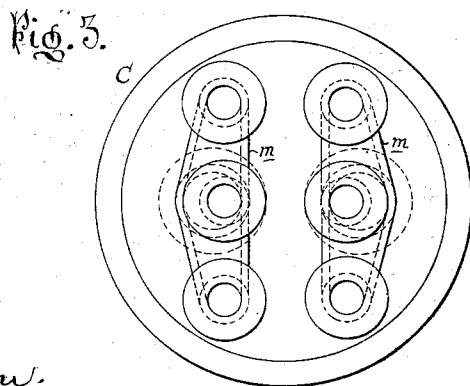
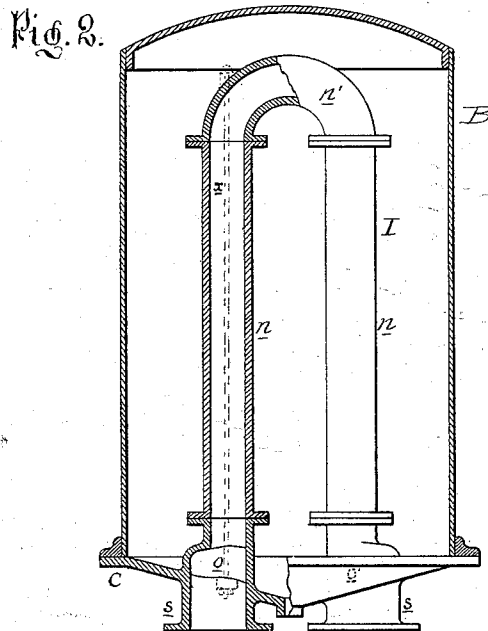
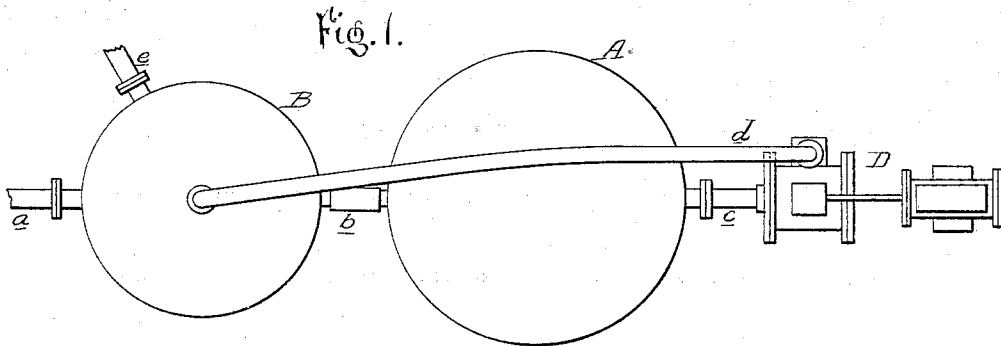


R. BERRYMAN.

Feed Water-Heaters and Condensers.

No. 135,756.

Patented Feb. 11, 1873.



Witnesses
Edw. F. Brown.
Wm. S. Henderson

R. Berryman
By his attys
Hanson & Co

UNITED STATES PATENT OFFICE.

ROBERT BERRYMAN, OF HARTFORD, CONNECTICUT.

IMPROVEMENT IN FEED-WATER HEATERS AND CONDENSERS.

Specification forming part of Letters Patent No. **135,756**, dated February 11, 1873.

To all whom it may concern:

Be it known that I, ROBERT BERRYMAN, of Hartford, county of Hartford, State of Connecticut, have invented a Combined Feed-Water Heater and Condenser, of which the following is a specification:

The object of my invention is, mainly, to economically condense exhaust steam, and at the same time heat the feed-water for a steam-boiler; and this I accomplish by combining with a condenser, A, Figure 1, a feed-water heater, B, which may be of the peculiar construction described hereafter, and connecting the condenser and heater so that the exhaust steam shall pass through the heater to the condenser, and the water of condensation through the heater to the boiler. The water from the condenser A is forced by a pump, D, into the feed-water heater B, where, before passing to the boiler, it is heated by the exhaust steam, the latter flowing from the pipe *a* to a chamber, *o*, of the heater, through U-shaped pipes to a second chamber, *o'*, and through a pipe, *c*, to the condenser, which it reaches in such a comparatively cool state that it is much more readily condensed than if it flowed into the condenser directly from the pipe *a*.

By this means the temperature of the exhaust steam is reduced and that of the feed-water increased without waste of heat or the use of expensive or unusual apparatus.

Although any suitable feed-water heater may be employed, I prefer to use one similar to that for which Letters Patent were granted to me on the 9th day of April, 1872; but instead of U-shaped pipes, made in one piece and of malleable metal, I make the said pipes either

wholly of cast metal, or else in sections *n n'*, the curved portions being of cast metal and the straight portions of malleable metal, the sections being flanged, and bolted together and to the head C of the heater, or else being secured by longitudinal stays *x*, as shown in dotted lines, Fig. 2.

By thus constructing the pipes the expense of bending and difficulty of securing and removing them, experienced when they are wholly of malleable metal, are avoided.

It is best to make the sections *n n'* of malleable metal, which, being thin, transmits heat readily; these sections being corrugated, if required, to impart greater stiffness.

To prevent galvanic action when different metals are employed for the different sections, the joints may be packed with red lead or other insulating material or composition.

Claims.

1. The combination, with a condenser, A, and feed-water heater B, of pipes or passages *b c d*, whereby the steam is conducted from the heater to the condenser, and the water from the latter is carried back to the heater, as specified.

2. The combination, with the head C of the heater, of U-shaped pipes, made in whole or in part of cast metal, and secured substantially as specified.

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

ROBERT BERRYMAN.

Witnesses:

CHARLES E. FOSTER,
EDM. F. BROWN.