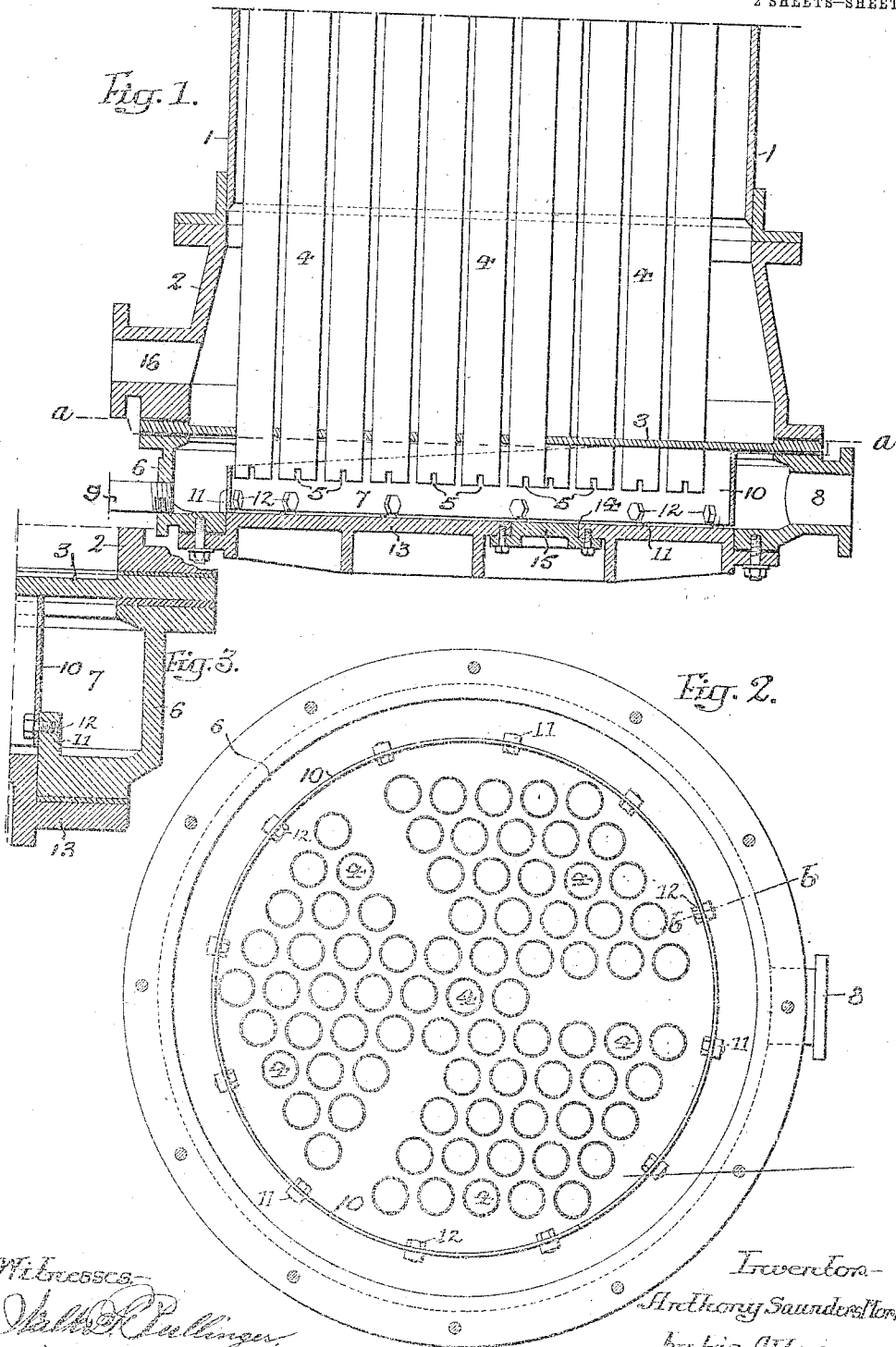


A. S. MORRIS.
FEEDING DEVICE FOR EVAPORATORS.
APPLICATION FILED NOV. 19, 1909.

971,395.

Patented Sept. 27, 1910.

2 SHEETS—SHEET 1.



Witnesses—
Walter C. Pullinger,
Willard A. Burrows

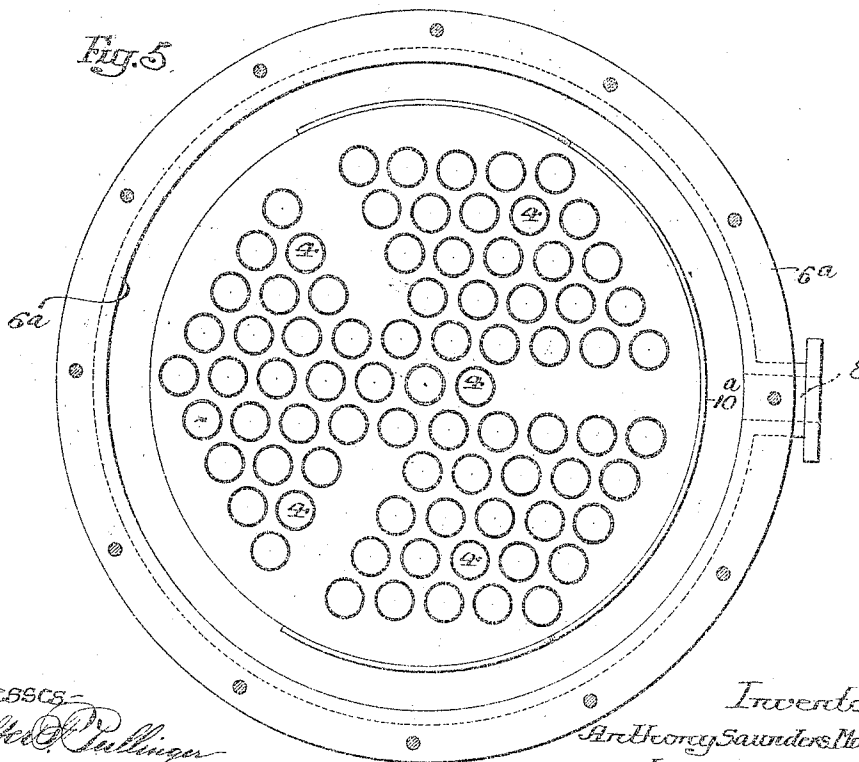
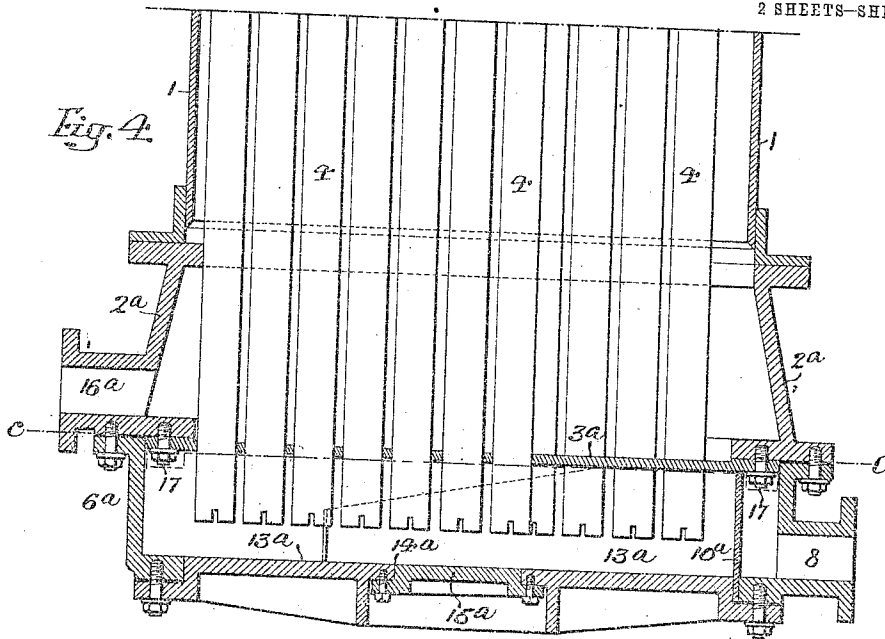
Inventor—
Anthony Saunders Morris
by his Attorneys—
Housson & Housson.

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UNITED STATES PATENT OFFICE.

ANTHONY SAUNDERS MORRIS, OF HAVERFORD, PENNSYLVANIA, ASSIGNOR TO KESTNER EVAPORATOR COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

FEEDING DEVICE FOR EVAPORATORS.

971,395.

Specification of Letters Patent. Patented Sept. 27, 1910.

Application filed November 19, 1909. Serial No. 528,936.

To all whom it may concern:

Be it known that I, ANTHONY SAUNDERS MORRIS, a citizen of the United States, residing in Haverford, Delaware county, Pennsylvania, have invented certain Improvements in Feeding Devices for Evaporators, of which the following is a specification.

My invention relates to evaporating apparatus, and consists of means for feeding the tubes of that class of evaporators in which concentration is effected by movement of the liquid in an upward direction in films upon the walls of suitable externally heated tubes.

My invention is fully shown in the accompanying drawings, in which:

Figure 1, is a sectional elevation of one form of feeding device embodying my invention; Fig. 2, is a sectional plan view of the same, taken on the line *a-a*, Fig. 1; Fig. 3, is an enlarged sectional view illustrating a detail of the structure shown in Figs. 1 and 2, taken on the line *b-b*, Fig. 2; Fig. 4, is a sectional view, similar to Fig. 1, illustrating another form of feeding device embodying my invention, and Fig. 5, is a sectional plan view, taken on the line *c-c*, Fig. 4.

In the evaporation of liquids in the class of evaporators referred to, unique conditions are met tending to affect the proper working of such form of evaporators, and these conditions must be overcome in order to make the work a success. When a superheated liquid is fed to the lower ends of the tubes in which such liquid is to rise in film-form layers, it undergoes a fall in temperature, with a consequent large production of vapor. Unless means are provided for taking care of such vapor, there is danger of the liquid feeding unevenly to the tubes; and the object of my invention is to provide means that will insure to the greatest possible extent, a simultaneously even and uniform feed of such liquid to each tube; a further object being to provide a construction that will permit ready examination of the tubes and tube sheet for cleaning, repairs and other purposes.

In the drawings, 1 represents a shell or casing forming the steam chamber or heating space of an evaporator of the type to which my invention has been applied, and 2

a suitable annular member, which may be a casting, at the bottom of the same, to which such shell is secured. A plate 3, secured to the underside of the member 2 forms the bottom of the steam chamber and such plate is apertured for the passage of tubes 4, which tubes extend upwardly through said steam chamber or heating space, while their lower ends extend some distance below the plate 3, being notched at 5, in the manner shown and described in Patent No. 882,322, dated March 17, 1908; such notches being for the same purpose as disclosed in said patent.

Below the member 2, a bottom structure 6 is provided, forming a chamber 7 into which the tubes 4 dip, and this member has an inlet 8 and drain 9. Disposed within the chamber 7, is an annular baffle or supplemental wall 10, designed to check the velocity of flow of the incoming liquid; such baffle extending its full height to the tube plate 3 for a portion of its circumference, but gradually lowering in height as clearly indicated in the drawings until its lowest point is substantially in the same horizontal plane as the top of the notches 5 formed in the ends of the tubes 4. By means of such baffle the greater volume of incoming liquid is sent in two directions from the inlet 8 and must overflow said baffle or wall 10 before it gains access to the tubes 4. In practice it is desirable to mount the baffle a slight distance above the bottom of the chamber 7, so that a thin film or body of the incoming liquid can find its way thereunder and the accompanying steam will have an opportunity to escape from the liquid, thereby securing an undisturbed surface permitting a substantially uniform feed to each of the several tubes. For this purpose the structure 6 may have a series of lugs 11 to which the baffle may be connected by screw bolts 12, more clearly shown in Fig. 3. The bottom of the structure 6 is closed by means of a bottom plate 13, which may be provided with a hand hole opening 14, closed by a suitable plate 15.

The member 2 may have an outlet 16, for the products of condensation within the steam chamber or heating space formed by the shell 1.

In the structure shown in Figs. 4 and 5, a pair of members 2^a and 6^a are provided,

which may be castings; the upper member having an outlet 16^a for the products of condensation from the steam or vapor space within the chamber formed by the casing 1 surrounding the tubes 4, while the lower member has the usual liquid inlet 8. In this instance the tube plate 3^a may be secured to the lower portion of the upper member 2^a by means of studs, bolts or other form of fastening, indicated at 17. To divert the passage of the liquid and secure a simultaneously even and uniform feed of the same to all of the tubes, I provide a curved baffle plate or supplemental wall 10^a disposed in the chamber formed by the lower member 6^a, and such plate may be held in place by the engagement of the bottom plate 13^a with the wall of the opening in the lower member 6^a, or in any other approved manner. This baffle plate or supplemental wall is discontinuous but closes vertically that part of the chamber 7 adjacent the inlet 8, tapering rearwardly from a point near such inlet to its ends on opposite sides of said inlet opening so as to cut off initial ingress of the entering vapor and provide gradual ingress of the steam with the liquid; the purpose being to facilitate an even distribution of the liquid and vapor to the tubes as in the structure shown in Figs. 1 and 2. In this form of structure, the bottom plate 13^a may be provided with a central hand hole suitably covered, and the member 6^a will have a suitable drain outlet (not shown).

It will be understood that other arrangements or forms of the baffle plate or supplemental wall may be made without departing from my invention, and that it might be formed integrally with some portion of the structure, with the bottom plate 13 (or 13^a), for instance. It will also be understood that a plate of the type shown in Fig. 4 might be continuous and extend to the height all around as the plate shown in Fig. 1, and be slotted adjacent the bottom plate 13 to perform the function attained by raising the baffle shown in Fig. 1 from said bottom plate.

I claim:

1. In a vertical tube evaporator, the combination of a shell or casing, a feed chamber at the bottom of the same having a suitable inlet, tubes disposed in said casing and having portions disposed in said feed chamber, and an annular baffle plate disposed in said chamber and substantially filling the vertical space of the same opposite said inlet, said baffle plate tapering rearwardly and provid-

ing for the gradual separation of vapor accompanying the liquid under treatment.

2. In a vertical tube evaporator, the combination of a shell or casing, an annular member secured to the bottom of the same, a plate secured to said member, tubes disposed in said casing and passing through said plate, a shell forming a chamber into which said tubes dip and having a liquid inlet, and an annular baffle plate disposed in said chamber and substantially filling the vertical space of the same opposite said inlet, said baffle plate tapering rearwardly and providing for the gradual separation of vapor accompanying the liquid under treatment.

3. In a vertical tube evaporator, the combination of a shell or casing, a feed chamber at the bottom of the same having a suitable inlet for the liquid under treatment, tubes mounted in said casing and projecting below into the feed chamber, an inner annular wall or baffle disposed within said chamber opposite the feed inlet, said wall extending to the top of the chamber at a point directly opposite the feed opening and inclined rearwardly from a point near such inlet to a point directly at the rear of the same for the gradual separation of vapor accompanying the liquid under treatment, and means for maintaining such baffle above the bottom of the feed chamber.

4. In a vertical tube evaporator, the combination of a shell or casing, an annular member secured to the bottom of the same, said member having an inlet and forming a receiving chamber for the liquid under treatment, a plate carried by said member, tubes mounted in said plate and projecting below the same, an annular ring having a feed inlet secured to said member, a bottom cover plate fitting said ring and forming with it a chamber into which the tubes dip, and an inner annular wall or diaphragm disposed within said chamber opposite the feed inlet, said wall extending to the top of the chamber at a point directly opposite the feed opening and inclined from such point for the gradual separation of vapor accompanying the liquid under treatment.

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

A. SAUNDERS MORRIS.

Witnesses:

MURRAY C. BOYER,
WM. A. BARR.