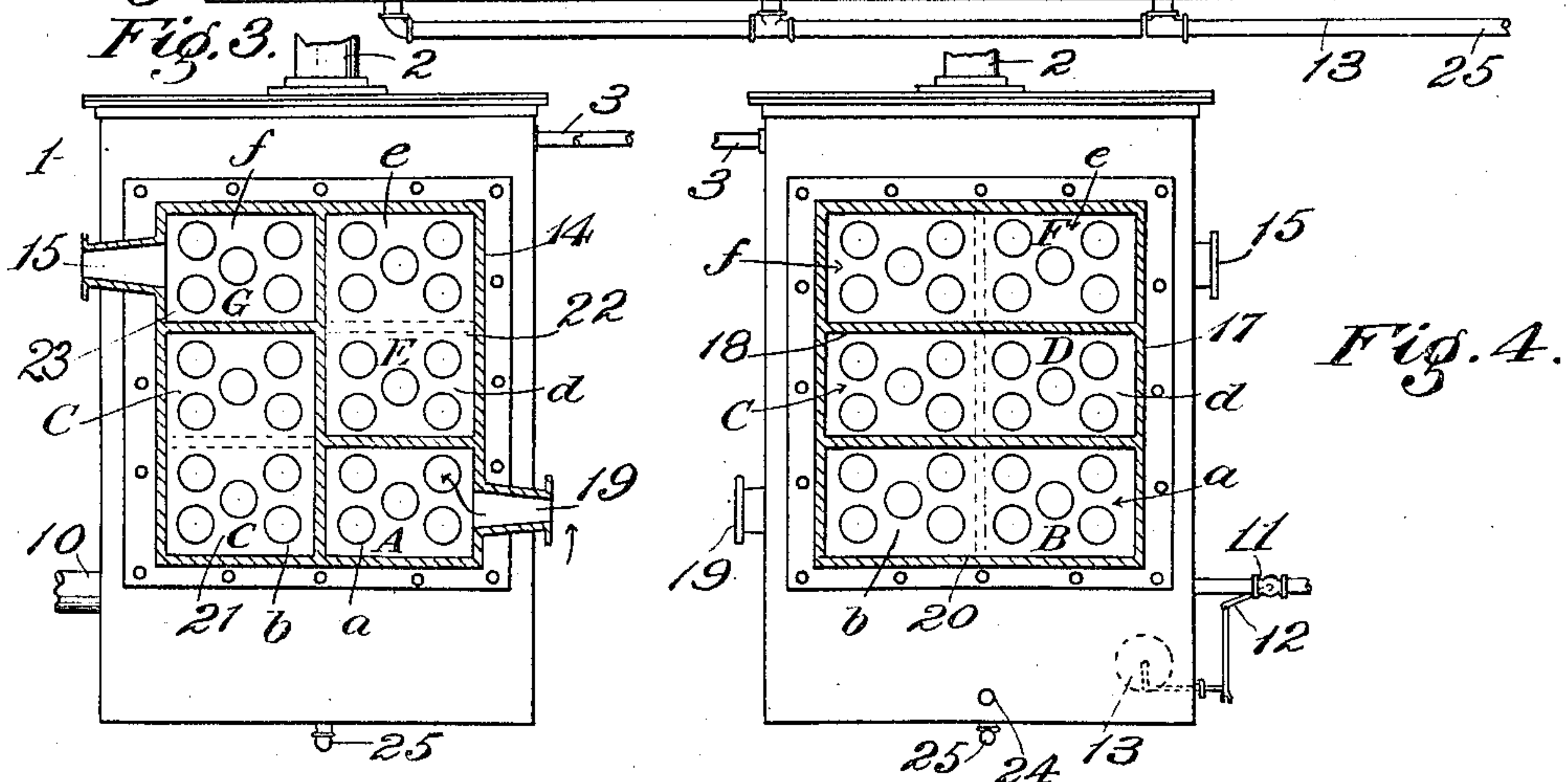
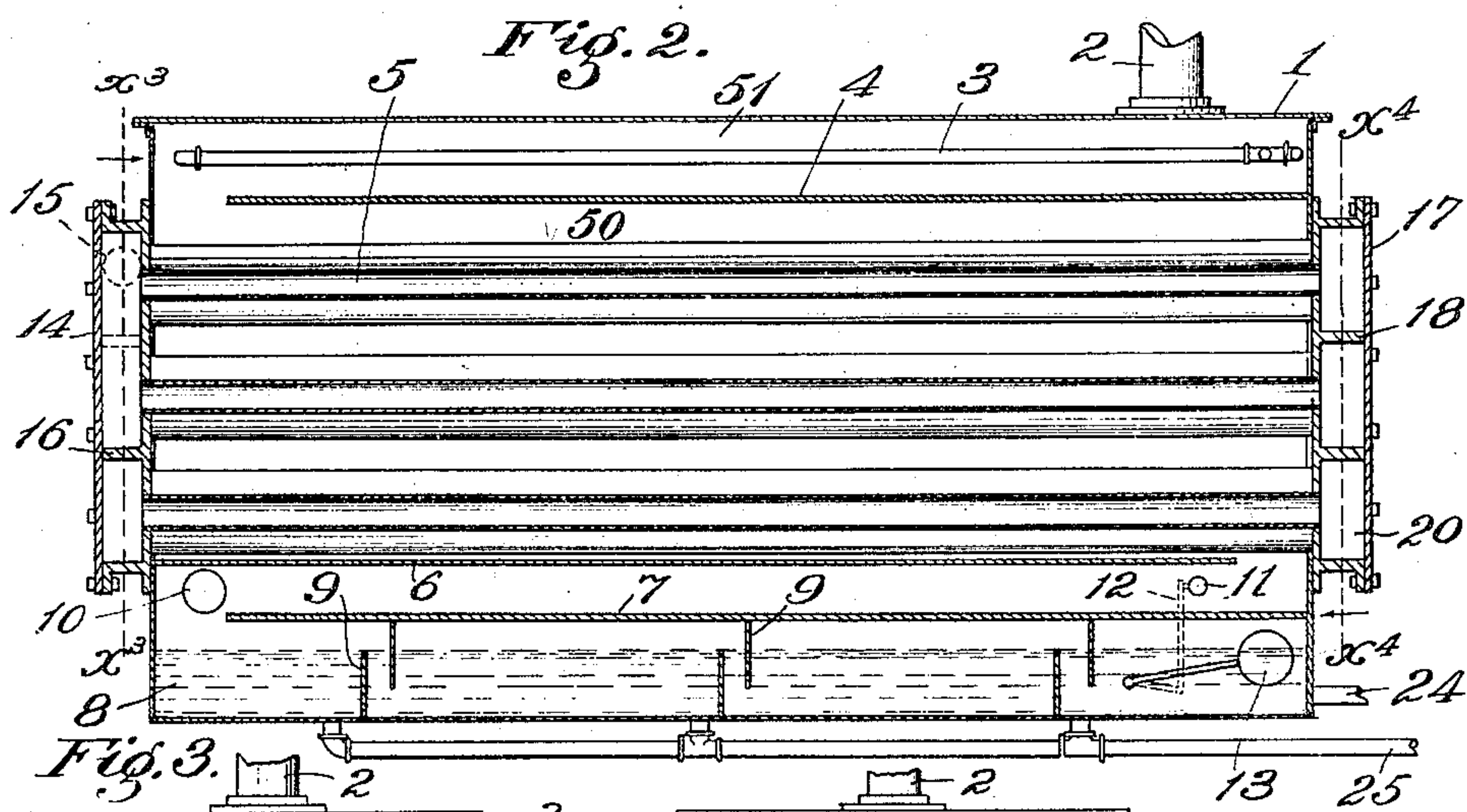
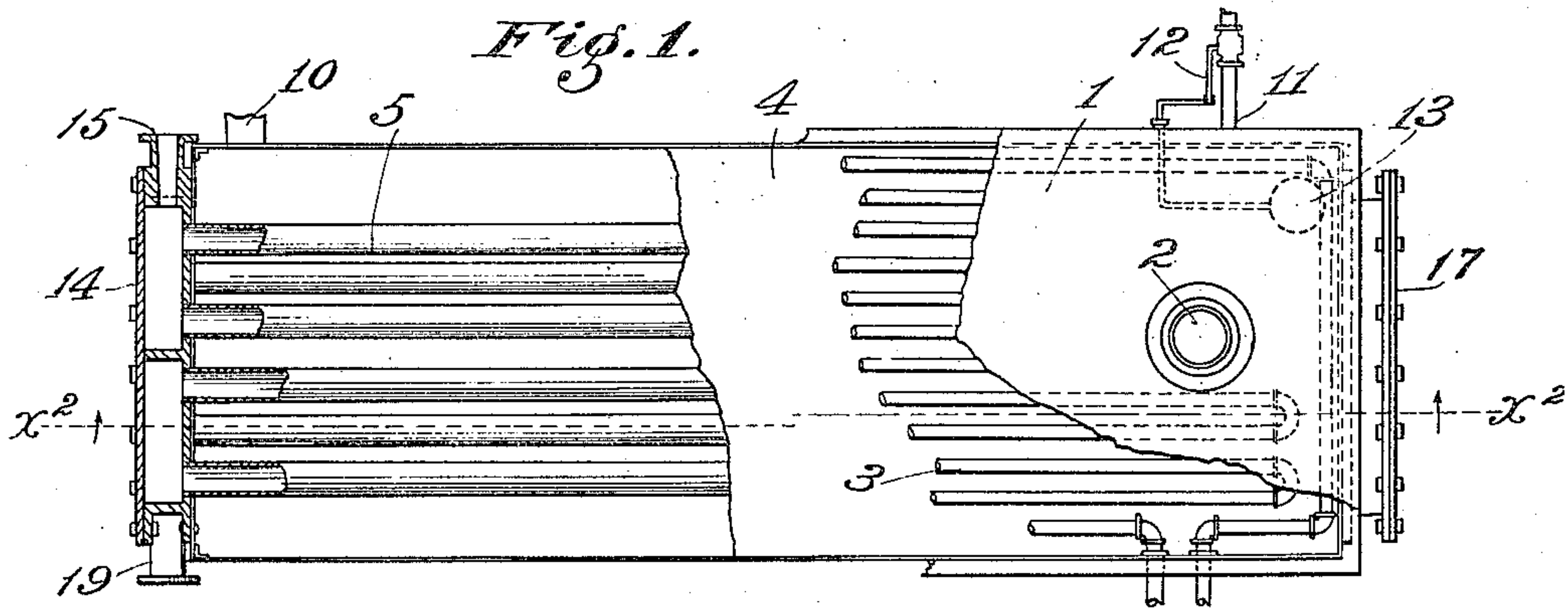


No. 865,875.

PATENTED SEPT. 10, 1907.

G. CURRAN.  
FEED WATER HEATER.  
APPLICATION FILED APR. 20, 1906.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

GARNER CURRAN, OF LOS ANGELES, CALIFORNIA.

## FEED-WATER HEATER.

No. 865,875.

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed April 20, 1906. Serial No. 312,791.

*To all whom it may concern:*

Be it known that I, GARNER CURRAN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Feed and Hot Water Heater, of which the following is a specification.

This invention relates to feed and hot water heaters, and has particular reference to water heaters designed for other than boiler use.

One of the objects of this invention is to provide a superior, simple, cheap and economical apparatus for heating water with steam from the exhaust of an engine, in which the steam is prevented from commingling with the water to be heated; to make provision for obviating the necessity of skimming the water of condensation of its impurities and sediments and allowing it to pass out in as pure a condition as may be required for feeding the boiler.

A further object of this invention is to instantaneously heat the water by the use of steam from the exhaust, and to allow it to be drawn off as quickly as it has circulated through the heating space.

A further object of this invention is to provide an apparatus of the character about to be described, in which the water to be heated is arranged to circulate through a predetermined number of tubes located within a heating chamber, the alternate travel of said water, from one end of the tubes to the other, serving to store the water within said tubes inside said heating chamber during the process of heating, so that no variations in the degree of the temperature of the water will be experienced when the water is allowed to escape.

The free admission of steam to the tubes containing and conveying the water, creates, or nearly so, a vacuum, thus avoiding any back pressure from the engine, a vent being provided in the present instance of practically the same dimensions as the exhaust inlet, whereby the surplus steam is allowed to escape, leaving the impure products of condensation within a receptacle provided for this purpose in the apparatus.

With these and other objects in view, my invention consists in the features and details of construction, separate and in combination, as will be described in connection with the accompanying drawings, and then be more specifically pointed out in the claims.

The accompanying drawing illustrates the invention:—

Figure 1 is a top plan view, partly in section. Fig. 2, a longitudinal, vertical section on the lines  $x^2$ — $x^2$  of Fig. 1. Fig. 3, a front elevation of the apparatus in section on line  $x^3$ , Fig. 2. Fig. 4, a rear elevation on line  $x^4$ , Fig. 2.

Referring more in detail to the drawing, 1 designates a casing substantially rectangular, having an exhaust

steam inlet 2 communicating with the interior of said casing 1.

3 represents a reheating coil arranged within said casing for feeding water to the boiler.

4 designates a baffle-plate extending nearly across the interior of the casing 1, said baffle-plate lying between the reheating coil 3 and the water-conveying pipes 5. The steam entering into the exhaust at 2 travels over the reheating coil and the baffle-plate 4; thence is circulated around the water pipes 5, whereupon it is allowed to escape over the baffle-plate 6 arranged in said casing and forming with the baffle-plate 4 a compartment adapted for the retention of the steam for heating the water. 7 is another baffle-plate arranged to convey condensed steam into the hot well 8 immediately below the said baffle-plate 7. The waters of condensation are accumulated and collected in said hot well or trap 8, the said trap being provided with a plurality of partitions 9 fixed to the baffle-plate 7 and to the bottom of the casing, this arrangement serving to collect the floating impurities and to prevent the sediment from being reconveyed into the feed-water coil.

A vent 10 is fixed on the casing for permitting the uncondensed or surplus steam to escape, thus leaving practically a vacuum within said casing and avoiding all danger of back pressure from the engine.

A perforated spray-pipe 11 provided in the compartment formed by the baffle-plates 6 and 7 is arranged to be connected with a water supply, and is designed to convey water to the casing 1 in order to make up for any deficiency therein. This perforated spray-pipe is connected with a valve, the stem of which is shown at 12, and is automatically operated by a float 13 provided in the hot well 8. It will be seen from this that when the water is low, the float will descend and open the valve to the perforated pipe, which will then spray water over the baffle-plate 7 until the required quantity of water in the hot well is replenished; whereupon the rise in the water will automatically close the said spray-pipe valve. A header 14 is fixed to the forward end of said casing, which header has an opening 15 and a plurality of compartments formed therein, shown at 16. A similar header 17 is provided on the opposite side of said casing and is divided into compartments 18. The water-conveying tubes 5 communicate with the compartments of the headers and travel forward and backward until the outlet is reached. An inlet 19 serves to admit the water into the pipes. The water entering at the inlet 19 traverses the pipes and discharges at the outlet of said pipes, which outlet is formed in the header by the compartment 20. From this compartment the water travels through the pipes to the compartment 21, thence upward and outward through the pipes in the same com-



partment into the compartment 22, upward and outward in the same compartment until finally discharged at the outlet 23. In this manner the water is heated while in its travel and kept heated until discharged, the temperature of the water varying only in proportion to the amount of water drawn off.

The headers 14 and 17 are provided with compartments each of which are capable of communicating with one or two groups of water pipes 5. This will be understood by reference to Fig. 3 and 4 in which the intake compartment A of the header 14 communicates with a group *a* of five pipes and receives a single stream of water from the inlet 19. The compartment B in the header 17 communicates with two groups of pipes corresponding to each other and one of which is the same group as that with which A communicates, and the other group *b* is on the same level therewith and corresponds thereto. These two groups are arranged side by side across the bottom of the heater, and compartment B extends horizontally twice the width of compartment A. Compartment C also communicates with two groups *b* and *c*, being approximately of the same cross section as compartment B but vertically arranged. Compartment D communicates with two groups *c* and *d*, and is arranged horizontally above the compartment *b* in header 17. Compartment E also communicates with two groups of pipes *d* and *e* arranged vertically one above the other. Compartment F is arranged horizontally in the header 17 and communicates with two groups of pipes *e* and *f* which are arranged side by side. The discharge compartment G communicates with the group *f* and with the outlet 15. By the arrangement thus shown the water will pass through the heater from end to end with the effect of a return coil, and yet the pipes 5 are readily accessible by simply removing the plates of the headers 14 and 17.

In my construction there is an inlet compartment as A, and an outlet compartment as G, each of which communicates with a single group of pipes. With this exception the compartments at one end of the casing are arranged to communicate with horizontally arranged groups, and those at the other end of the casing with vertically arranged groups, thus practically providing a heater having a plurality of groups of pipes and means for conducting a single stream of water zig-zag through said groups back and forth through the heater from side to side and from bottom to top.

In the present instance, the drawing represents a series of tubes, each series containing five pipes for conveying the water from one compartment to the other. This arrangement is not compulsory, since the series as well as the number of tubes in each series may be changed according to the capacity desired; and if an increased amount of water is desired, addi-

tional tubes may be inserted in proportion to the horse-power and in proportion to the quantity of water used.

The pipe 24 is connected with a pump, not shown, for the purpose of feeding water to the boiler, and a pipe 25 serves to carry off the sediment and other settling impurities of the condensed steam.

The construction and arrangement of tubes in the present invention render it possible to obtain perfectly pure and clean water for other than boiler use, which is especially adaptable in laundries, hotels, restaurants, etc.

In the drawings forming part of this specification, headers are represented arranged on opposite sides of the casing divided into compartments and forming outlets for the series of pipes arranged within the casing. The provision of headers on said casing may be dispensed with by connecting the alternate ends of the pipes with T joints, thereby affording a continuous flow through said pipes.

While I have represented in the drawings a device for heating water by means of pipes arranged within a casing through the medium of exhaust steam, I do not wish to be limited to the exact construction represented and described, since any arrangement of pipes within said casing,—so long as they are continuous and isolated from direct contact with the steam,—is within the scope of this invention, the primary object of which is to heat water in a feed water heater for other than boiler purposes.

What I claim is:—

1. A feed and hot water heater comprising a casing having headers divided into compartments, a reheating coil in the upper portion of said casing and means for circulating water therethrough, baffle plates in stepped relation, a plurality of tubes arranged in series communicating with said compartments alternately, means for continuously circulating water through said tubes, means for conveying exhaust steam into said casing, spray pipes for replenishing the water supply and means for storing the products of condensation.

2. A feed and hot water heater comprising a casing having headers divided into compartments, a reheating coil located in the upper portion of said casing and connected with a source of supply, a plurality of stepped baffle plates within said casing, a plurality of series of horizontally-arranged tubes communicating with said compartments alternately, an inlet and an outlet in one of said headers, means for continuously circulating water through said tubes, means for conveying exhaust steam to said casing, means for replenishing the water supply, and means for storing the products of condensation.

In testimony whereof, I have hereunto set my hand at Los Angeles, California this 10th day of April 1906.

GARNER CURRAN.

In presence of—

ANTON GLOETZNER, Jr.,  
JAMES R. TOWNSEND.