No. 692,788. Patented Feb. 4, 1902.

I. H. JEWELL.

DISTILLING APPARATUS.

(Application filed May 8, 1900. Renewed May 11, 1901.)

(No Model.) 2 Sheets—Sheet 1.

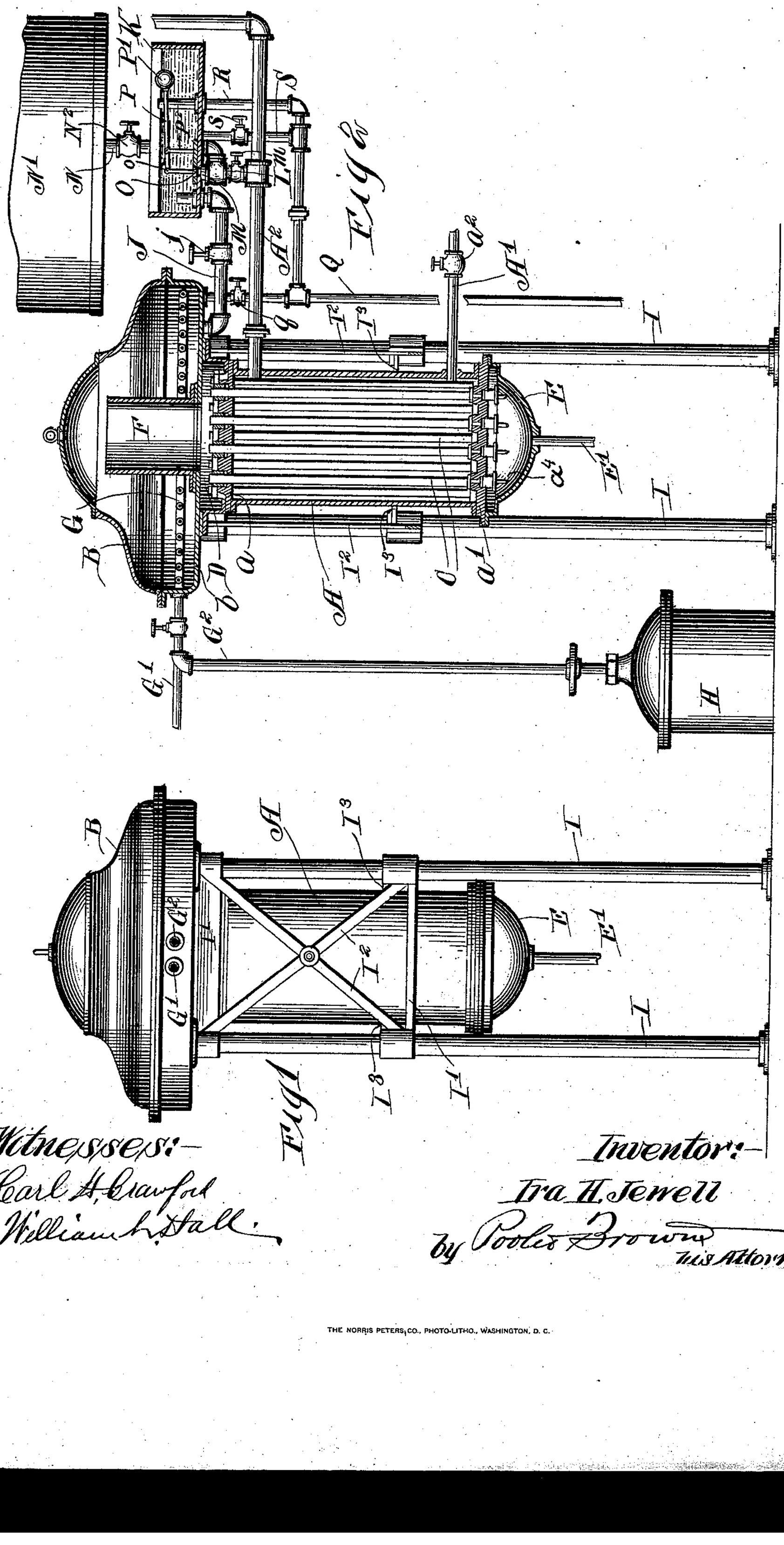

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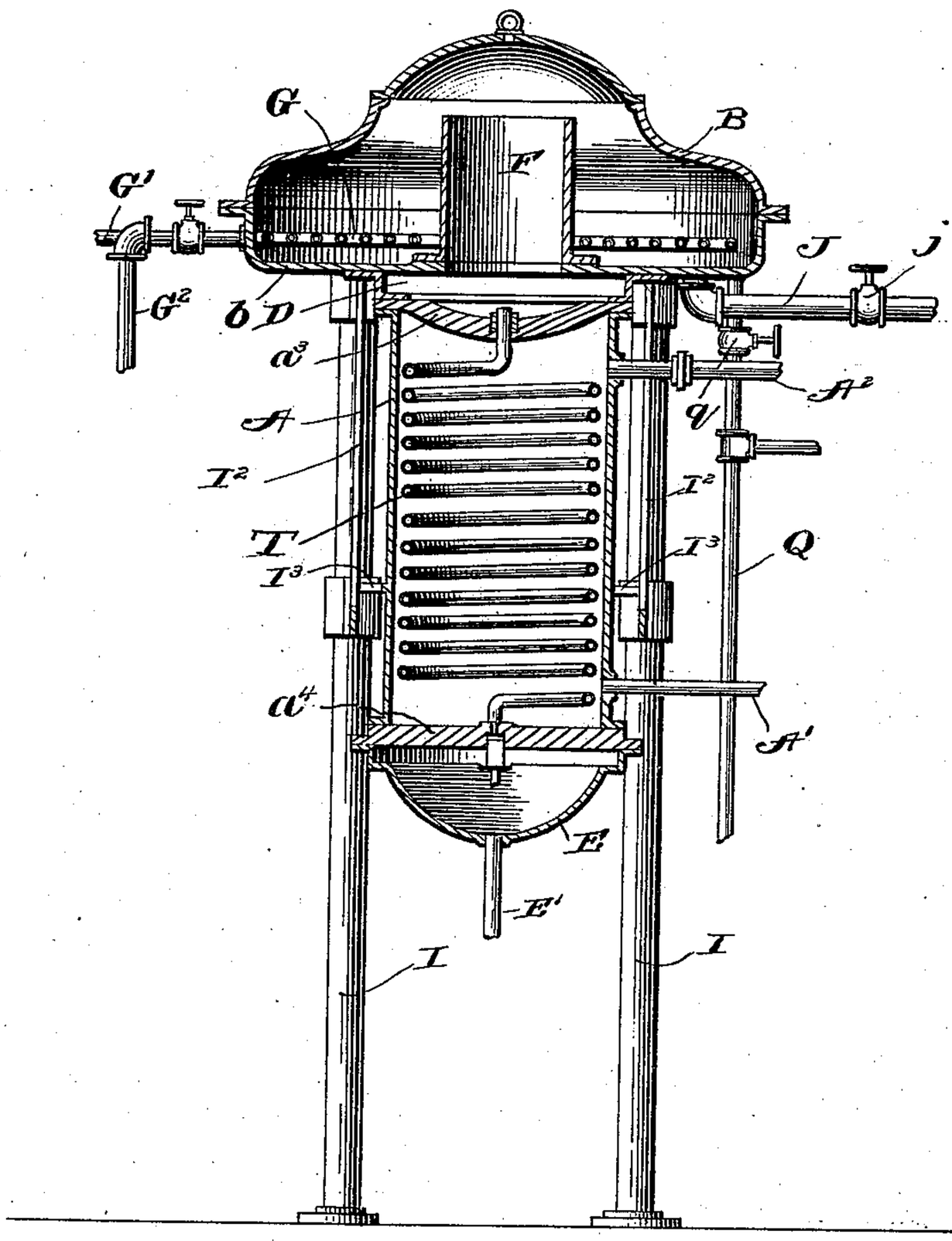
Fig. 3.



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UNITED STATES PATENT OFFICE.

IRA H. JEWELL, OF CHICAGO, ILLINOIS.

DISTILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 692,788, dated February 4, 1902.

Application filed May 8, 1900. Renewed May 11, 1901. Serial No. 59,874. (No model.)

To all whom it may concern:

Be it known that I, IRA H. JEWELL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Distilling Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in distilling apparatus, and is designed more particularly to produce distilled water, the object being to improve the construction of apparatus of this character and to simplify the operation thereof.

The invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a side elevation of parts of a distilling apparatus made in accordance with my invention. Fig. 2 is a view, partly in central vertical section and partly in elevation, of the same in a plane at right angles to the view of Fig. 1. Fig. 3 is a vertical section of a modified form of the invention.

As shown in said drawings, A designates an upright jacket constituting part of a condensing-chamber, which in the form herein shown is cylindric, and B designates a boiler located centrally over said jacket and in communication with the upper end thereof and provided with a removable cover. Within said jacket are located a plurality of vertical condensing-pipes C, arranged symmetrically therein and attached at their opposite ends to upper and lower heads *a a'* of said jacket. The condenser-pipes open at their upper ends into an annular centrally-disposed chamber D, which is in open communication with the boiler B, and at their lower ends said pipes open into a cup E, arranged below the water-jacket and into which the distilled water from said pipes is discharged. Suitable stuffing-boxes surround the upper ends of the condensing-tubes and prevent the water of condensation in the chamber D from passing into the water-jacket. The lower ends of said tubes are connected with drip-pipes a^4, which depend from the lower wall of the water-jacket. Said cup is provided with a centrally-located outlet-pipe E'.

The arrangement of the condensing-tubes enables the same to be removed for the purpose of cleaning or renewing of the same upon the removal of the cover from the boiler B or enables the tubes to be cleaned by the insertion thereinto of a suitable implement when said cover is so removed.

The communication between the chamber B at the entrance of the condensing-tubes and the boiler in the instance shown consists of a short upright pipe F, which is opened at both ends and extends at its upper end into the steam-space of said boiler and near the top thereof to permit the entrance of steam thereinto, and through which pipe F the steam is directed into the chamber D and condenser-tubes. Said pipe F, as herein shown, rests on the bottom of the boiler B over a centrally-located opening in the bottom wall *b* thereof. This bottom wall *b* constitutes the upper wall of the chamber D. The tubes C may themselves extend into the boiler, if desired. A valved inlet-pipe A' leads into the lower end of the jacket and admits water from any suitable source of supply.

A^2 designates a cooling-water-outlet pipe leading from the upper end of the jacket.

G designates a steam-coil located within the boiler, which in this instance constitutes the means for heating the water within the boiler. Said coil G is connected at one end with a steam-inlet pipe G', leading from any suitable source supplying steam, and is connected at its other end with a valved outlet-pipe G^2, which in this instance discharges into a steam-trap H, of any preferred construction, in which the steam is condensed and the water of condensation led therefrom in the usual manner.

The pipes A' A^2 will usually embrace a part of a pressure water-supply system of the building in which the device is located, the water being delivered to the jacket under the pressure of such system.

The jacket, condensing-tubes, and boiler are supported on a frame consisting, as herein shown, of four upright columns I I, connected by transverse and oblique braces I' I^2, which are connected together in a manner to form

a rigid frame. The boiler B rests directly on the upper end of said columns and is secured thereto in any suitable manner and to the jacket to provide a steam-tight joint, and the jacket A is supported from said column by means of radially-extending supporting-arms I^3.

The water in its natural state is fed to the boiler by means of a pipe J, which enters the bottom of the same. Said pipe is connected at its other end with a feed-tank K and is provided between its ends with a suitable valve *j*. The feed-tank K is connected with a suitable source for supplying water and is located at the level of the boiler B, desirably closely adjacent thereto. Said tank is provided with controlling-valve mechanism, which is constructed to automatically control the supply of the undistilled water to the boiler B, and the location of the tank and the construction of said controlling mechanism is such that the water in the feed-tank and in the boiler is maintained at the same level, so that the supply of water to the boiler is maintained approximately uniform. The undistilled water will usually be fed to the feed-tank K through a pipe L, connected with the pipe A^2, leading from the upper end of the water-jacket, so that the water to be distilled may first serve the purpose of cooling the condensing-tubes. Said pipe L discharges at its upper end into another pipe M, which enters the bottom of the feed-tank K, and the opening between said pipe M and feed-tank is adapted to be closed by means of a valve O, which is controlled by a float in the tank. In this instance said valve O is provided with a stem *o*, extending upwardly from the bottom of the tank, and to the upper end of said stem is pivotally connected a lever P, carrying at one end a float P′ and pivoted between its ends on a post P^2, which rises from the bottom of the tank. Said pipe M is provided with a hand-valve *m*, by which the supply of water to the feed-tank may be controlled. With this construction the water is fed to the device through the pipe A′ under the pressure of the system of which the pipes A′ A^2 constitute a part, and the controlling mechanism between the pipe A^2 and the boiler embracing the float-valve mechanism or the regulating-valve between the discharge-pipe and boiler enables such quantity of water to be drawn from the system as required by the distilling apparatus, the volume of water passing through the pipe beyond that required for distillation purposes remaining in the system and not wasted, as in devices of this character heretofore employed. The inlet-pipe M is shown as connected also with a discharge-pipe N, leading from a reservoir or tank N′, in which the impurities in the undistilled water may be precipitated before the water is discharged into the feed-tank K. Said pipe N is provided with a controlling-valve N^2. When water is supplied from the tank N′ to the tank K, the valve *m* is closed, so that no water enters said tank K from the pipe A^2. The tank N′ may receive water from any suitable source, either from the pressure system or otherwise.

Q designates a wash-out pipe which leads from the bottom of the boiler and through which the wash-out water from said boiler may be discharged. Said wash-out pipe is provided with a valve *q*, by which it is normally closed.

R designates an overflow-pipe which projects through the bottom of the tank K and to within a short distance of the top thereof and by means of which the quantity of water within the tank may be limited in the usual way. S designates a drain-pipe leading from the bottom of said tank and connected at its lower end with the overflow-pipe R. Said overflow-pipe is connected at its end remote from the tank K to the wash-out pipe, and through which wash-out pipe the overflow-water and the drain from the tank is discharged. Said drain-pipe is provided with a valve *s*, which is kept normally closed.

In the operation of the apparatus cool water is supplied to the jacket A through the pipe A′, the supply of which is regulated by means of a valve a^2 in said pipe, and is led off from said jacket through the discharge-pipe A^2. The supply of water to said jacket is maintained sufficiently rapid to keep the condenser-tube at a temperature low enough to secure the condensation of all the steam entering the same. Water in its natural state is fed to the boiler through the supply-pipe J and the float-valve mechanism described. Steam is admitted to the steam-coil G through the pipe G′ and discharged therefrom through the pipe G^2 to the steam-trap H. When steam is admitted to said coil, the water in the boiler B will be heated and steam formed in said boiler. In the absence of any other outlet the steam arising from the water in the boiler B will be forced by its own pressure through the upright tube F downwardly into the chamber D and condensing-tubes C. When the steam comes in contact with the walls of said tubes, which latter are maintained at a suitably-low temperature by the water contained within the jacket A, said steam will be rapidly condensed and will escape down the cold walls of said tubes until it escapes into the cup E and therefrom through the discharge-pipe E′ into a suitable vessel placed thereunder. Owing to the natural tendency of the steam to rise, it will only move down into the condensing-tubes by reason of the pressure within the boiler, so that condensation will take place to a great extent in the upper ends of the tubes, and therefore when the parts are properly proportioned there will be no liability of the steam being driven out uncondensed into the distilled-water cup E. As the water is dissipated in the boiler B by its generation into steam the supply of the boiler will be automatically replaced through the pipe J from the tank K, the float in the

tank regulating the same. By reason of the open communication between said boiler and tank (the valve J being open during the operation of the apparatus) the water in the boiler and tank will normally be maintained at a uniform level, and when the water in said tank and boiler is in balance the valve O will be closed by reason of the elevation of the float P'. When the level of the water is lowered in the tank, the float P' will drop and open the valve O to permit a further supply to enter the pipe L, thus automatically maintaining a constant supply of the undistilled water to the tank K and therethrough to the boiler B. In case the valve O should not act quickly or should be ineffective in its operation for any reason the supply of water in the tank to a greater level than desired in the boiler will be reduced by reason of the presence of the overflow-pipe R, which prevents the water in said tank K rising beyond the level of the upper end of the pipe. In this manner I am able to maintain the operation of the apparatus entirely automatic so long as the same is operating under ordinary and usual conditions.

My apparatus is simple, cheap, durable, and not liable to easily get out or order.

In Fig. 3 I have shown a modified construction wherein the plurality of condensing-tubes shown in Fig. 2 is replaced by a single spirally-arranged condensing-tube T, which passes at its upper end through the upper end wall a^3 of the water-jacket and at its lower end through the lower wall a^4 thereof. Stuffing-boxes surround the ends of said tube at the places where it passes through the end walls of the water-jacket. The upper end of said tube passes centrally through the upper wall of the water-jacket, and the upper surface of said upper wall is inclined toward its center, so as to direct the water falling on said wall to the tube. The other part of the apparatus may be like similar parts of the previously-described figures and are herein designated by like reference-letters. The provision of the single spirally-arranged tube may be made as effective as the prior construction and avoids the necessity of a large number of stuffing-boxes between the tube and the ends of the water-jacket.

I claim as my invention—

1. A distilling apparatus comprising an upright tubular jacket, having supply and discharge orifices, condensing tube or tubes therein, which extend through the end walls of the jacket, a boiler located above said jacket, a chamber located between said boiler and the jacket, the upper wall of which is formed by the lower end of said boiler and the lower wall by the upper end wall of the jacket, and an upwardly-extending steam-gathering tube having its upper end above the water-line in said boiler, and opening at its lower end into said chamber.

2. A distilling apparatus comprising a tubular water-jacket having supply and discharge orifices, a condensing tube or tubes therein which extend through the end walls of the jacket, a boiler supported on said jacket and having a water-supply pipe connected with a water-supply which is independent of the water-supply of the jacket, a chamber located between the boiler and jacket, the upper wall of which is formed by the lower end of the boiler, and the lower wall by the upper end wall of the jacket, and an upwardly-extending steam-gathering tube, having its upper end above the water-level in said boiler, and opening at its lower end into said chamber.

3. A distilling apparatus comprising a tubular water-jacket having supply and discharge orifices, a condenser in said jacket which extends through the end walls of said jacket, a boiler supported on said jacket, a chamber located between said boiler and jacket the upper wall of which is formed by the lower end of said boiler, and the lower wall by the upper end wall of the jacket, an upwardly-extending steam-gathering tube having its upper end above the water-line in said boiler and opening at its lower end into said chamber, and a steam-coil surrounding said tube and designed for connection with a source of steam under pressure.

4. A distilling apparatus comprising an upright tubular water-jacket having supply and discharge orifices a condensing tube or tubes in said jacket, extending at their opposite ends through the top and bottom walls of the jacket, a boiler located above the jacket, a chamber intermediate with said boiler and the water-jacket communicating with the condensing tube or tubes, a steam-gathering tube which rises upwardly from the bottom of the boiler and extending above the water-line in the boiler, said gathering-tube being open at both ends to afford communication between the boiler and said intermediate chamber, a heating device for said boiler, and a drip-cup below said condensing tube or tubes provided with a discharge-orifice.

5. A distilling apparatus comprising a water-jacket having supply and discharge orifices, a condenser therein, a boiler, a steam-gathering tube in the boiler communicating with the condenser, a tank located outside of the jacket, a pipe leading from said tank to the boiler, and communications between the discharge-orifice of said jacket and tank including an automatic water-regulating device.

6. A distilling apparatus comprising an upright tubular water-jacket having supply and discharge orifices, a boiler located thereover, a steam-gathering tube therein, a condensing tube or tubes in said jacket which are in communication with said steam-gathering tube, a feed-water tank, a pipe leading from said tank of the boiler, a supply-pipe leading to said feed-tank, and means for controlling the supply of water to said tank comprising a valve, a float located in the tank, and connected with said valve, and an overflow-pipe

projecting into the tank above the normal water-line therein.

7. A distilling apparatus comprising an upright tubular water-jacket having supply and discharge orifices, a boiler located thereover, and containing a steam-gathering tube, a condensing tube or tubes in said jacket, in communication with the steam-gathering tube, a feed-water tank located at the level of the said boiler, a pipe leading from said tank of the boiler, a supply-pipe leading to said feed-tank and means for controlling the supply of water to said tank comprising a valve, a float located in the tank and connected with the valve, and an overflow-pipe leading through the bottom of the tank and projecting into the tank above the normal water-line therein, and a pipe leading from the bottom of said feed-tank and discharging into the overflow-pipe.

8. A distilling apparatus comprising an upright tubular water-jacket having supply and discharge orifices, a boiler located over said jacket, a steam-gathering tube therein, a condensing tube or tubes in said jacket which communicate with the steam-gathering tube, a feed-tank, a pipe connecting said feed-tank and boiler, a pipe leading from the discharge-orifice of the jacket, a pipe connecting said discharge-pipe with the feed-tank, a valve between said last-mentioned pipe and the feed-tank, and a float in said tank operatively connected with said valve.

9. A distilling apparatus comprising a tubular water-jacket, supply and discharge pipes leading to and from the jacket respectively, which pipes include parts of a pressure water system, a boiler located over said jacket, condensing tube or tubes in said jacket which receive at their upper ends steam from said boiler and connections between said water-jacket discharge-pipe and boiler.

10. A distilling apparatus comprising a tubular water-jacket, supply and discharge pipes leading to and from the jacket respectively, which pipes include parts of a pressure water system, a boiler located over said jacket, condensing tube or tubes in said jacket which receive steam from said boiler, and connections between said water-jacket discharge-pipe and the boiler embracing a regulating-valve.

11. A distilling apparatus comprising a tubular water-jacket, supply and discharge pipes leading to and from the jacket respectively, which pipes include parts of a pressure water system, a boiler located over said jacket, condensing tube or tubes in said jacket which receive steam from said boiler, and connections between said water-jacket discharge-pipe and the boiler embracing an automatic water-controller designed to maintain a given supply of water in the boiler.

12. A distilling apparatus comprising an upright tubular water-jacket having discharge and supply pipes, a boiler located over said jacket and separated from the interior of the jacket by the upper end wall of said jacket, condensing tube or tubes located within the jacket which pass at their upper ends through the upper wall of the jacket and receive steam from said boiler and discharge at their lower ends in a drip-cup located beneath the jacket, the upper ends of said tubes being accessible for cleaning or renewing when the boiler is removed.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 5th day of May, A. D. 1900.

IRA H. JEWELL.

Witnesses:
TAYLOR E. BROWN,
GERTRUDE BRYCE.