

(No Model.)

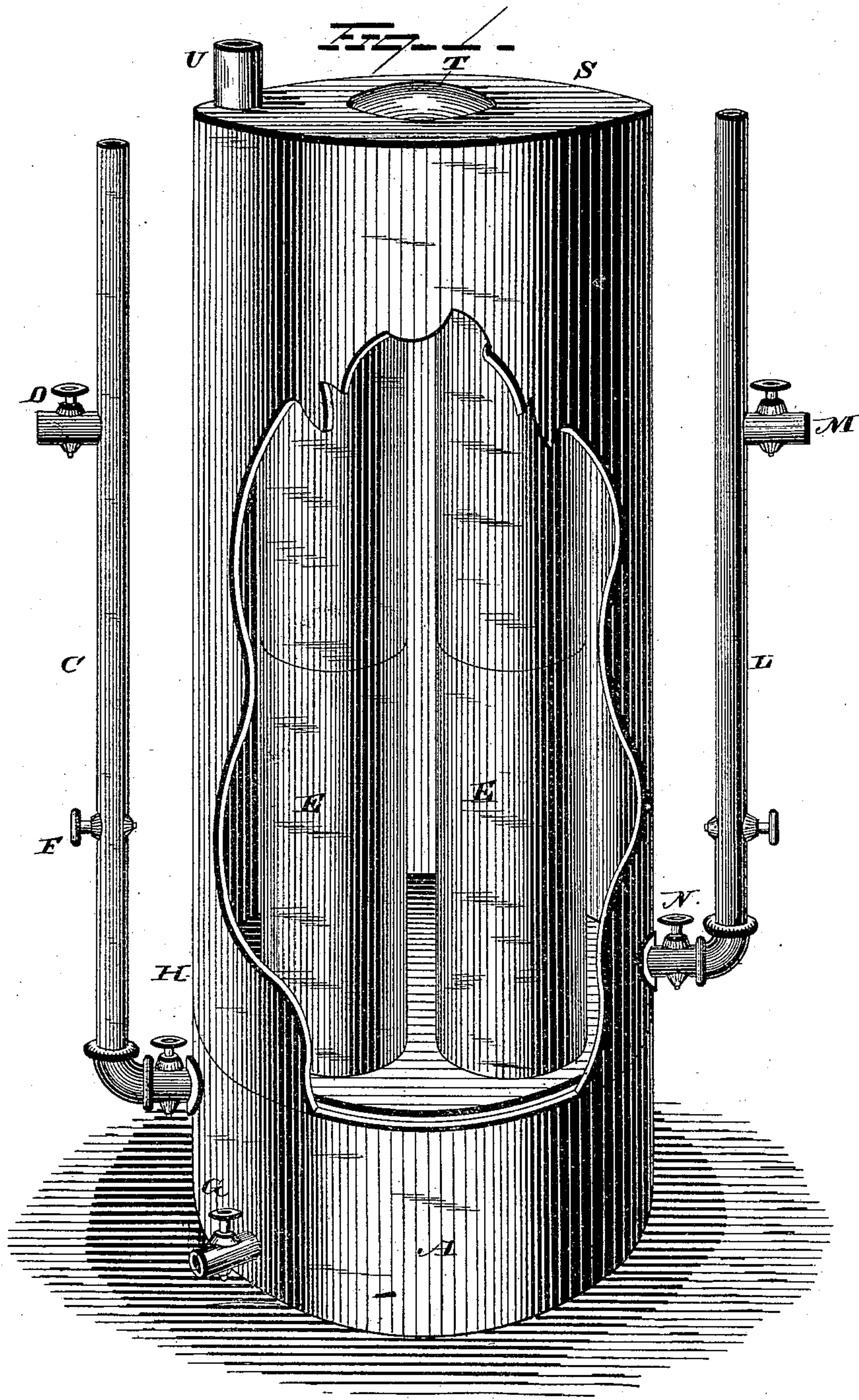
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G. B. FIELD.

PURIFYING, HEATING AND CONDENSING APPARATUS.

No. 272,831.

Patented Feb. 20, 1883.



WITNESSES
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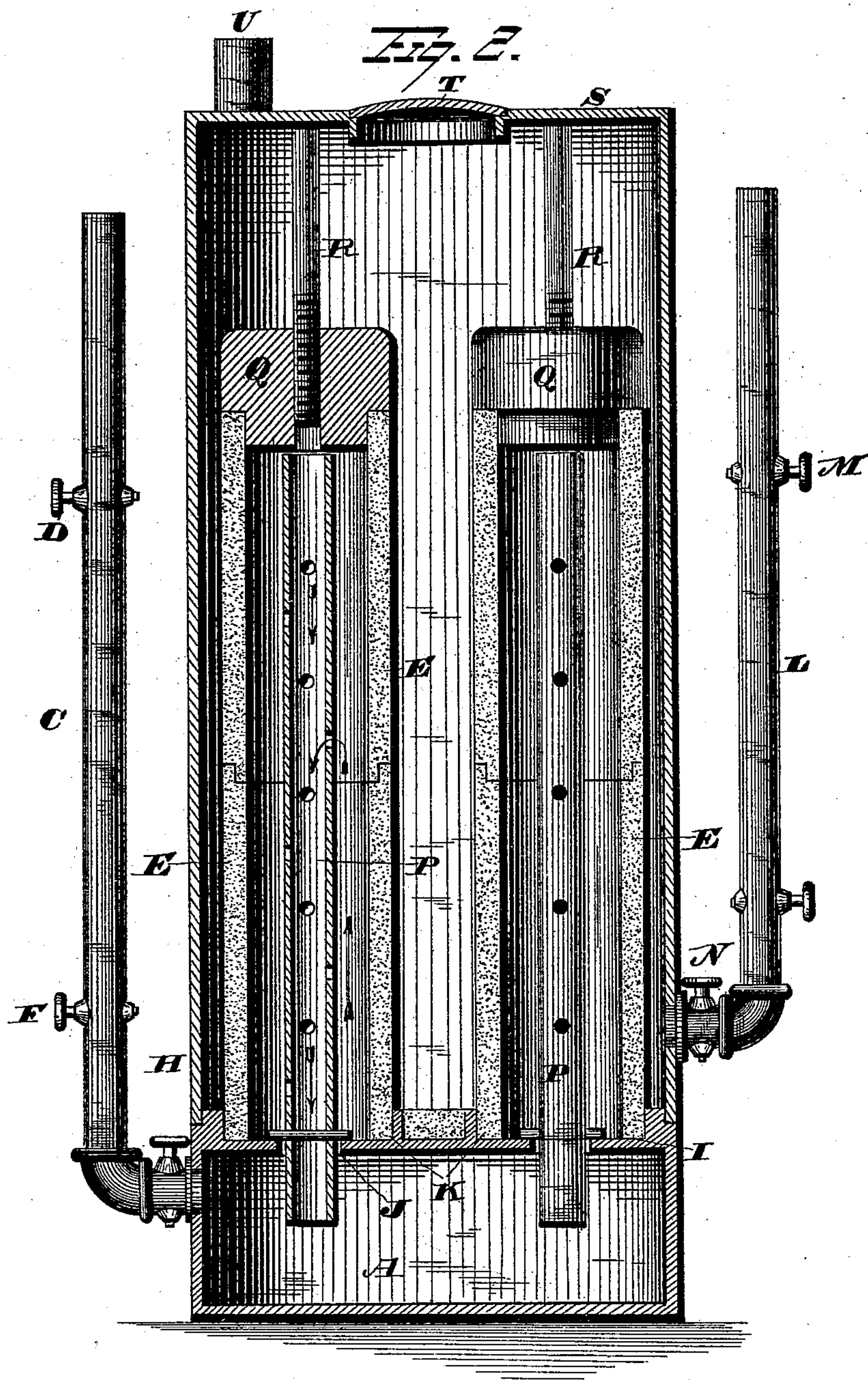
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UNITED STATES PATENT OFFICE.

GEORGE B. FIELD, OF NEW YORK, N. Y.

PURIFYING, HEATING, AND CONDENSING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 272,831, dated February 20, 1883.

Application filed July 12, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. FIELD, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Purifying, Heating, and Condensing Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to an improvement in devices designed for the purification of water, the object of the invention being to provide a device of this character adapted to fulfill, in addition to its primary function, the additional functions of a heater and condenser.

With these objects in view my invention consists in certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in perspective of a device constructed in accordance with my invention, and Fig. 2 is a view thereof in vertical cross-section.

A is a receiving-chamber, of any desired form and construction, into which the water to be purified is primarily introduced through the upright pipe C, which is provided with a stop-cock, D, to regulate the elevation of the water in the porous filtering-columns E. The said pipe is also provided with a stop-cock, F, the function of which lies in closing the pipe when the action of the apparatus is reversed for the purpose of cleaning the porous filtering-columns aforesaid.

G is a cock for withdrawing from the receiver the sediment deposited from the water and collected therein.

H is a secondary chamber, preferably conforming in cross-section to a similar section taken through the primary receiver A, from which it is separated by a diaphragm, I, provided with perforations J, those portions of the diaphragm surrounding the perforations being depressed to form suitable receptacles, K, to receive the lower ends of the porous filtering-columns E. The adaptation of the diaphragm to receive the said columns is, however, a matter which may be greatly varied, and I do not limit myself to the construction shown herein.

The pipe L, attached to the secondary receiver, fulfills a threefold function, in that it affords means for withdrawing the purified water and the water of condensation from the said secondary receiver, it affords an escape for the steam which is not condensed in the said chamber, and it affords means of introducing water into the chamber for conducting the operation of cleansing the porous columns E. The said pipe is provided with a stop-cock, M, to regulate the elevation of the water within the receiver H during the operation of cleansing the porous columns by reversing the direction of the percolation of the water through them. It is also provided with a stop-cock, N, through which the purified water is withdrawn. The columns are formed from a composition of clay and sawdust, the latter being burned out to render them porous. They are preferably prepared in short sections and joined together by cement, by gaskets, or by any suitable means of union.

Perforated pipes P, located in the center of the columns E, are arranged to extend into the primary receiving-chamber A to a point below the level at which the water enters the same through the pipe C. These pipes perform an important function in conveying the impurities abstracted from the water to the chamber A, as will be hereinafter described. Ordinarily the pressure of the water being filtered will alone be relied upon to effect and facilitate filtration. If, however, it is desired to increase the amount of water filtered in any given time, the head of the water may be increased, or artificial pressure may be resorted to. In such case the open and upper ends of the porous columns E are hermetically closed by caps Q, provided with screw-stems R, the same being adapted to impinge against the head S of the secondary receiver H, said head being provided with a man-hole, T, through which the interior of the said receiver is rendered accessible. The head of the cylinder is also provided with a short section, U, of pipe, which is connected with the steam-exhaust of the engine.

Having described the construction of my device, I will now set forth the method of its operation.

The water which it is desired to purify is

first introduced into the pipe C, from thence flowing into the primary reservoir A, in which it will rise and fill the porous columns E, the same being prevented from overflowing by the stop-cock D. The water will now filter through the walls of the said porous columns, and, exuding from them, flow into the secondary chamber, from which it is withdrawn through the stop-cock N of the pipe C. The character of the porous columns is so perfectly adapted to the purposes of filtration that in passing through them the impurities with which the water is impregnated are eliminated. After a time the inner walls of the said columns will become so coated with the deposit from the water that the filtration thereof will be interrupted. To relieve this difficulty and to remove the deposit, the direction of the percolation of the water through the columns is reversed. This is effected by introducing water into the secondary chamber through the pipe L, the water so introduced percolating through and into the columns E, thence descending into the primary chamber A, this reversal of current being continued until the inner walls of the columns are washed clean and the pores relieved of all foreign substances.

If desired to force the filtration, or, in other words, to increase the quantity of water filtered in any given time, the head of the water being filtered may be increased, or artificial pressure may be used in conjunction with the head of water at hand. If desired to force the filtration as above, the columns E are hermetically closed by the caps Q, which are adjusted in position and forced down on the tops of the columns by reversing the stems R until the upper extremities impinge against the head of the receiver H, the operations of adjusting said caps being conducted by a workman, who enters the said receiver through the man-hole T. By closing the stop-cock D and introducing water under pressure into the pipe C, the columns will be completely filled with water, which will percolate through them with a rapidity dependent upon the pressure.

So far the device has been considered only in connection with its primary function as a filter; but it has other important functions as a condenser and a heater when used in connection with a steam-engine.

In order to avoid the formation of scales and to prevent the accumulation of incrustations in steam-boilers, it is necessary to supply them with perfectly pure water, and with this object in view it is desirable, from an economical standpoint, to utilize the exhaust-steam from the engine, which condenses into pure water. My device is especially well adapted to effect such condensations, utilizing at the same time the sensible heat to be derived from the steam for heating the filtered water before its transmission to the boiler, and in heating and effecting desirable reactions in the unfiltered water. The exhaust-steam is introduced into the secondary receiver through the pipe U, which is connected with the steam-exhaust of

an engine, the steam, which at once expands to fill the receiver, being alone condensed by the large exposure of condensing-surface with which it is brought in contact. The water of condensation falls to the bottom of the receiver, and, mingling with the filtered water therein, is drawn off through the stop-cock N of the pipe L. The sensible heat imparted by the exhaust-steam to the contents of the receiving-chamber will, after a time, heat the filtered and unfiltered water in it to 212° Fahrenheit. So far as the filtered water is concerned, it is simply brought into a desirable condition for feeding to the boiler; but as regards the unfiltered water the action of the heat is still more important, for by bringing it to a temperature of 212° Fahrenheit reactions take place, which result in the precipitation of many of the impurities in the water—lime in particular. The outer walls of the columns being the more heated, a series of currents will be connected, which will take the paths indicated by the arrows, the descending currents entering the central pipes and following them down into the bottom of the primary receiver, where the impurities will be deposited, and from whence they may be withdrawn through the pipe G.

It is apparent that the apparatus may be modified in many particulars without violating the spirit of my invention; also, in accommodating my invention to the requirements resulting from the oscillation of the ordinary practical conditions, some changes in the device may be necessary. I would therefore have it understood that I do not limit myself to the exact construction shown and described, but that I hold myself at liberty to make such slight changes and alterations as fairly fall within the spirit and scope of my invention.

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

1. The combination, with a receiving and a secondary chamber, of a perforated diaphragm interposed between said chambers, and porous filtering-columns located in the secondary and communicating with the receiving chamber through the perforations in the diaphragm, substantially as set forth.

2. The combination, with a receiving and a secondary chamber, of a perforated diaphragm located between said chambers, porous filtering-columns located in the secondary and communicating with the receiving chamber through the perforations in the diaphragm, conduits associated with said chambers, and cocks to regulate the elevation of the water in the filtering-columns, substantially as set forth.

3. The combination, with a receiving and a secondary chamber, of a perforated diaphragm located between said chambers, porous filtering-columns located in the secondary and communicating with the receiving chamber through the perforations in the diaphragm, and perforated pipes located in the filtering-columns and extending into the receiving-chamber, substantially as set forth.

4. The combination, with a receiving and a secondary chamber, of a perforated diaphragm located between said chambers, porous filtering-columns located in the secondary and communicating with the receiving chamber through the perforations in the diaphragm, and adjustable devices adapted to seal the open and upper ends of the porous columns, substantially as set forth.

5. The combination, with a receiving and a secondary chamber, of a perforated diaphragm located between said chambers, porous filtering-columns located in the secondary and communicating with the receiving chamber through the perforations in the diaphragm, caps to close the upper and open ends of the porous columns, and screw-stems inserted in the caps and arranged to impinge against the upper wall of the secondary chamber, substantially as set forth.

6. The combination, with a receiving and a secondary chamber, of a perforated diaphragm located between said chambers, porous filtering-columns located in the secondary and

communicating with the receiving chamber through the perforations in the diaphragm, inlet and discharge conduits located in the receiving-chamber, and steam and water conduits leading, respectively, into and from the secondary chamber, substantially as set forth.

7. The combination, with a receiving and a secondary chamber, of a perforated diaphragm located between said chambers, porous filtering-columns located in the secondary and communicating with the receiving chamber, devices to seal the open ends of the said columns, and conduits leading into said chambers and provided with cocks to properly deflect the water when the current is reversed for the purpose of cleansing the filtering-columns, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GEO. B. FIELD.

Witnesses:

GEO. D. SEYMOUR,
GEO. F. DOWNING.