

H. Yates,

Steam-Boiler Furnace,

No 20,840.

Patented July 6, 1858.

Fig. 2.

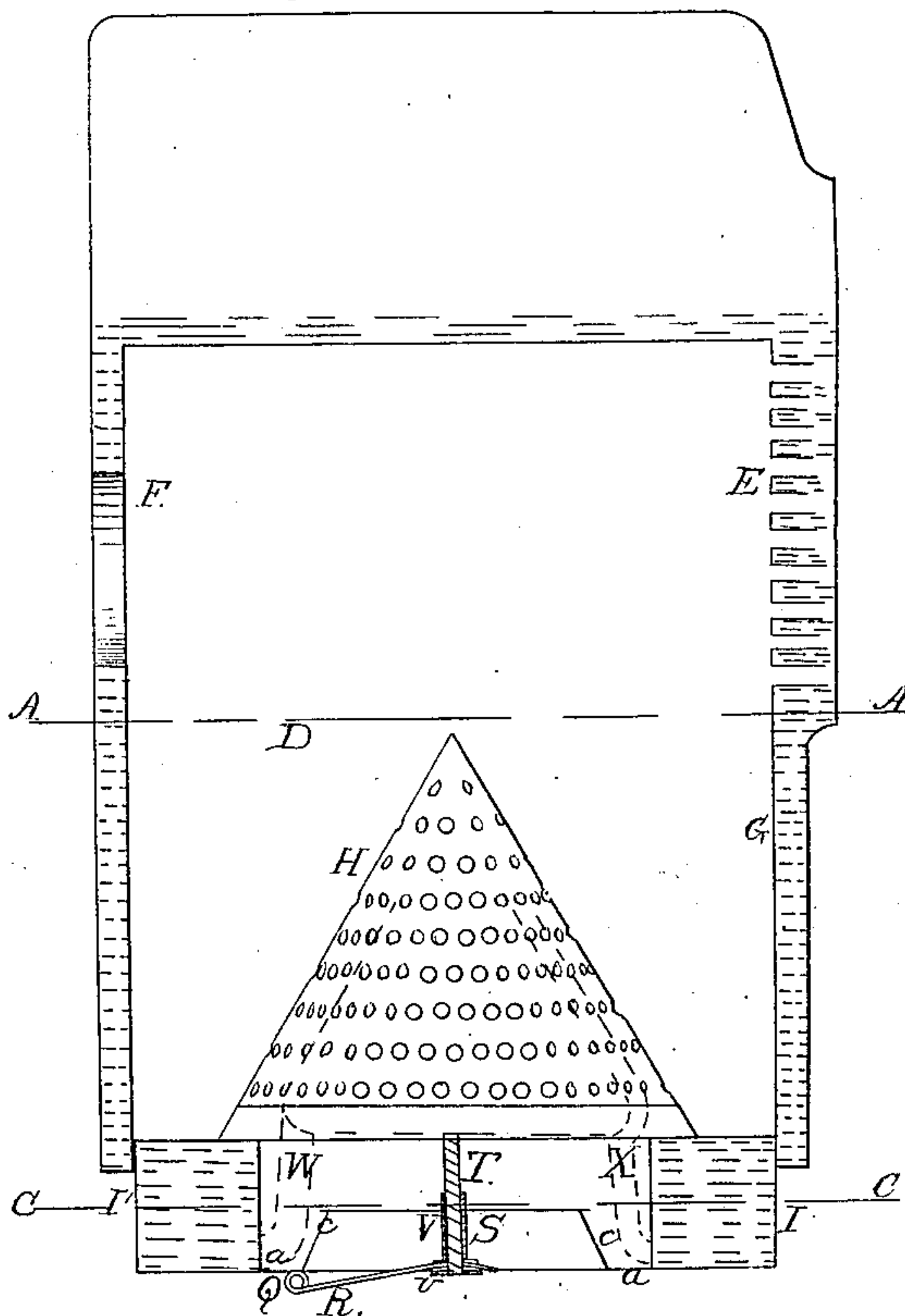


Fig. 1.

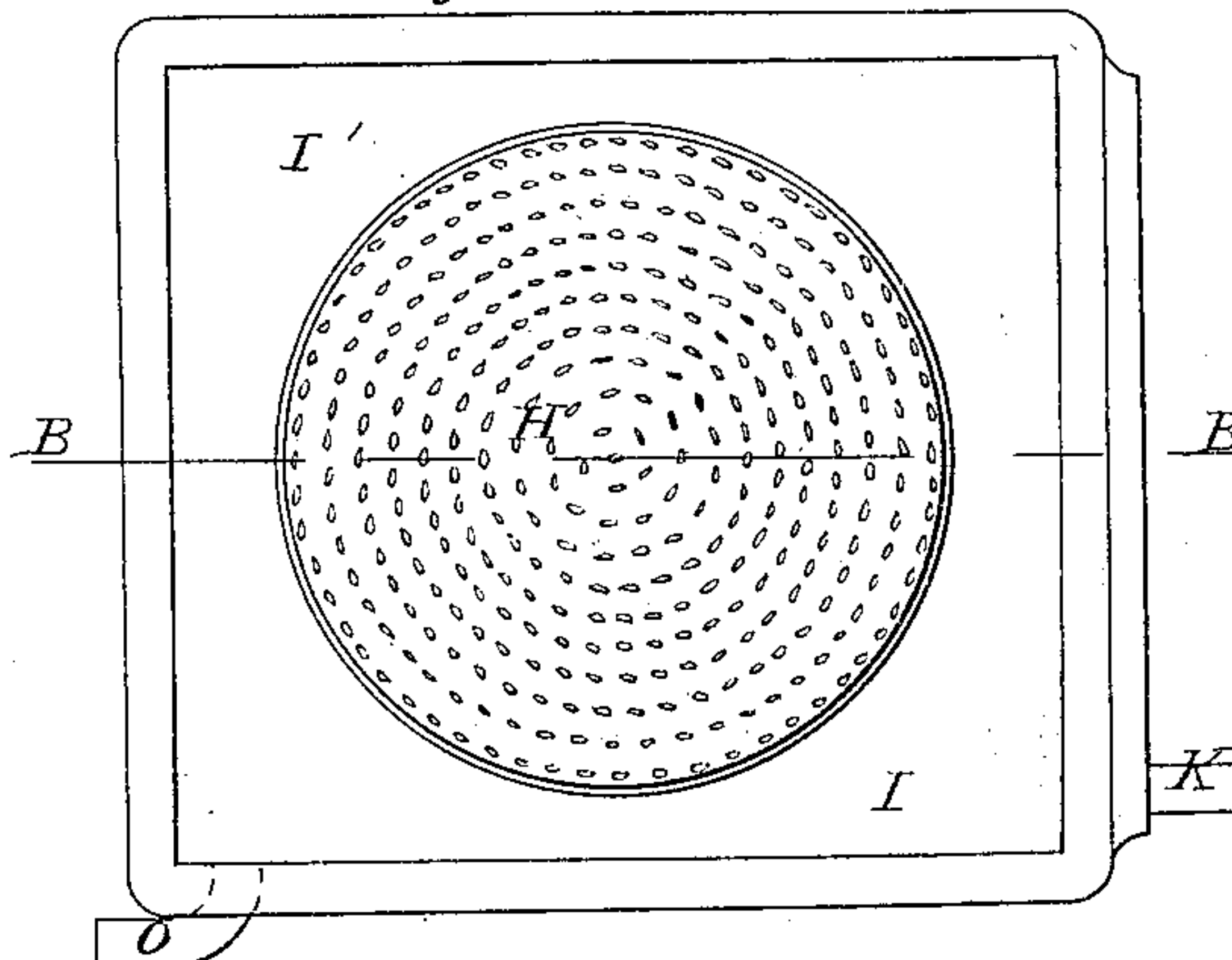


Fig. 4.

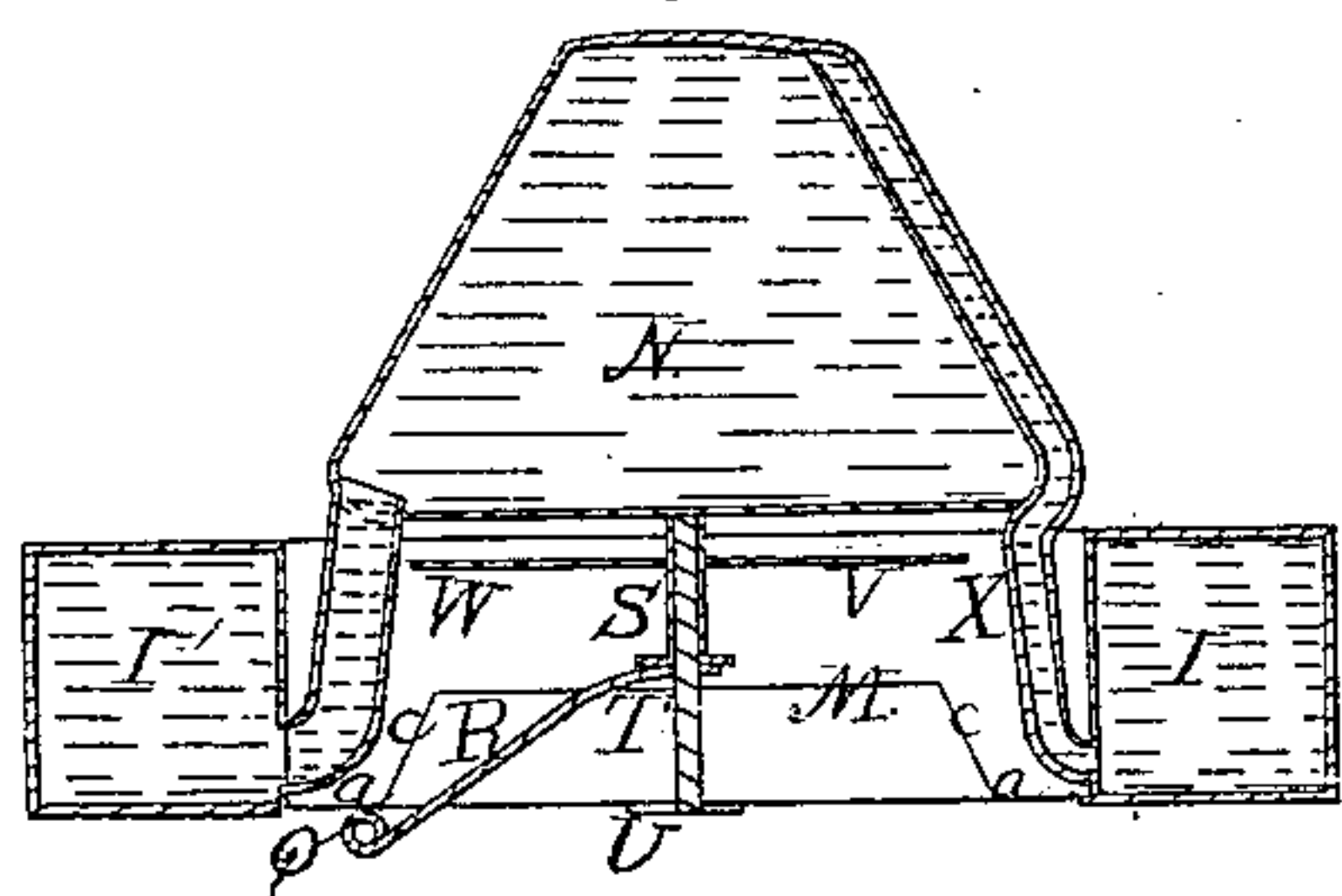
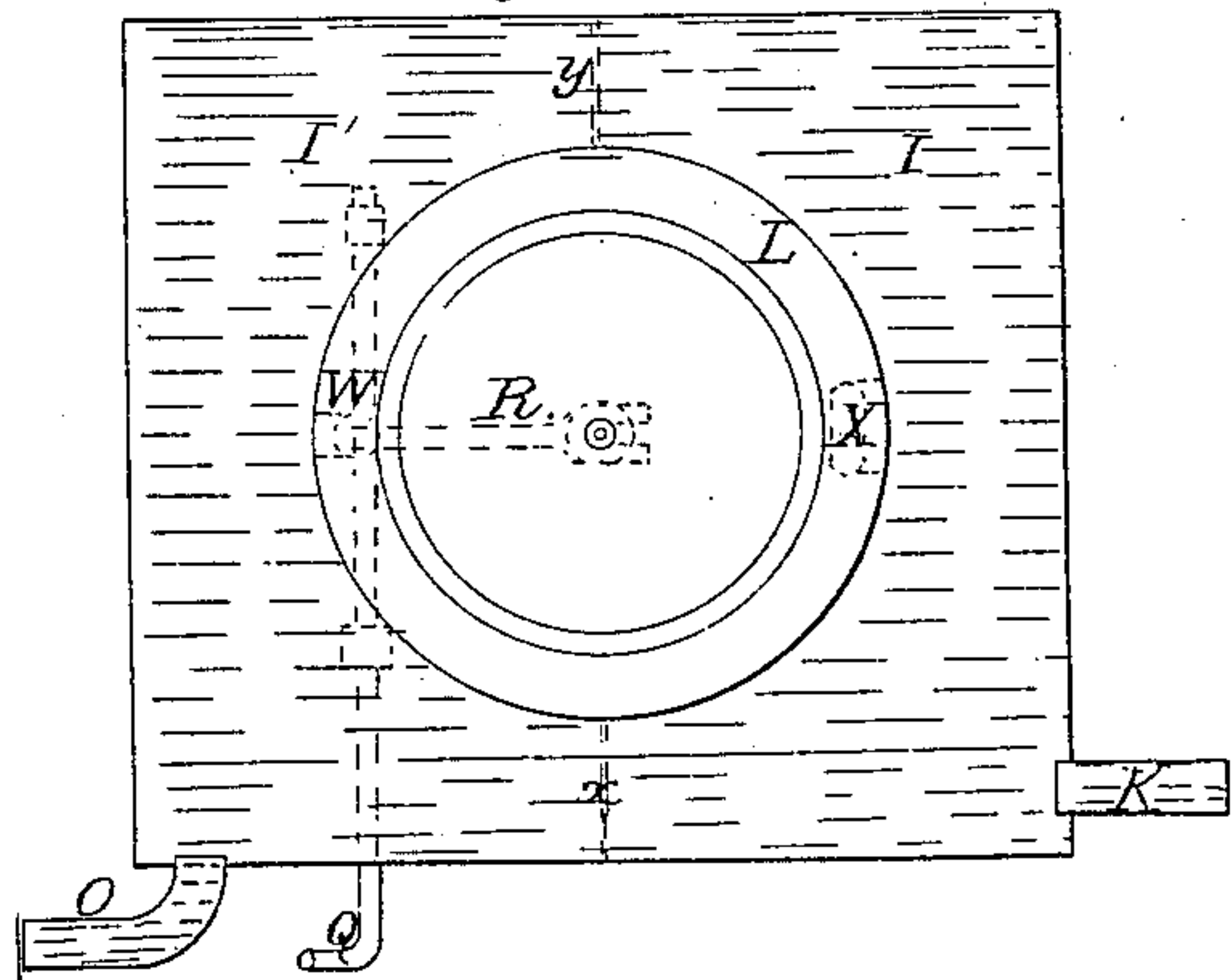


Fig. 3.



UNITED STATES PATENT OFFICE.

HENRY YATES, OF BRANTFORD, CANADA.

FURNACE OF STEAM-BOILERS.

Specification of Letters Patent No. 20,840, dated July 6, 1858.

To all whom it may concern:

Be it known that I, HENRY YATES, of Brantford, in the Dominion of Canada, have invented certain Improvements in Furnaces of Locomotives, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan of the parts beneath the section A, A of Fig. 2. Fig. 2 is a vertical section upon the line B, B of Fig. 1; Fig. 3 a horizontal section upon the line C, C of Fig. 2; Fig. 4, detail to be referred to hereafter.

My invention has for its object to economize fuel and prevent the falling of coals and brands upon the woodwork either of the bridges or the permanent roadway, and also to increase the water space heating surface of the furnace.

To enable others skilled in the art to understand my invention and to construct and use my furnace I will proceed to describe the manner in which I have carried out my invention and the construction and operation of my furnace.

In the accompanying drawings D is the fire box, E the tube sheet, F the fire door, G the water space surrounding the fire box.

In order to prevent the falling of coals from the fire box, the grate bars are entirely dispensed with, the bottom of the fire box being closed with the exception of a circular opening in the center which is covered by a perforated metallic cone H, the inclination of the sides of which is such that no coals can pass through, while a sufficiency of draft is admitted through its perforations to supply the combustion of the fuel.

Beneath the fire box and constituting the bottom or floor thereof is a water heater which is constructed and arranged as follows: I—I' is a chamber of a size that shall just fill the bottom of the furnace. This chamber is divided into two compartments by the partitions x and y and communication is established between these compartments through a conical chamber N (see Fig. 4) (which occupies the space within and beneath the perforated cone H) by means of the pipes W, X. The feed water entering the compartment I by the pipe K passes by the pipe X to the top of the conical heater N thence by the pipe W to the compartment I' of the heater, whence it passes by the pipe O to the boiler. This water heater may be ar-

anged separate and distinct from the boiler, and communicate therewith only through the pipe O as in the drawings or it may form a continuation or part of the water space surrounding the fire box. In either case it will furnish a material addition to the heating surface of the boiler, as it will be constantly covered with a body of heated coals when the furnace is in operation; the lighter particles of ashes being all passed off with the smoke through the stack.

In the center of the water heater or water space which forms the bottom of the fire box is a circular opening L a portion of which is closed with a bottom at a which rises at c as seen in the drawings, the opening M thus formed, which is the only opening through the bottom of the fire box is commanded by a tight fitting damper V that when depressed as seen in Fig. 2 entirely shuts off the draft.

The damper is raised as required to regulate the draft by the engineer who by means of a hand lever (not shown upon the drawings) turns the shaft Q from which projects the lifting arm R upon the end of which rests a sleeve S attached to the damper, this sleeve slides up and down upon a rod or pin T which rises from a suitable cross bar U beneath the fire box and by which the damper is steadied. When the locomotive is in operation the engineer is enabled to regulate the draft to the requirements of the fire, while as is obvious no coal can at any time escape upon the wood work either of the bridges or the permanent road way. When the damper is closed as in Fig. 2 the draft is entirely shut off and both the fire and the heat within the boiler may thus be preserved for a great length of time and with very small waste.

By means of the above described combination of the perforated cone and tight furnace bottom I am enabled to dispense with the ordinary ash pan and to occupy its place by heating surface, thereby greatly increasing the generating capacity of the boiler, and by means of the conical heater or chamber N even that portion of the heat is economized which radiates through the perforated cone H.

What I claim as my invention and desire to secure by Letters Patent as an improvement in the fire boxes of locomotives is—

1. The perforated metal cone H in combination with the tight furnace bottom op-

erating in the manner substantially as set forth.

2. And in combination with the above I claim the damper V operating in the manner
5 substantially as set forth.

3. And I also claim the water-heater I, I' in combination with the perforated metallic

cone and damper constructed and arranged in the manner specified.

HENRY YATES.

Witnesses:

THOS. R. ROACH,
P. E. TESCHEMACHER.