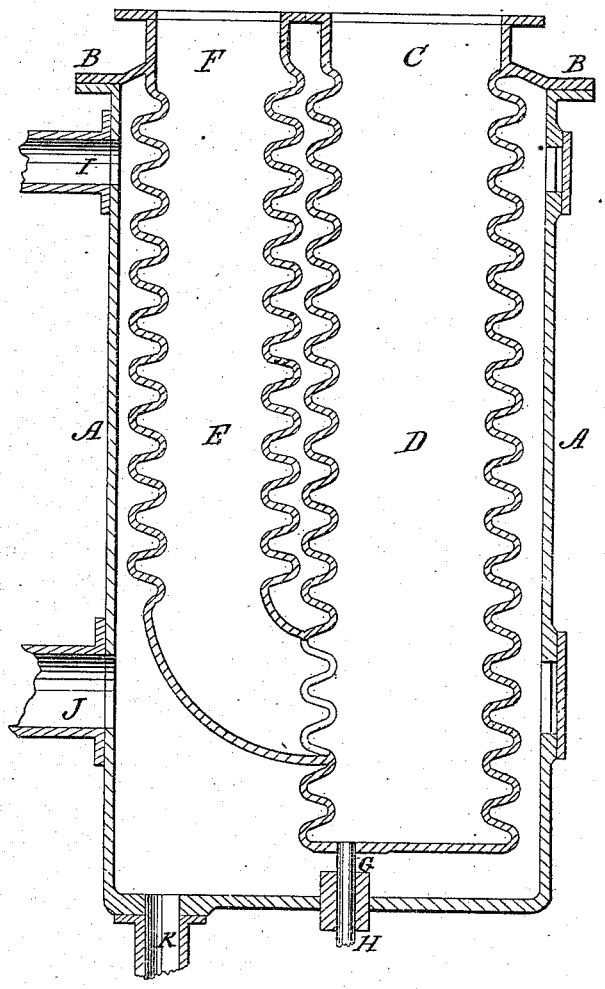
H. N. WATERS.

Feed-Water Heater for Steam-Boilers.

No. 160,979. Patented March 16, 1875.



WITNESSES:

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UNITED STATES PATENT OFFICE.

HORATIO N. WATERS, OF WEST MERIDEN, CONNECTICUT.

IMPROVEMENT IN FEED-WATER HEATERS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **160,979**, dated March 16, 1875; application filed January 25, 1875.

To all whom it may concern:

Be it known that I, HORATIO N. WATERS, of West Meriden, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement in Feed-Water Heaters for Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming a part of this specification, in which—

The drawing shows a sectional elevation of my improved heater.

The chief objection to boiler feed-water heaters of the class in which exhaust-steam is conveyed through a pipe or pipes arranged within the water-reservoir formed by the shell of the heater, is the leakage caused by contraction and expansion under variation of temperature, and the damage, annoyance, and expense consequent thereon. The object of my invention is to provide a heater which shall be free from this defect. To this end the construction and arrangement of parts are as hereinafter described.

A indicates the shell of the water-reservoir, having an inlet, J, for cold water, near the bottom, and an exit, I, near the top, for the same water when heated. The openings J I connect, respectively, with a suitable water-supply reservoir and the steam-boiler. D is a corrugated exhaust steam-pipe connecting with the boiler, and E is a similarly corrugated branch thereof, through which the steam escapes, the two being connected at the bottom, and both cast (of iron or other suitable metal) in one piece with the cover B of the shell A. The cover is secured by any preferred means. The corrugations serve to increase the respective steam and water contact surfaces of the pipes without corresponding increase in their diameter, while the absence of seams or joints between the pipes and the cover prevents leakage due to unequal expansion and contraction, or other cause.

To draw off the condensed water from pipes D and E I provide the former with a downward vertical extension, G, which passes through the cylindrical plug or packing piece H in the bottom of the reservoir A, and is, in practice, provided with a suitable stop-cock. The plug H is accurately fitted to pipe G, so that the latter slides through it as the pipes D and E contract and expand together under the influence of varying degrees of heat.

By the above construction I provide a heater in which the tendency or liability to leakage, by reason of the tubes through which the steam (or water) is conducted being connected rigidly to the inner wall of the shell or case of the heater, is entirely obviated.

Lime or other impurities precipitated by the heat of the steam may be drawn off by pipe K.

What I claim is—

In a feed-water heater, the pipes D and E, attached to and suspended from the cover B, and provided with the downward extension G, the plug H, and reservoir A, all combined, constructed, and arranged as shown and described, to operate as specified.

HORATIO N. WATERS.

Witnesses:

BENJ. PAGE, Jr.,

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