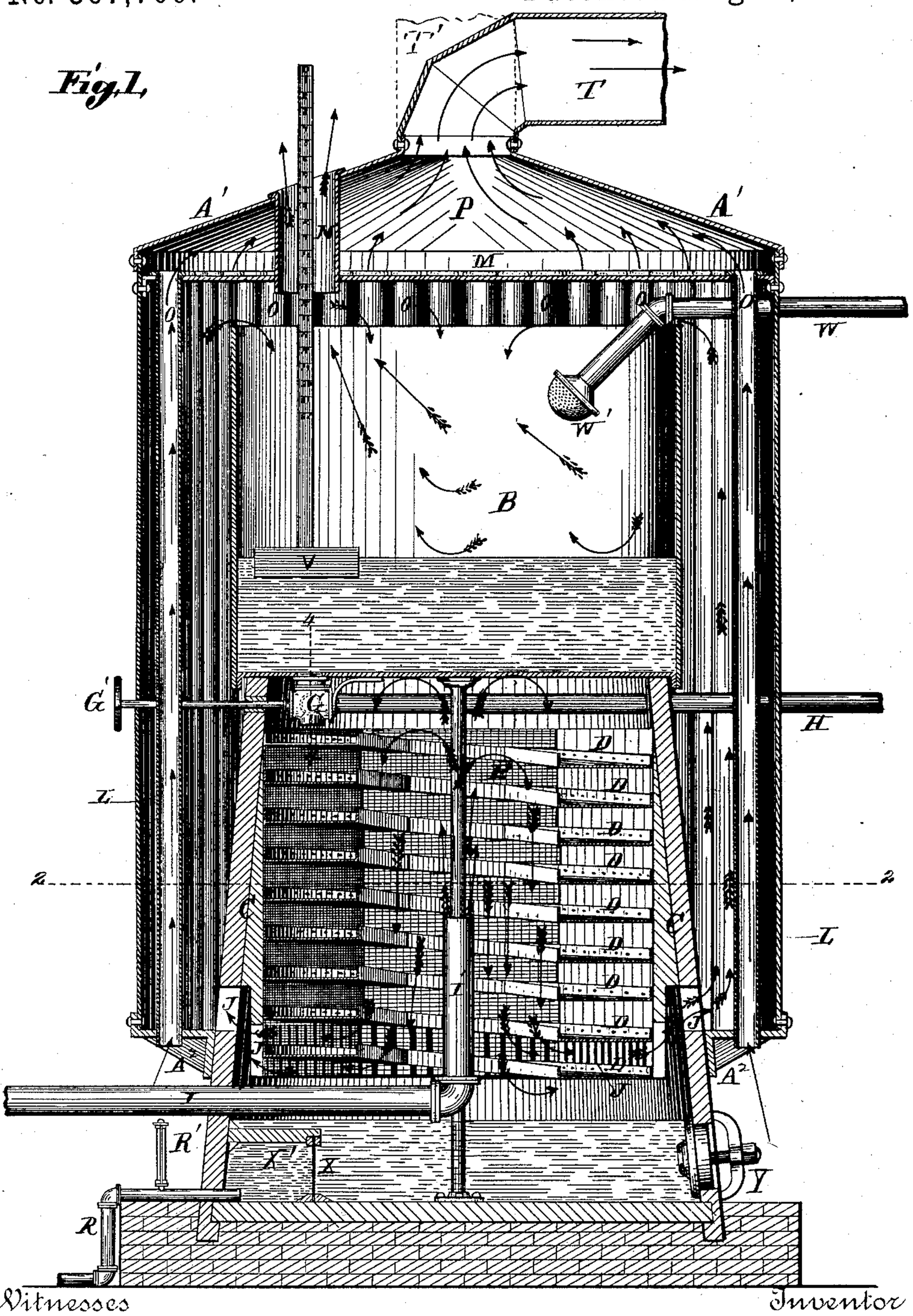
(No Model.) 2 Sheets—Sheet 1.

A. L. DRAPER.

CONDENSING DUPLEX HEATER.

No. 367,706. Patented Aug. 2, 1887.

Fig. 1.



Witnesses
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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2,

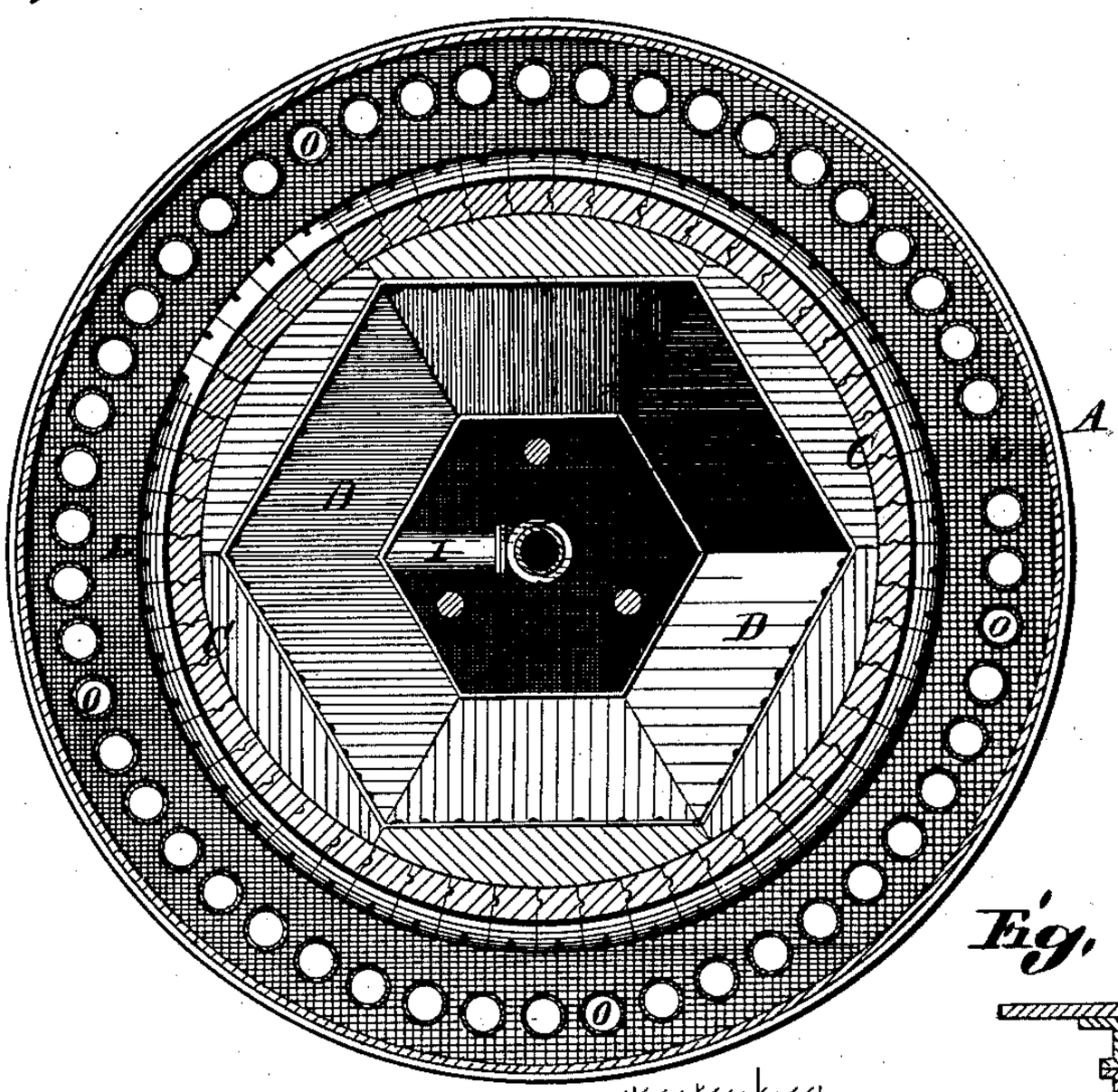

Fig. 4,

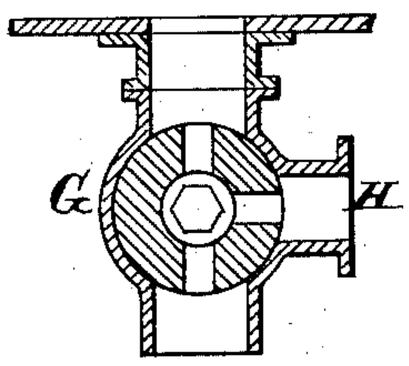

Fig. 3,

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UNITED STATES PATENT OFFICE.

ALVIN L. DRAPER, OF ELLSWORTH, KANSAS.

CONDENSING DUPLEX HEATER.

SPECIFICATION forming part of Letters Patent No. 367,706, dated August 2, 1887.

Application filed September 6, 1886. Serial No. 212,841. (No model.)

To all whom it may concern:

Be it known that I, ALVIN L. DRAPER, a citizen of the United States, residing in the city and county of Ellsworth and State of Kansas, have invented a certain new and useful Improvement in Condensing Duplex Heaters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a vertical section through my improved condenser and heater. Fig. 2 is a horizontal transverse section taken on line 2 2, Fig. 1. Fig. 3 is a section through the wall of a room, showing part of the hot-air pipe and fan in elevation. Fig. 4 is an enlarged view of the three-way valve taken on line 4 4, Fig. 1.

My invention relates to a device for condensing steam, heating feed-water, and for heating rooms, if desired; and my invention consists in features of novelty, hereinafter fully described, and pointed out in the claims.

Referring to the drawings, A represents an outer case or jacket, having a top, A′, and bottom, A^2. Located within and a distance from this jacket is a water tank or receiver, B, which is preferably made of metal, and beneath this tank B is a combined water and steam tank, C, preferably made of wood, the top of which is formed by the bottom of the tank B, which is supported thereby.

Within the tank C is a winding shelf, D, extending from or near the top to near the bottom of the tank, as shown in Fig. 1. The shelf extends horizontally from the outer wall of the tank C inward a desired distance, leaving a central steam-chamber, E, as shown in Figs. 1 and 2.

The shelf D, according to my present invention, differs from those ordinarily used, in that instead of running in a circular direction around a common center it runs in straight lines united by such angles that in plan view it appears polygonal. The results produced by these two constructions are widely different. With a shelf running in a circular direction the centrifugal force, which is constantly accelerated as the water descends, causes it to fly off from the center around which the shelf winds and follow the outer side thereof, where it will be deepest, while the edge of the shelf nearest the center is perhaps perfectly dry. By constructing the shelf in straight lines, or with an outside edge bounded by straight lines, this centrifugal force is entirely avoided, and the water runs in a straight line over each straight portion of the shelf in a sheet of equal depth from one side of the shelf to the other.

The water passes from the tank B onto the upper spiral of the shelf through a three-way valve, G, (shown in Fig. 4,) and which is secured to the end of a pipe, H, leading direct to the boiler. The valve is provided with a stem, G′, extending through the jacket A, by which the valve may be turned to close the water off from the shelf and cause it to pass through the pipe H when it is desired to fill the boiler direct through this pipe. The water falling on the shelf passes slowly around, being finally discharged into the bottom of the tank C. As it passes along the shelf, the scale and sediment settles upon the shelf and the water is heated by means of exhaust-steam ejected into the chamber E from the boiler through a pipe, I, which has an upward extension, I′, so that the steam is directed upward against the bottom of the tank B, and then it is deflected down again, as indicated by the arrows. The chamber E is thus filled with steam, and the steam of course enters between the spirals of the shelf D, heating them and heating the water thereon.

The steam that is not condensed in this chamber escapes through openings or ports J (there is preferably one of these ports in each stave of the tank C, though I do not confine myself to any particular number) and enters a steam-chamber, L, formed by the tanks B and C and the jacket or case A. The steam passes up through the chamber L and enters the top of the tank B, as indicated by the arrows in Fig. 1, heating the water therein, there being a space left between the top of the tank B (for this passage of the steam from the chamber L) and a diaphragm, M, extending across the case A, near its top A′. The steam that is not condensed in the chamber L and tank B escapes through a pipe or tube, N, extending from the diaphragm M to the top A′ of the jacket A.

Located in the chamber L are a number of pipes or tubes, O, passing at their lower ends through the bottom A^2 of the jacket A, so as

to commnicate with the outer air, and passing at their upper ends through the diaphragm M, so as to communicate with a hot-air chamber, P, formed by the diaphragm M and the top A′ of the jacket. The cold air circulates through these pipes, as indicated by the featherless arrows in Fig. 1, and the action of the cold air upon the steam in the chamber L is to condense the latter, which, falling upon the bottom of the chamber L in the form of water, runs through the openings J in the tank C without falling upon the shelf D, and is deposited in the bottom of the tank in the form of clear pure water, which is taken from the tank through a pipe, R, which communicates with the feed-pump of the boiler.

I claim particular advantages in the device constructed to expose steam to the action of cold air, in that a great amount of steam is condensed in a small space and can be used as feed-water, having no impurities.

As the air passes through the pipes O, it becomes heated and enters the hot-air chamber P, from where it may be taken through a flue, T, to heat a room, U, the circulation of the air being caused by a suitable fan, U′, as shown in Fig. 3, the fan causing not only the circulation of the air from the chamber P through the flue T, but also through the pipes O.

In case the air is not needed for the purpose of heating a room or building, there may be secured to the chamber P (in lieu of the pipe T) a draft-tube, T′, as shown in dotted lines in Fig. 1, to cause a natural draft of the air through the tubes O.

The tank B may be provided with a float, V, having a scale-bar, V′, extending through the flue N, by which the amount of water in the tank B may be indicated.

The cold water is discharged into the tank B through a pipe, W, provided at its end with a spray-nozzle, W′.

The water may be strained in its passage through the tank C by a screen, X, placed in the side of a clear-water chamber, X′, formed at one side of the tank C, and with which the pipe R communicates.

The pipe R may be provided with a gage, R′, to indicate the amount of water in the clear-water chamber X′.

Y represents a man-head in the lower part of the tank C.

I claim as my invention—

1. In a condenser, in combination with an inner water and steam receptacle and an outer jacket forming a steam-chamber, means, substantially as described, for causing a circulation of cold air through the said chamber to condense the steam, substantially as set forth.

2. In a condenser, the combination of a central water-receiver, an outer jacket, and cold-air pipes, the receiver and jacket forming a steam-chamber in which the pipes are located and in which the steam is condensed by the action of the air in the pipes, substantially as set forth.

3. In a condenser, the combination of the tanks, outer jacket, and cold-air pipes, the tanks and jacket forming a steam-chamber in which the cold-air pipes are located and in which the steam is condensed by the action of the cold air in the pipes, substantially as set forth.

4. In a feed-water heater, the combination of the outer jacket, upper tank, lower tank, cold-water pipe discharging into the upper tank, winding shelf located in the lower tank, and exhaust-steam pipe discharging into the lower tank, substantially as set forth.

5. In a feed-water heater, the combination of the outer jacket or case, an upper tank or water-receiver, a lower tank, winding shelf located within the lower tank and upon which the water is discharged from the upper tank, a valve for controlling the passage of the water, and a steam-pipe entering the lower tank, substantially as and for the purpose set forth.

6. In a feed-water heater, the combination, with a suitable tank or casing and a pipe for feeding water thereinto, of a winding shelf upon which the feed-water is discharged, constructed with sides running in straight lines and united so as to form a shelf of polygonal (as contradistinguished from circular) shape, substantially as and for the purpose set forth.

7. In a feed-water heater, the combination, with the upper water-tank and the lower steam-tank having a communicating-passage between them, of a valve for controlling the flow of water from the upper to the lower tank, a winding shelf in the lower tank upon which the water is discharged, and a steam-pipe for admitting steam to the lower tank, substantially as and for the purpose set forth.

8. In a feed-water heater, the combination of the upper water-tank, the lower tank provided with a winding shelf, a valve for controlling the passage of water from the upper tank to the shelf of the lower tank, and a pipe with which said valve is connected and through which the water may be made to pass by operating said valve, substantially as set forth.

9. In a feed-water heater, in combination with the upper tank or water-receiver, a lower tank provided with a winding shelf, a pipe located at the bottom of the upper tank, and a three-way valve for controlling the passage of water from the upper tank to the shelf of the lower tank or through the said pipe or for cutting it off from both, substantially as set forth.

10. In a feed-water heater, in combination with the upper tank or water-receiver, the lower tank provided with a winding shelf, a valve for controlling the passage of water from the upper tank to the shelf in the lower tank, and a pipe for discharging steam into the lower tank, said pipe having an upward extension ejecting the steam against the bottom of the upper tank, substantially as shown and described, for the purpose set forth.

11. In combination with an outer jacket, an upper tank and lower tank, a pipe for dis-

charging steam into said lower tank, and a cold-water pipe provided with a spray-nozzle for discharging water into the upper tank, substantially as set forth.

12. In combination with the outer jacket or case, the upper tank and lower perforated combined steam and water tank, a pipe for discharging steam into said lower tank, the steam passing through the perforations in the tank into a chamber formed by the said tanks and jacket and from thence into said upper tank, substantially as set forth.

13. In combination with the outer jacket, an upper tank and a lower perforated tank, the tanks and jacket forming a steam-chamber, the pipe for discharging steam into the lower tank, and cold-air pipes in said steam-chamber, substantially as and for the purpose set forth.

14. In combination with the outer jacket and upper and lower tanks, the pipe for discharging steam into the lower tank, which escapes through perforations in said tank, cold-air pipe located in a chamber formed by said tanks and jacket, hot-air chamber located over the upper tank and with which said cold-air pipes communicate, and a flue leading from said hot-air chamber to a room and provided with a fan, substantially as set forth.

15. In combination with the outer jacket and upper and lower tanks, the lower tank being perforated, the pipe for discharging steam into the lower tank, which escapes through the perforations in the lower tank into a chamber formed by said tanks and jacket, and a flue, N, for carrying off the uncondensed steam from the upper tank, substantially as and for the purpose set forth.

16. In combination with the outer jacket, the upper and lower tanks, the lower tank being perforated, a pipe for discharging steam into said lower tank, which escapes through the perforations in the tank into a chamber formed by the tanks and jacket and into the upper tank, a flue or pipe, N, for carrying off the uncondensed steam, and a float provided with a scale extending through said flue or pipe, substantially as set forth.

17. In combination with the outer jacket and upper and lower tanks, the lower tank being provided with perforations, a pipe for discharging steam into said lower tank, which escapes through the perforations into a chamber formed by said tanks and jacket, the perforations being located at the bottom of said chamber, whereby the condensed steam may flow from the chamber into the lower tank, substantially as and for the purpose set forth.

18. In a feed-water heater, the combination, with tank for containing the heated water, of the water-chamber X′, the pipe R, leading therefrom, the screen X, placed over said water-chamber, and the man-hole Y, all constructed and arranged substantially as set forth.

ALVIN L. DRAPER.

Witnesses:
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J. H. CLARK.