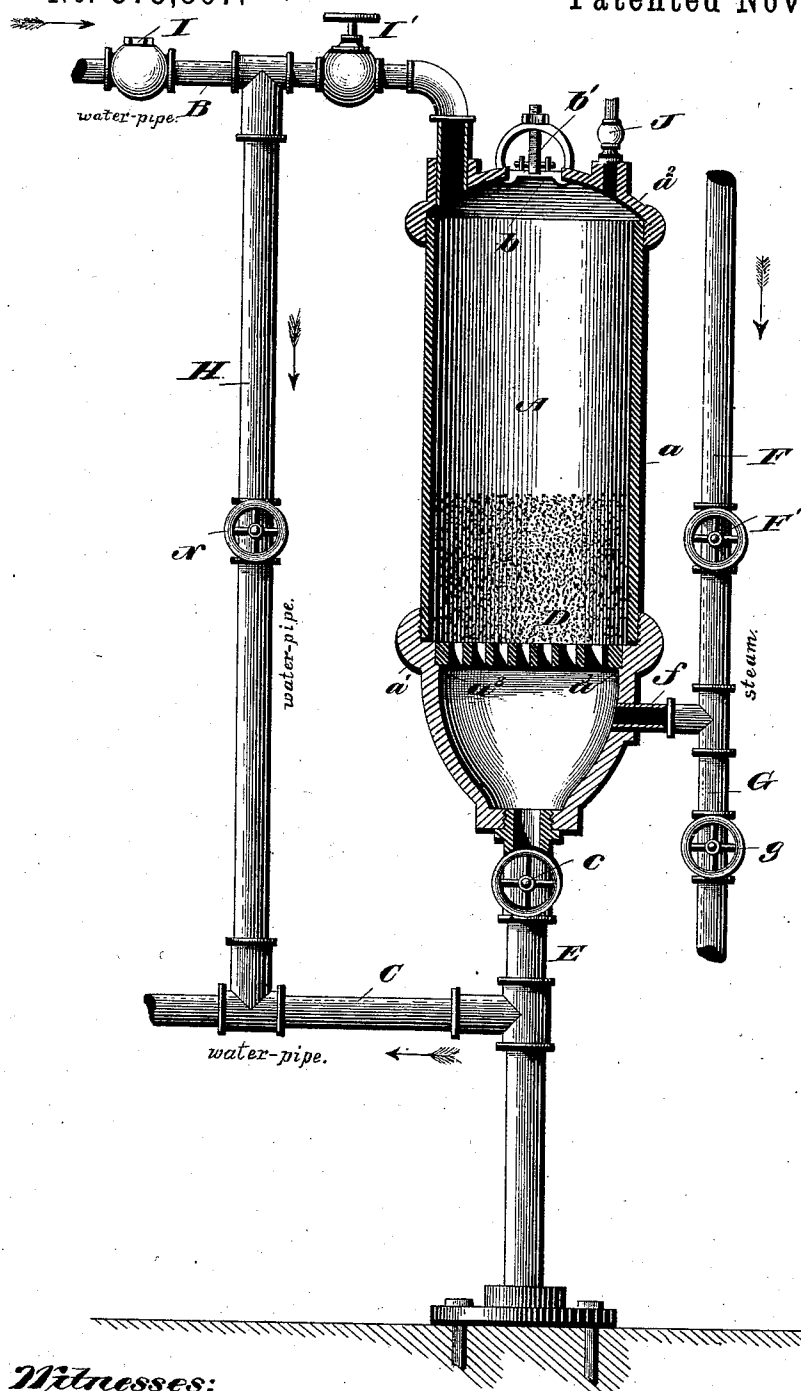


(No Model.)

F. TROWBRIDGE.
FEED WATER CLEANER.

No. 373,867.

Patented Nov. 29, 1887.



Witnesses:

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UNITED STATES PATENT OFFICE.

FRANK TROWBRIDGE, OF FOND DU LAC, WISCONSIN.

FEED-WATER CLEANER.

SPECIFICATION forming part of Letters Patent No. 373,867, dated November 29, 1887.

Application filed April 15, 1887. Serial No. 234,935. (No model.)

To all whom it may concern:

Be it known that I, FRANK TROWBRIDGE, a citizen of the United States, residing at Fond du Lac, in the county of Fond du Lac and State of Wisconsin, have invented certain new and useful Improvements in Feed-Water Cleaners; and I do 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 the letters and figures of reference marked thereon, which form a part of this specification.

The invention relates to improvements in feed-water cleaners; and it consists of the combination, construction, and arrangement of the various parts for service, as will be hereinafter fully set forth, and particularly pointed out in the claims.

In a prior patent granted to me on the 23d day of June, 1885, I have shown and described an apparatus for cleaning the feed-water of boilers, in which I provide a receiver in which potatoes or other substance or compound is boiled by the feed-water admitted thereto from the pump or heater, a cut-off valve being located in the supply-pipe to the boiler, by which the flow of water to the latter can be regulated at will.

In my improved cleaner I provide means whereby the potatoes, which are preferably employed, are first steamed to extract the desirable liquid matter therefrom, after which the feed-water is admitted into the receiver and allowed to pass through the same continuously, thereby feeding the liquid matter extracted from the potatoes and the pulp thereof with the water into the boiler simultaneously, the potato liquid being efficacious in precipitating the sediment in the feed-water and removing incrustations in the boiler. I also provide a diaphragm on which the potatoes are placed while they are being reduced to a pulp, said diaphragm being so constructed as to permit the pulp to pass therethrough and enter the boiler together with the feed-water and the extracted liquid, so that the receiver will be emptied and cleansed entirely of all its contents by the passage of the feed-water through the same.

In the drawing the single figure represents a

vertical sectional view of a feed-water cleaner embodying my invention, the various pipes and valves being shown in elevation.

Referring by letter to the drawing, A designates the receiver of my improved feed-water cleaner, which is connected by separate pipes B C with the boiler and the heater or pump, respectively, the latter devices not being shown herein, as they may be of any preferred pattern, my invention being adapted for cleaning the feed-water to any class of boilers.

I preferably construct the receiver of an open-ended cylinder, *a*, which is exteriorly screw-threaded at its ends, and the lower and upper heads, *a'* *a''*, which are screwed over the ends of the cylinder to close the same. These heads are preferably concavo-convex in form, and the lower head is provided with an annular flange or ledge, *a'''*, near its upper edge, for a purpose to be presently described.

The feed-pipe B from the heater or pump enters the receiver through the upper head, *a''*, at one side of the same, and the supply-pipe C to the boiler opens into the middle of the lower head, *a'*. The upper removable head, *a''*, is provided with a central hand-hole, *b*, which is closed by a cover, *b'*, of any preferred pattern, through which the potatoes are to be introduced.

D designates a perforated diaphragm which is inclosed or fitted in the receiver. The diaphragm rests on and is supported by the horizontal ledge or flange *a'''* of the lower head, *a'*, and is thereby suspended in the lower head, so that the feed-water will percolate freely through the mass of pulp supported on the same.

The receiver A is supported on a central standard, E, which is fixed in any suitable manner to the floor, as shown.

A steam-pipe, F, is arranged in a vertical position alongside of the receiver, and it communicates at its lower end with a short branch pipe, *f*, which enters the receiver at a point below the perforated horizontal diaphragm at one side of the lower head, *a'*, as shown. This steam-pipe communicates with a boiler or other source of steam-supply, and it has a cut-off valve, *F'*, by which the supply of steam can be readily shut off. A vertical drip-pipe, G, depends from the steam-pipe F, by which

the waste water from the receiver can be drawn off, and this pipe is also provided with a valve, *g*.

The feed and supply pipes B C are connected at a short distance from the points where they enter the receiver by a vertical pipe, H, leaving a valve, N, through which the feed-water from the heater or pump passes when it is not desired to supply the boiler with a cleansing compound.

The feed-pipe from the heater or pump is provided with a check-valve, I, and a cut-off valve, I', which are located on opposite sides of the vertical pipe, the function of the check-valve being to prevent the water from flowing back into the heater or pump and the other to cut off the water from entering the receiver when it is desired to cause it to flow through the vertical pipe H and into the supply-pipe.

An air-valve, J, is affixed to the upper head of the receiver, and it has a hollow stem which is extended through the head so as to communicate with the chamber of the receiver and thereby permit the compressed air in the latter to escape when it increases above a certain point.

The supply-pipe C to the boiler is provided at or near the point where it enters the receiver with a cut-off valve, *c*, by which the water from the receiver can be cut off from or allowed to flow through the supply-pipe.

This being the construction of my improved boiler-cleaner, the operation thereof is as follows: The feed-water ordinarily flows from the heater or pump through the feed-pipe B, the vertical pipe H, and the supply-pipe C into the boiler, the valves I' and *c* being closed to prevent the water from entering the receiver, and the check-valve I preventing the backflow of the water. To pass a cleansing substance into the boiler with the feed-water the hand-hole cover is removed from the receiver and a quantity of potatoes is placed in the receiver, being supported on the perforated diaphragm. The valve in the steam-pipe is opened to admit live steam into the receiver below the diaphragm, which passes up through the mass of potatoes to thoroughly steam the same and thereby reduce them to a pulp and partly extract the liquid matter from the same which accumulated in the concave lower head of the receiver below the diaphragm. The valves in the steam and vertical pipes E and H are now closed, and the valves in the feed and supply pipes opened to permit the water to pass through the receiver. The feed-water carries with it into the boiler the liquid matter extracted from the potatoes and the mass of pulp supported on the diaphragm, the perforations in which are of sufficient size to permit the pulp, which had been previously reduced to a semi-fluid state, to readily pass therethrough, thereby cleansing the receiver of its contents. The waste water can be readily drawn off by opening the valve in the drip-pipe, and by removing the cover from the

hand-hole the mass of potato pulp can be readily removed.

By first reducing the potatoes to a pulp and extracting the liquid matter therefrom the operation of feeding the cleansing matter to the boiler can be more expeditiously performed than by the apparatus described in my prior patent hereinbefore referred to, as the operation of reducing and extracting the liquid from the potatoes can be carried on at the same time that the boiler is being partially fed, and when the potatoes are properly reduced the water can be caused to flow through the receiver by simply manipulating a few valves, so that the water carries the liquid matter and pulp with it into the boiler.

My improved feed-water cleaner can be adapted for use in connection with any class of boiler and pump or heater with ease and facility, as the receiver can be readily erected at any suitable point and the necessary connections with the pump and boiler made in like manner.

I would state that while I deem the devices herein shown and described as best adapted for carrying my invention into effect, still I do not desire to confine myself to the exact details of construction and arrangement of parts, as I am aware that changes therein can be made without departing from the spirit or sacrificing the advantages of my invention.

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

1. The method herein described of feeding cleansing compounds to steam-boilers, consisting in subjecting potatoes to the action of steam in a closed vessel and then passing the feed-water through the vessel and the potatoes therein, as herein set forth.

2. In a feed-water cleaner, the combination of a receiver, a diaphragm therein, a steam-pipe entering the receiver at a point below the diaphragm, and water supply and discharge pipes communicating with the receiver, substantially as described.

3. In a feed-water cleaner, the receiver having a diaphragm and an air-valve above the diaphragm, a steam-pipe communicating with the receiver, and a water-supply pipe and a discharge-pipe also communicating with the receiver to convey feed-water to and from the same, substantially as and for the purpose set forth.

4. The combination, in a feed-water cleaner, of a receiver having a perforated diaphragm, a valved steam-pipe entering the receiver below the diaphragm, and the valved feed and supply pipes opening into opposite ends of the receiver, substantially as described.

5. In a feed-water cleaner, the combination of a receiver having the perforated diaphragm, a valved steam-pipe, a drip-pipe depending from the receiver, and the feed and supply pipes opening into opposite ends of the receiver, substantially as described.

6. In a feed-water cleaner, the combination of a receiver having the diaphragm, the valved feed and supply pipes entering the receiver at points above and below the diaphragm, the steam-pipe entering the receiver below the diaphragm, and a valved pipe connecting the feed and supply pipes, substantially as described.

7. In a feed-water cleaner, a receiver consisting of a shell and the removable concave heads fitted over the open ends of the shell, in combination with a perforated diaphragm sup-

ported in the lower head, a steam-pipe entering the lower head below the diaphragm, and the connected feed and supply pipes entering the receiver at points above and below the diaphragm, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK TROWBRIDGE.

Witnesses:

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H. P. BROWN.