

(No Model.)

2 Sheets—Sheet 1.

R. LEARMONTH.

FEED WATER HEATING AND PURIFYING APPARATUS.

No. 432,055.

Patented July 15, 1890.

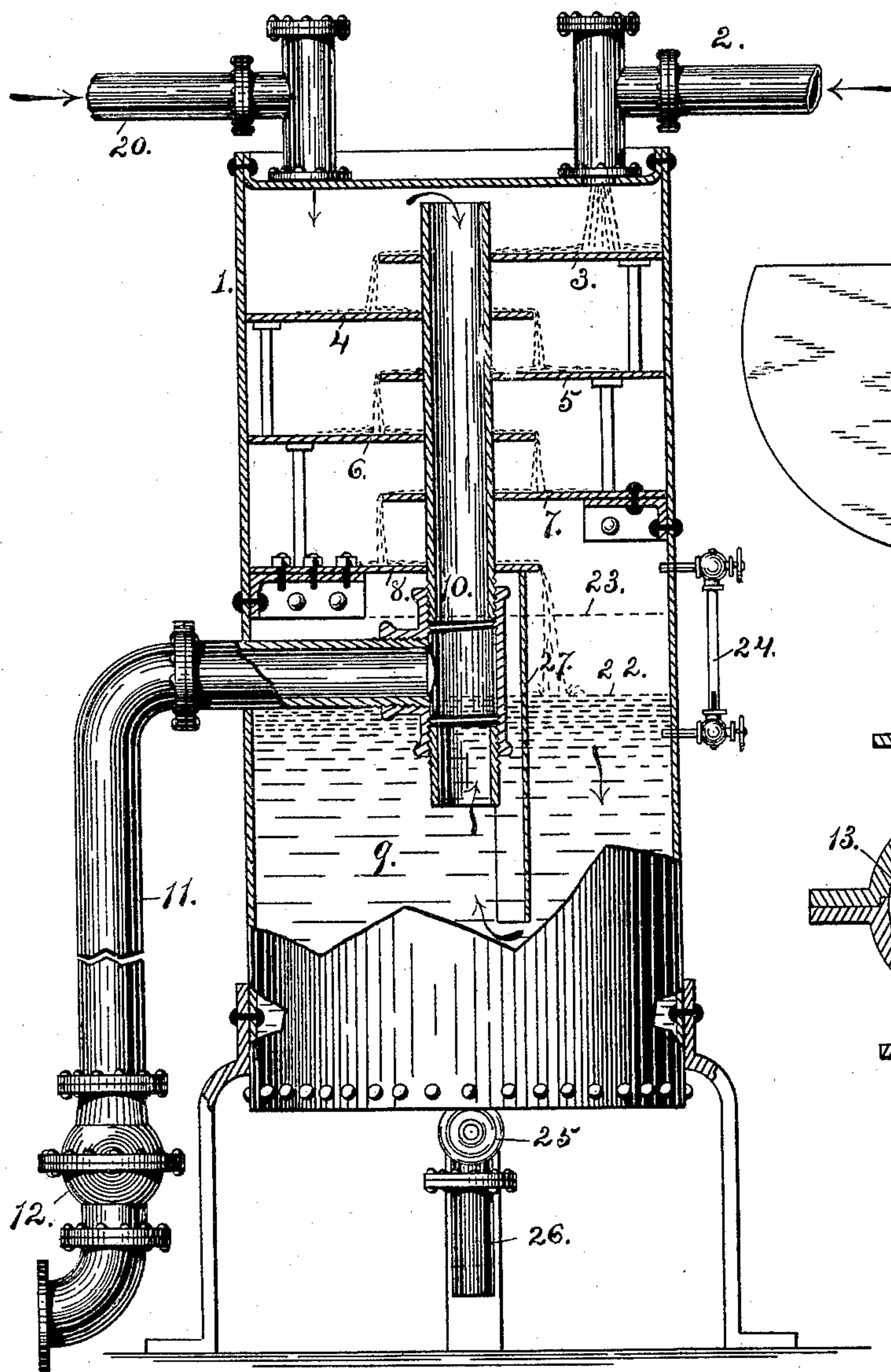


Fig. 1.

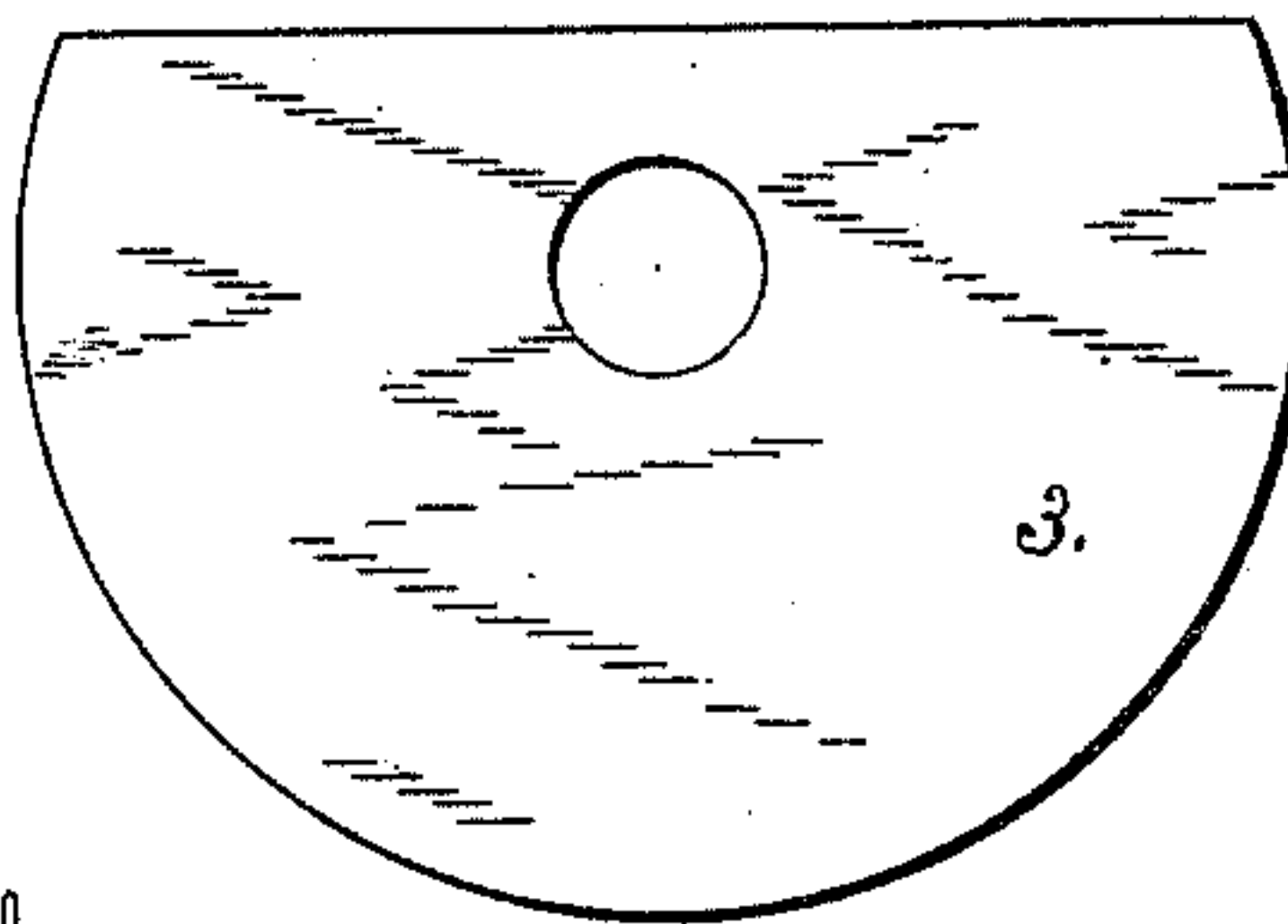


Fig. 2.

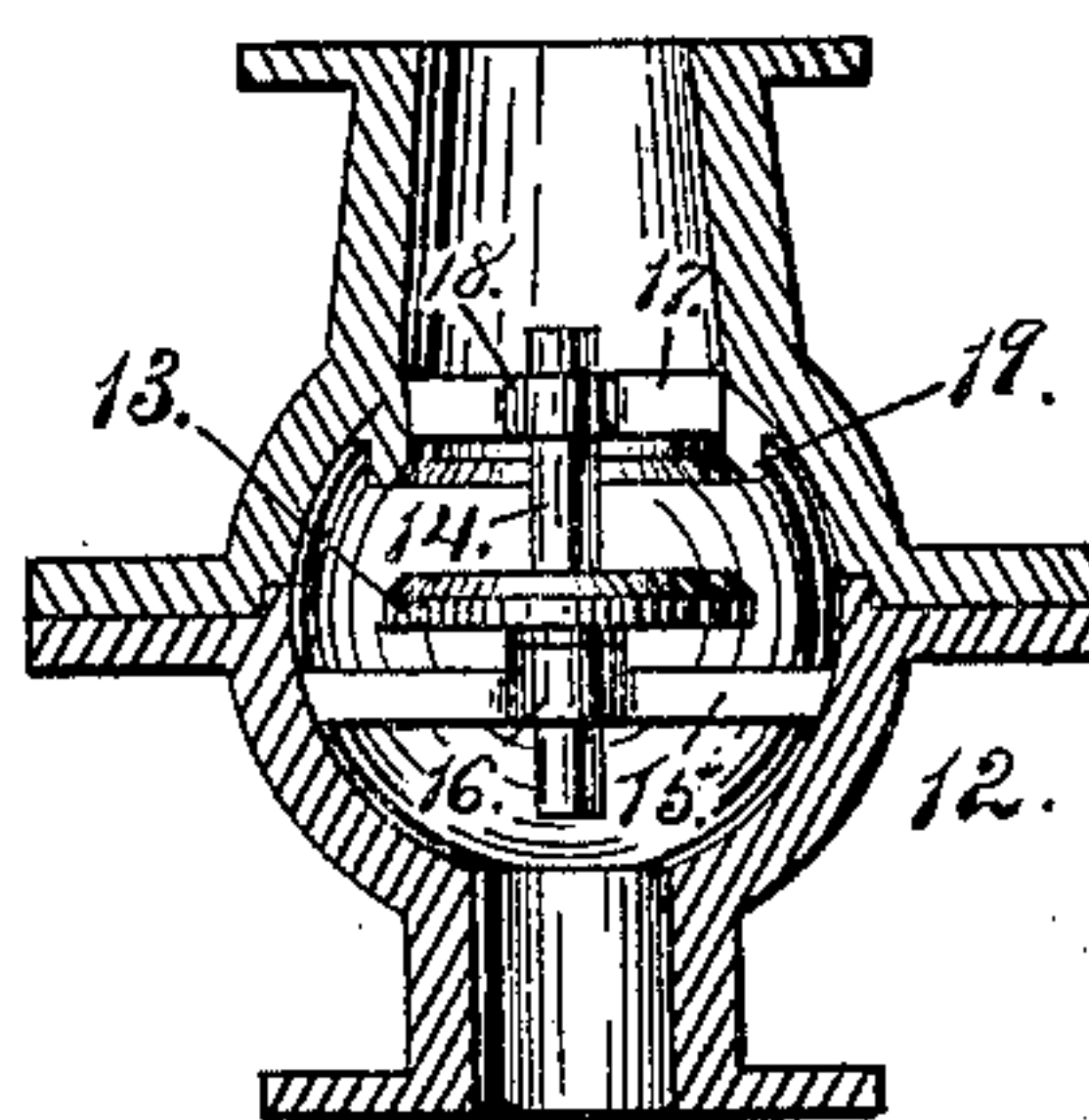


Fig. 3.

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(No Model.)

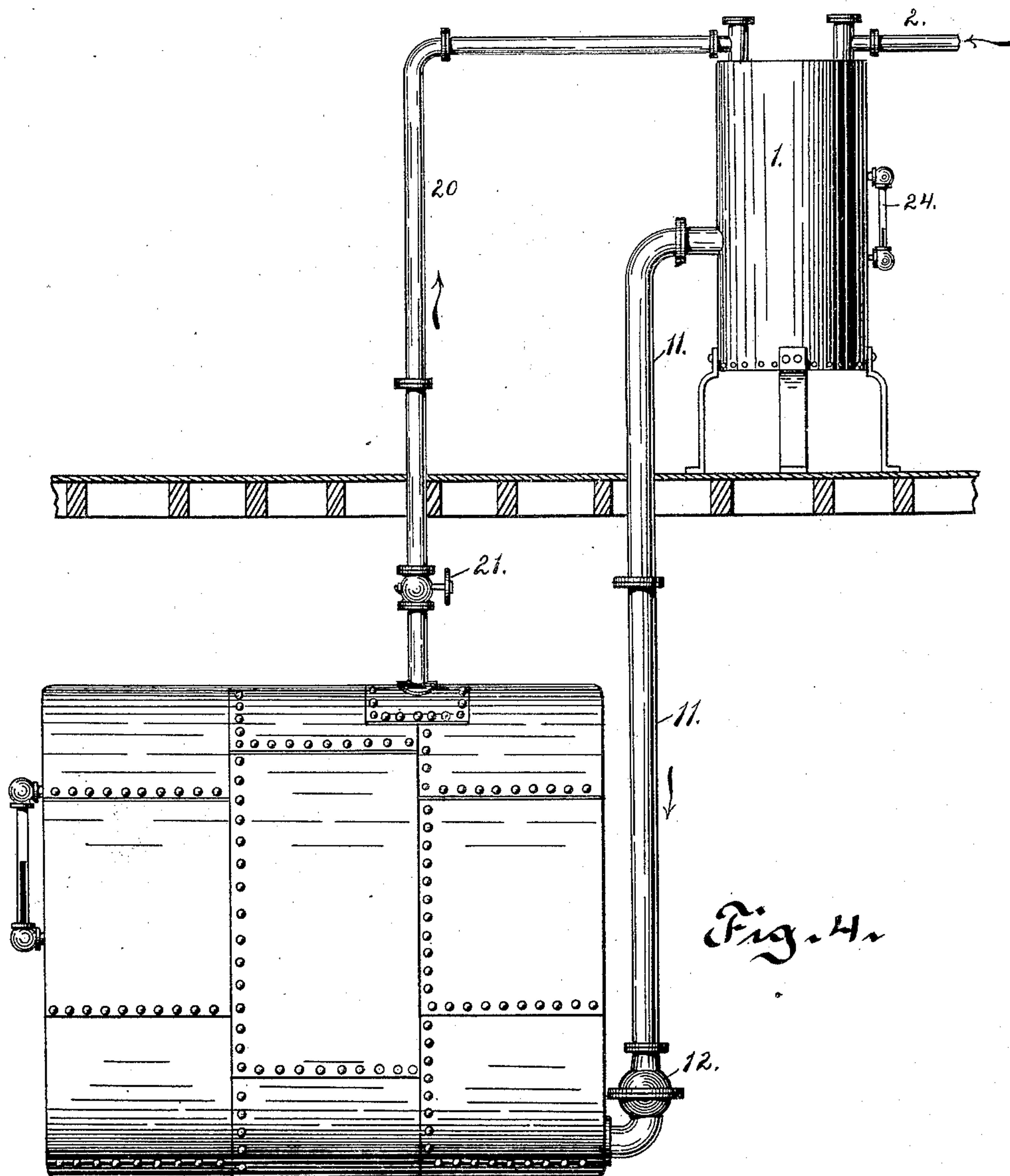
2 Sheets—Sheet 2.

R. LEARMONTH.

FEED WATER HEATING AND PURIFYING APPARATUS.

No. 432,055.

Patented July 15, 1890.



Witnesses:

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UNITED STATES PATENT OFFICE.

ROBERT LEARMONTH, OF BUFFALO, NEW YORK.

FEED-WATER HEATING AND PURIFYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 432,055, dated July 15, 1890.

Application filed March 14, 1890. Serial No. 343,863. (No model.)

To all whom it may concern:

Be it known that I, ROBERT LEARMONTH, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Feed-Water Heating and Purifying 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 appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in feed-water heaters and purifiers, and more particularly to that class of feed-water heaters and purifiers which have a direct communication with the boiler, both with its live steam and feed-supply.

The object of my invention is to produce a feed-water heater and purifying apparatus by means of which the water in the heater attains an equal heat with that in the boiler, or nearly so, and also the accumulation of the sediment, which by reason of the high temperature of the water is most thoroughly extricated.

My invention further consists in the detail of its construction, all of which I will now proceed to definitely describe and claim.

In the drawings, Figure 1 is a partial central vertical section of my improved feed-water heating and purifying apparatus. Fig. 2 is a detail view showing one of the disks or plates over which the water successively passes. Fig. 3 is a central cross-section of the automatic shut-off valve, and Fig. 4 is a general view of my improvement connected with a boiler to show its operation.

Referring to the drawings, 1 is a steam-tight reservoir or chamber forming the body of my improved heater.

2 is the water-supply pipe, through which the water enters into the heater, falling upon the sectional disk 3, where it passes off in a thin sheet, falling upon the next disk 4, and so on, falling successively from one disk to another until it reaches the disk 8, where it falls off into the sediment-accumulating chamber 9 in the lower portion of the heater. This

sediment-accumulating chamber 9 is divided into two (2) compartments by the dividing wall or partition 27, the water falling from the disks passing down to the base of the heater on one (1) side of the wall, and up again on the opposite side, passing around and into the equalizing-passage 10, and thence to the boiler through the pipe 11. The equalizing-passage 10 forms a tube or passage having open ends and extending from a point above the sectional disk 3 downwardly to a point below the water-line of the heater, as seen in Fig. 1, thus equalizing the pressure on the surface of the water within the tube with that around it, and at the same time preventing any foreign substance which may be floating upon the surface of the water from passing into the boiler.

In the pipe 11 (through which the water passes off into the boiler) is arranged the automatic shut-off valve 12, constructed as shown in Fig. 3.

The valve-plate 13, which rests upon the short sleeve or collar 16, is mounted upon the valve-stem 14, (which may be integral with it.) This valve-stem is made to pass loosely through the short sleeves or collars 16 and 18, said sleeves or collars being supported by the cross-pieces 15 and 17, respectively.

Just below the cross-piece 17 is arranged the valve-seat 19, made to receive the plate 13 when the valve is shut off or closed.

20 is a steam-supply pipe leading from the live steam of the boiler to the upper portion of the heater, as seen in Fig. 4, and being brought in contact with the water as it falls in thin sheets successively from one (1) disk to the other must thoroughly subject it to the action of the steam, thus abstracting all sediment which is deposited in the bottom of the heater. This pipe 20 also serves to equalize the pressure in the heater with that in the boiler; as well as raising the temperature of the water to almost an equal heat to that in the boiler. It will be seen that the pressure being equal on both sides of the valve-plate 13 the valve remains open, the plates resting upon the sleeve or collar 16.

At the base of the heater 1 is arranged the blow-off pipe 26, having the valve 25.

In operation water is first fed into the

heater through the pipe 2, and falling successively from one (1) disk to the other until it falls on one (1) side of the dividing wall or partition 27, and rising upon the opposite
 5 side of said partition until it reaches the line 22, as shown in Fig. 1. When it is desired to feed the water to the boiler, water is pumped into the heater, its surface reaching about to the line 23, which operation may be observed
 10 by the water-gage 24. This extra supply of water will raise the water in the pipe of passage 10, where it passes off through the pipe 11 and valve 12 into the boiler.

When it is found necessary to cleanse the
 15 heater, the valve 25 is opened, which reduces the pressure in the heater, thus causing the automatic shut-off valve 12 to close by the pressure of the boiler, and the live steam passing from the boiler to the top of the
 20 heater is forced down through the heater and out through the blow-off pipe 26, carrying with it all the water remaining in the base of the heater and also the sediment and foreign matter which may have accumulated there,
 25 and as the valve 25 is closed, the pressure in the heater being again equal to that in the boiler, the automatic shut-off valve 12 opens the valve-plate 13, falling to its normal position by its own gravity.

30 It will be seen that should any accident occur to the heater or any of its connections by leakage or otherwise the pressure in the pipe 11 would be reduced and the pressure from the boiler would immediately close the valve
 35 12, thus effectually closing all communication at that point, and the operator has only to close the valve 21 in the pipe 20 and all communication with the boiler is closed, the valve 12 thus acting as a safety-valve as well as a
 40 shut-off valve.

I claim—

1. In a feed-water heating and purifying apparatus, a chamber having two or more sectional disks arranged at suitable distances
 45 apart in its upper portion and over which the water successively passes, a vertical tube or passage with open ends extending below the water-level bottom of said chamber and projecting above said disks, a water-supply pipe

opening into said vertical tube or passage 50 and communicating with the boiler below the water-line, a pipe leading from the live steam of the boiler to the upper portion of said chamber, the lower portion of said chamber being divided into two (2) compartments by
 55 a dividing wall or partition, and a suitable blow-off valve arranged at the base of the chamber for cleansing the same, the whole combined and operating substantially as and for the purpose stated. 60

2. In a feed-water heating and purifying apparatus, a chamber having two or more sectional disks arranged at suitable distances apart in its upper portion, a vertical tube having open ends centrally located within said
 65 chamber, a water-supply pipe opening into said vertical tube and communicating with the boiler, said pipe having an automatic shut-off valve, a pipe leading from the live steam of the boiler to the upper portion of said
 70 chamber, having a valve for regulating the pressure of the steam passing through it, and a suitable blow-off valve arranged at the base of the chamber for cleansing the same, the whole combined and operating substantially
 75 as shown and described.

3. In a feed-water heating and purifying apparatus, the combination of a chamber 1, having the water-supply pipe 2 and the sectional
 80 disks 3 4 5 6 7 8, the sediment-accumulating chamber 9, divided by the wall or partition 27, the vertical tube or passage 10, a feed-supply pipe 11, within which is arranged the automatic shut-off valve 12, having the valve-plate 13 resting on the sleeve or collar 16, the
 85 valve-stem 14, integral with said plate and passing loosely through the sleeves 16 and 18, the pipe or passage 20, having the valve 21 and leading from the live steam to the top of said chamber, a blow-off pipe 26, and valve
 90 25, substantially as shown.

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

ROBERT LEARMONTH.

Witnesses:

CHAS. M. HARRINGTON,
 OTTO E. HODDICK.