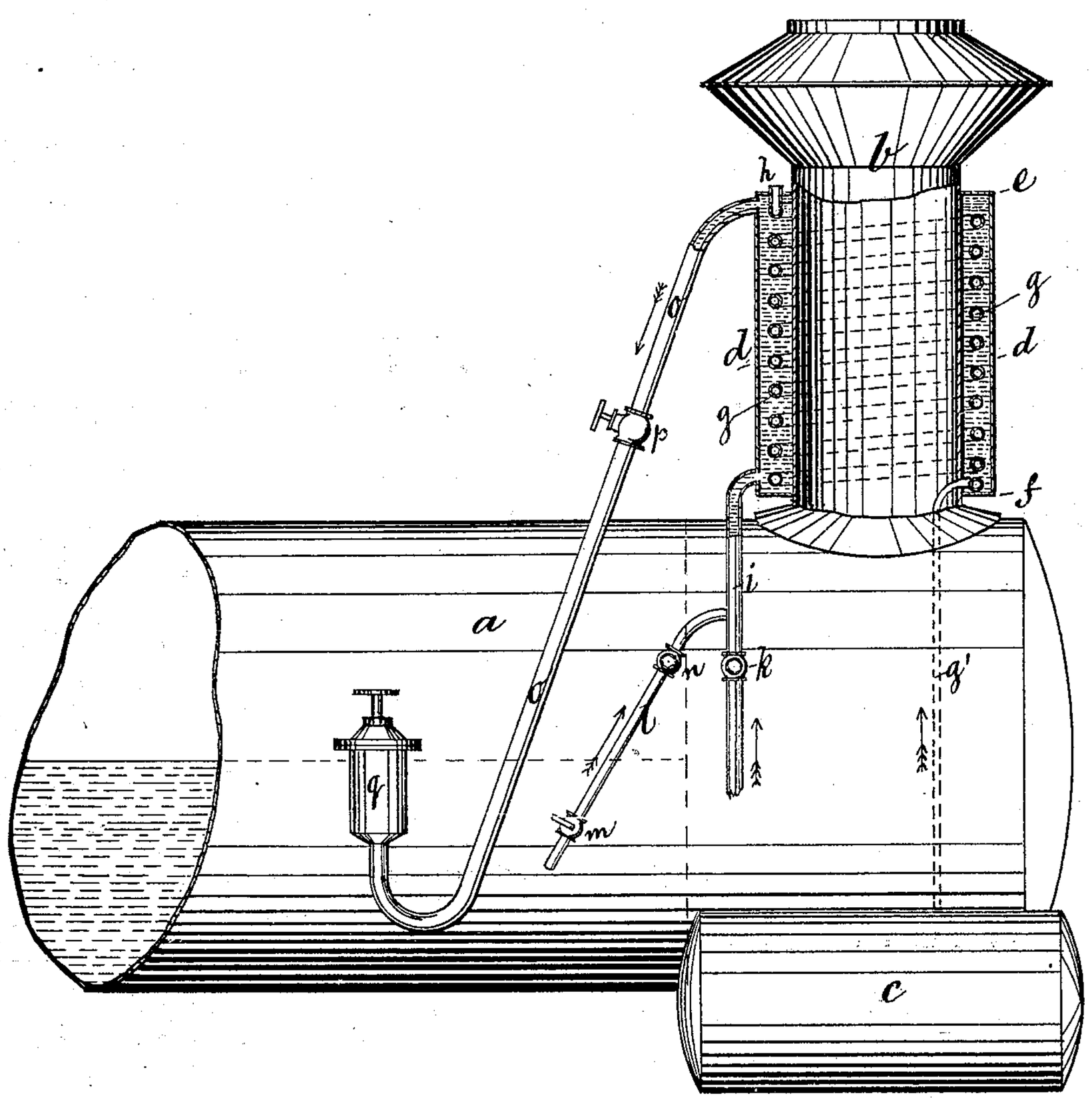
A. C. WHITNEY & J. H. HALE.

Feed Water Heaters for Boilers.

No. 151,816. Patented June 9, 1874.



Witnesses:

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UNITED STATES PATENT OFFICE.

ALFRED C. WHITNEY AND JOHN H. HALE, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN FEED-WATER HEATERS FOR BOILERS.

Specification forming part of Letters Patent No. **151,816**, dated June 9, 1874; application filed May 15, 1874.

To all whom it may concern:

Be it known that we, ALFRED C. WHITNEY and JOHN H. HALE, both of Boston, in the county of Suffolk and State of Massachusetts, have jointly invented certain new and useful Improvements in Feed-Water Heaters for Boilers; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

Our invention relates to improvements in feed-water heaters for steam-boilers, consisting of a jacket that surrounds the smoke-stack, in combination with a coiled pipe placed therein, through which a part of the exhaust steam passes from the cylinder. The feed-water is forced from the pump into the annular space that surrounds the smoke-stack, where it is heated partly by the heated products going up through the chimney or smoke-stack, and partly by the coiled exhaust-pipe. A circulating-pipe, provided with a regulating-valve and a check-valve, communicates from the water in the boiler to the feed-pipe from the pump, by which arrangement the water in the annular space around the chimney is prevented from overheating when the pump is not working. The water in the annular chamber aforesaid, after being heated, is forced to the boiler through a pipe provided with a stop-valve and regulating-valve, as will now be herein more fully shown and described.

The annexed drawing represents a sectional elevation of our improved feed-water heater.

a represents a locomotive or other boiler, provided with a chimney or smoke-stack, *b*, in the usual manner. *c* represents a steam-cylinder. An annular jacket or shell, *d*, with its ends *e* and *f*, surrounds the smoke-stack *b*, in such a manner that a water-tight compartment is made between the chimney and the annular jacket *d*, into which the feed-water is forced from the pump previous to entering the boiler. A coiled exhaust-pipe, *g*, is located in the aforesaid water-tight compartment, as shown in the drawings. The exhaust steam from the cylinder is partly forced through a small pipe, *g'*, to the coiled pipe *g*, by which arrangement the water in the annular space around the chimney is heated in addition to being heated by the hot products that rise up through the chimney *b*. The exhaust steam, after passing through the coiled pipe *g*, escapes through the top at *h*, as shown. *i* represents the feed-water pipe leading from the force-pump to the lower part of the jacket *d*. The pipe *i* is provided with a check-valve, *k*, for the purpose of preventing the water in the jacket *d* from being forced back on the pump when the latter is at rest. A circulating-pipe, *l*, provided with a stop-valve or cut-off, *m*, and check-valve, *n*, is connected from below the water-line in the boiler *a* to the feed-pipe *i* at a point between the check-valve *k* and the lower part of the jacket *d*, by which arrangement a proper circulation of the water is established from the boiler to the jacket *d*, and back again to the boiler, whether the pump is working or not, whereby the water in the jacket *d* is prevented from being overheated, particularly if the feed-pump is at rest. The water, after being heated in the jacket *d*, is forced through a pipe, *o*, leading from the upper part of the said jacket *d*, to the water-space in the boiler *a*. The pipe *o* is provided with a stop-valve, *p*, and a regulating-valve or cut-off, *q*, close to the boiler *a*, as shown.

The arrows indicate the direction in which the feed-water is forced from the pump to the boiler.

By this arrangement we are able to heat the feed-water to a high temperature previous to being forced into the boiler, and in this manner effect a great saving in the consumption of fuel.

Having thus fully described our invention, what we wish to secure by Letters Patent, and claim, is—

In combination with a boiler and its chimney, the annular jacket *d*, coiled exhaust-pipe *g*, feed-pipe *i*, with its check-valve *k*, the circulating-pipe *l*, with its valves *m n*, and the delivery-pipe *o*, with its valves *p q*, as and for the purpose herein set forth and described.

In testimony that we claim the foregoing, we have hereunto set our hands this 10th day of January, 1874.

ALFRED C. WHITNEY.
JOHN H. HALE.

Witnesses:
ALBAN ANDRÉN,
JOHN R. HEARD.