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J. E. DUNN.
EVAPORATOR.
APPLICATION FILED JULY 29, 1909.

Patented Dec. 20, 1910.

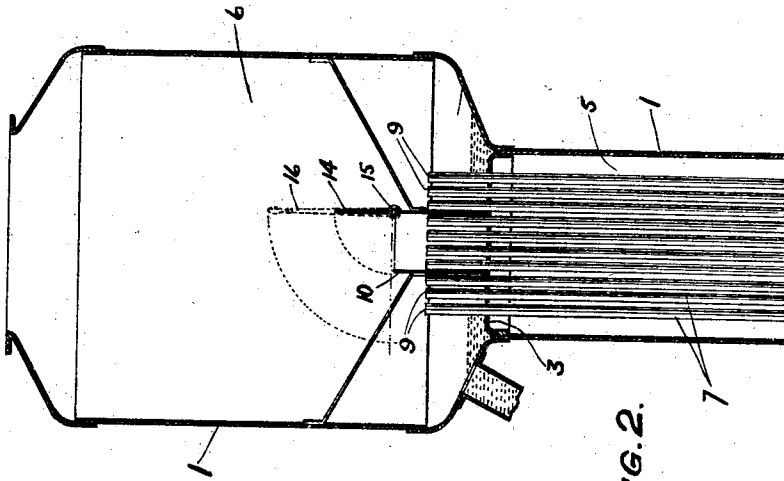


FIG. 2.

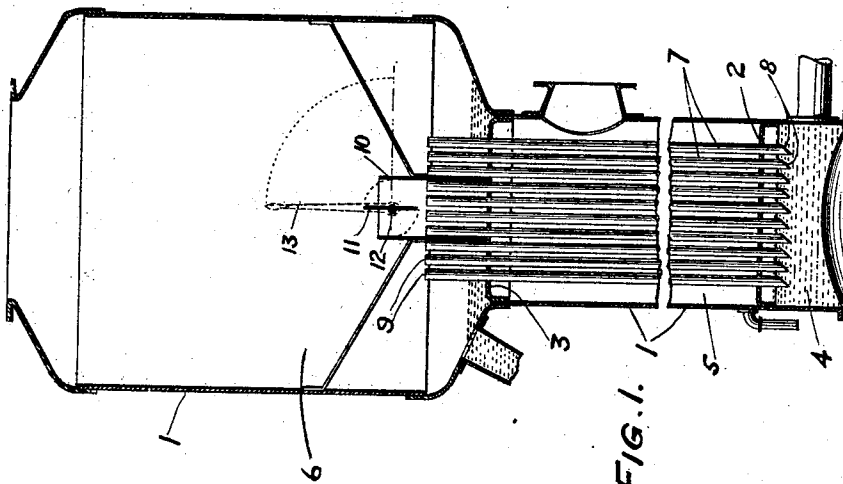


FIG. 1.

WITNESSES:

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EVAPORATOR.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSEPH E. DUNN, a resident of the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain Improvements in Evaporators, of which the following is a specification.

This invention relates to evaporation by passing steam through heated tubes and heating the liquid to be evaporated by causing the steam to draw it in a thin film along the inner surfaces of the tubes.

In the operation as it has been practiced heretofore, it is necessary to maintain a sufficient supply of the liquid and steam to keep all of the tubes charged with a definite volume of steam flowing at a definite rate in order to raise the liquid through the tubes to their discharge ends.

In my improvements means are provided for regulating the area of the evaporating surface so that it shall bear the ratio to the work to be done which is desired to attain the desired efficiency. This is accomplished by apparatus so constructed that the number of tubes required for efficient evaporation can be used and the remainder cut out or rendered inactive, the operation being flexible and susceptible of modification so that it is adaptable to the quantity of liquid to be evaporated.

In the accompanying drawings, Figure 1 is a sectional elevation of evaporating mechanism embodying my improvements, and Fig. 2 is a sectional elevation of a modified form of the same.

The apparatus, as shown in the drawings, comprises a shell 1 divided by the sheets 2 and 3 into the liquid chamber 4, the heating chamber 5, and the vapor chamber 6. Vertical tubes 7, having their bodies disposed in the heating chamber, pass through and are held by the sheets 2 and 3, the lower ends of the tubes extending below the sheet 2 so that their inclined mouths 8 lie just below the normal level of the liquid supply in the chamber 2 and the upper ends of the tubes extend above the sheet 3 so that their outlets 9 shall be above the normal level of the liquid in the vapor chamber 6.

As illustrated in Fig. 1, a box 10 rests upon the sheet 3 and surrounds the tops of a number of the tubes 9. A butterfly valve 11 is supported and turned by means of journals 12 in the open top of the box by

turning the handle 13 fixed to the valve. The valve is opened to its full capacity when the apparatus is working at its full capacity, so that all the tubes will be fully charged with steam or vapor. But when the operation does not provide the volume of steam or vapor necessary for lifting the film of liquid through the tubes, the valve is closed.

As shown in Fig. 2, the box 10, which rests on the sheet 3 and surrounds the tops of a section of the tubes 7, has the valve 14 connected by the hinge 15 with the edge of its open top. The valve has the operating handle 16 connected thereto, whereby it is opened when the apparatus is working at its full capacity and is closed when operating at its reduced capacity.

It will be understood that the box and its valve are readily placed and removed, hence any desired number of tubes may be closed off by selecting the desired size of box and valve.

Having described my invention, I claim:

1. An evaporator having a liquid chamber, a vapor chamber, tubes connecting said chambers, and means for cutting off the communication between said chambers through a part of said tubes while maintaining the communication through the remainder of said tubes.

2. An evaporator having a set of vertical tubes, means whereby vapor and a liquid are carried through said tubes, and means for varying the number of said tubes in action proportionately to the volume of said vapor.

3. An evaporator comprising a shell containing a liquid chamber, a heating chamber above said liquid chamber, and a vapor chamber above said heating chamber, in combination with a set of evaporating tubes passing from said liquid chamber through said heating chamber into said vapor chamber, and means for cutting off the communication between said liquid and vapor chambers through part of said tubes while maintaining the communication through the remainder of said tubes.

4. An evaporator having a liquid chamber, a vapor chamber, tubes connecting said chambers, and a valve for closing the connection between said chambers through several of said tubes without cutting off the communication through the remaining tubes.

5. An evaporator comprising a shell hav-

ing sheets separating it into a liquid chamber, a heating chamber above said liquid chamber, and an evaporating chamber above said heating chamber, in combination with a
5 box surrounding ends of several of said tubes and a valve for closing said box.

In witness whereof I have hereunto set my

name this 28th day of July, 1909, in the presence of the subscribing witnesses.

JOSEPH E. DUNN.

Witnesses:

JOHN THIEL,

JOS. G. DENNY, Jr.