(No Model.)

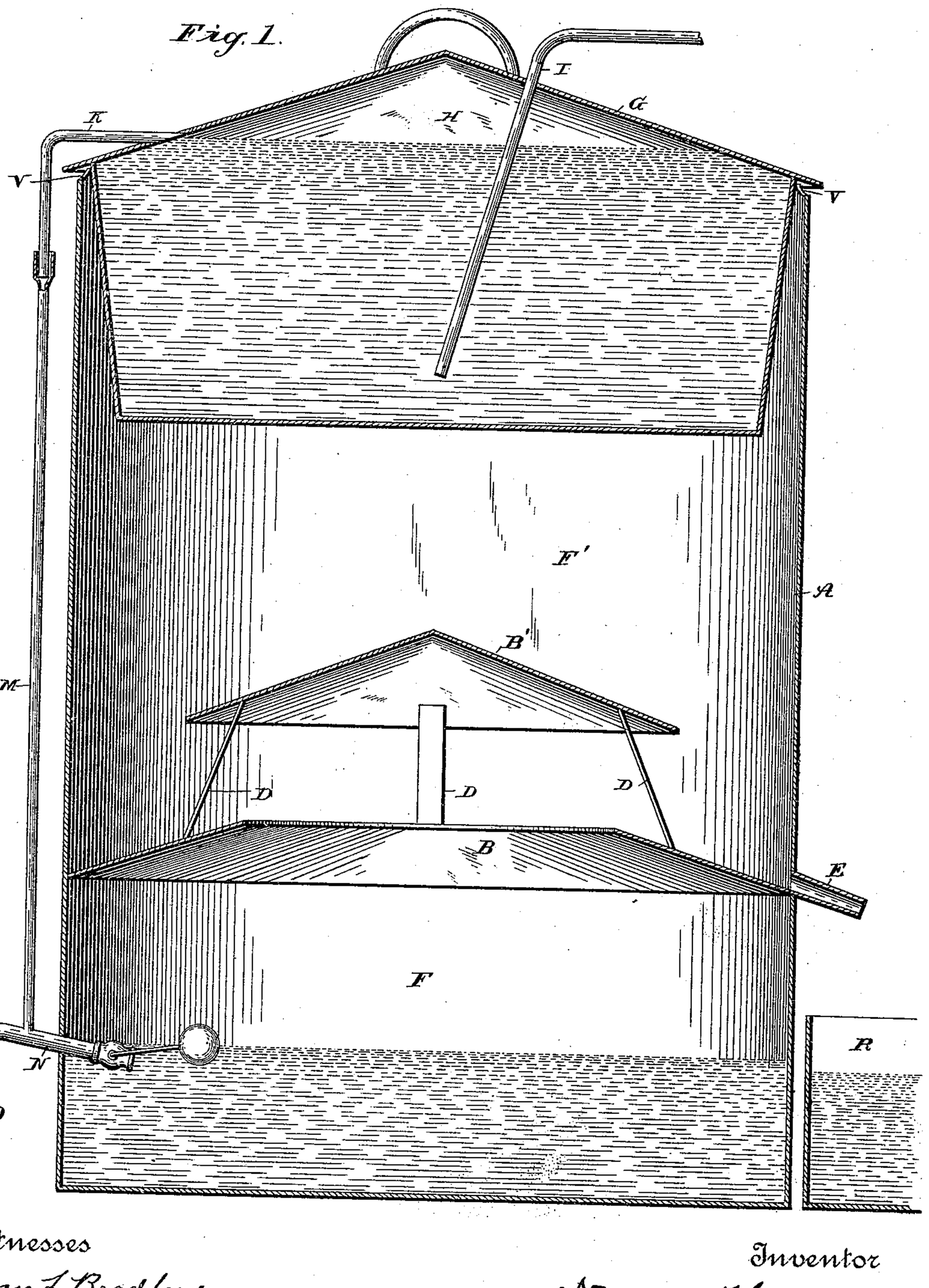
2 Sheets—Sheet 1.

N. HUNTING.

APPARATUS FOR DISTILLING WATER.

No. 448,041. Patented Mar. 10, 1891.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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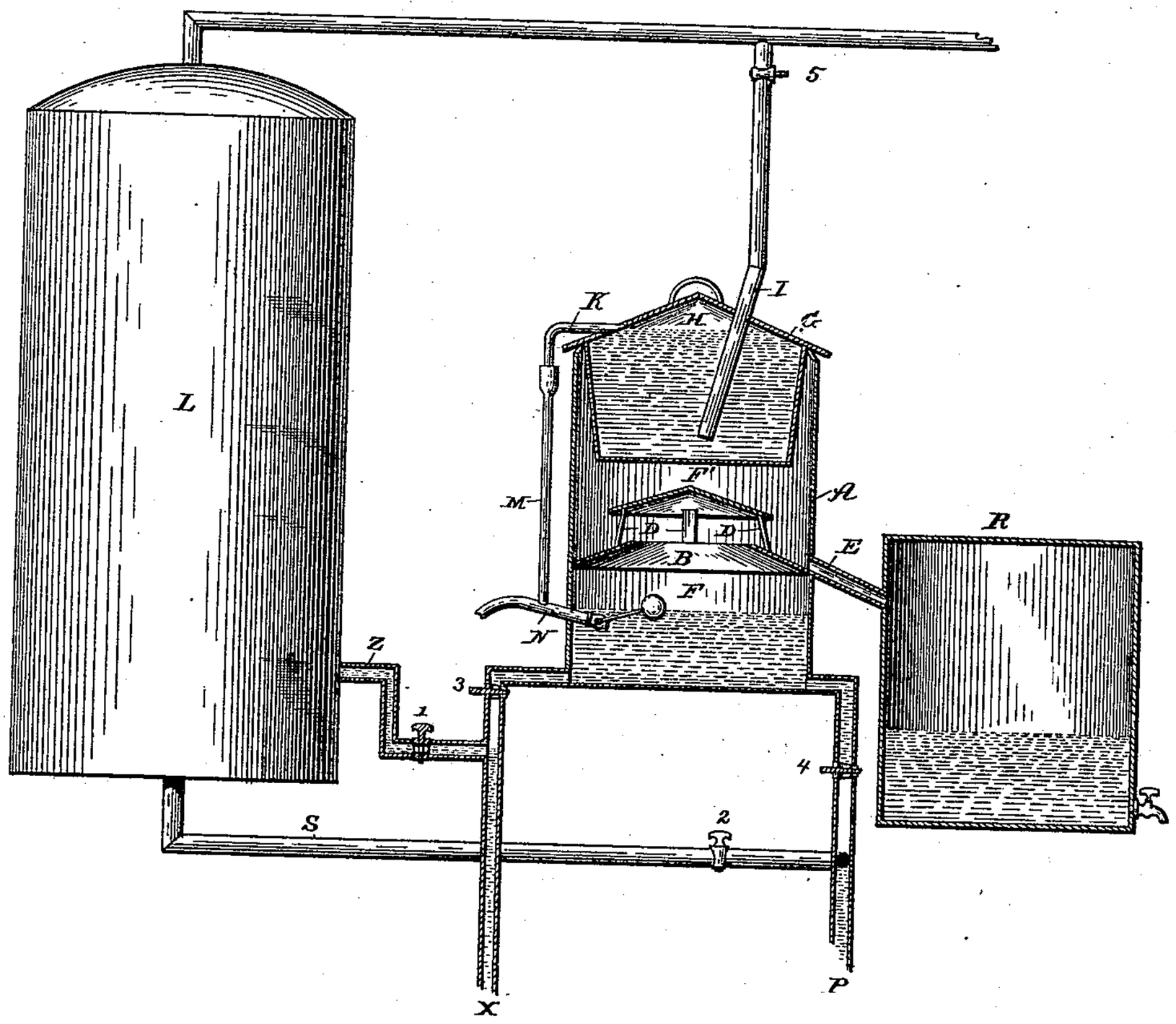
Fig. 2.



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UNITED STATES PATENT OFFICE.

NELSON HUNTING, OF ALBANY, NEW YORK.

APPARATUS FOR DISTILLING WATER.

SPECIFICATION forming part of Letters Patent No. 448,041, dated March 10, 1891.

Application filed October 23, 1888. Serial No. 288,901. (No model.)

To all whom it may concern:

Be it known that I, NELSON HUNTING, a citizen of the United States, residing in the city and county of Albany, in the State of New York, have invented a certain new and useful Improvement in Apparatus for Distilling Water; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to improvements in apparatus for distilling water for potable, pharmaceutical, or domestic purposes.

The absorption of moisture by atmospheric air as it is raised in temperature in contact with water and the precipitation of such moisture again on its being lowered in temperature may be made available to effect a treatment analogous to and which I will term "distillation." It delivers a product which possesses the purity of distilled water with the further quality of being partially aerated. The process differs from the ordinary distillation in the important point that it can be conducted at a lower temperature. It can be worked with sufficient rapidity to be eminently useful. I have devised a simple and effective apparatus therefor adapted for domestic use. The heat may be obtained from the kitchen stove or range now in common use. The water of condensation may be used sparingly and delivered at a temperature only a little below that in the heating-chamber. The water to be distilled can be supplied from the condensing-tank heated nearly to the point required. I have devised means for automatically regulating the flow of such supply to the evaporating-chamber and allowing the surplus to be discharged through another passage.

My apparatus is illustrated in the accompanying drawings, in which—

Figure 1 is a central vertical section of one form of my apparatus, the same being automatic in its operation. Fig. 2 is an elevation, partly in section, showing the invention arranged in connection with a primary boiler connected by water-pipes with the water-back in a range.

A is a vessel, of any suitable dimensions, having an evaporating-chamber F in the lower part thereof and a condensing-chamber F′ in its upper part. The chambers are separated by an open-work diaphragm consisting of conically-arranged plates B and B′, the latter being above the former and overlapping the same, thus forming a shed. The plate B is attached to the inner walls of the vessel, forming a trough or gutter, into which the condensed vapor or water flows from the inclined plates of the shed. The upper plate B′ is supported by stays D or by other suitable means upon and at a distance above B, leaving free space between them, through which vapors rise from generator or vaporizing-chamber F to condensing-chamber F′.

E is a spout or nozzle leading from the gutter through the wall of the vessel and adapted to discharge the distillate to any suitable receptacle, as R.

H is a cold-water reservoir removably inserted in the top of the vessel A, so as to form a cover therefor, but leaving an annular passage V between them, which performs important functions. This reservoir is tightly closed by a cap G, and is provided with an inlet or supply tube I. The tube I is connected by flexible hose or otherwise with any suitable source of supply. A discharge or overflow tube K is also removably connected with the reservoir H. The overflow-pipe K usually extends downwardly and forms a slip-joint with the upper end of another pipe M, which forms a continuation of the overflow-pipe.

The pipe M is preferably secured to the outside of the vessel and forms a juncture with an inclined branch pipe N, preferably of greater capacity than the overflow-pipe M. The inner end of the pipe N extends into the vessel A below the diaphragm and to a point below where the level of the water is to be maintained in the vaporizing-chamber. The outer end of the branch pipe is provided with a downward extension O for conducting the surplus or waste water to the point desired. Through the branch pipe N water from pipe M is supplied to the evaporating-chamber until it reaches the level of the highest point in the double inclined branch pipe, when the surplus will be discharged through downward extension O. In some instances it may be desirable to deliver the surplus water at a higher level, and to provide for such contingency I have attached a float-valve y' to the inner end of the branch pipe N, which will operate to

open and admit water when it becomes low from evaporation, and will be automatically closed by the float when the water has risen to the normal level.

The air in the chambers F and F′ circulates actively. It traverses alternately in contact first with the surface of the nearly but not quite boiling water lying in the chamber F, and then in contact with the metallic surface presented by the bottom and sides of the slightly-cooler vessel H and deposits thereon a part of its moisture. As the operation proceeds a portion of the air is absorbed by the condensed water. The loose joint or narrow aperture between the exterior of the vessel H and the top rim of the vessel A is sufficiently open to allow fresh air to be inducted as required to take the place of the air absorbed by the condensed water. In case that vapor is generated in excess in the apparatus it can be discharged through the same loose joint. Under ordinary conditions all the vapor mingling with the air will ultimately be condensed by the successive traverses of the air in contact with the cool surface of the vessel H, and the resulting water will be discharged through the spout E in a partially-aerated condition.

The form of apparatus shown in Fig. 1 is designed to be placed on a stove, range, or other heated surface. In Fig. 2 the same general distilling apparatus is shown as that in Fig. 1, the means of vaporizing the liquid only being different.

L is a hot-water tank or boiler connected with a suitable furnace or with a water-back in the fire or flue space of a range, so that the water in said boiler may be heated by circulation through the water-back Q in the ordinary manner.

I connect the bottom portion of the vessel A with circulating-pipes P and X and with other circulating-pipes S and Z, which communicate with a suitable source of heat. I also provide cocks 1, 2, 3, 4, and 5, arranged as shown in the drawings, Fig. 2. In operation the cocks 3, 4, and 5 being closed and 1 and 2 opened, the water circulates from the water-back Q through pipes S and Z and the boiler L, the hot water rising through X Z and the cooler water descending through S P and the distilling apparatus is cut out of the circulation; but cocks 1 and 2 being closed and 3, 4, and 5 being opened the distilling apparatus commences to operate, the water circulating upward from water-back or heater through pipe X into the chamber F and descending through pipe P. When thus conditioned, the boiler L is cut out of the circulation. By this apparatus a water-boiler or distilling apparatus may be alternately cut into and out of the circulation through a water-back or other heating device, and thus hot water from the ordinary boiler L or distilled water from my apparatus may be obtained at will.

It should be observed that when aqueous vapors are generated in the vaporizing-chamber F the air contained in and adjacent to the water also expands and rises with the vapors and simultaneously comes in contact with the condensing-surface of the cold-water tank H and is contracted and held in whole or in part by the distilled water. The aerified state or natural condition of the water is thereby maintained by this open process of distillation.

The distilling apparatus operates as follows: Water having been supplied to the evaporating-chamber F and having become heated sufficiently to produce vapor, and cold water being circulated through reservoir or tank H, the hot air mingled with vapor from the heated water will come in contact with the surface of the cold-water tank, and its moisture will thereby become condensed. The water resulting from this condensation drops to the inclined shed or diaphragm B C and runs down to the gutter and is discharged through the spout E. The cold water admitted slowly through the pipe J after it has become warmed in the tank H by the heat received from the vapor condensed on the bottom and sides of such tank overflows down through the pipe K and runs down the pipe M into the double inclined pipe N O. As the water in the bottom of the vessel F becomes reduced by the evaporation, it is supplied from this overflow; but when the water in F has been sufficiently replenished the further induction of water will be arrested and the overflow will be discharged through the pipe O and flow away without cooling the water in F. This result is assured by the valve y', which is governed by the float y and controls the induction from the pipe N, so that when the water is high in F the valve y' is completely closed.

I claim as my invention—

1. An apparatus for distillation, composed of a heater and connections P X therefrom to a main vessel A, an open-work diaphragm allowing contained air and vapor to circulate freely, but arresting the descent of the water of condensation, an angular gutter and a spout for conducting away such water, in combination with each other and with a condensing-vessel mounted in the top of said vessel A, a pipe supplying cold water thereto, with means for controlling it, and an overflow-pipe leading therefrom, an inclined branched pipe arranged, as shown, so as to lead the overflow into the evaporating-chamber when the level therein is low and to conduct away the surplus, all substantially as herein specified.

2. In a water-distilling apparatus, the combination of a vessel having vaporizing and condensing chambers, an open-work diaphragm, a spout leading from the suspended angular gutter through the wall of the vessel, a cold-water reservoir located in the mouth of the vessel, with a narrow annular aperture between for the induction of additional air, an overflow-pipe, and an inclined branch pipe connected therewith for supplying water to

the vaporizing-chamber, arranged, as shown, so as to maintain a constant level in said chamber and to discharge the remainder of the overflow, as herein specified.

3. In an automatically-operating water-distilling apparatus, the combination of a vessel A, containing a vaporizing-chamber F and provided with a coniform diaphragm B, secured by a water-tight joint to the inner side of said vessel, a shield B′ of a greater diameter than the central opening of said diaphragm and held clear from the upper surface of the latter, an outlet-pipe E for conveying the distilled water from the angular channel or gutter formed by the junction of said diaphragm with the body of the vessel, a cold-water receptacle H, which forms a removable cover for the vessel A and is provided with a cold-water-supply pipe I and with a waste-water pipe K, the latter being connected with a pipe M, forming a junction with an inclined branch N, opening into the vaporizing-chamber F below its water-line at one end and the opposite end forming an escape-outlet for the waste water from the apparatus, the pipes K, M, and N, forming an overflow water-pipe from the receptacle H to the vaporizing-chamber F, substantially as specified.

4. In an apparatus for open distillation, the vessel A, with provisions for heating the water lying in the lower part thereof, an open-work diaphragm for allowing the vapor-laden warm air to circulate freely, but to interrupt the falling of the condensed drops and to convey them to one side, an angular gutter and spout for conveying away such water, a removable cover with provisions for holding cold water and allowing it to condense the vapor on its under surface, an annular space around such cover in which the vapor-laden air may circulate and condense its vapor, and provisions for supplying cold water to the cover and a detachable connection to a discharge-pipe for allowing the water to flow away and the cover to be easily removed and replaced, as herein specified.

5. An apparatus for distillation, composed of a heater Q and connections P X therefrom to a main vessel A, an open-work diaphragm allowing contained air and vapor to circulate freely, but arresting the descent of the water of condensation, an angular gutter and a spout for conducting away such water, in combination with each other and with a condensing-vessel, a pipe supplying cold water thereto, with means for controlling it, an overflow-pipe leading therefrom, a branch pipe connecting therewith, one branch leading to the evaporating-chamber and the other branch adapted to conduct away the surplus liquid, and means, as the valve and float, to automatically stop the supply to the evaporating-chamber and to direct away the surplus without cooling the evaporating-chamber when the latter is filled to the proper level, all substantially as herein specified.

NELSON HUNTING.

Witnesses:
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