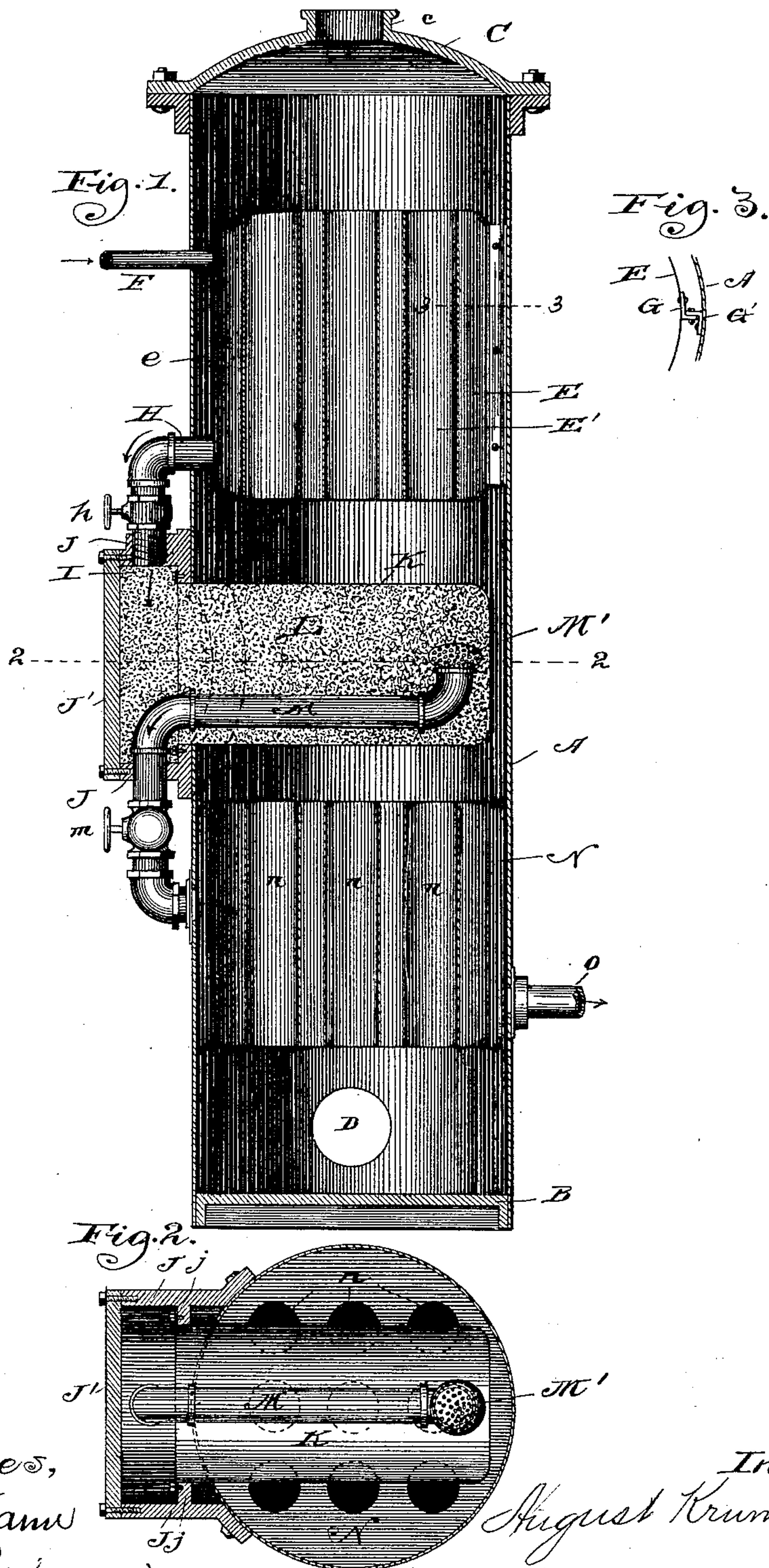


(No Model.)

A. KRUMHOLZ.
FEED WATER HEATER AND PURIFIER.

No. 434,667.

Patented Aug. 19, 1890.



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FEED-WATER HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 434,667, dated August 19, 1890.

Application filed June 20, 1890. Serial No. 356,088. (No model.)

To all whom it may concern:

Be it known that I, AUGUST KRUMHOLZ, a citizen of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Feed-Water Heaters and Purifiers, of which the following is a specification.

My invention relates to certain improvements in feed-water heaters and purifiers wherein the feed-water is heated by exhaust-steam from the engine and the impurities collected from the water.

In carrying out my invention I employ by preference a cylindrical casing containing toward its opposite ends heating-drums, the upper one being preferably arranged so as to be surrounded entirely by the exhaust-steam, and between these two drums I provide a filtering-chamber by means of a peripheral enlargement of the casing and a shell projected into the space inclosed by the casing, and which chamber is filled with excelsior or other material through which the water is filtered, and to which the water is delivered by a pipe leading from the upper drum, and from which it is carried away through a pipe having a strainer within the chamber and delivering at its opposite end to the lower drum. A removable cap or cover closes one end of this filtering-chamber, and said plate being removed the filtering material can be withdrawn and fresh material substituted quickly and without stopping the engine, and the interior shell may also be removed to permit access to the flues of the drums.

In the accompanying drawings, Figure 1 is a central vertical section through the upright casing and the shell of the filtering-chamber, the pipe system showing in elevation and parts thereof broken away. Fig. 2 is a section below the line 2 2 of Fig. 1; and Fig. 3 is a section on line 3 3 of Fig. 1, showing the means of securing the upper drum to the casing.

In the drawings, A represents the casing, which is secured upon a suitable base B, and has a cover C, with a discharge *c* for the exhaust-steam.

D indicates the inlet for the exhaust-steam from the engine.

Secured within the casing toward its upper end is the initial heating-drum E, which is of

less transverse diameter than the chamber, to provide an annular space *e* around its periphery, and through which the exhaust-steam may pass. This initial drum comprises a cylindrical shell having the tubes *E'* there-through, and the feed-water is delivered to this drum by means of the pipe F. To support this drum within the casing, I employ the angle-irons G G', (shown in Fig. 3,) one being secured to the wall of the drum and the other to the inside of the casing, and the flanges of the two being bolted together. Leading from the lower end of this drum is the pipe H, having the valve *h* therein, which is tapped through the wall of the chamber I, which is a peripheral enlargement of the casing formed by the walls J and a removable cap or cover J', secured by the bolts to the side walls J of the chamber. These side walls are bolted to the casing, which is apertured, as clearly shown in Fig. 2 of the drawings, and within the aperture is secured the open end of a shell K, cylindrical in form and flanged at its mouth to adapt it for securement to lugs *j*, projecting from the side walls J. The shell K projects nearly to the opposite wall of the casing and contains excelsior (indicated by L) or other suitable filtering material, through which the feed-water percolates, and rising within this chamber is the pipe M, having the strainer M', through which the feed-water passes. The pipe M is provided with a valve *m*, and the lower end of said pipe communicates with the heating-drum N, having the tubes *n*, and the discharge-pipe O. The course of the water is indicated by the arrows in Fig. 1, entering by the pipe at the top of the upper drum and discharging by the pipe leading from the lower drum, which communicates with the boiler. The flow of the water being established, exhaust-steam is admitted at D and ascends through the tubes of the lower shell, circulating around the shell of the purifying-chamber, and thence ascends through the tubes of the upper drum, and finally discharging through the top. The feed-water, receiving its initial heating in the upper drum, passes to the filtering-chamber, and, depositing its sediment, is drawn off through the strainer and pipe to the lower drum, where it is again subjected to heat, and thence escapes by the discharge-pipe.

It is well known that in purifying feed-water for boilers the sediment rapidly accumulates in the filtering material, rendering it unfit for purifying water in a longer or a shorter time, dependent on the impurities present.

In some cases it is found expedient to remove the filtering material frequently, and to render this easy of accomplishment is the principal object of my invention. To this end I have provided the removable cap or plate for the filtering-chamber, which being removed, ready access is had to the filtering material, which may be cleansed and replaced or fresh material substituted without interrupting the working of the machinery or occupying more than a few moments of time, it being only necessary to close the valves, so as to stop the flow of water, and then take out the bolts, securing the cap in place. Again, it often becomes necessary to repair the heating-drums because of the springing of the tubes under the influence of heat or from other causes, and to facilitate this I make the shell K easily removable, it being only necessary to uncouple the pipe leading from the filtering-chamber and then to remove the bolts which secure the flange of the shell.

I claim—

1. In a feed-water heater and purifier, the combination, with an exterior casing inclosing toward its opposite ends heating-drums having flues through which the heating agent is passed, of a filtering-chamber intermediate the drums and having one wall thereof formed by a removable plate to provide ready access to the filtering material, and suitable pipes to conduct the water to and from the drums and

purifying-chamber, substantially as described.

2. In a feed-water heater, the combination, with an exterior casing, of heating-drums within the casing located toward its respective ends, an intermediate filtering-chamber provided by a shell removably secured within the casing and adapted to contain a filtering material, and a removable plate or cover for the wall of the filtering-chamber, and suitable pipes to deliver the feed-water to the drums and conduct it to and from the filtering-chamber, substantially as described.

3. In a feed-water heater and purifier, the combination, with an exterior casing, of a drum located in the upper end thereof and having an inlet and outflow pipe, the latter provided with a valve, said casing having a peripheral enlargement formed by walls secured upon the side of the casing and one of said walls being removable and the side walls thereof having flanges, a shell having a flange adapted to the flanges of said walls and adapted to project into the interior of the casing to provide a filtering-chamber, a pipe communicating with the lower end of the upper drum and with a chamber formed by the peripheral enlargement of the casing, and a second pipe communicating with the interior of the filtering-chamber and leading from the lower end of the peripheral enlargement and connected with the lower heating-drum, substantially as described.

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