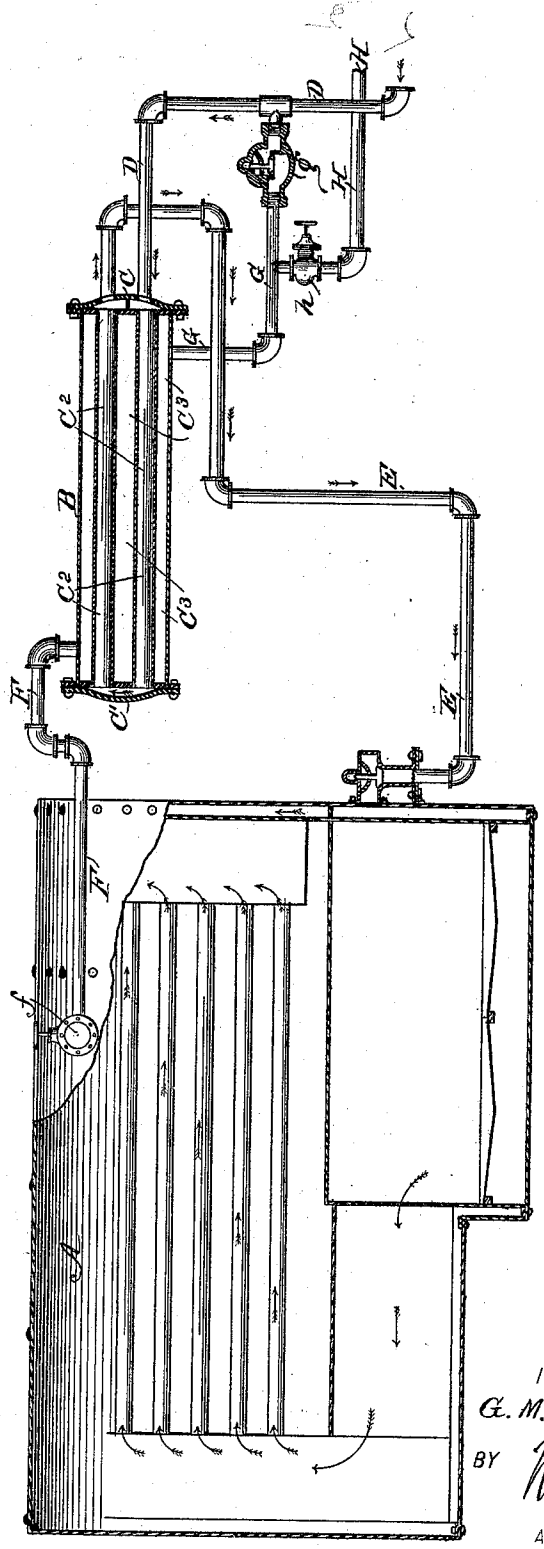
(No Model.)

G. M. MULLEN.

HEATING FEED WATER.

No. 513,409. Patented Jan. 23, 1894.



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GREGORY M. MULLEN, OF BALTIMORE, MARYLAND.

HEATING FEED-WATER.

SPECIFICATION forming part of Letters Patent No. 513,409, dated January 23, 1894.

Application filed April 5, 1893. Serial No. 469,154. (No model.)

To all whom it may concern:

Be it known that I, GREGORY M. MULLEN, of Baltimore city, in the State of Maryland, have invented a new and useful Improvement in Heating Feed-Water, of which the following is a specification.

My invention is an improvement in heating feed water and especially in that class of such devices in which the feed water is heated by steam and water from the boiler and the invention consists in the novel construction, combination and arrangement of parts as will be hereinafter described and pointed out in the claims.

In the drawing the figure is a sectional view of an apparatus constructed according to my invention.

The boiler A may be of ordinary construction. Adjacent thereto is arranged the heater B which is formed with a water space having end inlet and outlet chambers C and C′ and tubes C^2 connecting said chambers and a surrounding steam and water space C^3. The supply pipe D from the pump not shown, leads into the inlet chamber C and a pipe E leads from the outlet chamber to the boiler A opening into a water leg or other part thereof as shown. This pipe E has a check valve to permit the water to pass into the boiler and to prevent steam from passing from the boiler back through the pipe E into the heater. A surface blow pipe F leads from the boiler and discharges into the steam and water space of the heater, a suitable valve *f* being provided to control the said pipe and regulate the passage of steam to the heater. This pipe supplies the steam and water to circulate around the tubes within the heater and so operates to heat the feed water passed through the said tubes. A pipe G connects at one end with the steam and water space of the heater near the bottom thereof and leads to and opens into the supply pipe D a check valve *g* being provided in said pipe and arranged to permit steam and water from boiler under excessive pressures to pass into the pipe D and yet prevent the feed water from passing from the pipe D into the pipe G. A pipe H connects with the pipe G between the check valve *g* and the heater and leads overboard or to the condenser as the case may require. This pipe H has a suitable controlling valve *h* which may be opened or closed as occasion may require.

In operation the water supplied through the pipe D by means of the pump or other feeder, is discharged into the heater, circulates within the same and is heated by the steam and water fed to the steam and water space thereof and passes into the boiler at a comparatively high temperature. The pipe G provides for conducting the condensations and other water accumulated in the steam space of the heater back into the boiler in such manner as to in a measure heat the feed water before the latter reaches the heater proper.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a feed water heating apparatus the combination with the heater, the pipe supplying water thereto and the water and steam pipes connecting the heater with the boiler, of the outlet pipe leading from the steam space of the heater and connected with the water supply pipe which leads to said heater all substantially as set forth.

2. In a feed water heater the combination substantially as herein described of a heater formed with separated water and steam spaces, the water pipe leading to said water space, an outlet pipe connected with the steam space of the heater and extended and opening into the said water supply pipe, a check valve in said outlet pipe and water and steam connections between the heater and the boiler substantially as set forth.

3. The combination substantially as herein described of the boiler, the heater having separated water and steam spaces, the heating pipe leading from the boiler to the steam space of the heater, the supply water pipe leading to the water space of the heater a connecting pipe leading from the water space of the heater to the boiler, and an outlet pipe leading from the steam space of the heater to the water supply pipe of said heater and a check valve in said outlet steam pipe substantially as set forth.

4. The feed water heater substantially as described consisting of the heater proper having separated water and steam spaces pipes leading between the water and steam spaces of said heater and the boiler the water supply pipe leading to the water space of the heater an outlet pipe leading from the steam space of the heater to and connected with the water supply pipe which leads to said heater, a check valve in said outlet pipe and a discharge pipe connected with the steam outlet pipe between the check valve thereof and the heater all substantially as and for the purposes set forth.

GREGORY M. MULLEN.

Witnesses:
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