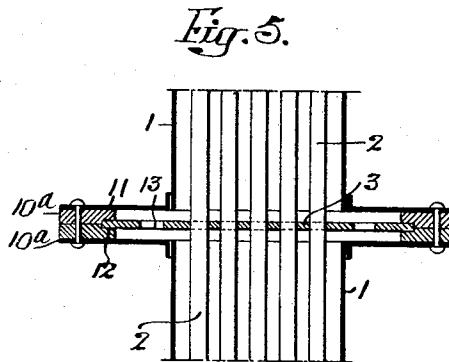
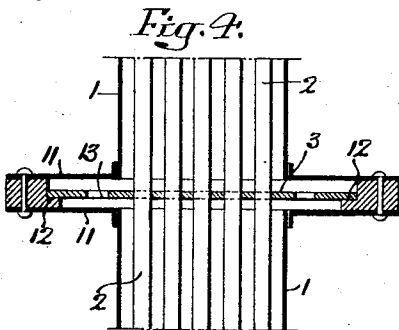
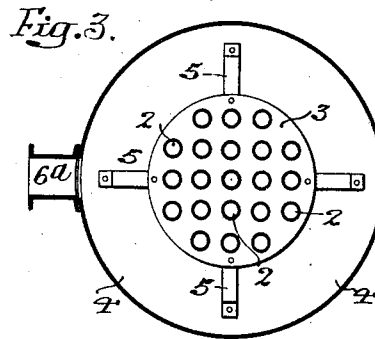
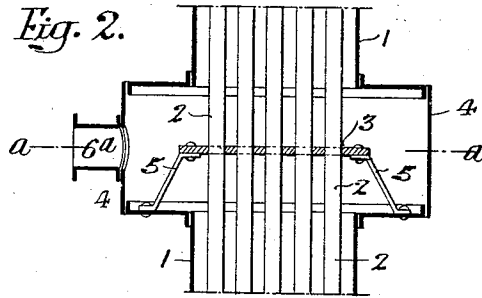
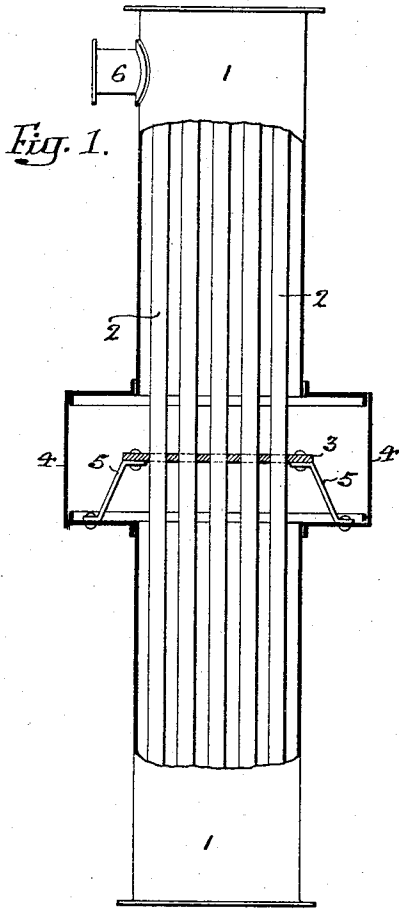


A. S. MORRIS.
EVAPORATOR.
APPLICATION FILED AUG. 17, 1908.

965,395.

Patented July 26, 1910.



Witnesses
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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.

EVAPORATOR.

965,395.

Specification of Letters Patent.

Patented July 26, 1910.

Application filed August 17, 1908. Serial No. 448,849.

To all whom it may concern:

Be it known that I, ANTHONY SAUNDERS MORRIS, a citizen of the United States, and a resident of Haverford, Delaware county, Pennsylvania, have invented certain improvements in Evaporators, of which the following is a specification.

My invention relates to evaporators of the vertical tube type, in which the tubes are of great length; and the object of my invention is to provide an intermediate plate through which the tubes are passed, which plate serves as a steadying means for the tubes, and also as the means of catching the water of condensation from said tubes and diverting it to the wall of the casing in which said tubes are located, thereby checking the flow of the water of condensation down the tubes and permitting free access of the steam thereto so as to increase the efficiency of the same.

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

Figure 1, is a vertical section of one form of vertical tube evaporator equipped with the additional tube sheet in accordance with my invention; Fig. 2, is a view somewhat similar to Fig. 1, illustrating a modification embodying my invention; Fig. 3, is a sectional view on the line *a-a*, Fig. 2, and Figs. 4 and 5, are views illustrating further modifications embodying my invention.

In the use of vertical tube evaporators in which the tubes are of considerable length, condensation of the steam employed as the heating medium for said tubes begins to occur very close to the upper ends of the same and continually increases, so that in practice said tubes are wet with water for the greater portion of their length. It will be readily understood that such condition seriously affects the efficiency of the evaporators, inasmuch as the film of water on the tubes acts to insulate the same from the heating effect of the steam. If, therefore, means be provided for diverting this water of condensation from the tubes at points in the length of the same, additional zones of substantially dry tubes may be gained, with the added result of materially increasing the amount of work done by the heating medium.

In Fig. 1, 1 represents the shell or casing of the evaporator, 2 the tubes within the

same, which are suitably connected to upper and lower tube plates, (not shown). Intermediate these tube plates, I provide an additional plate 3 through which all of the tubes pass, which additional plate may be attached to the casing in any suitable manner. The shell of the evaporator is preferably provided with an enlarged section 4, and the intermediate tube sheet 3 is disposed substantially in the center of said enlarged section, being supported by legs 5 and having a free peripheral margin so that the water of condensation may flow from the same onto the side walls of the casing. The upper surface of the plate 3 may be slightly convex to insure the carrying off of the water of condensation. The diverting of the water of condensation from the tubes is important, since it will give the tubes a dry zone and enable the steam to impart to such portion of the tubes its full heating value.

In the structure shown in Fig. 1, a steam inlet 6 is provided near the top of the casing, and the enlarged section is employed simply as an accommodation for the intermediate tube sheet. In Figs. 2 and 3, however, I have shown a steam inlet 6^a entering the enlarged section 4. An advantage of the enlarged section connecting portions of the casing is the fact that it forms an expansion joint.

In Figs. 4 and 5, other forms of expansion joints with which the drip plate may be combined are shown. In Fig. 4, a ring is employed to which the sections 11 are secured. The ring has a seat 12 for the plate 3 and the latter is apertured at 13 for the passage of the water of condensation. In Fig. 5, a pair of rings 10^a are employed between which the plate is secured; the structure being otherwise the same as that shown in Fig. 4.

An incidental advantage of the use of the intermediate tube sheet, and one of considerable importance; is the fact that it serves to steady the tubes and prevent the sagging of the same when an evaporator of this type is shipped from the factory to the point of use.

I claim:

1. The combination, in a vertical tube evaporator, of a casing, tubes mounted therein and suitably secured, and a supplemental sheet or plate through which said

tubes are passed, said plate being disposed intermediate the ends of the casing and the latter enlarged at a point opposite said plate.

2. The combination, in an evaporator, of a
5 vertically disposed casing, a series of tubes mounted therein, said tubes being suitably connected at their upper and lower ends, an enlarged section in said casing intermediate
10 its ends, and a supplemental tube sheet or plate disposed within said casing through which said tubes are passed and situated opposite said enlarged section of the casing.

3. The combination, in an evaporator, of
15 a vertically disposed casing, a series of tubes mounted therein, said tubes being suitably

connected at their upper and lower ends, an enlarged section in said casing intermediate its ends, a supplemental tube sheet or plate disposed within said casing through which the tubes are passed and situated opposite
20 said enlarged section of the casing, and a steam connection entering said enlarged section.

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

A. SAUNDERS MORRIS.

Witnesses:

MURRAY C. BOYER,
WM. A. BARR.