

J. E. & F. M. DUNN.
VACUUM EVAPORATOR OR HEATER.
APPLICATION FILED AUG. 15, 1907.

906,517.

Patented Dec. 15, 1908.

Fig. 1.

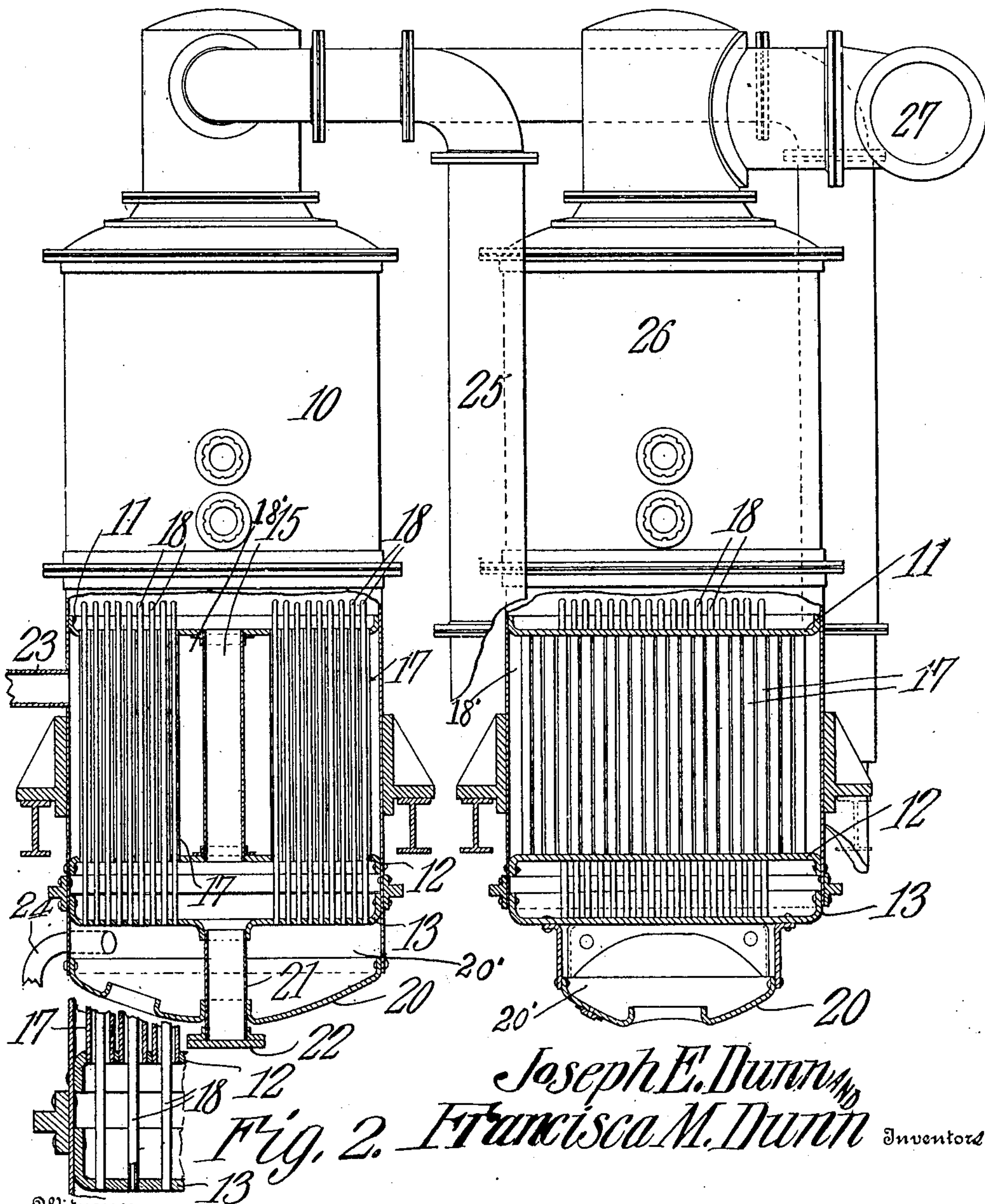


Fig. 2.

Joseph E. Dunn
Francisca M. Dunn

Inventors

Witnesses

E. J. Clavett
J. E. Parker

By

C. A. Snow

Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH E. DUNN AND FRANCISCA M. DUNN, OF SANTIAGO, CUBA.

VACUUM EVAPORATOR OR HEATER.

REISSUED

No. 906,517.

Specification of Letters Patent.

Patented Dec. 15, 1908.

Application filed August 15, 1907. Serial No. 388,746.

To all whom it may concern:

Be it known that we, JOSEPH E. DUNN and FRANCISCA M. DUNN, citizens of the United States, residing at Santiago, Cuba, have invented a new and useful Vacuum Evaporator or Heater, of which the following is a specification.

This invention relates to the construction of vacuum pans for the evaporation and concentration of liquids, or to be used for heating or distilling purposes.

The object of the invention is to provide an improved apparatus in which the temperature of the liquid may be quickly raised by dividing it into thin films which are caused to flow between highly heated surfaces.

The invention consists in a vacuum evaporator or heater, constructed and arranged as hereinafter set forth and claimed.

In the accompanying drawings:—Figure 1 is a sectional elevation of a double effect vacuum pan provided with heating apparatus embodying the invention. Fig. 2 is a detail view in vertical section of a portion of the lower end of one of the pans in Fig. 1.

Similar numerals of reference are employed to indicate corresponding parts throughout both figures of the drawings.

The pan 10 is of any desired capacity and secured within its lower portion are three plate or sheet members, tube sections 11, 12 and 13, all of which are provided with centrally disposed openings having flanged walls. Extending from the sheet 11 to sheet 12 is a central circulating tube 15 through which the liquid being heated passes down from the upper portion of the pan to the lower space between the sheets 12 and 13.

Secured to the sheets 11 and 12 are the ends of tubes 17 through which the liquid circulates and extending through these tubes 17 are smaller tubes 18, the lower open ends of which are secured to the lower tube sheet 13. The lower tube sheet 13 has a centrally disposed flanged opening which is connected to an opening in the lower flanged head 20 by a tube 21, the lower end of this tube 21 being normally closed by a cap 22.

The space around the tubes 17 between the upper and the lower tube sheets 11 and 12 forms a steam box 18' into which steam passes at any desired temperature through a

feed pipe 23. Steam is, also, admitted through a pipe 24 to the lower steam box 20' formed between the tube sheet 13 and the lower head 20.

The steam passes upward into the small tubes 18, and any water of condensation which may form therein will flow by gravity down into the lower steam box 20'. The steam will, also, inclose and heat the larger tubes 17, and each pair of tubes 17, 18, is arranged to form a very narrow passage, so that a mere film of liquid will be acted upon and its temperature quickly raised to a very high point. The pipes 15 and 21 extending through the upper and lower steam chambers will aid in heating the circulating liquid.

The vapor is drawn off through a pipe 25 which connects with the two steam spaces of the second pan 26, the construction of this pan being the same as that previously described, and the vapor from this latter pan passes off through a discharge pipe 27 to a third pan or to a condenser.

We claim:—

In an evaporator, a casing; a liquid chamber in the upper part of the casing; an upper and lower steam chamber in said casing; a lower liquid chamber located between said steam chambers; liquid circulating pipes open at each end, and extending through the upper steam chamber, and connecting the said lower liquid chamber with the liquid chamber in the upper part of the casing; steam pipes extending through and concentric with said circulating pipes, and projecting up into the upper liquid chamber, and extending through the lower liquid chamber, and communicating with the lower steam chamber; a central liquid circulating pipe extending through the upper steam chamber, and communicating with the upper and lower steam chambers; and a second liquid circulating pipe extending through the lower steam chamber, and opening into the lower liquid chamber.

In testimony that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses.

JOSEPH E. DUNN.
FRANCISCA M. DUNN.

Witnesses:

FEMIS WELES A. RAVETO,
J. A. PORTER.