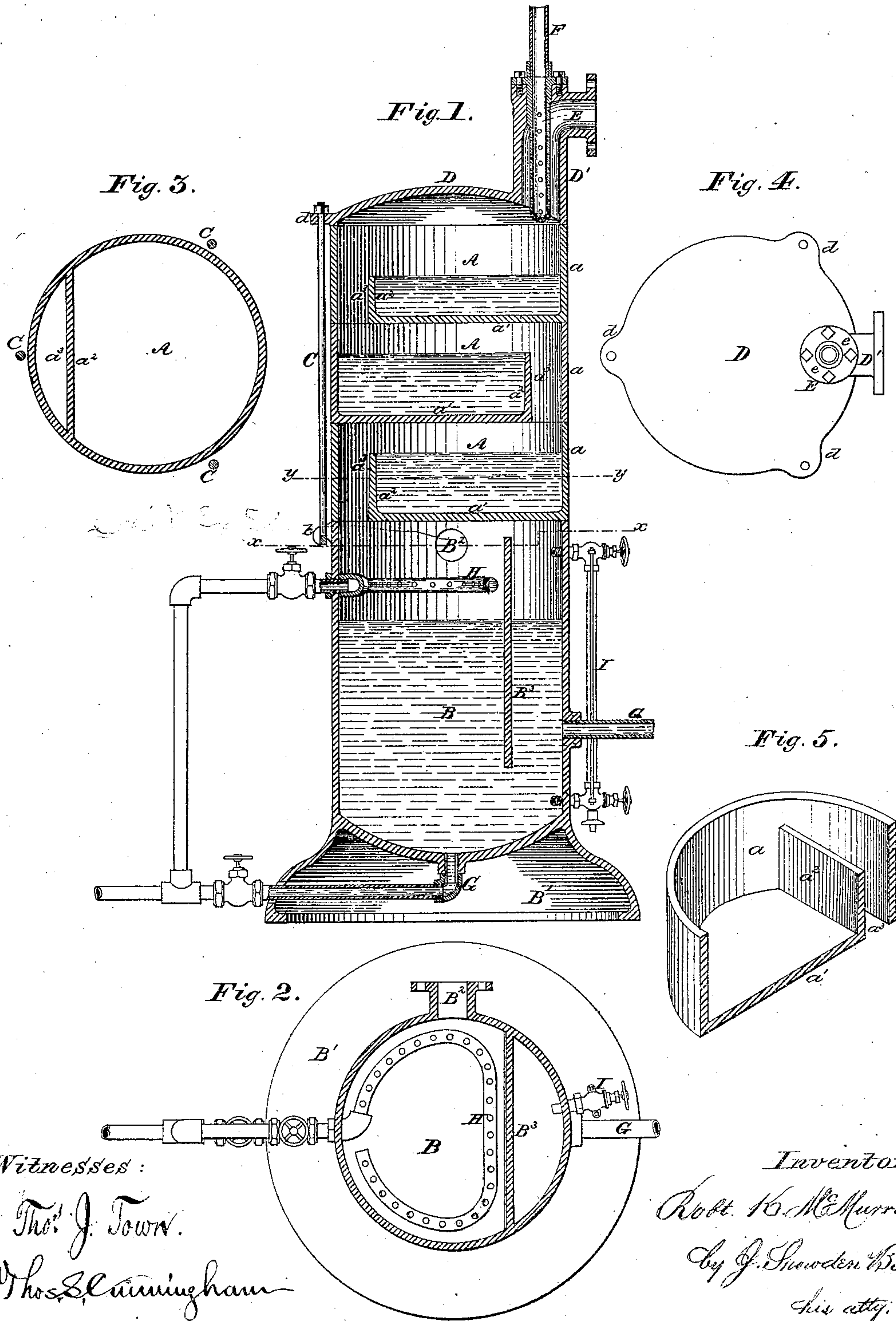


R. K. McMURRAY.

Improvement in Feed-Water Heaters and Purifiers.

No. 132,170.

Patented Oct. 15, 1872.



Witnesses:

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# UNITED STATES PATENT OFFICE.

ROBERT K. McMURRAY, OF WEST NEW BRIGHTON, NEW YORK.

## IMPROVEMENT IN FEED-WATER HEATERS AND PURIFIERS.

Specification forming part of Letters Patent No. 132,170, dated October 15, 1872.

*To all whom it may concern:*

Be it known that I, ROBERT K. McMURRAY, of West New Brighton, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Feed-Water Heaters and Purifiers for Steam-Boilers, of which the following is a specification:

The object of my invention is to provide a feed-water heater and purifier which shall embody in its construction the features of simplicity and economy, ready accessibility for cleansing and repairs, and adaptability to be increased in capacity when required, at a comparatively small cost, and with but little loss of time, and which will afford efficient means for separating from the feed-water the salts, grease, and other foreign matters that it may contain, and effectually preventing such impurities from passing over to the feed-pump and thence to the boiler. My improvements consist in combining in a feed-water heater and purifier a series of chambers, through which the exhaust steam and the feed-water are made to pass, and in each of which space is provided for the separation and retention of impurities contained in the water; and a feed-chamber, in which provision is made for preventing the access of grease to the feed-pump, and depositing such foreign matters as may pass the separating-chambers. The several features of my improvements are hereinafter fully set forth.

In the accompanying drawing, Fig. 1 is a vertical central section of my improved feed-water heater and purifier; Fig. 2, a horizontal section of the same at the line  $xx$  of Fig. 1; Fig. 3, a similar section at the line  $yy$  of Fig. 1; Fig. 4, a plan or top view of the cover-plate detached; and Fig. 5, a perspective section of one of the separating-chambers.

To carry out the object of my invention I provide a series of separating-chambers,  $A A$ , each consisting of an open-topped cylindrical shell,  $a$ , a bottom plate,  $a^1$ , and an overflow plate,  $a^2$ , extending upward from the bottom plate across the chamber. The bottom plate  $a^1$  does not extend beyond the overflow-plate, the segment-shaped passage  $a^3$  on the opposite side of the overflow-plate serving to allow the water and steam to pass out of the chamber. The chambers are cast, each in a

single piece, faced off truly upon their edges so as to make tight joints between them, and arranged vertically in such a position that the alternate exit-passages  $a^3$  will be, respectively, on opposite sides of the heater. The series of separating-chambers thus arranged is placed upon the top of a cylindrical feed-chamber,  $B$ , which is faced off so as to make a tight joint, and which stands upon a suitable base or pedestal,  $B^1$ , and the separating-chambers and feed-chamber are united by T-headed bolts  $C$  passing through lugs  $d$  in a cover-plate,  $D$ , the bolt-heads engaging with hooked projections  $b$  on the outside of the feed-chamber. An exhaust entrance-nozzle,  $D'$ , is cast upon the cover-plate  $D$ , in the center of which nozzle a perforated pipe or rose,  $E$ , is secured by tap-bolts  $e$  passing through a flange on its upper end, to which the feed-water entrance-pipe  $F$  is connected. The exit-nozzle  $B^2$  for the exhaust steam is cast upon the side of the feed-chamber  $B$ , and near its top. The exit feed-pipe  $G$ , leading to the feed-pump, is connected to the feed-chamber  $B$  at such a distance from the bottom as to afford ample space for the subsidence and deposition of mud or other impurities that may pass the separating-chambers. Such impurities remain quiescent in the bottom of the feed-chamber, until blown off when desired by the mud-blow  $G'$ , which is provided for that purpose. In order to prevent grease from passing into the exit feed-pipe  $G$ , I provide a diaphragm,  $B^3$ , extending vertically across the feed-chamber. The bottom of the diaphragm extends a few inches below the level of the exit feed-pipe, and the top of the diaphragm is about one inch below the top of the feed-chamber, thus establishing communication between the two sides of the chamber, both above and below the diaphragm. As all the grease contained in the water naturally floats upon the surface, the effect of the diaphragm is to prevent the grease from being drawn in to the feed-pipe; inasmuch as the water which is supplied to the pipe passes under the diaphragm, and when the level of the water in the feed-chamber falls to that of the feed-pipe, the latter will draw air through the space above the top of the diaphragm, and the grease will remain on the surface of the water on the side of the diaphragm furthest from the feed-pipe. f



deemed preferable, the diaphragm may extend from the top to the bottom of the feed-chamber, and be perforated with one or more openings adjacent to its upper and lower ends, respectively; but I consider the form first described to be most desirable. For the purpose of removing grease from the feed-chamber, I provide a grease-blow, H, the same consisting of a curved perforated pipe, secured in a horizontal position to the inside of the feed-chamber below the exhaust exit-nozzle B<sup>2</sup>, and provided with a proper valve connected by a pipe to the discharge-pipe of the mud-blow G'. The grease can be blown out of the feed-chamber as often as deemed necessary, the level of the water being indicated by a glass gage, I.

In the operation of my improved heater and purifier, the exhaust steam which enters the entrance-nozzle D' meets the feed-water which escapes in small streams from the apertures of the perforated pipe E, and thoroughly heats it in its passage through the heater. The heated water falls into the upper separating-chamber and fills it to the top of the overflow-plate, the foreign matters being deposited upon the bottom plate and there remaining quiescent. After filling this chamber, as stated, the water falls in a thin stream over the overflow-plate into the chamber next below, and so on until it passes finally into the feed-chamber, whence it is pumped into the boiler, as required. Such impurities as may pass through the upper separating-chamber will be arrested in the lower chambers of the series, and as the exhaust steam passes through the chambers on its way to the exit-nozzle B<sup>2</sup>, it imparts its heat thoroughly to the water. By removing the bolts C any or all of the separating-chambers may be taken out and cleaned without breaking any other joints, and access can be had to the feed-chamber. If it be desirable

to increase the capacity of the heater, additional chambers can be readily added. Such impurities as may be deposited in the bottom of the feed-chamber will remain there until blown off, without any tendency to be drawn into the exit feed-pipe. The diaphragm B<sup>2</sup> effectually prevents grease being carried into the pump and boiler.

I claim as my invention, and desire to secure by Letters Patent—

1. The combination, in a feed-water heater and purifier, of a cover-plate, one or more separating-chambers, each composed of an open-topped cylindrical shell, a bottom plate, and an overflow-plate, and a feed-chamber for the reception of the heated and purified water, constructed substantially as described.

2. The combination, in a feed-water heater and purifier, of the cover-plate, the perforated pipe for diffusing the current of entering feed-water, and the entrance-nozzle for the exhaust steam, surrounding the perforated feed-water pipe, these parts being constructed and combined substantially as set forth.

3. The combination, in a feed-water heater and purifier, of a series of separating-chambers, constructed substantially as set forth, and a feed-chamber, provided with a vertical diaphragm, open at top and bottom, and a feed-pipe connected to the feed-chamber above the level of the bottom of the diaphragm, as and for the purpose set forth.

4. The combination, in a feed-water heater and purifier, of a series of separating-chambers, a feed-chamber, and a curved perforated pipe for blowing off the grease from the surface of the water in the feed-chamber, constructed substantially as set forth.

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Witnesses:

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