

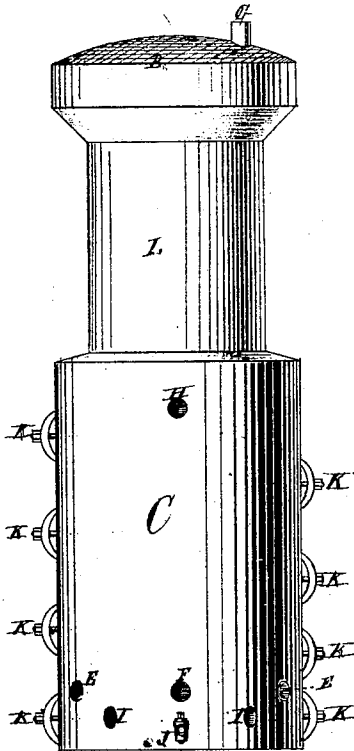
*J. S. Hooton,*

*Condenser.*

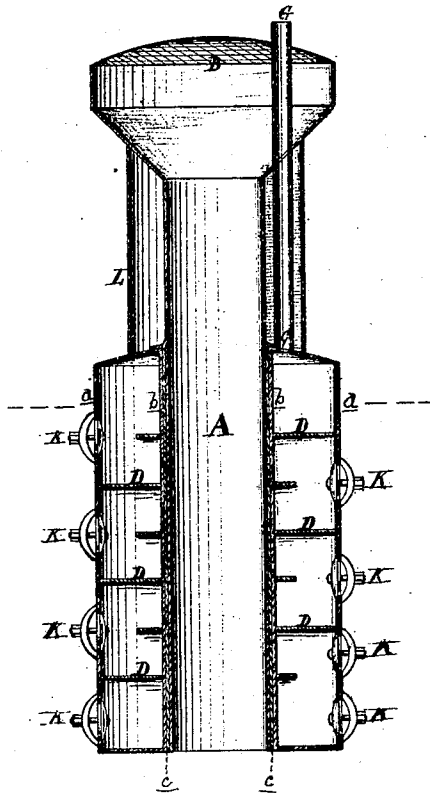
*No. 105207.*

*Patented July 12, 1870.*

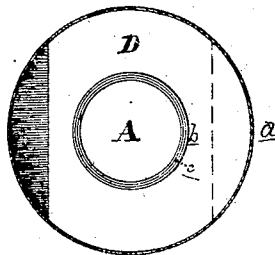
*Figure 1 -*



*Figure 2 -*



*Figure 3 -*



ATTEST:

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INVENTOR:

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*Thos. S. Sprague.*

# United States Patent Office.

JAMES S. HOOTON, OF NEW CARLISLE, INDIANA.

Letters Patent No. 105,207, dated July 12, 1870.

## FEED-WATER HEATER FOR LOCOMOTIVES.

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

### To whom it may concern:

Be it known that I, JAMES S. HOOTON, of New Carlisle, in the county of St. Joseph and State of Indiana, have invented a new and useful Improvement in Feed-water Heaters for Locomotives and Portable Engines; and I do declare that the following is a true and accurate description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon, and being a part of this specification, in which—

Figure 1 is an elevation of my improvement, as attached to the smoke-stack of a locomotive;

Figure 2 is a vertical section of the same; and

Figure 3 is a horizontal section, showing a plan on the line *x x*.

Similar letters of reference indicate corresponding parts in each figure.

The nature of this invention relates to the construction of a lime-extracting feed-water heater in such a manner that it may be attached to a portable or locomotive-engine, surrounding the smoke-stack of the boiler.

It consists in so changing the structure of a heater, provided with overlapping shelves, induction and eduction-pipes and openings for water and steam, and arranged to heat and purify the feed-water, that it may be applied and used within a jacket surrounding the smoke-stack of a locomotive-engine.

In the drawing—

A represents the smoke-stack of a locomotive-boiler, provided with the usual spark-arrester B.

C is a cylindrical condensing heater, being an insular chamber formed by an outer wall, *a*, and an inner one, *b*, said chamber being closed at both ends, the smoke-stack passing up through the inner one, which should be protected from too great a degree of heat by an intermediate jacket, *c*.

D are segmental annular plates of the form shown in fig. 3, alternately disposed in the heater as shown in fig. 2.

E are openings in the lower part of the heater, through which a portion of the exhaust steam enters, and F another, through which a jet of live steam enters when the exhaust-pipes deliver no steam to the heater, as on a down grade, when the steam is shut off from the cylinders of the engine.

G is the escape-pipe, through which the steam leaves the heater.

H is the cold-water induction-pipe, and

I, the eduction-pipes.

J is a drain-cock, through which the contents of the heater may be drawn off.

K are hand-holes, closed with suitable plates, giving access to the upper faces of the plates D.

L is a jacket, which may be placed around the body of the smoke-stack, inclosing also the escape-pipe above the heater.

The operation of this improvement may be described as follows:

Cold water is pumped into the heater at H, falling on the upper shelf in a continuous stream, falling thence in a thin sheet on the next below, traversing its length, and falling on the next below, and so on to the bottom. At the same time a portion of the exhaust steam is turned into the heater, entering it under the lower shelf, and, rising from shelf to shelf, imparts its heat to the water and to the shelves or plates.

The water being heated to a high degree, readily parts with the earthy salts it holds in solution, which are precipitated upon and are retained thereon in the form of a hardened crust or scale, the surplus steam (a portion of which is necessarily condensed by contact with the cold water) escaping at G. The water, heated to a high degree, is then drawn off at I by the supply-pipes, and fed to the boiler in a pure state, the advantages of which are too well known to be further explained.

As often as may be necessary the deposits may be removed from the plates through the hand-holes.

The device is equally applicable to portable boilers as to locomotives.

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

The feed-water heater C, provided with alternate broad and narrow annular shelves D, openings E and F, escape-pipe G, induction-pipe H, eduction-pipe I, and drain-cock K, in connection with the smoke-stack of a locomotive-engine or portable boiler, when constructed as described, and operating as and for the purpose set forth.

JAMES S. HOOTON.

Witnesses:

S. C. LANCASTER,  
NOAH WILTHOUS,  
F. D. WARNER.