; but, so far as I know, the combination described and shown by me for producing the results sought to be accomplished have never before been made. Neither am I aware that the devices I employ for dividing the pan into separate and distinct compartments when it is to be used as an open pan for what is termed "striking" have ever been known; and I am not aware that a valve operated by the pressure of the atmosphere upon its outer surface, and opening more or less as the pressure in the pan is allowed to increase or is diminished by the action of the vacuum-producing apparatus with which it is connected, has ever been used. My devices and combinations, which I will now proceed to describe, are such as to produce the above-named and other desirable results.

In constructing pans of this type I form a vessel, A, of any desired dimensions, preferably of copper, preferring to have its width equal at least to one-half of its length; but other proportions may be adopted, if desired. This vessel may be of any required length, it being closed, when used as a vacuum-pan, by a cover, A', which is secured thereto by bolts or in any other suitable manner, said cover being provided with a nozzle, A<sup>2</sup>, to which a pipe is to be attached and led to any suitable vacuum-forming device, the operation of which will be to take off all of the steam formed in the pan and cause the pressure therein to be less than that of the surrounding atmosphere. By dispensing with the cover A' the pan can be used advantageously as an open one, the only other requisite being that the outlet for the material, which when the pan is used with a vacuum is partially open, should be kept closed. The bottom sheet of the pan has formed in it a great number of holes, their arrangement with reference to each other being substantially such as is shown in Fig. 1, the object of which is to cause the material, as it flows from one side of the pan to the other, to impinge against the heating-cups, by which means the flow will be to some extent intercepted, and the material will absorb a greater amount of heat from the cups than it would if the rows were in straight lines.

The cups A<sup>4</sup>, just alluded to, are made of thin copper, closed at their upper ends, as shown in Figs. 3 and 7, their length being two inches, more or less, they being secured to the lower sheet of the pan, as best shown in Fig. 8. In making provision for heating the cups and the material in the pans there is formed below the lower or perforated sheet, A<sup>3</sup>, a chamber, A<sup>5</sup>, which is formed by securing to the projecting portions of sheet A<sup>3</sup> a frame or bars of metal, A<sup>6</sup>, of, say, one-half of an inch in thickness, or of any other thickness that may

be desired, and covering said frame with a sheet of iron or other metal, as shown at A<sup>7</sup> in Figs. 3, 4, 7, and 8, the last-named sheet being riveted or otherwise secured to the frame or bars and both to the sheet A<sup>3</sup> in such a manner as to make the chamber which they form steam and air tight. The sheet A<sup>7</sup> is to be of such thickness as to render it fit for attaching the different pipes and cocks rendered necessary to the operation of the pan by securing them or the bolts which hold them therein.

The material to be treated enters the pans through a pipe, B, which passes through both of the sheets of the chamber and opens into the pan at B', Fig. 1. From this point it flows across it to a gate, B<sup>2</sup>, formed in a partition, B<sup>3</sup>, one end of which is fastened to or in contact with the opposite side of the pan, the material flowing around the end of said partition, as shown, the size of the aperture through which it passes being regulated by the valve. At proper intervals between the partitions B<sup>3</sup> and the opposite end of the pan there are placed other partitions of the same character as the one above described, the intervals between them being sufficiently great to admit of there being placed between them three or more series of heating-cups, their arrangement being as shown in Fig. 1, in order that the material in flowing through the pan shall pass from one side thereof to the other alternately. There may be as many of these partitions and valves as may be found desirable, their arrangement being such that when the pan is used open, or as a common striking-pan, all of the compartments, or any number less than the whole, may be used by shutting off the flow from the compartments not in use—an arrangement which is of great convenience when the quantity of material to be treated is small. The valves above alluded to are moved by hand-wheels B<sup>4</sup> B<sup>4</sup>, placed on rods which pass through the sides of the pan.

For conducting the steam or air to the chamber A<sup>5</sup> there is provided a pipe, C, one end of which is provided with a series of short pipes, C', which have couplings C<sup>2</sup> attached to them, that turn upon each other. Two of the pipes C' are at right angles to the pipes C, and two are parallel therewith, the center one being in line with the pipe C, which is firmly attached to the pan and rises and falls with it when it is tilted, as will hereinafter be described, the above-described arrangement of the pipes C C' C' and couplings being for the purpose of allowing for such movement without the use of flexible pipes.

To the pipe C is attached a series of branch pipes, C<sup>3</sup>, which conduct the steam or air to the different compartments of the chamber A<sup>5</sup> at points near its edges, by which means the heat is distributed and the equitable heating of the material is effected.

It is important in pans of this description that provision be made for the escape of the air from the chamber when the steam or air is



first admitted, and for this purpose a pipe, C<sup>4</sup>, is inserted into the bottom sheet of the chamber, which communicates with the interior thereof, it being provided with valves, which, when steam or heated air is first admitted to said chamber, may be opened, and thus allow the air to pass out.

In providing for the escape of the water of condensation from the chamber A<sup>5</sup> there is placed near what is the lowest end of the pan when it is tilted, as shown in Fig. 3, a cylinder, D, which is connected with the chamber by a series of pipes, D' D', said pipes being arranged transversely across the pan in order that the water may be drawn off from all parts of the chamber at the same time, and thus provide for the proper heating of all parts of the material. The cylinder above alluded to is provided with a discharge-pipe at one of its ends, which is controlled by a valve, D<sup>2</sup>, by which the discharge of water can be regulated and the escape of steam prevented.

Provision is made for the discharge of the material from the pan, it being such that the operator can cause the material to flow out at just the required rate of speed, or, in other words, can cause the material to flow through said pans at a greater or less rate of speed—a matter which is of great importance, as the amount of evaporation necessary in different kinds of substances varies, some containing more water in proportion to the solid substance contained therein than others, which renders it necessary that they should be longer retained in contact with the heating-surface. The device which I prefer to employ for this purpose consists of a wing or stem valve, which I inclose in a case, E, connected with the pan by a pipe, E'. To the lower end of the case E there is attached a pipe, which is controlled by a valve, E<sup>2</sup>, which, by being more or less opened, will control the discharge of the material from the pan. The arrangement and construction of the valve inclosed in the case E are such that as the pressure in the pan is increased or diminished by the action of the vacuum-producing apparatus it will rise or fall, and thus cause said valve to become a further means of regulating the flow of the material from the pan, its closing movement being caused by the pressure in said pan and its opening one by the pressure of the atmosphere upon its under surface, the air passing for that purpose through the partially-open valve E<sup>2</sup> and the pipe E'.

Another important feature of my invention is the suspending of the pan at or near its center, by which means it may be used as a vacuum-pan from which there is a continuous flow of material, the condition of which can be regulated by its position, as, if the pan is placed nearly on a level, the material will be retained for a greater length of time therein than it will be when it has a greater degree of inclination.

Provision is made for suspending the pan by attaching to its under surface, at or near

its center, a block or lug of metal, the lower surface of which is semicircular in form, which is caused to rest in a circular recess formed in the upper surface of a frame, F, which supports the pan. For the purpose of controlling the inclination of said pan there is pivoted to the frame F a lever, F', one end of which is made to bear against the under surface thereof, as shown in Figs. 2 and 4, said lever being provided at a suitable point with a slotted projection, F<sup>2</sup>, through which passes a bolt secured to the frame, which is provided with a handled nut for holding the lever in its adjusted positions. Upon the frame F there is fixed a scale for determining the inclination of the pan.

When it is desired to use the pan for striking, the cover is to be removed and the pan placed in a level position, and secured thereon by the lever F, at which time it may be thus used.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with a vacuum-pan for evaporating saccharine and other substances, of an automatically-operating valve, the closing movement of which is produced by the pressure in said pan and its opening movement by the pressure of the atmosphere upon its under or outer surface, substantially as and for the purpose set forth.

2. The combination, in a vacuum-pan for evaporating saccharine and other substances, of the dividing-partitions and sliding valves or gates for dividing the evaporating-space into different compartments, substantially as and for the purpose set forth.

3. In a pan for evaporating saccharine and other substances, the combination of the heating-cups A<sup>4</sup>, made of thin sheet metal, the dividing-partitions B<sup>3</sup>, and valves or gates B<sup>2</sup>, whereby provision is made for dividing the pan into separate and distinct compartments and heating the material in some compartments separately, substantially as set forth.

4. The combination of the evaporating-pan and the steam or air pipes for supplying steam or air thereto, the jointed pipes C', and couplings C<sup>2</sup>, the parts being arranged substantially as described, whereby provision is made for tilting the pan without the use of flexible connections, or causing leakage in the pipes, substantially as described.

5. The combination, in a pan for evaporating saccharine and other substances, of a reservoir suspended at or near its center, having its tilting movement in the direction of its length, and a steam or air pipe connected therewith, arranged to tilt with the pan, substantially in the manner and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ABEL BREAR.

Witnesses:

G. W. BALLOCH,  
D. P. HOLLOWAY.