

T. W. HAYES.
FEED-WATER HEATER.

No. 173,856.

Patented Feb. 22, 1876.

Fig. 1

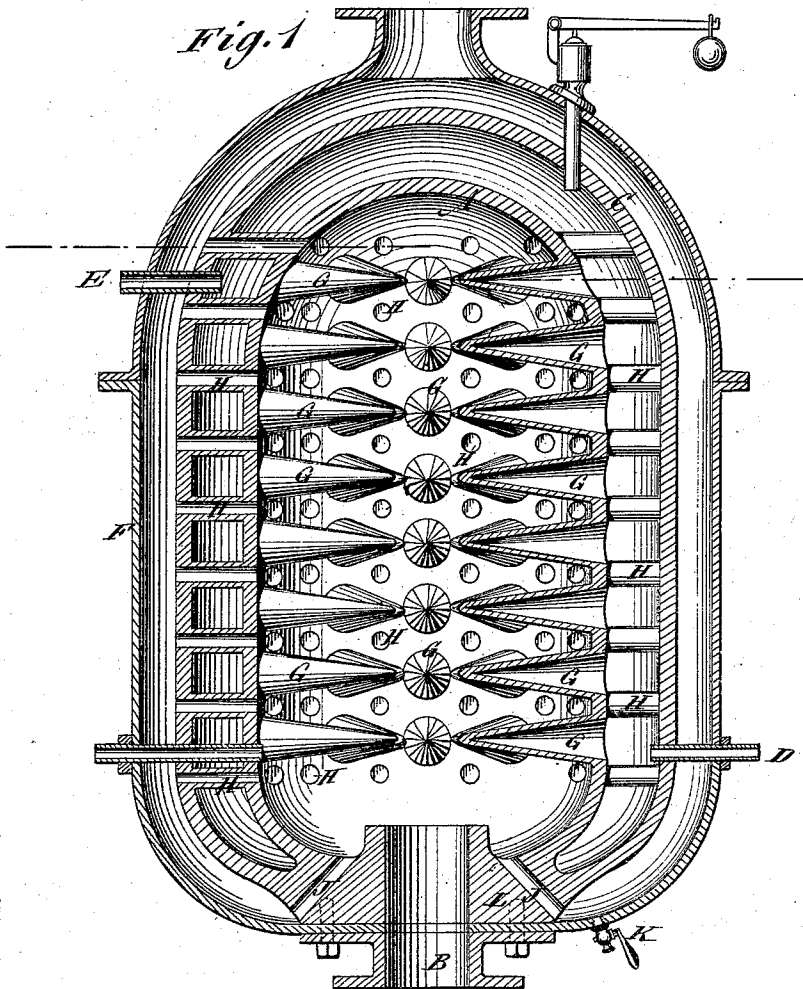
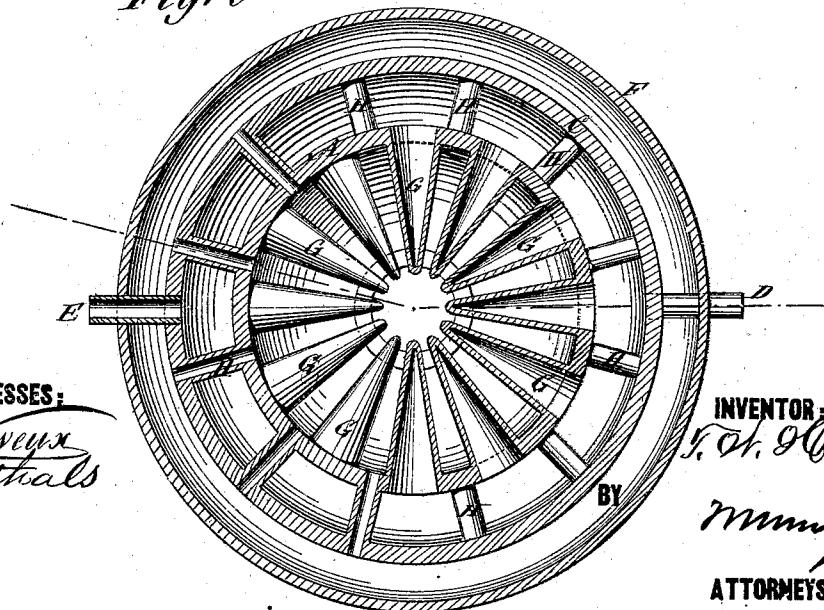


Fig. 2



WITNESSES:

C. Neveux
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BY

mm
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UNITED STATES PATENT OFFICE

TIMOTHY W. HAYES, OF TRENTON, NEW JERSEY.

IMPROVEMENT IN FEED-WATER HEATERS.

Specification forming part of Letters Patent No. **173,856**, dated February 22, 1876; application filed January 4, 1876.

To all whom it may concern:

Be it known that I, TIMOTHY W. HAYES, of Trenton, in the county of Mercer and State of New Jersey, have invented a new and useful Improvement in Feed-Water Heater, of which the following is a specification:

My invention consists of a hollow cylinder, into which the exhaust steam discharges, located within a larger hollow cylinder, through which the feed-water is forced into the boiler, this steam-cylinder having hollow conical studs projecting radially from its sides in all directions to the center for filling with water from the water-cylinders, and having small exit-pipes for the steam passing out from all parts through the water, all in such manner that the heat is distributed and applied more efficiently within a given space than in other heaters. Outside of the water-cylinder is a jacket to receive the steam from the numerous exit-pipes, and conduct it to the discharge-pipe. These two cylinders, together with the hollow water-studs and exit steam-pipes, will, in practice, be cast in one piece, so as to construct the heater cheaply, and the water-cylinder will have a safety-valve attached, so that in case the cock between it and the boiler should be left closed when the pump is started up the heater will not be exploded.

Figure 1 is a sectional elevation of my improved heater taken on the line *xx* of Fig. 2. Fig. 2 is a horizontal section taken on line *zz* of Fig. 2.

Similar letters of reference indicate corresponding parts.

A is the inner cylinder into which the steam is discharged from the engine—say, by pipe B. C is the water-cylinder inclosing cylinder A, and having inlet and outlet pipes D E, and F is the steam-jacket surrounding the water-cylinder.

The hollow conical studs G radiate from the shell of cylinder A to its center, or nearly so, and conduct the water into the steam-space from cylinder G, so as to distribute the application of the heat very efficiently, and the

small exit steam-pipes radiating outwardly from said cylinder A make another efficient distribution. Both the hollow studs and the exit-pipes are distributed uniformly, or as nearly so as is necessary for producing uniform effects throughout the heater, and the capacity of the pipes H is regulated to that of the exhaust-pipe B, so as to afford the most efficient application of the heat to the surfaces attainable without obstructing the escape of the steam.

The pipe B is prolonged a little above the bottom of cylinder A to make a kind of trap to prevent the water of condensation from flowing back in it, and passages J are made for it to flow into steam-jacket F, from which it may be drawn by a cock, K. Cylinders A and C are cast in connection together at L, making a substantial base, onto which the jacket F is also connected so as to seat the heater on the top of the pipe B, or any other suitable support.

The construction of the apparatus is such as to avoid all risk of fracture from expansion and contraction, the cones having been provided, instead of tubes connected at both ends, with express reference to the changes of temperature to which the heater will necessarily be subjected when in use.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of the steam-cylinder A and the water-cylinder C, the steam-cylinder having the radial hollow conical studs G, and the two cylinders having the exit-pipes for steam passing through and connecting them, substantially as specified.

2. The steam-cylinder and the water-cylinder, constructed in connection at the base L and the steam-jacket connected to said base, substantially as specified.

TIMOTHY W. HAYES.

Witnesses:

T. B. MOSHER,
ALEX. F. ROBERTS.