

No. 635,233.

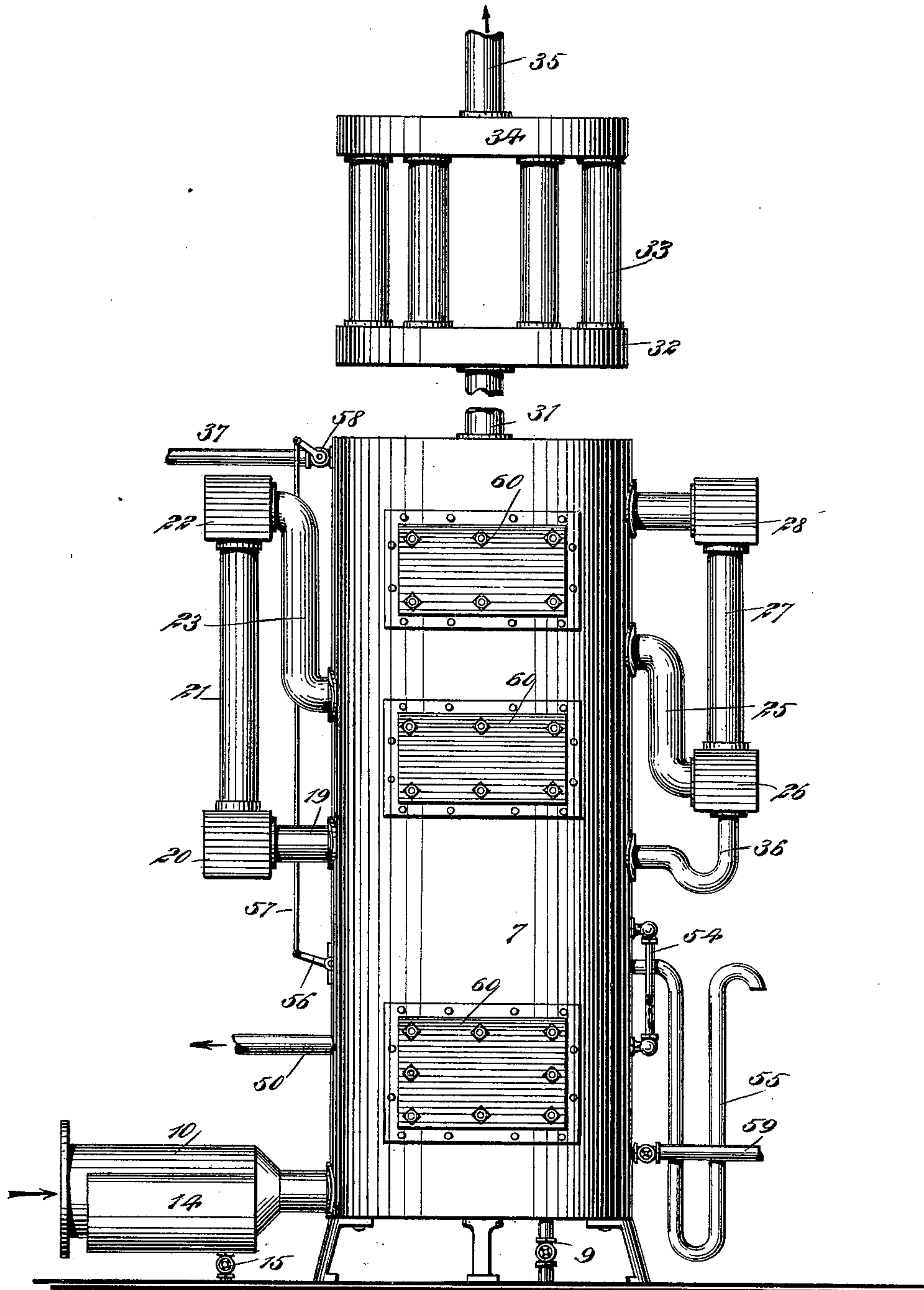
Patented Oct. 17, 1899.

J. S. CARTER.
FEED WATER APPARATUS.

(Application filed Feb. 9, 1899.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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Fig. 1

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No. 635,233.

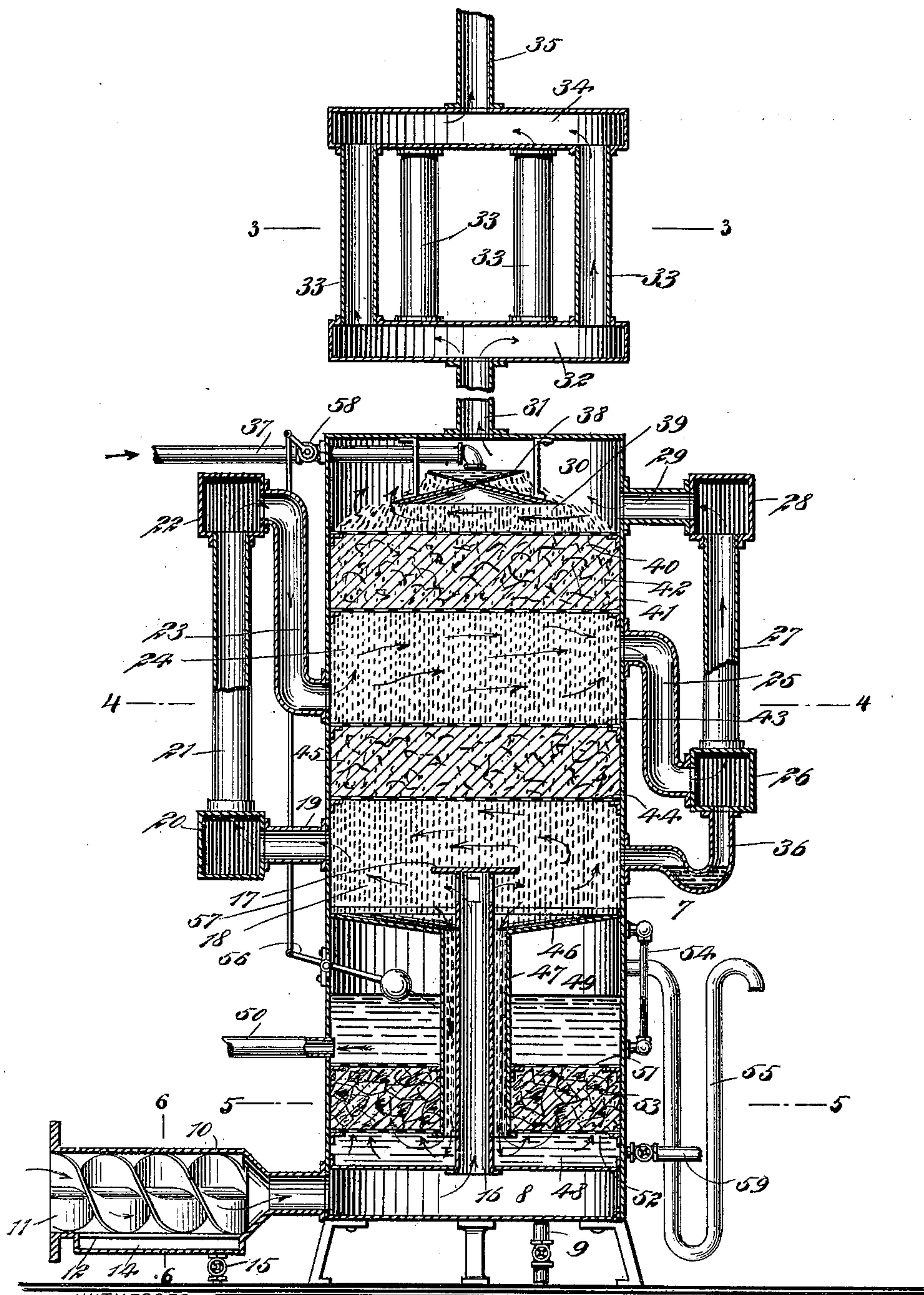
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(Application filed Feb. 9, 1899.)

(No Model.)

3 Sheets—Sheet 2.



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Fig. 2

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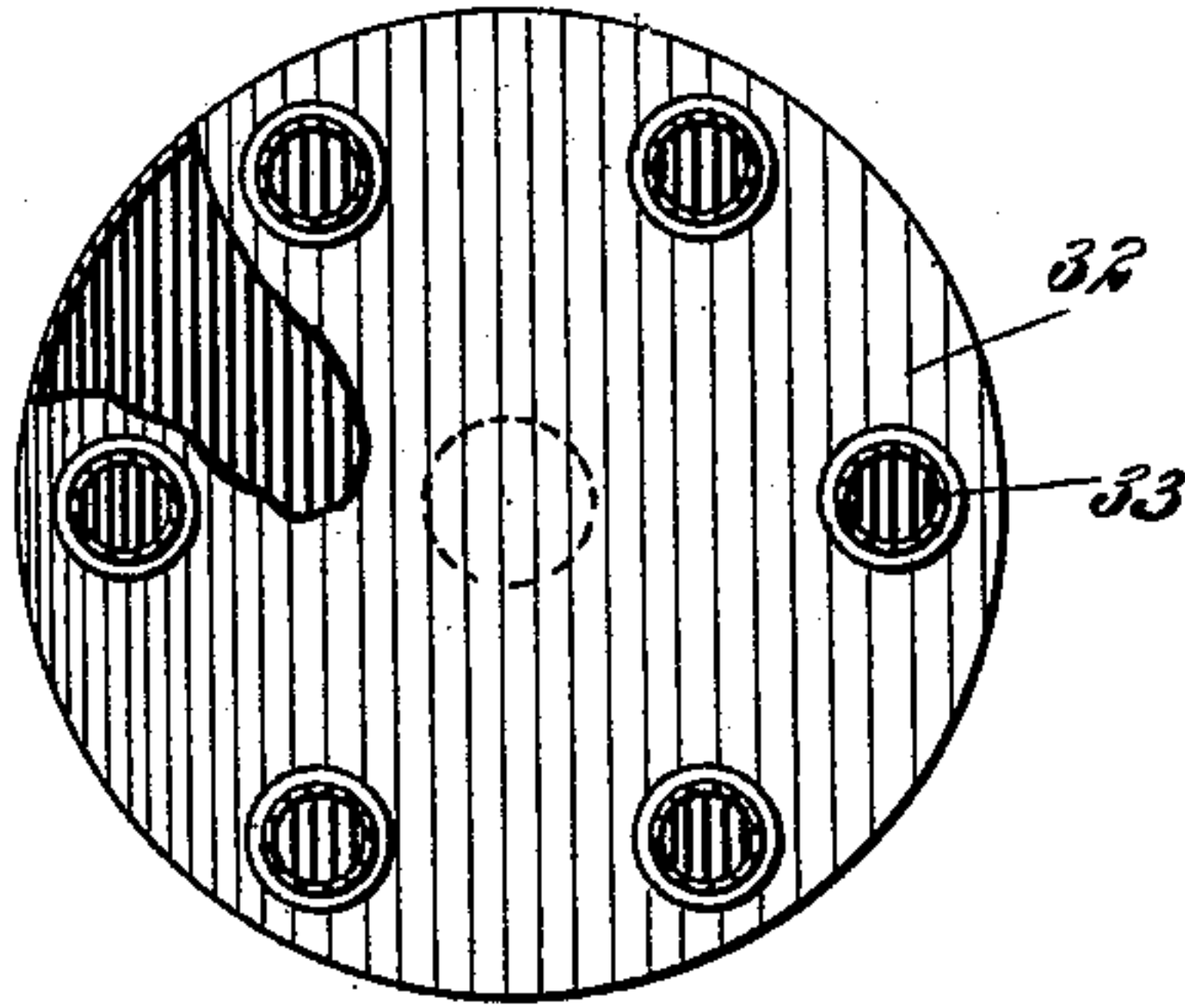


Fig. 3

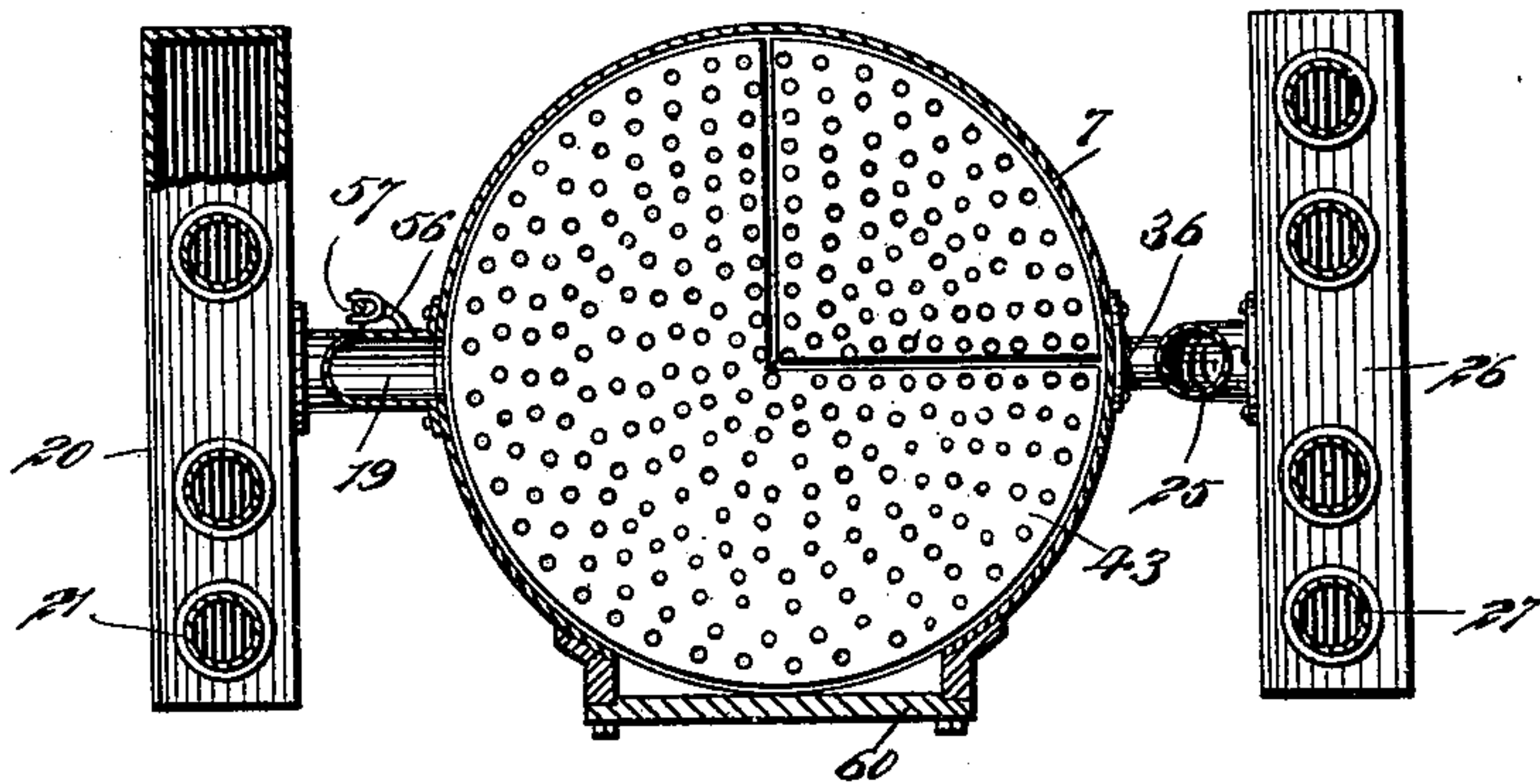


Fig. 4

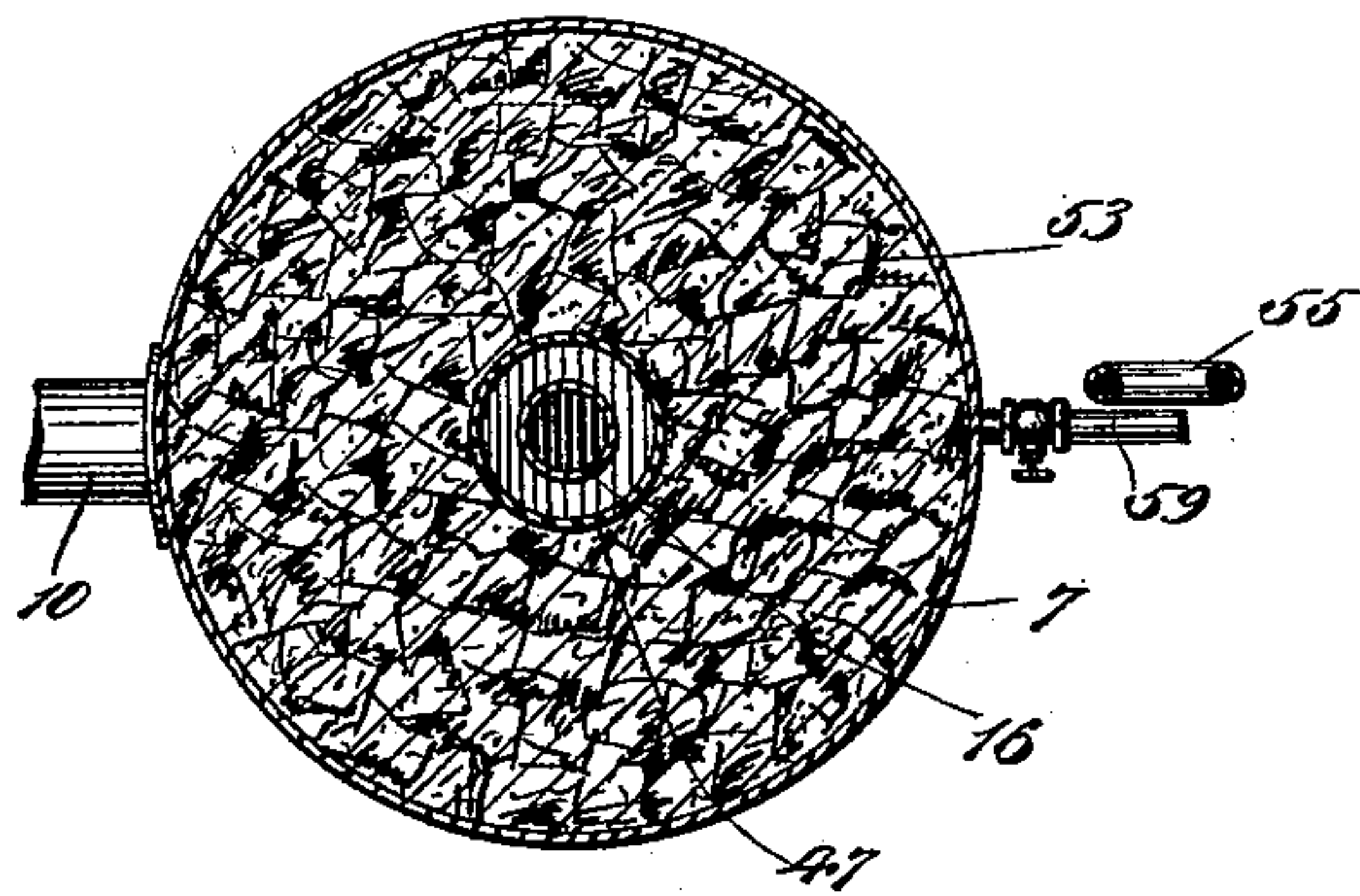


Fig. 5

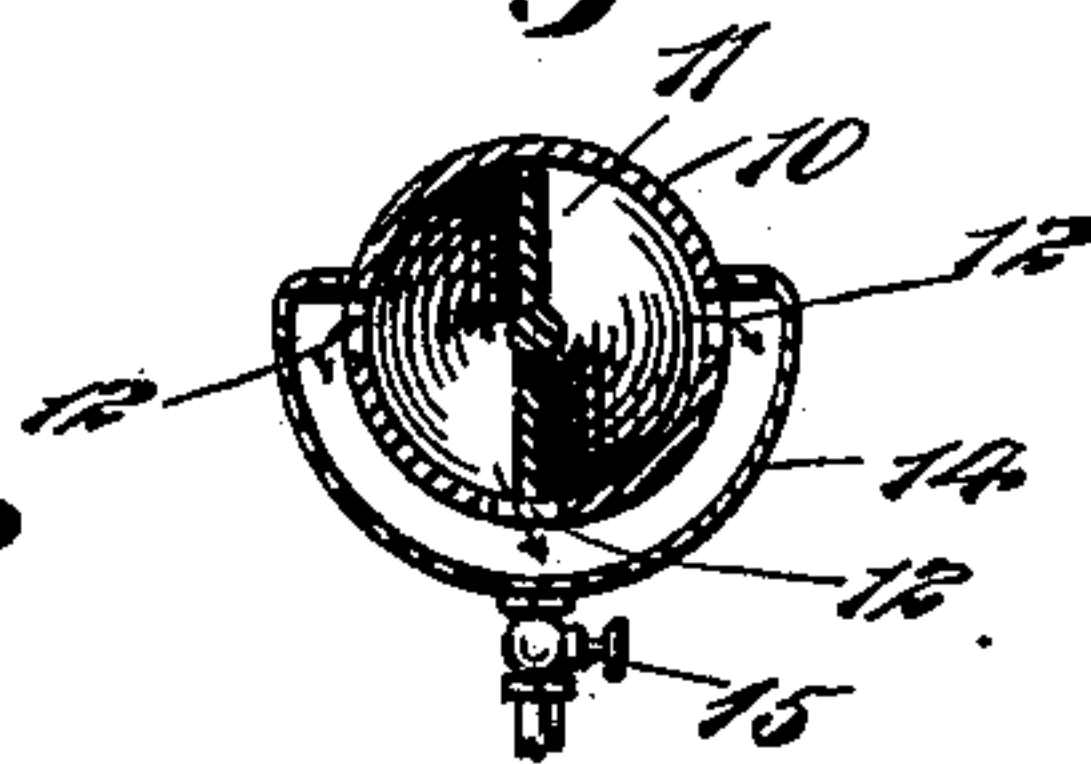


Fig. 6

WITNESSES.

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UNITED STATES PATENT OFFICE.

JOHN SLADE CARTER, OF BUFFALO, NEW YORK.

FEED-WATER APPARATUS.

SPECIFICATION forming part of Letters Patent No. 635,233, dated October 17, 1899.

Application filed February 9, 1899. Serial No. 705,018. (No model.)

To all whom it may concern:

Be it known that I, JOHN SLADE CARTER, of Buffalo, in the county of Erie and State of New York, have invented a new and improved
5 Feed-Water Apparatus, of which the following is a full, clear, and exact description.

This invention relates to feed-water apparatus in which exhaust-steam from the engine or other apparatus in connection with
10 which the boiler is used is led to the feed-water apparatus to heat the feed-water and at the same time to condense the exhaust-steam and cause its return to the boiler.

My apparatus also embodies means for purifying the feed-water and for separating oil
15 from the exhaust-steam.

This specification is the disclosure of one form of my invention, while the claims define the actual scope thereof.

20 Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

25 Figure 1 is a front elevation of my invention. Fig. 2 is a vertical longitudinal section thereof. Fig. 3 is a sectional view on the line 3 3 of Fig. 2. Fig. 4 is a similar view on the line 4 4 of Fig. 2. Fig. 5 is a similar view on
30 the line 5 5 of Fig. 2, and Fig. 6 is a detail cross-section on the line 6 6 of Fig. 2.

The apparatus has a cylindrical casing 7, in the bottom of which is formed an annular chamber 8, having a blow-out pipe 9 in connection therewith. Leading into the chamber 8 is
35 the contracted neck of a circular drum 10, in which is fitted a stationary screw 11. The exhaust-steam is passed through the drum 10 in the direction of the arrow shown in Fig. 2, so as to be led into the steam-chamber 8.
40 The drum 10 is formed with a number of longitudinally-extending slots 12 therein, all of which lead into a curved receptacle 14, surrounding the lower portion of the drum and
45 commanded by a petcock 15. The steam driven through the drum is caused to have a spiral movement by the screw 11, which by centrifugal action throws outward the particles of oil that be suspended in the steam, such
50 particles of oil engaging the sides of the drum and passing through the openings 12 into the receptacle 14, from which they may be with-

drawn by way of the cock 15. By these means the oil is effectively separated from the steam, which latter passes into the apparatus in a
55 pure state.

Leading up from the steam-chamber 8 is a pipe 16, which has openings near its upper end for the exit of the steam and which has a horizontal baffle-plate 17 secured to its up-
60 per extremity, causing the steam to pass out horizontally into a feed-water-heating chamber 18. From the feed-water-heating chamber 18 the steam passes by a pipe 19 to a box 20, which is in communication with a number
65 of vertically-standing condensing-tubes 21, constructed, preferably, of glass. The upper ends of these tubes are in connection with a box 22 similar to the box 20, so that the steam passes from the tubes 21 to the box 22 and
70 from the box 22 into a pipe 23, which leads into a second feed-water-heating chamber 24. The steam passes horizontally across this chamber and out by way of a pipe 25, which leads to a box 26 similar to the box 20 and
75 in communication with condensing-tubes 27 similar to the tubes 21. The upper ends of the tubes 27 communicate with a box 28 similar to the box 22, from which box 28 passes a pipe 29, that leads into a third feed-water-
80 heating chamber 30, which is located at the upper extremity of the casing 7. From the box 26 a trapped or return pipe 36 leads to the feed-water-heating chamber 18, by means of which pipe the water of condensa-
85 tion from the elements 28, 27, and 26 is returned to said feed-water-heating chamber 18. From the chamber 30 the steam passes by way of a perpendicular pipe 31 to an annular box 32, which communicates with a
90 number of perpendicularly-extending condensing-tubes 33, leading to a box 34 similar to the box 32. The box 34 has an outlet in the form of a vertically-extending pipe 35. The steam in its passage through the various
95 compartments thus described is condensed, and the water of condensation runs back into the casing to be employed as feed-water. The steam is also employed to heat the feed-water in a manner which will now be described.
100

The feed-water is led into the apparatus by means of a pipe 37, which delivers upon an imperforate concave baffle-plate 38. The water passes over this plate and upon a convex

baffle-plate 39, located directly beneath the plate 38, over which the water passes in a spray, so that the steam entering the chamber 30 by the pipe 29 will act thoroughly upon the water to heat the same. The chambers 24 and 30 are divided by means of a filtering-partition formed of an upper screen 40 and a lower screen 41, between which is packed a fibrous filtering material 42. The water from the chamber 30 percolates through the filtering material 42 and falls in a spray into the chamber 24, where it is again subjected to the action of the steam passing between the pipes 23 and 25 to be further heated. The chamber 24 is divided from the chamber 18 by a filtering-partition formed of an upper screen 43 and a lower screen 44, between which is held a fibrous filtering material 45. Through this filtering-partition the water passes in a spray to the chamber 18, where it is for the third time acted on by the steam, which then passes from the chamber 18 to the pipe 19. A concave circular plate 46 forms the bottom of the chamber 18 and has an opening in its center, from which passes downwardly a pipe 47, that surrounds the pipe 16. This pipe 47 carries off the water from the chamber 18 and leads the same downward into a water-chamber 48, located directly above the steam-chamber 8. Situated directly beneath the plate 46 is a feed-water chamber 49, from which the water is led to the boiler by means of a pipe 50. The chamber 49 is divided from the chamber 48 by a filtering-partition formed of an upper screen 51 and a lower screen 52, between which is arranged a mass of mineral filtering material 53, preferably coke. The chamber 49 is provided with a water-gage 54, and this chamber also has a trapped overflow-pipe 55. A float-lever 56 is extended into the chamber 49, to be actuated by the water therein, and is connected by means of a link 57 with the arm of a valve 58, controlling the pipe 37, so that the volume of water delivered to the apparatus is regulated by the height of the water in the chamber 49. The chamber 48 is provided with a valved blow-off pipe 59.

The casing 7 of the boiler is provided with three manholes closed by plates 60, through which manholes access may be had to the interior of the casing for cleaning the several filtering-partitions, and for this purpose the upper filtering-plates 40, 43, and 51 are formed in two or more removable sections, as shown

with reference to the plate 43 in Fig. 4, so that the plates referred to may be removed or partly removed and the filtering material reached.

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

1. A feed-water apparatus, having a casing formed with a chamber at its lower end, the chamber having a steam-inlet, a water-chamber formed above the first-named or steam chamber, a pipe passing between the two chambers and leading the steam upward, a filtering-partition located in the casing above the pipe, an outside condensing connection passing around the partition to lead the steam past the same, means for feeding the water to the upper end of the casing, the water passing downward through the filtering-partition and being heated by the steam and the steam being condensed by the water, and a second pipe surrounding the first-named pipe and leading the feed-water to the water-chamber.

2. In a feed-water apparatus, the combination of a casing, means for feeding the steam to the casing at the lower portion thereof below the partitions, means for feeding the water to the upper portion of the casing above the partition, and a condensing connection outside of the casing and communicating with the interior of the casing at each side of the partition to lead the steam around the partition and to condense the steam as it passes through the said connection.

3. A feed-water apparatus, having a casing with two filtering-partitions therein, such partitions being separated from each other to form three chambers, a condensing connection located outside of the casing and passing around one of the partitions, the connection communicating with the adjacent chambers, a second condensing connection located outside of the casing and passing around the other filtering-partition and communicating with the two adjacent chambers, a return-pipe passing from the second condensing connection and leading into the lowermost of the said chambers, and means for feeding the steam to the lower portion of the casing and the water to the upper portion thereof.

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Witnesses:

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