(No Model.)

J. KELLER.

FEED WATER HEATER.

No. 282,902. Patented Aug. 7, 1883.

Fig. 1.

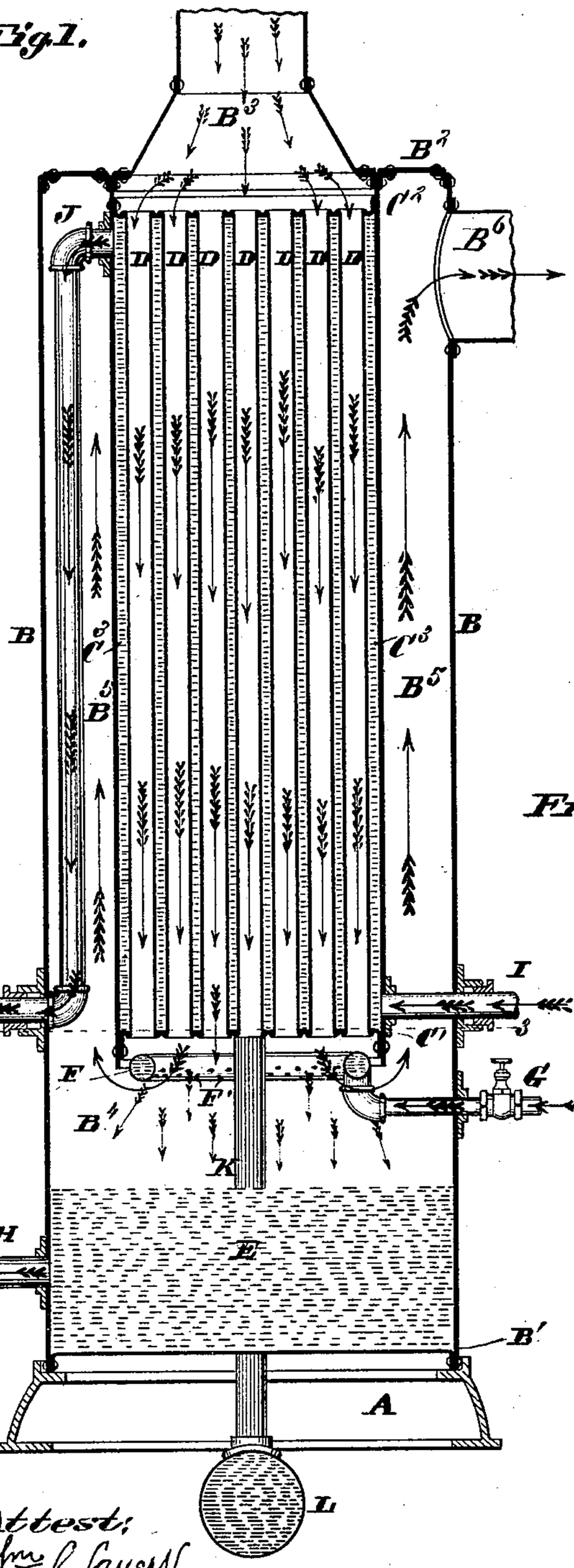


Fig. 2.

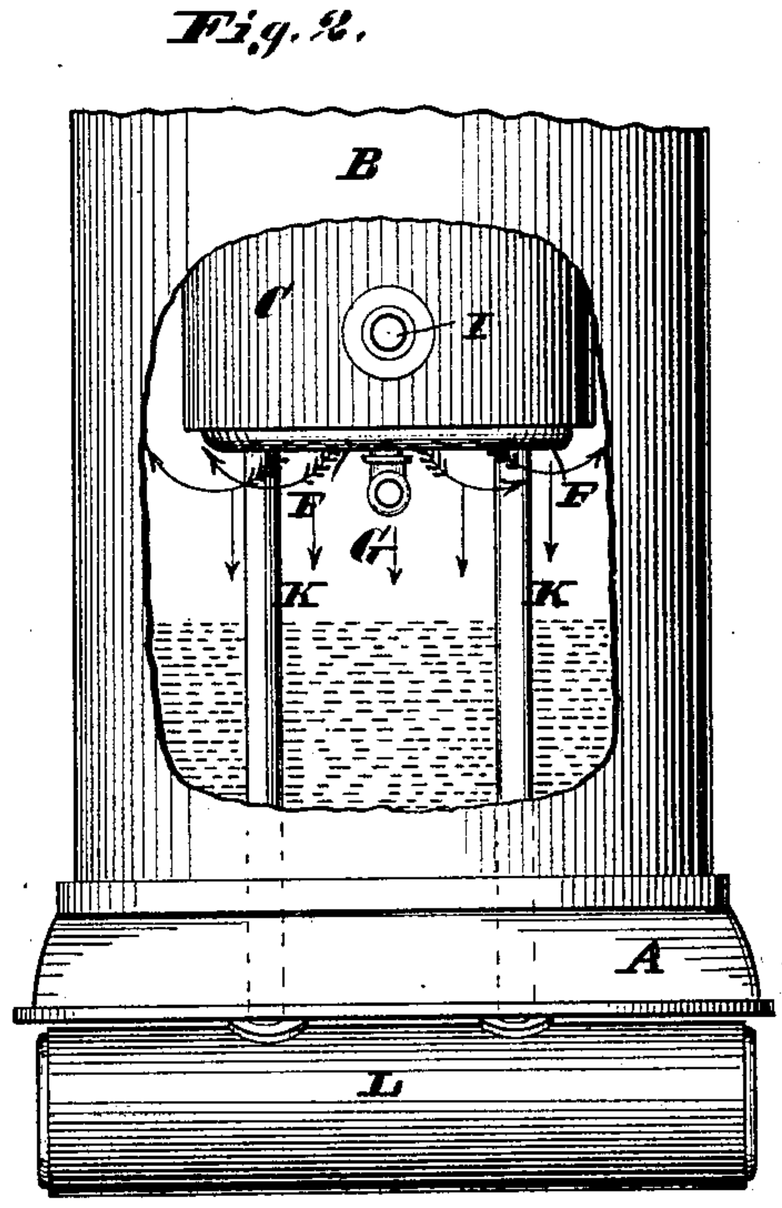
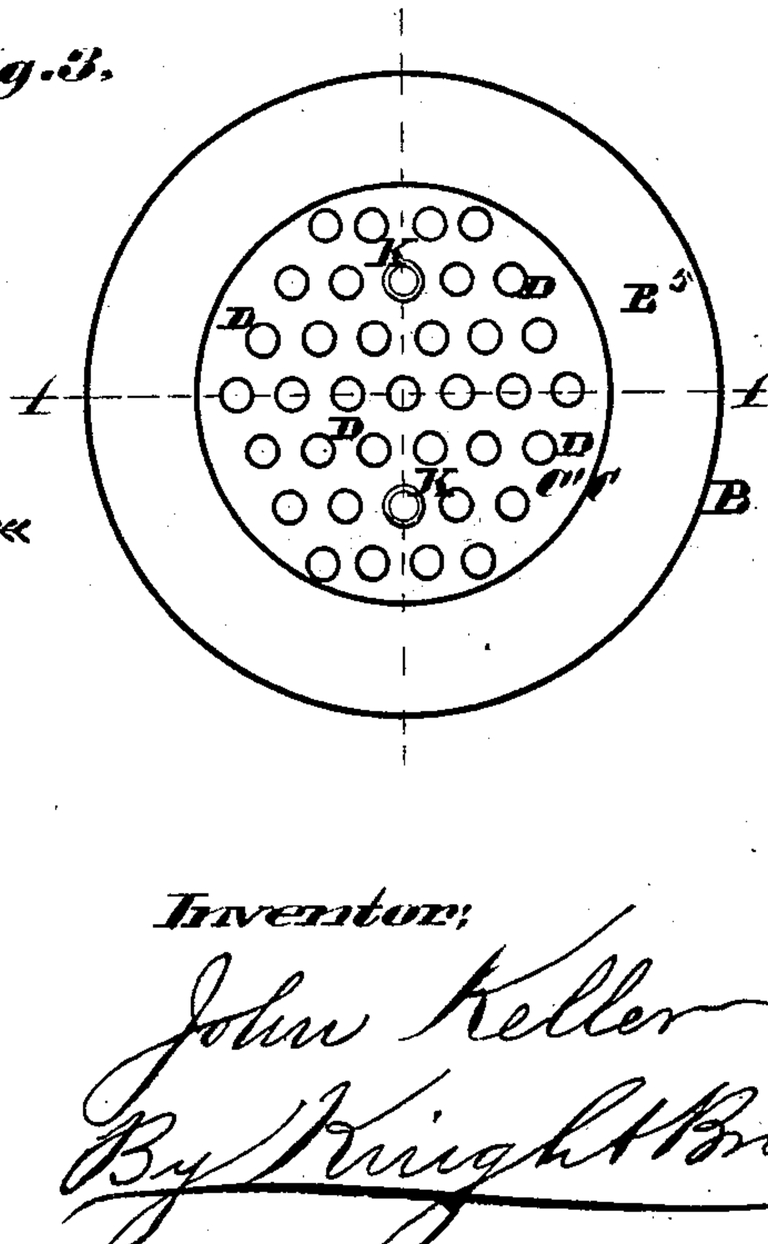


Fig. 3.



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JOHN KELLER, OF ST. LOUIS, MISSOURI.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 282,902, dated August 7, 1883.

Application filed April 9, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN KELLER, of the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Feed-Water Heaters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

The scope of my invention is set forth in the claims.

Figure 1 is an axial section at 1 1, Fig. 3. Fig. 2 is a side elevation of the lower portion of the apparatus with part of the outer shell broken away. Fig. 3 is a horizontal section at 3 3, Fig. 1.

A is the base of the apparatus. B is an outer cylindrical shell having a bottom, B′, and top B^2.

C is an interior cylindrical shell or chamber suspended concentrically within the shell B, and having a bottom, C′, and top C^2.

D are a number of tubes passing through holes in the top and bottom plates, C^2 C′, and expanded therein, so as to make tight joints between the tubes and the plates C′ C^2. The top plate, B^2, has an aperture, B^3, about equal in diameter to the perforate plate C^2, and through this aperture the exhaust-steam from the steam-engine enters the upper ends of the tubes D and passes down the tubes to the lower part of the case B, where it impinges upon a deposit of water, E, occupying the lower part of the case-chamber B^4.

Under the chamber C is an annular jet-pipe, F, having numerous jet-holes at F′, casting a spray of cold water upon the steam and causing condensation of the same. The jet-pipe is fed by a cold-water supply-pipe, G, the water being forced through the pipe G by an injector or pump, if required. Any uncondensed steam passes up the annular space B^5 between the cases B and C, and finds exit through the eduction-orifice B^6.

H is a pipe, through which water escapes from the chamber B^4 to supply the "doctor," which forces the water through the pipe I into the lower part of the chamber C^3, through which the pipes D pass. The water fills the chamber C^3 as high as the opening of the eduction-pipe J, through which the water escapes from chamber C^3 and goes to feed the boiler. This pipe J may descend in the annular space B^5, so as to cause some increase in the heat of the water, or may pass directly through the case B.

K are pipes passing from the lower part of chamber C^3 to the mud-drum L. Two of these pipes are shown. There may be either one or more. The bottom of chamber B^4 may also be connected with the mud-drum.

The surface of the water E should be kept at about one level by means of a ball-cock or other well-known or suitable means.

I claim herein as new and of my invention—

1. The combination, in a feed-water heater, of exhaust-steam tubes descending through a water-chamber within a case containing water whose surface is beneath the lower ends of the said pipes, substantially as set forth.

2. The combination of outer shell, B, inner shell, C, having tubes D, passing entirely through it, exhaust-passage at top of the inner shell, and jet-pipe F at the bottom of the inner shell, the exhaust entering the upper ends of the tubes in a direct line therewith, and the uncondensed steam passing upward through the chamber formed between the inner and outer shells, as set forth.

3. The case B, with exhaust-steam openings B^3 B^6, and containing water chamber or vessel C, traversed by steam pipes or tubes D, discharging upon water-deposit E, and water-pipes H, I, and J, communicating with the chambers B^4 C^3, substantially as and for the purpose set forth.

4. The combination, in a feed-water heater, of outer case, B, containing a case, C, placed concentrically therein, and of smaller diameter, containing water, and traversed by tubes D, and the induction and eduction exhaust-steam passages B^3 B^6 in communication, respectively, with the upper ends of the tubes D and the upper part of the annular space B^5, substantially as set forth.

5. In a feed-water heater, the combination of outer shell, B, inner shell, C, leaving chamber B^5 between them, tubes D, passing entirely through the inner shell, exhaust-steam inlet B^3 in line with the tops of the tubes, steam-exit at top of the outer shell, pipe to supply water to the lower part of inner shell, discharge-pipe at the upper part of inner shell, and a mud-drum connected with the bottom of the inner shell by a pipe, K, as set forth.

Witnesses:
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JOHN KELLER.