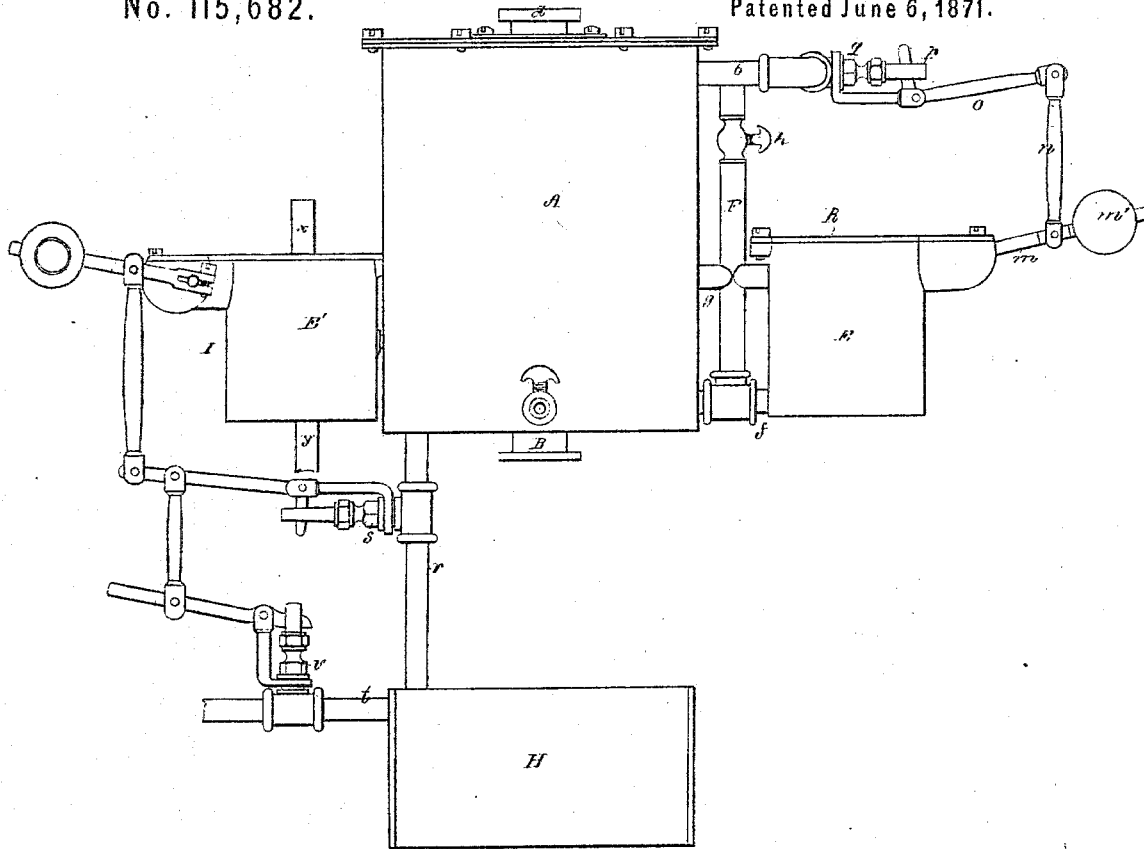


ROBERT BERRYMAN.

Improvement in Feed Water Heaters for Steam Boilers.

No. 115,682.

Patented June 6, 1871.



Witnesses.

S. A. Piper

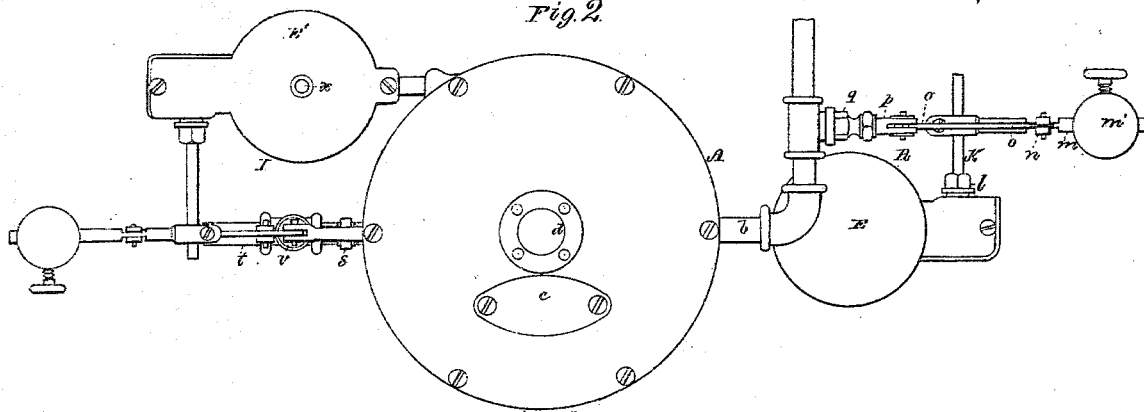
L. A. Moles

R. Berryman.

by his attorney

R. W. Ledy

Fig. 2.



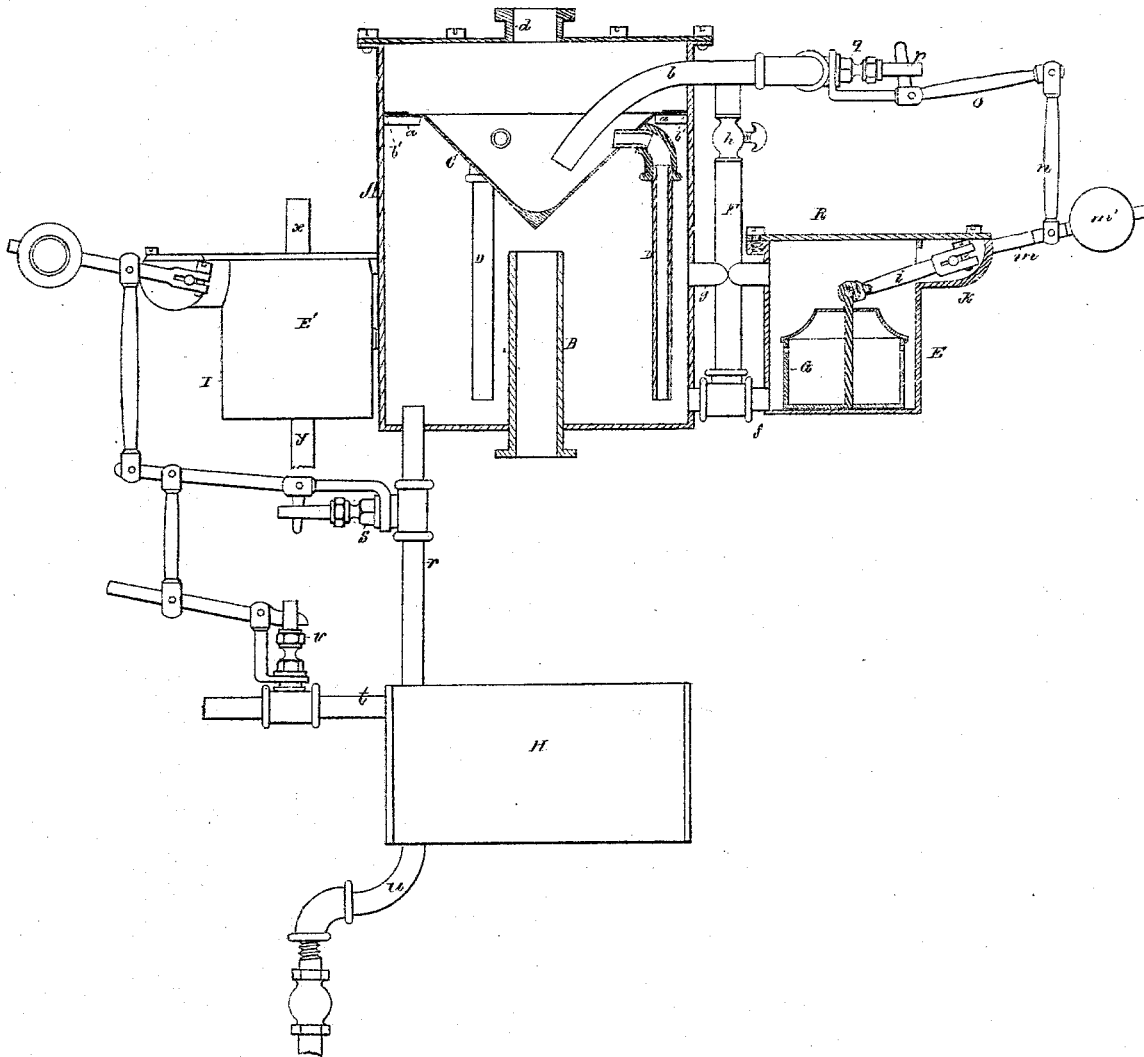
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Fig. 3.



Witnesses.  
S. N. Piper  
L. N. Mollen

R. Berryman.  
by his attorney  
N. H. Eddy

# UNITED STATES PATENT OFFICE.

ROBERT BERRYMAN, OF HARTFORD, CONNECTICUT.

## IMPROVEMENT IN FEED-WATER HEATERS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 115,682, dated June 6, 1871.

*To all persons to whom these presents may come:*

Be it known that I, ROBERT BERRYMAN, of the city and county of Hartford and State of Connecticut, have invented a new and useful or Improved Automatic Feeder and Water-Heater for a Steam-Boiler; and do hereby declare the same to be fully described in the following specification and represented in the accompanying drawing, of which—

Figure 1 is a front elevation, Fig. 2 a top view, and Fig. 3 a vertical section of it.

The apparatus will heat the water nearly to boiling temperature. It operates to keep the exhaust steam out of contact with the feed-water.

Owing to the amount of sulphuric acid in the preparation of the grease or tallow employed for the lubrication of the pistons of engines, much of said acid is liable to be carried into the feed-water heater by the exhaust steam, and from thence it will pass into the boiler to the injury of the latter. The importance of keeping the exhaust steam, while used, to heat the feed-water out of contact therewith, will be easily perceived.

In the drawing, A denotes a vertical drum or vessel provided with a pipe, B, extending through and up from its bottom in manner as shown, such pipe being to receive the exhaust steam from a steam-engine. Above the top of the pipe the vessel A is furnished with a series of projections, *a a*, to support the deposit-extractor C, which is an inverted hollow vessel or cone having a series of pipes, D D, leading out of and downward from it, as shown. There is a space, *b'*, around the outer edge of the said extractor, and between such and the inner periphery of the vessel A. With the deposit-extractor so constructed the exhaust steam, on entering the vessel A, will impinge against the bottom of the extractor, and thence flow up around and over the extractor and the pipes D, by which the feed-water that may flow into the extractor by a pipe, *b*, will be discharged into the lower part of the vessel A. The pipe *b* opens near the bottom of the conical receiver, and is to proceed from a tank or source of supply. This opening of the discharging end of the pipe *b* into the lower part of the receiver C causes the water, at a low temperature, to be brought in contact with the part of the receiver which is directly over that

on which the exhaust steam impinges on entering the vessel A. The heated water rising in the receiver will escape therefrom through the discharge-pipes D. The receiver will be kept nearly filled with water, which will deposit much of its sediment in the receiver. Such sediment may be removed, as occasion may require, through a hand-hole in the top of the vessel A, such hole being provided with a cover, *c*. During its passage through the vessel A and out of an eduction-pipe, *d*, in the top thereof, the exhaust steam passes over the surface of the water in the conical receiver, but will be kept out of contact therewith by the stratum of air that will gather and remain in the upper part of such receiver, and constitutes an elastic cushion between the steam and the water. The conical receiver, having the pressure equal on its opposite surfaces, may be made of thin and light material. To prevent the feed-water from overflowing into the exhaust-pipe, I combine with the vessel A an automatic feed-regulator, R, by which power is derived to open and close the valve of a cock, *g*, arranged in the feed-pipe *b*, thereby keeping the water at a constant level on the vessel A. This automatic feed-regulator is substantially like one I have described in an application for a patent recently filed by me, and may be thus explained. E is a hollow drum, which has pipes *f g* leading from it into the vessel A, and crossing and opening into a stand-pipe, F, that leads down from the supply-pipe *b*, and is provided with a stop-cock, *h*, arranged just below the feed-pipe, as shown. Within the case or drum E is a hollow bucket or vessel, G, which is closed except in having one or more small apertures leading out of it at its side. This vessel is pivoted to an arm, *i*, arranged within the case, and projected from a rock-shaft, *k*, extended out of the case and through a stuffing-box, *l*. Another arm, *m*, provided with an adjustable weight, *m'*, extends from the rock-shaft in manner as exhibited. A connecting-rod, *n*, is pivoted to the arm *m*, and a lever, *o*, applied to the stem *p* of a balanced valve-cock, *q*, arranged in the supply-pipe *b*. While the water in the vessel A may be at its proper level the drum E will be filled with water, which will also fill the vessel G. As the water may fall in the vessel A, so will it fall in the vessel E. The conse-

quence of such a fall of the water will be that the vessel G will fall by the weight of water in it, and thereby cause the valve of the cock *g* to be moved to admit a greater supply of water to the vessel A.

The other portions of the drawing show a feeding apparatus not necessarily connected with the present invention, and therefore not herein particularly described, a separate application for a patent having been made therefor.

Should cool water be needed in the feeding apparatus to facilitate condensation of the steam therein, the stop-cock *h* may be opened to admit a small quantity in the vessel A, thence to flow into the feeding apparatus.

In the operation of the vessel A and the extractor, the exhaust steam is kept from contact with the feed-water, so that the grease and its acids are carried off with the steam and do not find their way to the boiler.

I claim—

1. The combination of the extractor C and one or more pipes, D, proceeding from it, as described, with the vessel A and its pipes, for the induction and eduction of the exhaust steam, as set forth, all being arranged substantially in manner and so as to operate as described.

2. The combination of the automatic feed-regulator herein first described (provided or not with the stand-pipe and the cock thereof, as explained) with the induction-pipe *b*, the vessel A, its exhaust-steam pipes, and the extractor C and its pipe or pipes D, all being arranged, combined, and constructed so as to operate substantially in manner as set forth.

ROBERT BERRYMAN.

Witnesses:

R. H. EDDY,  
J. R. SNOW.