D. C. G. Field,

Feed Water Heater.

No. 111,526. Patented Feb. 7, 1871.

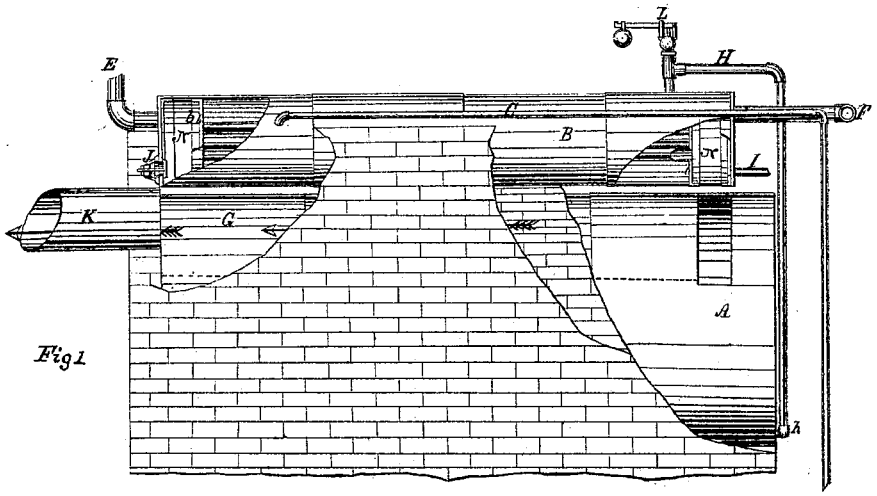

Fig 1

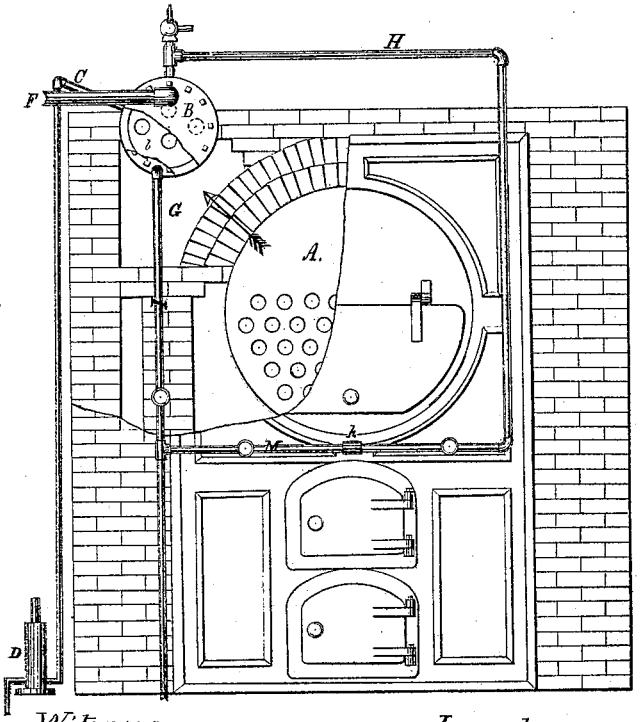

Fig 2

Witnesses.
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DAVID C. G. FIELD, OF LOWELL, MASSACHUSETTS.

Letters Patent No. 111,526, dated February 7, 1871.

IMPROVEMENT IN WATER-HEATERS FOR STEAM-BOILERS.

The Schedule referred to in these Letters Patent and making part of the same.

I, DAVID C. G. FIELD, of Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented certain Improvements in Water-Heaters connected with Steam-Boilers, of which the following is a specification.

My invention relates to the construction and arrangement of a water-heater in connection with a steam-boiler, exhaust steam from the engine, and brick-flue, in such a manner that the cold water pumped directly from the well or tank is transmitted to the boiler in a highly heated condition, causing a great saving in the amount of fuel and labor necessary to generate steam, rendering the boilers less liable to injury from sudden contraction and expansion in consequence of the admission of hot instead of cold water, and the pump less liable to get out of order in pumping cold instead of hot water.

I am enabled, owing to the peculiar construction and arrangement of my heating apparatus, to so utilize the waste heat from the furnace, and the exhaust steam from the engine, to lessen the cost of generating steam fully one-half over the ordinary method of pumping cold water into the boiler.

The exhaust steam from the engine, in passing through the pipes or tubes of the heater, is condensed to a certain extent by the cold water pumped into the heater, which has the effect of producing a partial vacuum in the exhaust-pipe of the engine, and is equivalent to an increased pressure of direct steam acting on the piston, thus increasing the power of the engine.

The boiler-plates, which come directly over the fire, are frequently cracked or warped by the sudden contraction caused by the injection of cold water into the boiler upon the heated plates, and from this cause, especially in the case of old boilers, often arise disastrous explosions.

By my improved apparatus this danger is avoided, as the water enters the boiler in a condition nearly as hot as that already in the boiler, and this is accomplished without any extra fuel or cost of any kind other than the first cost of the apparatus.

The exhaust steam from the engine is frequently employed to heat water in a cistern preparatory to its introduction into the boiler by means of the force-pump ordinarily employed. This method of heating the water and forcing the same into the boiler is often productive of great injury to the pump, in consequence of the heat acting upon the valves and deranging the same. This injury to the pump is entirely avoided by my invention.

Figure 1 is a side view of my invention, showing the arrangement of the heater and pipes connected with the same, as also a break in the brick-work surrounding the boiler, showing the position of the flue in connection with the heater, and the manner of introducing the exhaust steam into said heater.

Figure 2 is an end view of my invention, showing, through the broken boiler-front, the front end of the flue, and also of the heater with a portion of the front end of the heater broken from the same, showing the chamber at this end, which is identical with the chamber at the other end of the heater, and the arrangement of the pipes or tubes of the heater and the passage-way from the boiler-tubes to the flue, within and over which the heater is placed.

The same letters in both figures represent corresponding parts.

A is a steam tubular boiler, of the ordinary construction, inclosed in brick walls.

B is the heater, constructed of boiler-iron.

A chamber is formed at each end of the heater, inside, by the introduction of a round plate of iron, *b*, riveted at a suitable distance from the outside plate; said plates have four or more holes for the reception of the tubes, as represented, and to which plates the tubes are firmly welded, the object of said tubes being to receive the exhaust steam from the engine and conduct it through the heater, into which cold water is introduced through the pipe C, said pipe being connected to pump D.

E is the pipe which conveys the exhaust steam from the engine to the heater.

F is a pipe which conveys away the exhaust steam after it has passed the heater.

G is the brick flue, within and over which is placed the heater.

H is a pipe through which the water, after being heated, is forced by the pump into the boiler at the T *h*.

I is a pipe for conveying away the condensed steam or water in the chamber of the heater; this pipe connects with the blow-off pipe M of the boiler.

J is a hand-hole, which enters the chamber and the water portion of the heater, by means of which anything collecting in said heater may be removed.

K is a pipe, which is the connection of the brick flue with the chimney.

L is a safety-valve, by means of which all danger on account of an over-pressure of water in the heater is avoided.

N N are the chambers formed in the heater.

The water is introduced into the heater through the pipe C, and, by means of the exhaust steam from the engine and all of the heat that has passed the boiler, the water is heated and conveyed into the boiler through the pipe H.

The smoke and gases produced by the combustion

of the fuel pass through the brick flue G to the chimney.

I claim as my invention—

1. The position of the heater in and over the boiler-flue, in order that the advantage of the use of the exhaust steam may be combined with the use of the heat which has passed the boiler and would go to the chimney if not thus utilized as described.

2. The combination and arrangement of the heater B with the boiler A, (said heater being placed over and within the flue G,) and the pipes connected therewith, substantially as described and for the purpose specified.

DAVID C. G. FIELD.

Witnesses:

ALBERT M. MOORE,

ABEL T. ATHERTON.