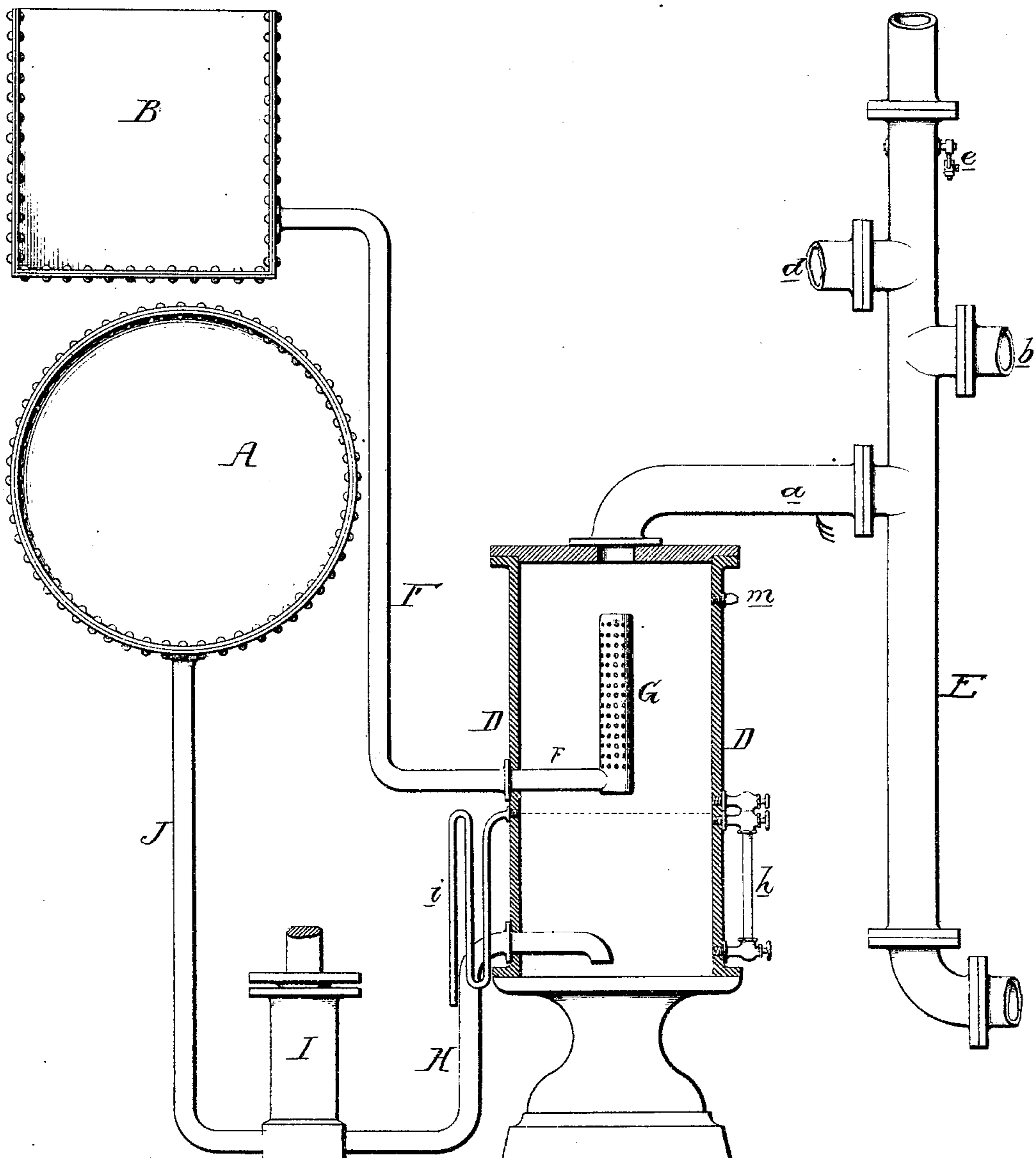


M. W. HAZELTON.

FEED-WATER HEATERS FOR STEAM-BOILERS.

No. 180,876.

Patented Aug. 8, 1876.



Witnesses
 Harry Howson
 Harry Smith

Milton W. Hazelton
 by his Attorneys
 Howson and Son.

UNITED STATES PATENT OFFICE.

MILTON W. HAZELTON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF HIS RIGHT TO JAMES A. WOODBURY, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN FEED-WATER HEATERS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 180,876, dated August 8, 1876; application filed December 30, 1875.

To all whom it may concern:

Be it known that I, MILTON W. HAZELTON, of the city of Chicago, Cook county, and State of Illinois, have invented an Improved Feed-Water Heater for Steam-Boilers, of which the following is a specification:

My invention relates to that class of feed-water heaters in which the exhaust-steam is used for the purpose of heating the water; and the main object of my invention is to construct a simple, effective, and economical heater of this class.

This object I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawing, the figure in which is a side view, partly in section, of my improved feed-water-heating apparatus.

A is the boiler; B, the feed-water tank; D, the heater, and E the exhaust-pipe of the engine. The latter has in the present instance three branches, *a*, *b*, and *d*, the former communicating with the top of the heater D, and the branches *b* and *d* with systems of steam-pipes for heating a building, or with any other appliances employed for utilizing the exhaust-steam. The pipe E is also provided, at a point above the branch *d*, with a regulating-valve, *e*. The heater D consists of a simple casing mounted upon a suitable pedestal or other foundation, and through one side of this casing projects the end of a pipe, F, communicating with the water-tank B, which is elevated above the heater D to a height sufficient to cause the desired pressure in the said pipe F, and the latter extending to about the center of the heater, where it communicates with a perforated tube, G, extending nearly to the top of the heater. H is the discharge-pipe, which communicates at one end with the heater at a point near the bottom of the same, and at the other end with a pump, I, arranged below the bottom of the heater D, and having a force-pipe, J, communicating with the boiler. At one side of the heater D is a water-gage, *h*, and at the other side an overflow-tube, *i*, and near the top of the heater is a

small outlet-valve, *m*, for permitting the escape of air.

The water issues from the perforated tube G in a number of fine jets or streams, and is projected outward until it strikes the casing of the heater, by which it is deflected inward, so that the steam, as it passes down through the annular space between the tube G and the casing, is brought into intimate contact with the spray, and is thereby condensed, the water being at the same time heated. As the steam is condensed a partial vacuum is formed in the upper portion of the heater, so that steam is induced to enter the same through the branch *a*; but no more steam will thus pass into the heater than is essential to the proper operation of the same, the main volume of steam passing directly through the pipe E and into the branches *b* and *d*. By connecting the heater to the exhaust-pipe of the engine, in the manner described, the operation of the said heater will not be interfered with by an excess of steam, while economy in the consumption of the latter is insured, and its use for purposes other than heating the feed-water will not be interfered with.

By arranging the pump I below the level of the heater D, the necessity of the latter having to lift its supply of water is obviated, and this supply is always insured as long as there is any water in the heater.

I claim as my invention—

A feed-water heater consisting of a casing, D, receiving a portion only of the exhaust-steam, and provided with an upright perforated tube, located centrally within the casing, and communicating with the water-supply, all substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MILTON W. HAZELTON.

Witnesses:

L. G. BRAINARD,
G. W. MACKIE.