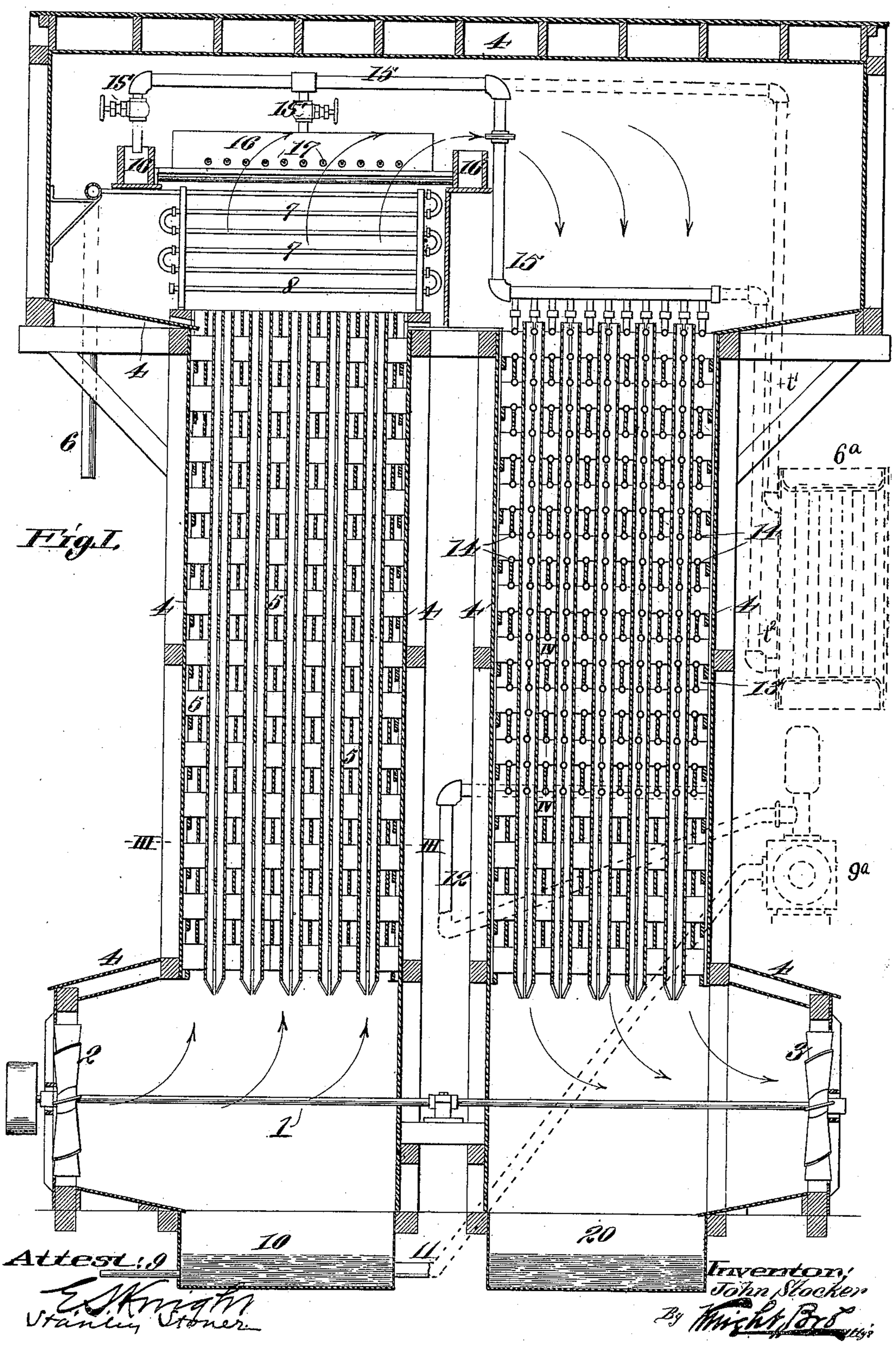
No. 614,776. Patented Nov. 22, 1898.

J. STOCKER.

DISTILLING APPARATUS.

(Application filed July 29, 1897.)

(No Model.) 2 Sheets—Sheet 1.



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E. L. Knight
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Fig. II.

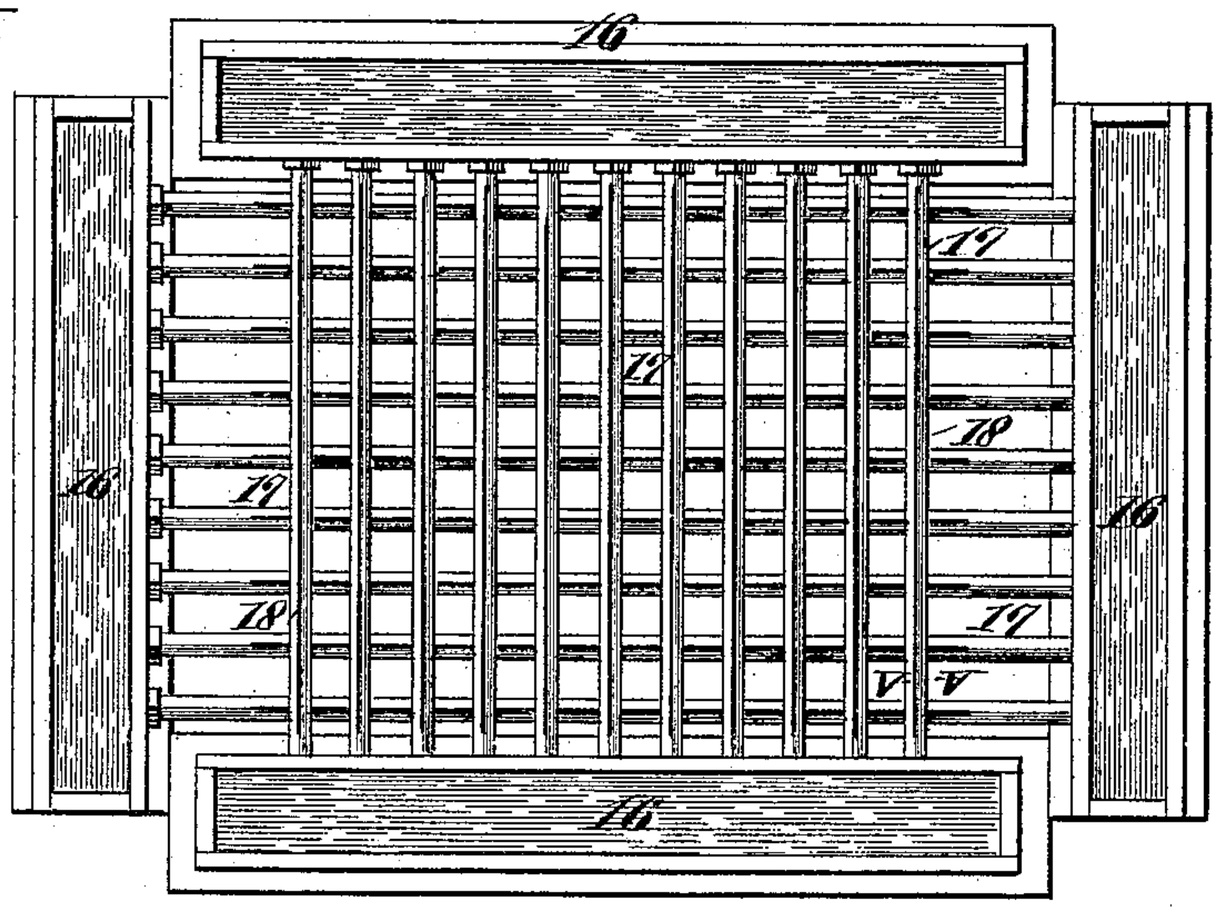


Fig. III.

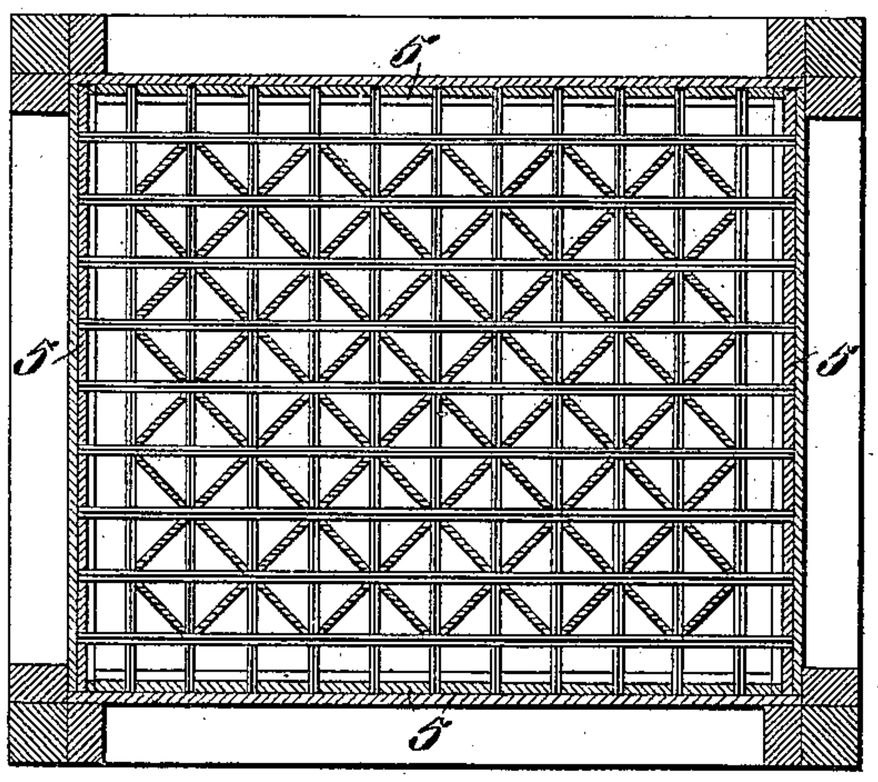
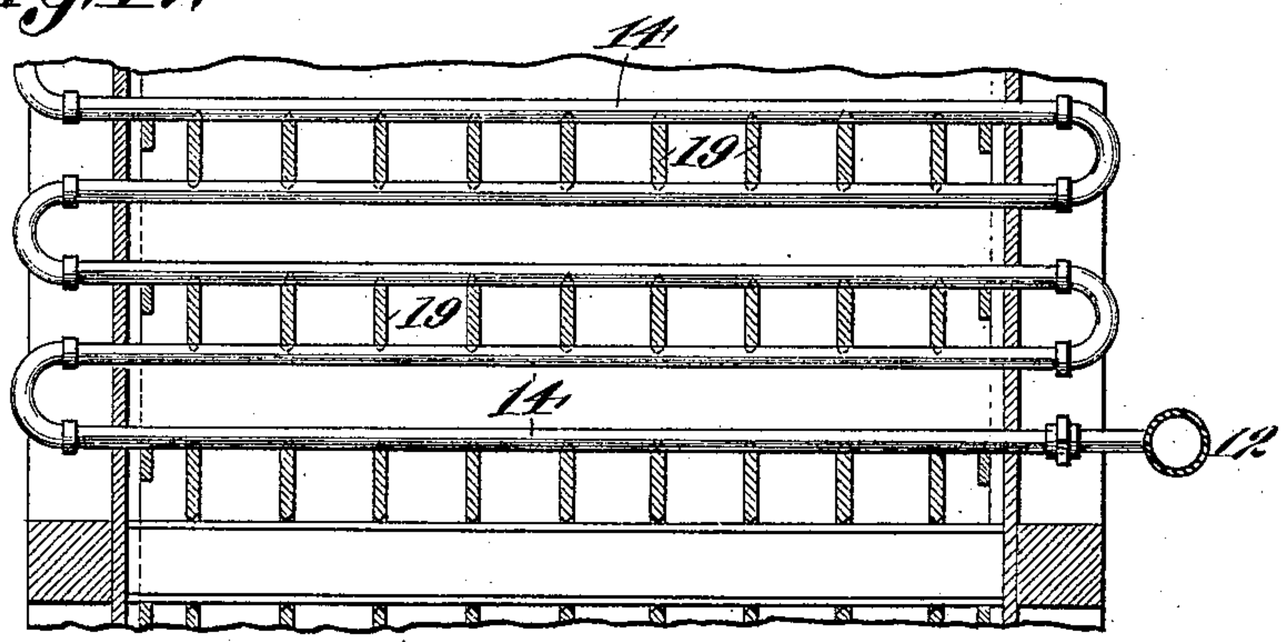


Fig. IV.



Attest!
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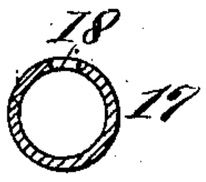
Fig. V.



Inventor:
John Stocker
By Wright Brothers
Attys

UNITED STATES PATENT OFFICE.

JOHN STOCKER, OF ST. LOUIS, MISSOURI.

DISTILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 614,776, dated November 22, 1898.

Application filed July 29, 1897. Serial No. 646,298. (No model.)

To all whom it may concern:

Be it known that I, JOHN STOCKER, a citizen of the United States, and a resident of the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Distilling Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The object of my invention is to obtain in the most economical way pure distilled water.

I am aware that it is old to produce more distilled water with a given supply of heat than will be directly evaporated therewith, as such a process has been carried out in different ways in the manufacture of clear ice by the use of secondary boilers.

Distilled water is, broadly speaking, water which has first been evaporated or turned into a vaporous form and then afterward condensed or brought back again to a liquid form, and since the same amount of heat has to be conducted to the water to change the same from the liquid form into vapor as has to be abstracted from the vapor to change it again into liquid form there should be theoretically no heat required to turn any amount of water into distilled water of the same temperature, provided that the above-mentioned quantities of heat could be perfectly exchanged. In my apparatus economy is attained by a more perfect heat exchange than is possible in the ordinary still, where only a small part of the heat gained by condensation of the steam can be utilized to heat the water before it enters the still. All the water which was used to condense the steam is run through a cooling-tower and there made to give up in the form of steam the heat it has previously taken up in the condensing-coils and the heater. Purity of product is attained by evaporation without ebullition.

Referring to the drawings, Figure I is a vertical sectional view of the device. Fig. II is a top or plan view of the upper portion of the cooling-tower, looking down on the basins and pipes used for distributing the water. Fig. III is a horizontal cross-section of the condensing-tower, taken on line III III, Fig. I. Fig. IV is a vertical side view, partly in section, of the condensing-tower, taken on line IV IV, Fig. I. Fig. V is a detail cross-section of one of the water-pipes shown in Fig. II.

1 is a shaft driven by any suitable source of power and which carries two fans 2 and 3. These fans are rigidly secured to the said shaft and worked simultaneously. The fan 2 is designed to operate as a blower for introducing air into the bottom of the cooling-tower 5 in the direction shown by arrows, and the fan 3 is designed to act as an exhaust for pulling or drawing the air out, also shown by arrows. The amount of air forced through the apparatus is regulated by the speed and size of these two fans.

4 is the inclosing case of the entire device.

5 is a cooling-tower which is made up in any ordinary manner of checker-work or cross-tiled and through which heated water trickles downward, as will afterward be described.

6 is a pipe for the purpose of bringing steam to the coil 7 in order to heat the water leaving the coil 14 and discharge-pipe 15 before the same is run through the tower. Instead of heating the water as shown in the drawings it may be heated in any other suitable way—as, for instance, by running the water through a heater 6^a outside of the tower, as shown in dotted lines in Fig. I. This heater may in its turn receive heat in any manner—as, for instance, the direct application of fire or live steam.

9 is a pipe leading from a source of water-supply—such as a well, reservoir, or the like—and which opens into a tank 10, situated at the bottom of and below the cooling-tower 5.

11 is a pipe leading therefrom to the suction side of a pump 9^a, as shown in dotted lines in Fig. I, but may be of any ordinary and suitable construction.

12 is a pipe leading from the above-mentioned pump and through which water is introduced into pipes placed in the condensing-tower 13. 14 are the pipes through which the water is forced by means of the said pump up to the main discharge-pipe 15. The water thus forced up through the condensing-tower is distributed into the four troughs 16, which troughs are connected by means of pipes 17, provided with openings 18 at the tops thereof. The distribution is regulated

by means of the stop-cocks 15'. 20 is the tank where the distilled water is accumulated. As the water runs through the said openings 18, which, it will be observed, are arranged to evenly distribute over the area of the cooling-tower, it drops down over the heating-pipes 7 and its temperature is raised. As this water thus heated to as near the temperature of steam as possible drops down through the cooling-tower 5 it meets the air pumped in by means of the fan 2, as heretofore described, and the said air by reason of its contact therewith becomes heated and saturated with the water. As the temperature of the air increases by reason of its rising in the cooling-tower 5 and meeting higher temperature the higher it comes up, its power to carry the water in a vaporous form increases correspondingly. In other words, the hotter the air the greater its power for absorbing the moisture, and the air thus saturated leaves the top of the cooling-tower at a temperature as near as possible to that of the coil 7. Of course the greater portion of the water that passes down through the tower 5 is not absorbed by the air passing upward, and this excess will accumulate in the tank 10 and will be of a temperature about equal to the air pumped in by the fan 2. This cooling will be produced as a consequence of the evaporation which takes place while the said water is running down through the tower 5. It is then pumped out through the pipe 11, as already described, to be again forced through the pipe 12.

The purpose of the tower 13, which it will be observed is distinct and separate from the tower 5, is to lower the temperature of the air again, and the highly-saturated air as it passes the pipes 14 is cooled and soon reaches its dew-point, when it will precipitate the steam which it carries along with it on the pipes 14. These pipes 14 are separated by means of partitions 19, the purpose of which is to afford an enlarged surface for contact with the air. As this condensation takes place the steam is precipitated on striking the pipes 14, and said precipitation trickles down over the partitions 19, by means of which an additional and very effective cooling-surface is created. The pump forces the water through the pipe 12 to the series of pipes 14 in the tower 13, said water being drawn from the tank 10 and finally discharged through the pipes 17. These pipes 17 distribute this water over the heating-coil 7, placed above the cooling-tower 5.

If exhaust-steam is used in heating the water, as is done in ice or power plants, the portion of the exhaust which condenses can either be run through the tower or collected by a special header-pipe connecting the lowest pipes 8, and this part of the condensed water obtained would have to be filtered or freed from oil before it can be used in boilers.

The apparatus is well adapted for making distilled water for drinking purposes, since the air which takes up the vapor in the cooling-tower is heated, and thereby thoroughly freed from impurities or bacteria. It makes from two to four times as much distilled water as could be directly evaporated by the heat supplied to it, and it uses but from five per cent. to ten per cent. of the water which would have to be used to condense this amount of steam in an ordinary still.

I have found it practicable to use a natural draft instead of the fans 2 and 3.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. A distilling apparatus comprising a cooling-tower having an air-chamber and a supply-tank beneath it, a condensing-tower having an air-chamber and a receiving-tank beneath it, the troughs and distributing-pipes surmounting the cooling-tower, the supply-pipes extending from the supply-tank through the condensing-tower and discharging into the troughs, and means for heating the water from the supply-pipes to the cooling-tower; substantially as described.

2. A distilling apparatus comprising a cooling-tower having an air-chamber and a supply-tank beneath it, a condensing-tower having an air-chamber and a receiving-tank beneath it, the blast-fan to the cooling-tower, the exhaust-fan from the condensing-tower, the troughs and distributing-pipes surmounting the cooling-tower, the supply-pipes extending from the supply-tank through the condensing-tower and discharging into the troughs, and means for heating the water from the supply-pipes to the cooling-tower; substantially as described.

3. A distilling apparatus comprising a cooling-tower having an air-chamber and a supply-tank beneath it, a condensing-tower having an air-chamber and a receiving-tank beneath it, the blast-fan to the cooling-tower, the exhaust-fan from the condensing-tower, the steam-coils located over the cooling-tower, the troughs and distributing-pipes surmounting the coils and the supply-pipes extending from the supply-tank through the condensing-tower and discharging into the troughs; substantially as described.

JOHN STOCKER.

In presence of—
E. S. KNIGHT,
STANLEY STONER.