No. 720,465. PATENTED FEB. 10, 1903.

O. M. NILSON.

EVAPORATING APPARATUS.

APPLICATION FILED DEC. 17, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 2.

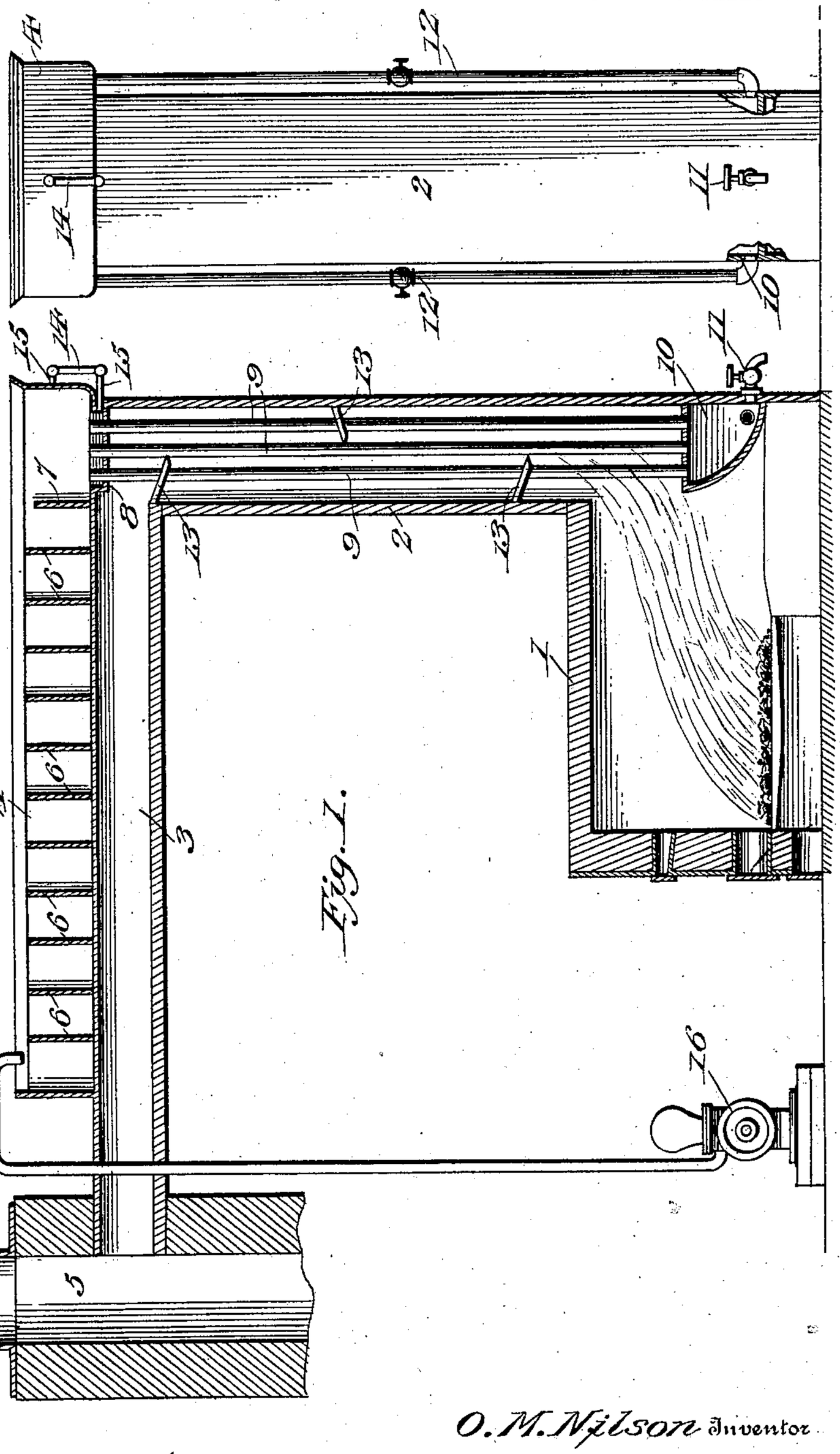

Fig. 3.

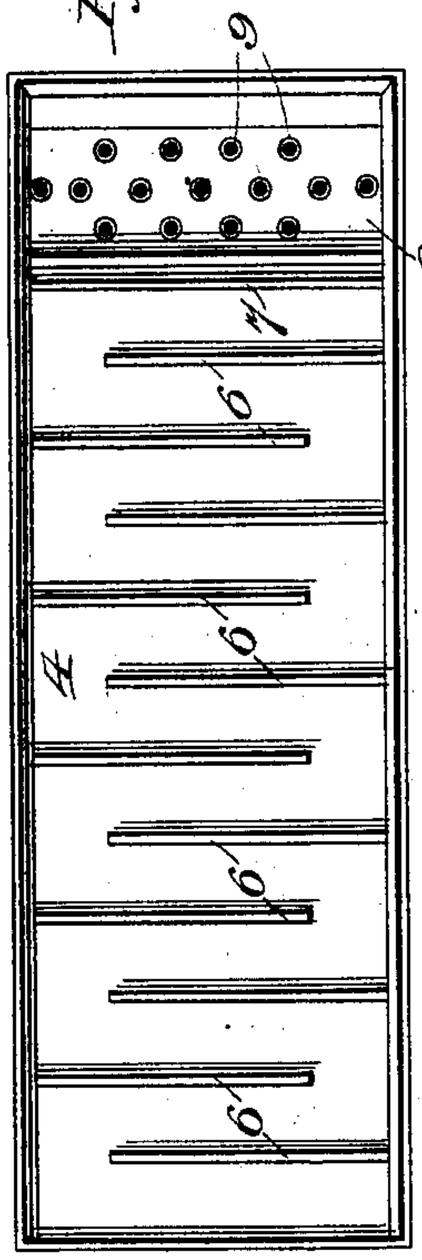

Fig. 1.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 4.

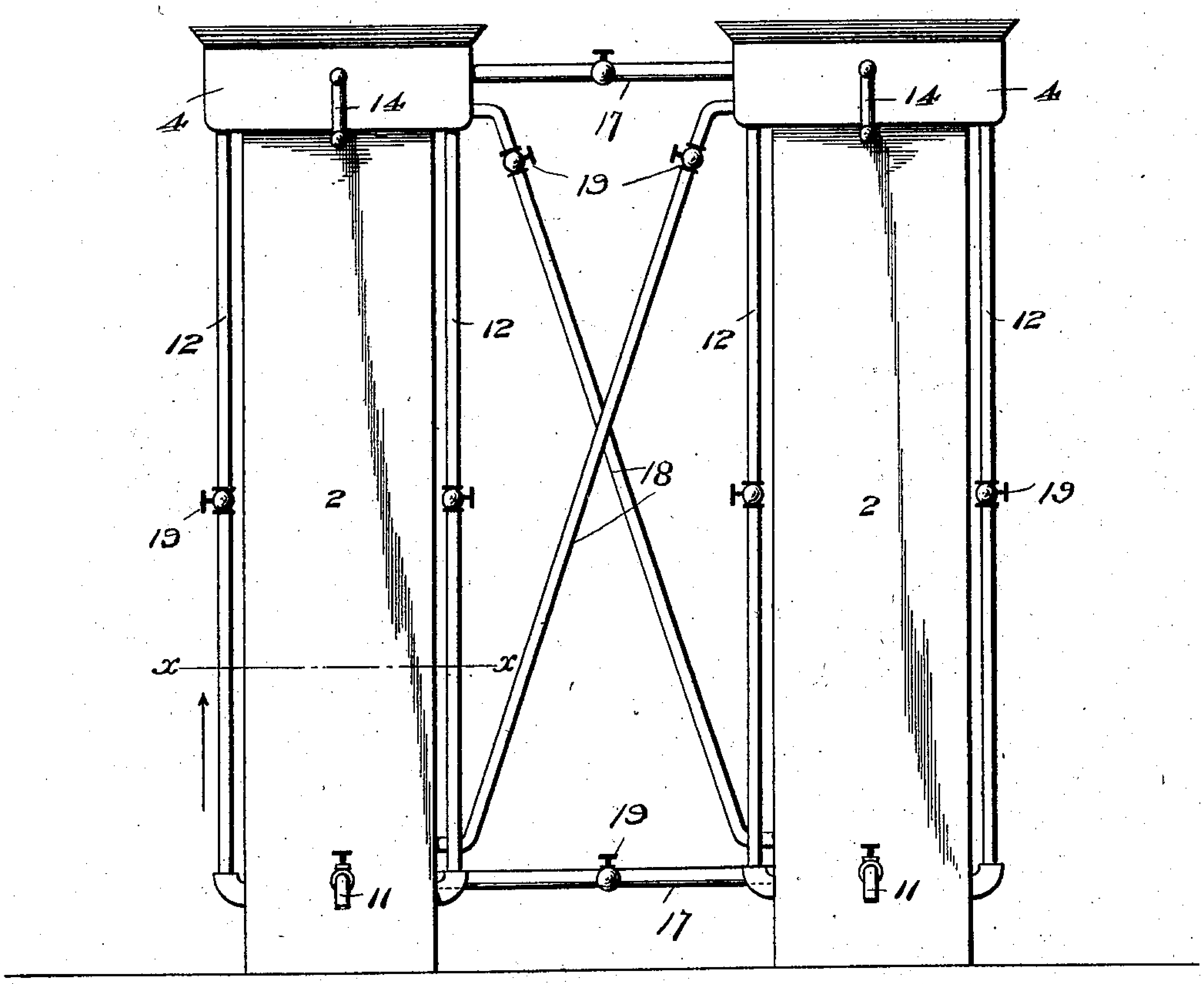
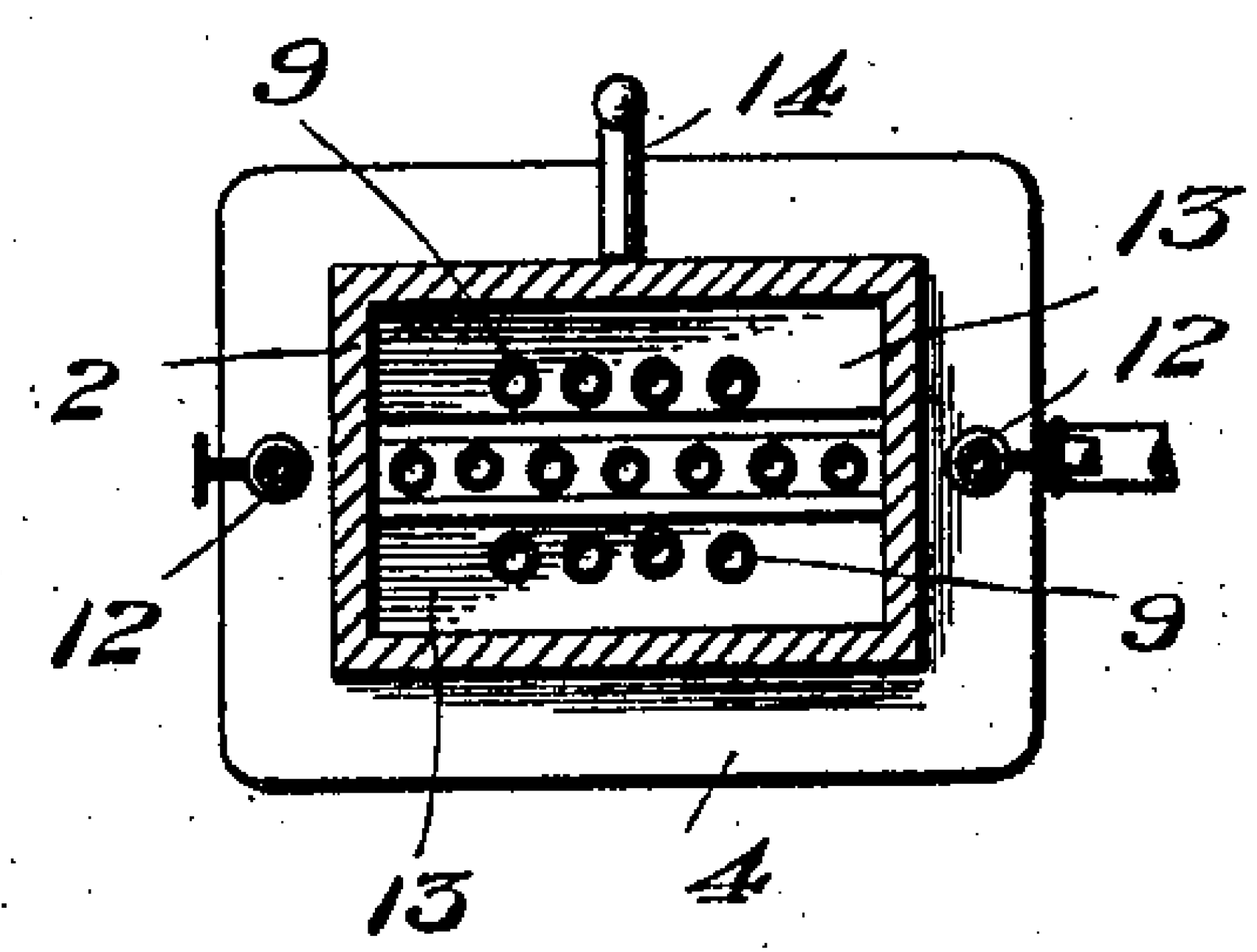


Fig. 5.



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UNITED STATES PATENT OFFICE.

OSCAR M. NILSON, OF MANSFIELD, LOUISIANA.

EVAPORATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 720,465, dated February 10, 1903.

Application filed December 17, 1901. Serial No. 86,283. (No model.)

To all whom it may concern:

Be it known that I, OSCAR M. NILSON, a citizen of the United States, residing at Mansfield, in the parish of De Soto and State of Louisiana, have invented certain new and useful Improvements in Evaporating Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to new and useful improvements in apparatus for boiling cane-juice and reducing it to sugar density. It is more especially an improvement upon the apparatus shown and described in Letters Patent No. 698,733, granted to me on April 29, 1902.

The primary object is to provide a simple and inexpensive apparatus having means whereby the maximum heating-surface is presented to the light syrup made from the previously-superheated juice and the same thereby quickly reduced to the desired density.

Another object is to provide a novel arrangement of tubes whereby a direct circulation of the juice or syrup is permitted between the reservoir and the clarifier or superheater used in connection with the apparatus.

A further object is to employ a series of deflectors within the hot-air flue, whereby the products of combustion are caused to circulate from side to side during their outward progress.

With these and other objects in view the invention consists in the novel construction and combination of parts hereinafter more fully described and claimed, and illustrated in the accompanying drawings, showing the preferred form of my invention, and in which—

Figure 1 is a vertical section through the apparatus. Fig. 2 is an end elevation thereof, partly broken away. Fig. 3 is a plan view of the clarifier. Fig. 4 is an end view of a series of apparatus connected together; and Fig. 5 is a section on line *x x*, Fig. 4.

Referring to the figures by numerals of reference, 1 is a brick or "Dutch" furnace, from the rear of the top of which extends a preferably rectangular metal drum 2, which opens into the furnace, as shown. The upper end of this drum opens into a horizontally-extending flue 3, extending entirely under a clarifier 4 and having an outlet into a suitable chimney or stack 5. The flue is preferably constructed of sheet metal and integral with the clarifier, although the same may be detachable, if desired.

The clarifier is substantially the same in construction as that disclosed in my application aforesaid. Strips 6 extend partly across the same from opposite sides alternately, and a dam 7, arranged adjacent to one end of the clarifier, extends entirely thereacross. The strips 6 may be omitted and the pan used to superheat syrup.

That portion 8 of the bottom of the clarifier which lies between the dam 7 and the adjacent end of the clarifier may, if desired, be sunken, as shown. Extending upward through the depressed portion 8 to points in horizontal alinement with the bottom of the clarifier are vertical tubes 9. These tubes extend down through the drum 2, and the lower ends thereof are fitted within the top of a metallic reservoir 10, arranged in the furnace 1 at a point under the drum. This reservoir forms a portion of the rear wall of the furnace and has a suitable valved outlet 11, whereby the contents thereof may be drawn off.

As shown in the drawings, the clarifier extends outward beyond the walls of the drum 2. Opening into the bottom of the clarifier, at opposite sides thereof, are pipes 12, which extend along the outside of the drum and open at their lower ends into the reservoir 10. Similar pipes of any desired number can also be arranged at the rear of the boiler.

Downwardly-inclined deflectors 13 are arranged upon opposite sides of the drum 2 and extend inwardly alternately.

A glass 14, having suitable graduations, is connected at its ends to the clarifier 4 by means of short tubes 15, as shown. By means of this glass the density of the syrup may be readily determined.

Syrup is placed in the clarifier 4 in any desired manner, as by means of a pump 16. It is there heated and partially evaporated by the heat passing through the flue 3. It is guided back and forth by the strips 6 and finally flows over or through the dam 7 into the depression 8. When it rises to the tops of the tubes 9, it will flow thereinto and pass downward into the reservoir 10. The tubes

or pipes 12 are also filled with the syrup, as is obvious.

The hot products of combustion escaping through the drum 2 from the furnace are deflected from side to side by the deflectors 13 and the syrup within the reservoir and the tubes 9 is thoroughly heated. As the syrup becomes lighter when heated, it will rise within the tubes 9 and be displaced by syrup admitted through the cool pipes 12. In this manner a circulation of the syrup is obtained and the density is gradually increased. When the desired density has been secured, the syrup is removed in a continuous stream or in charges through the outlet 11.

In Fig. 4 I have shown two of the apparatus connected, so as to permit the juice or syrup to flow back and forth from one to the other. In order to secure this result, I employ, in addition to the pipes 12, transverse horizontal pipes 17, which connect the clarifiers and reservoirs, respectively. Diagonally-arranged pipes 18 connect the clarifier of each apparatus with the reservoir of the adjacent apparatus. These pipes, as well as pipes 17 and 12, are provided with suitable valves 19, as shown. The valves in pipes 12 may, if desired, be despensed with.

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

1. In an evaporating apparatus the combination with a clarifier and a flue thereunder; of a furnace under said clarifier and flue, a reservoir therein, a drum for conveying the products of combustion from the furnace to the flue under the clarifier, and a normally heated and a normally cool pipe connecting said clarifier and reservoir.

2. In an evaporating apparatus the combination with a clarifier and a flue thereunder; of a furnace under the clarifier and flue, a reservoir therein, a drum for conveying the products of combustion from the furnace to the flue under the clarifier, a pipe connecting the reservoir and clarifier and adapted to be heated by the furnace, said pipe lying in the path of the products of combustion, and a normally cool pipe connecting the clarifier and reservoir.

3. In an evaporating apparatus the combination with a furnace; of a reservoir therein, a clarifier above the furnace and reservoir, a drum for conveying the products of combustion from the furnace to the clarifier whereby said clarifier may be heated, a normally heated pipe in the path of the products of combustion and connecting the clarifier and reservoir and a normally cool pipe connecting said reservoir and clarifier.

4. In an evaporating apparatus the combination with a clarifier, a flue thereunder, and a drum connecting with the flue; of a syrup-reservoir, means for heating the same, tubes extending through the drum and connecting the reservoir and clarifier, deflectors in the drum, and tubes outside the drum connecting the reservoir and clarifier.

5. In an evaporating apparatus the combination with a clarifier, a flue thereunder, and a drum connecting with the flue; of a furnace, a reservoir forming a portion of one wall of the furnace, tubes extending through the drum and connecting the reservoir and clarifier, deflectors within the drum, and tubes outside the drum connecting the clarifier and reservoir.

6. In an evaporating apparatus the combination with a clarifier having a dam therein and a depressed portion adjacent to the dam; of a reservoir, means for heating the same, tubes connecting the reservoir with the depressed portion of the clarifier and extending to points therein in horizontal alinement with the bottom of the clarifier, a second set of tubes connecting said clarifier and reservoir, one set of tubes being adapted to be heated, whereby circulation of syrup in the apparatus may be secured.

7. In an evaporating apparatus the combination with a receptacle for holding syrup and a flue thereunder; of a furnace, a reservoir therein, a drum for conveying the products of combustion from the furnace to the flue under the clarifier, and a normally heated and a normally cool pipe connecting the reservoir and receptacle.

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

OSCAR M. NILSON.

Witnesses:
T. WATKINS SHERMAN,
ALBERT GUILBAULT.