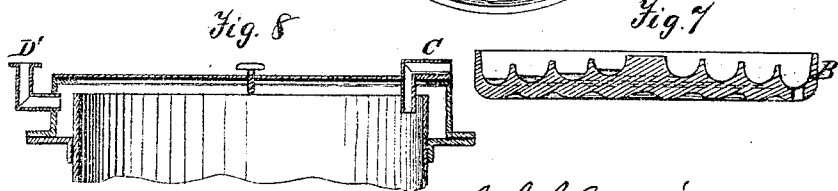
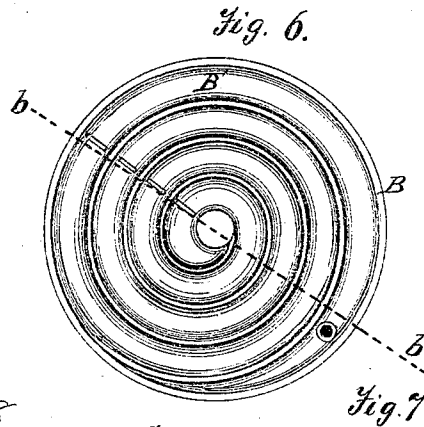
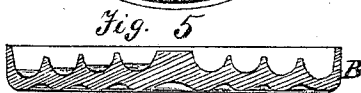
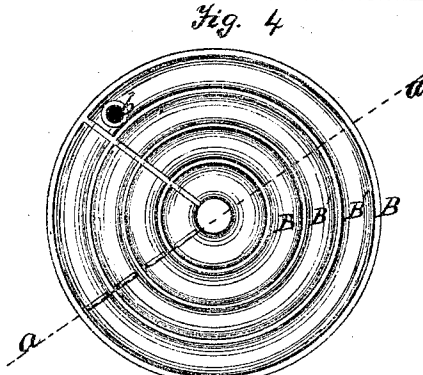
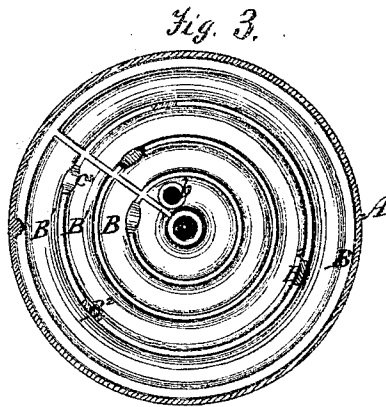
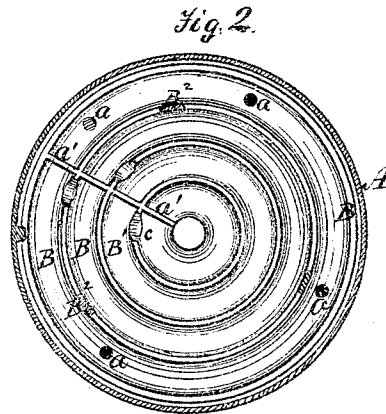
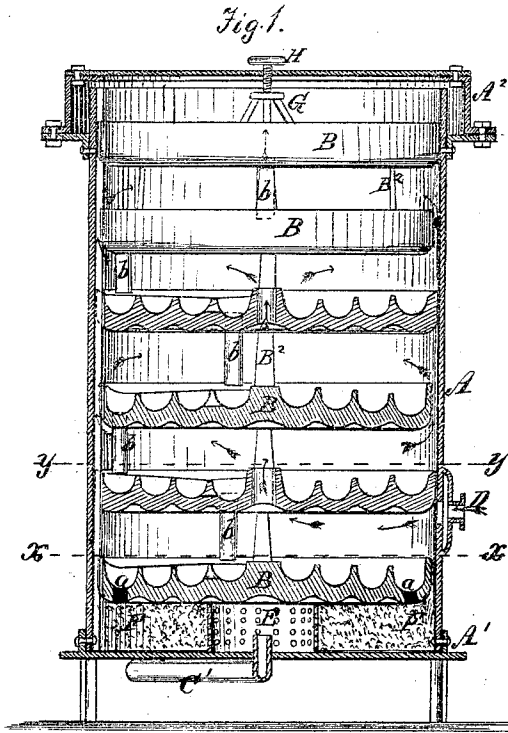


CHARLES S. S. GRIFFING.

Improvement in Feed-Water Heaters.

No. 114,132.

Patented April 25, 1871.



Witnesses:
A. Ruppert.
C. F. Clausen

C. S. S. Griffing
Inventor:
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Attys

United States Patent Office.

CHARLES S. S. GRIFFING, OF SALEM, OHIO, ASSIGNOR TO HIMSELF AND THOMAS SHARP, OF SAME PLACE.

Letters Patent No. 114,132, dated April 25, 1871.

IMPROVEMENT IN FEED-WATER HEATERS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, CHARLES S. S. GRIFFING, of Salem, in the county of Columbiana and State of Ohio, have invented certain Improvements in Feed-Water Heaters; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawing making part of this specification, in which—

Figure 1 is a sectional elevation of my improved heater, showing the cap upon its top for distributing the steam, the set-screw for holding the disks in position, the channelled disks for heating the water and receiving the sediment from the water, the steam-induction pipe and the water-induction pipe.

Figure 2 is a horizontal section on line *x x* of fig. 1, showing the recess in the side of the disk for holding it in position, the bar for partially obstructing the flow of the water, and the passages for its escape to the filtering-chamber.

Figure 3 is a horizontal section on line *y y* of fig. 1, showing the supports for keeping the disks separated.

Figure 4 is a plan view, showing a disk with an additional series of obstructions to the flow of the water.

Figure 5 is a vertical section on line *a a* of fig. 4, showing the construction of the water course and the arrangement of the dams or obstructions.

Figure 6 is a plan view of a modified form of one of the disks, showing a scroll-formed passage for the water and the dams or obstructions therein.

Figure 7 is a vertical section on line *b b* of fig. 6, showing the elevation of the inner portion of the groove for giving motion to the water, and the dams or obstructions for checking the flow of the lower stratum of the same.

Figure 8 is a section of the upper portion of the heater and of its cap, showing the water-induction pipe and the escape-pipe for the steam.

Corresponding letters refer to corresponding parts in the several figures.

A in the drawing refers to the case of the heater, which may be a cylinder of metal or of wood, and of any dimensions required. This cylinder is to be furnished with a lower head, *A'*, which will cover its entire surface, and be provided with a flange or other suitable means for attaching it to the cylinder.

A² refers to a cap which forms the cover or upper head of the heater, its diameter being somewhat larger than that of the cylinder to which it is attached by means of a ring, as shown in fig. 1. The upper portion of the cylinder or case of the heater extends up into the cap and nearly to its inner surface, leaving, however, between such surface and the end of the cylinder a sufficient space for any steam which may pass up through the heater without being condensed

to escape into the space between the cap and the upper portion of such cylinder, and out through an exhaust-pipe to the atmosphere or to any point where it may be directed.

The advantage claimed for this construction and arrangement of the cap is that it will retain the steam longer in the heater, and at the point near which the water is injected, and consequently will condense more of it, and thus return more of its heat to the generator than could otherwise be done, and at the same time will sooner heat the feed-water to such a temperature as to cause the earthy or mineral substances held in suspension by or in the water to be deposited.

In order to allow any water of condensation that may accumulate within the chamber at the top of the heater to escape, a series of holes is formed in the upper portion of the cylinder so as to permit it to pass into the interior thereof and mingle with the other water contained therein.

B B B refer to a series of concentrically or convolutely-grooved disks which are placed within the case or cylinder, as shown in fig. 1. The lower one of these disks is constructed as shown in figs. 1 and 2, its diameter being such as to cause it to fill the case, and it has through its outer concentric depression *B¹* a series of apertures, *a a*, for the discharge of the water into the filtering-chamber below.

From the hub or central projection of this disk there extends radially a bar or dam, the upper surface of which is about flush with the upper surface of the concentric grooves or channels, its object being to stop the flow of water around the disk and direct it from one groove or channel *B¹* to another.

It will be seen upon referring to the drawing that the water enters the inner concentric groove or channel *B¹* in the disk now being described, and in consequence of the fact that its lower surface is higher than those outside of it, it flows around in such groove until it comes in contact with the dam or obstruction above alluded to, where it is directed through the passage *c*, cut in the projection between this and the next outer channel into said groove or channel, through which it flows by virtue of its being higher than the one outside of it until it comes in contact with the dam or obstruction, when it flows into another groove, and so on until it has reached the outer one of the grooves, when it passes down through the aperture *a a* into the filtering-chamber below.

The channels or openings *c c c* from one concentric groove or channel to another are not cut so low as to reach the bottom of such grooves, but are cut to the depth of one-half, more or less, of the dividing projections, for the purpose of causing the water in the lower portion of such grooves or channels to move with less velocity than it does in the upper portion, in

order that the solid matter in the water may have more time in which to settle and be deposited upon the surface of the disk.

Owing to the fact that the surfaces of these grooves or channels are so arranged, in consequence of the peculiar construction of the disk, that each one into which the water enters is lower than the one through which it had previously traveled or flowed, it follows that a sufficient current will be maintained to keep the water in motion and yet not cause it to flow so rapidly as to prevent the deposition of the solid matter contained therein.

The disk next above the one just described is in all respects like it, except that it receives the water in its outer groove or channel, the surface of which is raised so as to cause the water to flow toward its central groove from which it passes through the tube *b* into the disk below. It also has an aperture through its center for the passage of the steam which is introduced between these two disks.

The next of the series of disks toward the upper end of the heater is like the one first described except that it is somewhat smaller in diameter, the object being to allow the steam as it rises to pass around its outer surface and from thence to the center of the next of the series, and thus be caused to reverberate from the center to the circumference of the series of disks from the bottom to the top of the heater.

The remaining disks of the series are constructed and arranged in pairs like the two disks last described.

B² B² refer to legs which are formed upon the under surface of the disks for the purpose of keeping them the proper distance apart.

O refers to the water-induction pipe, which is so arranged as to conduct the water through the upper head of the heater and into the outer concentric groove thereof, from which point it passes down through the same, passing alternately from the center to the circumference, and from the circumference to the center of the disks as above described until it reaches the filtering-chamber at the bottom, when it flows off through the induction-pipe C', as shown in fig. 1.

D refers to the steam-induction pipe or nozzle, which is located upon the side of the cylinder, and may be so arranged as to induct between the two lower disks of the series, or at any other desired point from which it will pass up through the heater, as shown by the arrows, and escape through the induction-pipe D', if

any portion of it should reach that point without being condensed.

E refers to a water-chamber, which is formed by a perforated ring, which is placed upon the lower head of the heater, the water being taken off from this chamber to the generator.

F F refer to a filtering-chamber, which surrounds the water-chamber, and may be filled with hay, straw, or any suitable material.

G refers to a spider, which is placed upon the upper surface of the upper disk, and between it and the cap or plate, its office being to receive the pressure of the set-screw H and transmit it to the series of disks, in order that they may be held in their proper positions and be prevented from rising in the case if the pressure of the steam should at any time be sufficient for that purpose.

The disks are prevented from turning in the case by means of a rib formed upon the interior of the same, which enters a cavity formed in the periphery of the disks, as shown in figs. 2 and 3.

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

1. The plates B B, with the winding water-channels, when such channels have a descending grade from the point at which the water falls upon them to the point at which it leaves them, substantially as and for the purpose set forth.

2. The plates B B, constructed with winding water-channels, which have a descending grade as described, when low transverse dams are formed in such channels, substantially as and for the purpose set forth.

3. The arrangement of the cap or cover A² with reference to the cylinder A, it being such that a narrow space is formed for the escape of the steam from the body of the heater to the chamber which conducts it to the exhaust-pipe, substantially as and for the purpose set forth.

4. The combination of the set-screw H, spider G, and disks B, substantially as and for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

C. S. S. GRIFFING.

Witnesses:

D. P. HOLLOWAY,
B. EDW. J. ELLS.