No. 878,744. PATENTED FEB. 11, 1908.

J. A. POWER.

MULTIPLE CONDENSER WATER STILL.

APPLICATION FILED FEB. 16, 1907.

Fig. 2.

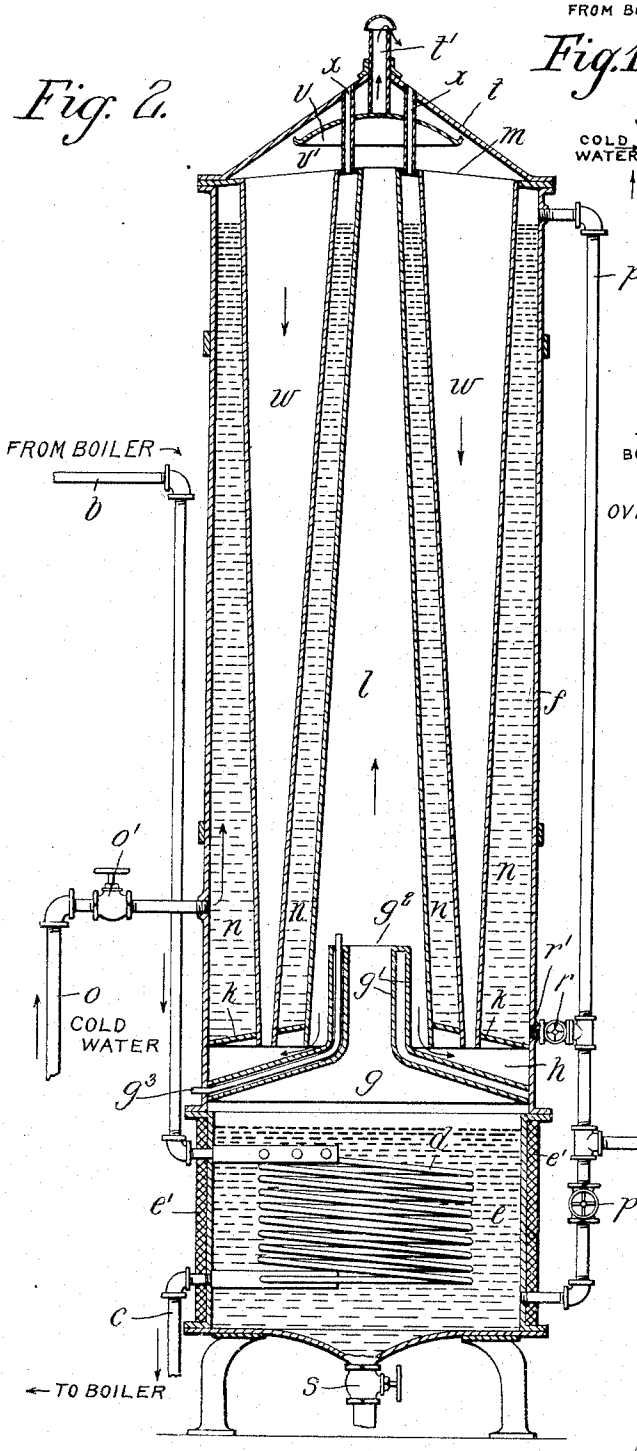


Fig. 1.

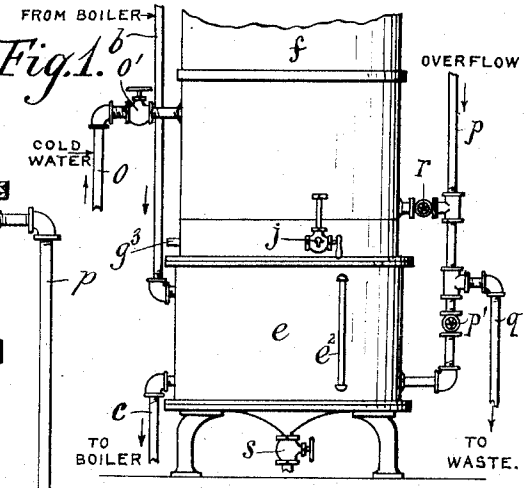
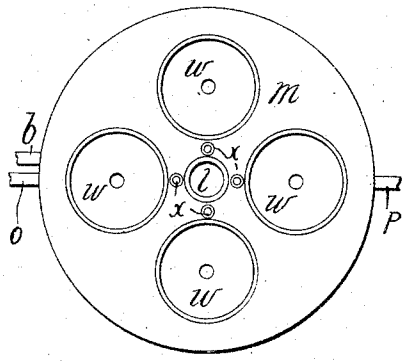


Fig. 3.



Witnesses

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MUTIPLE-CONDENSER WATER-STILL.

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To all whom it may concern:

Be it known that I, JOHN A. POWER, a citizen of the United States of America, residing at New York, borough of Manhattan, and State of New York, have invented certain new and useful Improvements in Multiple-Condenser Water-Stills, of which the following is a specification.

This invention relates to a water-still of large capacity known as a "multiple condenser water still", and its main object is to provide a still which will operate continuously, as the water, when boiled away, is replenished automatically, while the boiling of the water is accomplished by an uninterrupted and continuous flow of steam through a heating coil.

Further objects are to provide a compact, serviceable, durable and economical still of the type mentioned.

A further and very important object is to provide a maximum area of condensing surfaces, or in other words, to utilize the maximum cooling and condensing capacity of the cold water supply chamber or reservoir.

In order that my invention may be fully understood, I will now proceed to describe it with reference to a desirable form shown in the accompanying drawings, and in which,

Figure 1 is a side elevation of the lower part of my improved water still. Fig. 2 is a vertical central section of my improved still. Fig. 3 is a top view of the still; the dome being omitted.

Referring to the drawings, the apparatus comprises a boiler of suitable construction, not shown, from which leads the steam-supply pipe *b*, and back to which passes the steam-return pipe *c*. These pipes *b* and *c* are connected with the inlet and outlet ends, respectively, of a steam coil *d* located in an evaporator *e*, which is preferably in the form of a vessel, or retort, of cylindrical shape having a suitable packing of insulating material *e'* surrounding the wall thereof. Surmounting this evaporator *e* is a cylindrical shell *f*, in the lower part of which is supported a double walled conical bottom *g* from the center of which projects a short upright extension *g'* providing a discharge mouth g^2 for the steam passing from the evaporator *e*. The upper portion of the double walled conical bottom *g* and the adjacent part of the shell *f* form a distilled water reservoir *h*, and the double walled conical bottom *g*, provides a dead air space which serves for keeping the water in the reservoir *h* at a lower temperature than a single walled conical bottom.

g^3 is a pipe located in the air space between the walls of the conical bottom *g*, having its lower end projecting through the shell *f* and its upper end projecting through the closed top of said air space and into the shell *f* so as to admit air into the interior of the latter, from the exterior of the still. A faucet *j* enables the distilled water to be drawn from the distilled water reservoir *h*. Located above the distilled water reservoir *h* the shell *f* is provided with a dished lower head *k*, surrounding the upright extension *g'* and closing the bottom of a cold water chamber *n*.

l is an inner central upwardly tapering tube or uptake extending through the lower head *k* and receiving the upright extension *g'* of the conical bottom *g* and projecting upwardly through a dished upper head *m* closing the top of the cold water chamber *n*, the shell *f*, the lower head *k*, the upper head *m*, and the central upwardly tapering tube or uptake *l* forming the cold water chamber *n*, which is supplied with cold water by means of a supply pipe *o*, entering the lower part of the shell *f* and controlled by a valve *o'*.

An overflow pipe *p* leads from the top of the water chamber *n*, preferably from that side opposite the supply-pipe *o*, downwardly to and into the lower part of the evaporator *e* to continuously supply to the evaporator feed water which has been already heated. Pipe *p* is controlled by valve *p'*. The waste pipe *q* leads from the pipe *p* near the top of the evaporator. Valves *r* and *s* are used in cleaning out the still, valve *r* controlling a branch pipe *r'* leading from the lower part of the reservoir to the overflow pipe *p*, and valve *s* being at the bottom of the evaporator *e*. A gage glass e^2, see Fig. 1, indicates the height of the water in the evaporator *e*.

The dome *t* of the still is of conical shape, and is pierced centrally by a flue *t'*, from which issue the volatile and empyreumatic gases from the still. An apertured and dished baffle-plate *v* is located at the inner end of flue *t'*, and forms a partial top to the intermediate chamber *v'* in the upper part of the still. Said baffle-plate serves to deflect the steam downwardly into the upper end of a downtake *w*, which extends through

the cold water chamber or water-jacket *n* and discharges the distilled water into the distilled-water reservoir *h*. The downtake *w* preferably tapers from its upper to its lower end, and there are preferably a number of them, each of conical shape, arranged at equidistant points around the water chamber. Escape pipes or flues *x* extend from the cold-water supply-chamber through the baffle-plate *v*, and discharge such air or gases as may be in the said chamber at the outset, and also discharge the gases freed from the water in said chamber during working of the still.

In operation the still works as follows: When cold water is admitted through pipe *o* to the water chamber or water-jacket *n*, the still is ready for operation. The cold water flows upwardly in and fills the water chamber *n*, and overflows therefrom through pipe *p*, and passes into the evaporator *e*, and when the gage glass e^2 shows that the evaporator is nearly full, the valves *o'*, *p'* are turned half off. Steam is now slowly turned on. The steam from the boiler returning to it after use, although partially condensed by losing some of its heat to the water in the evaporator, insures economy in coal consumption, as the steam flows continuously from the boiler through the coil *d* and back to the boiler, there being, aside from the heat extracted from the coil in the evaporator, but a slight loss from radiation. The water in the evaporator becomes heated by the steam coil *d* and boils, and the steam generated in the evaporator rises through the mouth g^2 into the uptake *l*, where the long-run condensing surface furnished by the water-cooled wall of the uptake acts to condense a portion of the steam which trickles down the said surface and flows into the distilled-water resevoir *h*. The uncondensed steam passes up and out of the uptake and strikes the baffle-plate *v*, which deflects it downwardly into the downtakes *w*, whose long-run condensing surfaces condense the steam, which flows in streams of distilled water from the lower ends of the downtakes into the distilled-water reservoir *h*. The small cross section of the downtakes at their lower end gives more space in the cold water chamber *n* for the cold water, which first flows into the lower end thereof, thus utilizing to the full extent the cooling effect of the water in chamber *n* upon the water in the distilled-water reservoir. The water inlet *o* allows the water, as it becomes warm in the water chamber *n*, to flow upwardly, the steam in the downtakes *w* passing downwardly in a counter-current and is thus bound to be condensed before it passes the level of the coldest water and issues from the contracted ends of the downtakes into the distilled-water reservoir. The largest possible quantity of cold water is needed to cool the condensing surface at the lower end of the uptake *l* where the temperature is at about the highest. It will be seen that the uptake *l* and the downtakes *w* decrease in size in the direction of movement of the steam, and that the greatest amount of condensing surface is provided at the top of the still, which is at a point intermediate the line of discharge of the steam that is condensed, at a point where the water of highest temperature is present, in its passage by way of the downtakes. The described arrangement of uptake and downtakes also brings the center of gravity of the still, when full of water, nearer to the point of support, so that the still is not top-heavy. An advantage of the downward taper of downtakes *w* is that in the case of distilling water containing much foreign matter or mineral particles, as lime, the latter will not tend to deposit on the outside of the downtakes.

The still is built on such scientific principles that, after having been once put in operation, it requires no further attention, as the water is replenished continuously. The evaporator is kept full and the surplus escapes through pipe *q* in case the ebullition is not violent enough to produce steam as fast as the heated feed-water flows into the evaporator. By maintaining the water level in the evaporator at a point above the coil *d* so as to submerge it, the utilization of all the heat-units is fully accomplished. The installation may be made by any steam-fitter or plumber in a very short time, only three connections being necessary, first the connection of the two steam pipes and the still, and then the connection of the water supply pipe to the main.

Having thus described my invention, and without limiting myself to details, what I claim as new and of my invention is:

1. A water still comprising an evaporator, a steam coil located in the evaporator, pipes for connecting the steam coil with a steam boiler, a shell surmounting the evaporator, having a lower head spaced from the evaporator and an upper head, and providing a cold water chamber, a dome located above the upper head, providing an upper chamber, a double walled conical bottom located between the evaporator and the lower head of the shell, providing a distilled water chamber, and having an upright extension projecting through the lower head into the shell, an upwardly tapering central uptake surrounding the upright extension and connecting the distilled water chamber with the upper chamber, the downwardly tapering downtakes between the shell and the central uptake, and connecting the upper chamber with the distilled water chamber, a cold water supply pipe connected with the lower end of the cold water chamber, an overflow pipe, connecting the upper end of the cold

water chamber with the evaporator, and a waste pipe connected with the overflow pipe near the top of the evaporator.

2. A water still comprising an evaporator, a steam coil located in the evaporator, pipes for connecting the steam coil with a steam boiler, a shell surmounting the evaporator, having a lower head spaced from the evaporator, and an upper head, and providing a cold water chamber, a dome located above the upper head providing an upper chamber, a double walled conical bottom located between the evaporator and the lower head of the shell, providing a distilled water chamber, and having an upright extension projecting through the lower head into the shell, an air pipe extending between the walls of the shell, through the double conical bottom and its extension and thereabove, an upwardly tapering central uptake surrounding the upright extension and connecting the distilled water chamber with the upper chamber, the downwardly tapering downtakes between the shell and the central uptake, and connecting the upper chamber with the distilled water chamber, a cold water supply connected with the lower end of the cold water chamber, an overflow pipe, connecting the upper end of the cold water chamber with the evaporator, and a waste pipe connected with the overflow pipe near the top of the evaporator.

3. A water still comprising an evaporator, a steam coil located in the evaporator, pipes for connecting the steam coil with a steam boiler, a shell surmounting the evaporator, having a lower dished head spaced from the evaporator, and an upper dished head, and providing a cold water chamber, a dome located above the upper dished head providing an upper chamber, a double walled conical bottom located between the evaporator and the lower dished head of the shell, providing a distilled water chamber, and having an upright extension projecting through the lower dished head into the shell, an upwardly tapering central uptake surrounding the upright extension and connecting the distilled water chamber with the upper chamber, the downwardly tapering downtakes between the shell and the central uptake, and connecting the upper chamber with the distilled water chamber, a cold water supply pipe connected with the lower end of the cold water chamber, an overflow pipe, connecting the upper end of the cold water chamber with the evaporator, and a waste pipe connected with the overflow pipe near the top of the evaporator.

4. A waterstill comprising an evaporator, a steam coil located in the evaporator, pipes for connecting the steam coil with a steam boiler, a shell surmounting the evaporator, having a lower head spaced from the evaporator, and an upper head, and providing a cold water chamber, a dome located above the upper head providing an upper chamber, a central flue extending through the dome, an apertured dished baffle plate located in the upper chamber between the upper head and the dome, a double walled conical bottom located between the evaporator and the lower head of the shell, providing a distilled water chamber, and having an upright extension projecting through the lower head into the shell, an upwardly tapering central uptake surrounding the upright extension and connecting the distilled water chamber with the upper chamber, the downwardly tapering downtakes between the shell and the central uptake, and connecting the upper chamber with the distilled water chamber, a cold water supply pipe connected with the lower end of the cold water chamber, an overflow pipe, connecting the upper end of the cold water chamber, with the evaporator, and a waste pipe connected with the overflow pipe near the top of the evaporator.

5. A water still comprising an evaporator, a steam coil located in the evaporator, pipes for connecting the steam coil with a steam boiler, a shell surmounting the evaporator, having a lower head spaced from the evaporator, and an upper head, and providing a cold water chamber, a dome located above the upper head providing an upper chamber, escape pipes extending from the cold water chamber, through the upper head, through the upper chamber and through the dome, a double walled conical bottom located between the evaporator, and the lower head of the shell, providing a distilled water chamber, and having an upright extension projecting through the lower head into the shell, an upwardly tapering central uptake surrounding the upright extension and connecting the distilled water chamber with the upper chamber, the downwardly tapering downtakes between the shell and the central uptake, connecting the upper chamber with the distilled water chamber, a cold water supply pipe connected with the lower end of the cold water chamber, an overflow pipe, connecting the upper end of the cold water chamber with the evaporator, and a waste pipe connected with the overflow pipe near the top of the evaporator.

Signed at New York, N. Y. this 10" day of January 1907.

JOHN A. POWER.

Witnesses:
EMIL H. FRANK, Jr.,
GEO. L. WHEELOCK.