

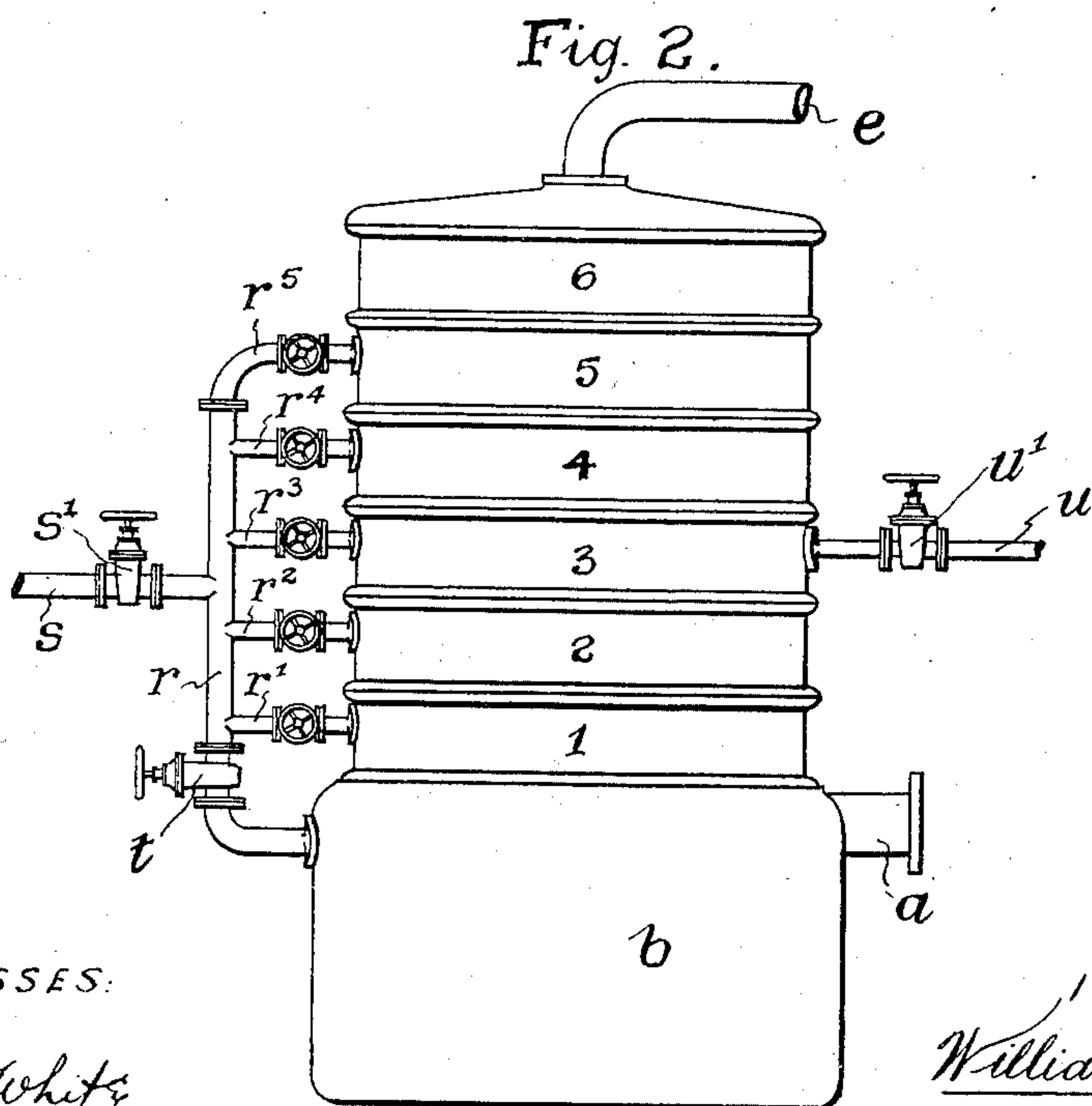
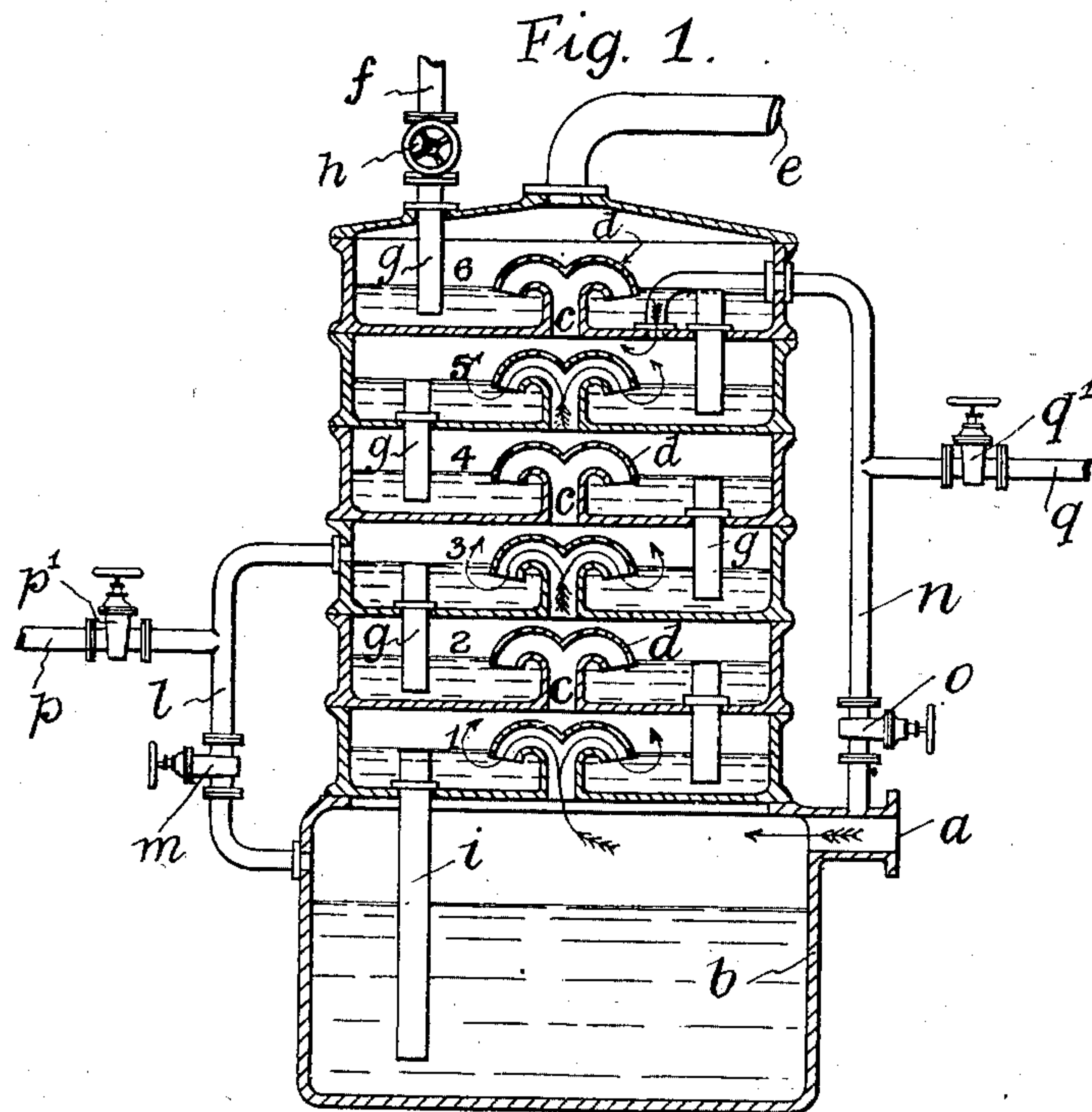
No. 729,121:

PATENTED MAY 26, 1903.

W. BOBY.  
WATER SOFTENING APPARATUS.

APPLICATION FILED DEC. 3, 1902.

NO MODEL.



WITNESSES:

*Ired White*  
*Thomas Wallace*

INVENTOR:

*William Boby*

*By his Attorneys*

*Julius C. O'Brien*

# UNITED STATES PATENT OFFICE.

WILLIAM BOBY, OF LONDON, ENGLAND.

## WATER-SOFTENING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 729,121, dated May 26, 1903.

Application filed December 3, 1902. Serial No. 133,681. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM BOBY, engineer, of Salisbury House, London Wall, London, England, have invented certain new and useful Improvements Relating to Water-Softening Apparatus, of which the following is a specification.

This invention consists of improvements in means for supplying steam or other heated gases or vapors to that class of water-softeners which operate by means of heat derived from steam or other heated gases or vapors, and more particularly to the class of machines in which the purification of the water is effected by means of steam blown into and through the water, which is contained in a series of trays placed one above the other and which are usually not less than five in number, the steam being admitted to the trays by means of a single inlet supplied from one or more sources and common to all the trays, the arrangement being such that the steam enters below the lowest of the trays and acts upon all the trays one after the other, commencing at the bottom tray, which may be called "No. 1," through the water in which it passes, and thence to tray No. 2, which is situated immediately above No. 1, and so on into and through the water in each and all the trays of the machine.

My invention consists in providing an additional inlet or inlets for the steam, gas, or vapor, which inlet or inlets may act in conjunction with or independently of the common inlet above described and by means of which steam, gas, or vapor is admitted direct to one or more of the trays situated above tray No. 1 above described. By this means some or all of the steam, gas, or vapor required for working the trays of the machine which are situated above the improved additional inlet or inlets is admitted without its having been compelled to previously pass through the water in the trays situated below the improved additional inlet or inlets.

With reference to the advantages obtained by my invention they are practically as follows:

A less pressure is required to send the steam through the water contained in the machine from the fact that the total pressure is pro-

portionate to the number of trays through which the same steam has to pass.

By making one additional inlet therefor the pressure of steam in the common inlet is reduced to approximately one-half. In practice it is found to reduce it somewhat less than the one-half in question. By multiplying the inlets the pressure is proportionately reduced.

When the machine is being worked at a capacity less than its maximum, the secondary inlet insures the water in the upper trays of the machine receiving heat at the same time as or before the water in the lower trays of the machine.

When worked without the secondary inlet, the steam from the common inlet finds its way first into the bottom tray; but when worked with the secondary inlet it finds its way simultaneously into the bottom tray and into that or those which are in connection with the secondary inlet or inlets.

The common inlet above mentioned and the improved inlet or inlets may be connected together and may take the steam or other purifying agent from the same source of supply, or they may be disconnected and take it from different sources, respectively, and the important additional inlet or inlets may be provided with a valve or valves by means of which it or they may be opened or closed, as desired, for the purpose of cutting off steam, gas, or vapor from the tray or trays or for separating such additional inlets from the common inlet or from each other, and the valves in question may be operated either by the attendant or automatically by means of a suitable appliance.

In the following description of apparatus embodying the invention I will assume that steam is the medium which is blown through the water to purify the same; but it will be understood that any other suitable gas or vapor may be employed for the purpose.

The accompanying drawings illustrate by way of example two forms of apparatus embodying the invention, this being shown as applied to a heater-detartarizer of the character hereinbefore referred to.

In Figure 1 the trays and casing below same are shown in vertical mid-section to enable



the course of the steam to be readily followed. The apparatus shown in Fig. 2 is similar to that in Fig. 1 as regards the trays and lower casing, but differs as regards the connections for admitting steam to the trays.

Referring first to Fig. 1, *a* is the ordinary inlet to the machine, discharging into a casing *b* below the series of trays 1 2 3 4 5 6, this casing and the inlet *a* constituting the common inlet to the trays. From this casing the steam passes up from tray to tray through short pipes *c*, provided with hoods or baffles *d* to direct the steam down through the water in each tray before passing to the next tray, the steam finally escaping by the pipe *e* at the top of the machine. *f* is the pipe for supplying the water to be purified to the trays, each tray being provided with a short length of pipe *g*, extending from the water-level in each tray to near the bottom of the tray next below, so that when the water is turned on by the cock *h* to the pipe *f* it fills the trays to the proper level from top to bottom in succession, any surplus passing by the pipe *i* to the casing *b* at the bottom. All these are usual parts employed in apparatus of the character in question and constitute no part of the present invention.

From the upper part of the casing *b* a pipe *l* leads to the upper part of tray No. 3, a valve *m* being interposed in this pipe. By this means steam can be turned on from the casing *b* to tray No. 3, whence it can pass to trays 4, 5, and 6 without previously passing through the water in trays 1, 2, and 3. A pipe *n* and valve *o* similarly serve to admit steam direct from the inlet *a* to the top of tray No. 5, the pipe *n* discharging down through the bottom of tray No. 6 into the top of tray No. 5, whence it can pass through the water in tray No. 6 without previously having had to pass through the lower trays.

*p* and *q* are pipes leading to a separate source of steam and discharging into pipes *l* and *n*, respectively, and *p'* and *q'* are valves fitted in the pipes *p* and *q*. By closing the valves *m* and *o*, or either of them, and opening the valves *p'* and *q'*, or either of them, steam can be admitted by either or both the pipes *p* and *q* from a separate source of supply.

Referring now to Fig. 2, the arrangement here shown is such that steam can be admitted to any or all of the trays without having to pass through the water in the tray or trays below. *r* is a pipe leading from the casing *b* and communicating by branches *r'* *r*<sup>2</sup> *r*<sup>3</sup> *r*<sup>4</sup> *r*<sup>5</sup> with the trays 1 2 3 4 5, respectively, each branch discharging above the water-level of the tray with which it is connected. Each of these branches is fitted with a valve, as shown. Steam can thus be admitted from the casing *b* to any or all of the trays 2 3 4 5 6 without having to pass through the water in the tray or trays below, the steam passing from the upper part of each tray, to which it is delivered by the branches direct to the tray

next above. *s* is a pipe in connection with a separate source of steam and provided with a valve *s'*. By closing valve *t* in pipe *r* and opening the valve *s'* steam can be admitted from a separate source to the pipe *r* and any or all of the trays 2 3 4 5 6, as required. *u* represents another pipe, and *u'* a valve therein, whereby steam may be admitted to the upper part of tray No. 3 from a separate source when required.

In either of the above constructions it will be understood that steam is likewise admitted, as usual, by the common inlet at the bottom of the column of trays and rises up through same in the ordinary way. It will be further understood that the two forms of apparatus above described, and illustrated in the drawings, are merely typical and may be varied considerably without departing from the invention, the additional inlet or inlets for the steam, either from the same source, as the common inlet, or from a separate source being connected to any one or more of the trays, as may be desired.

What I claim, and desire to secure by Letters Patent, is—

1. In apparatus for softening water wherein steam or other hot gas or vapor is blown through superposed trays containing the water to be softened, being admitted from a common inlet to the lowermost tray and rising through the trays in succession, a supplementary inlet for steam, gas or vapor, said supplementary inlet discharging into one of the trays at a point above the water-level of the bottom tray whereby a quantity of steam, gas or vapor can be passed direct to the water in an upper tray without passing through the water in the tray or trays below, substantially as described.

2. In apparatus for softening water wherein steam or other hot gas or vapor is blown through superposed trays containing the water to be softened, being admitted from a common inlet to the lowermost tray and rising through the trays in succession, a plurality of supplementary inlets for steam gas or vapor, said supplementary inlets discharging respectively into trays at points above the water-level of the bottom tray, whereby a quantity of steam, gas or vapor can be passed direct to the water in a plurality of trays without passing through the water in the tray or trays below, substantially as described.

3. In apparatus for softening water wherein steam or other hot gas or vapor is blown through superposed trays containing the water to be softened, being admitted from a common inlet to the lowermost tray and rising through the trays in succession, a supplementary connection between said common inlet and one of the trays, said connection discharging into said tray at a point above the water-level in the bottom tray for the purpose specified.

4. In apparatus for softening water wherein



steam or other hot gas or vapor is blown through superposed trays containing the water to be softened, being admitted from a common inlet to the lowermost tray and rising through the trays in succession, a supplementary connection between said common inlet and one of the trays, said connection discharging into said tray at a point above the water-level in the bottom tray, and a valve in said supplementary connection adapted to open and close the same to the supply of steam, gas or vapor from the common inlet, all for the purpose specified.

5. In apparatus for softening water wherein steam, or other hot gas or vapor, is blown through superposed trays containing the water to be softened, being admitted from a common inlet to the lowermost tray and rising through the trays in succession, a plurality of supplementary connections between said common inlet and a plurality of the trays, each such connection discharging into a tray at a point above the water-level of the bottom tray for the purpose specified.

6. In apparatus for softening water wherein steam or other hot gas or vapor is blown through superposed trays containing the water to be softened, being admitted from a common inlet to the lowermost tray and rising through the trays in succession, a plurality of supplementary connections between said common inlet and a plurality of the trays, each such connection discharging into a tray at a point above the water-level of the bottom tray, and means for opening and closing communication between said supplementary connections and the supply of steam, gas or vapor from the common inlet, all for the purpose specified.

7. In apparatus for softening water wherein steam or other hot gas or vapor is blown through superposed trays containing the water to be softened, being admitted from a common inlet to the lowermost tray and rising through the trays in succession, a supplementary inlet for steam, gas or vapor discharging into one of the trays at a point above the water-level of the bottom tray, said supplementary inlet being in connection with a separate source from that which supplies said common inlet for the purpose specified.

8. In apparatus for softening water wherein steam or other hot gas or vapor is blown through superposed trays, containing the water to be softened, being admitted from a common inlet to the lowermost tray, and rising through the trays in succession, a supplementary inlet for steam, gas or vapor discharging into one of the trays at a point above the water-level of the bottom tray, said supplementary inlet being in connection with a separate source from that which supplies said common inlet, and a valve adapted to open

and close communication between said supplementary inlet and said separate source of supply for the purpose specified.

9. In apparatus for softening water wherein steam or other hot gas or vapor is blown through superposed trays containing the water to be softened, being admitted from a common inlet to the lowermost tray and rising through the trays in succession, a plurality of supplementary inlets for steam, gas or vapor, each discharging into a tray at a point above the water-level of the bottom tray, said supplementary inlets being in connection with a separate source of supply from that which supplies said common inlet and means for opening and closing communication between said supplementary inlets and said separate source of supply for the purpose specified.

10. In apparatus for softening water wherein steam or other hot gas or vapor is blown through superposed trays containing the water to be softened, being admitted from a common inlet to the lowermost tray and rising through the trays in succession, a supplementary connection between said common inlet and one of the trays, said connection discharging into said tray at a point above the water-level in the bottom tray, said supplementary inlet being also in connection with a separate source of supply from that which supplies said common inlet, and means for opening communication between said supplementary inlet and said common inlet or between said supplementary inlet and said separate source of supply, substantially as described.

11. In apparatus for softening water, wherein steam or other hot gas or vapor is blown through superposed trays, containing the water to be softened, being admitted from a common inlet to the lowermost tray and rising through the trays in succession, a plurality of supplementary connections between said common inlet and a plurality of trays, each such connection discharging into a tray at a point above the water-level of the bottom tray, said supplementary connections being also in connection with a separate source of supply from that which supplies said common inlet, and means for opening communication between said supplementary connections and said common inlet or between said supplementary connections and said separate source of supply, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM BOBY.

Witnesses:

HENRY A. PRYOR,

ROBERT M. SPEARPOINT.