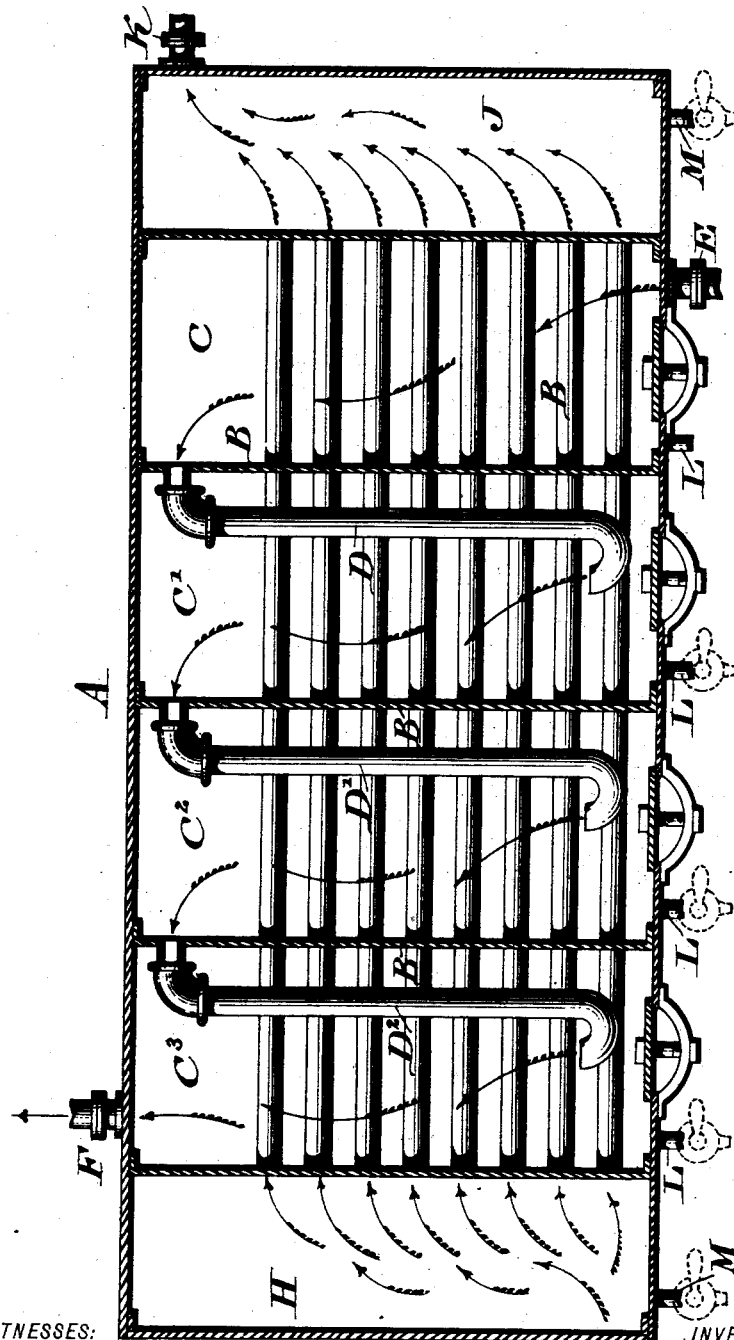


(No Model.)

H. G. KEASBEY.  
FEED WATER HEATER.

No. 525,552.

Patented Sept. 4, 1894.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

HENRY G. KEASBEY, OF AMBLER, PENNSYLVANIA.

## FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 525,552, dated September 4, 1894.

Application filed January 18, 1894. Serial No. 497,244. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY G. KEASBEY, a citizen of the United States, residing at Ambler, in the county of Montgomery, State of Pennsylvania, have invented a new and useful Improvement in Feed-Water Heaters, Economizers, and Purifiers, which improvement is fully set forth in the following specification and accompanying drawing.

My invention consists of a feed water heater, &c., formed of a chambered shell with flues and pipes therein, inclosed end chambers for said shell, one of which is adapted to serve as an inlet for live or exhaust steam, and the other as an outlet chamber for the same, said flues terminating in said end chambers and said pipes serving to impart a zig-zag or alternating top and bottom motion to the water throughout the heater while it is being subjected to the action of the steam, the heating being gradual and being effected by either live or exhaust steam, all as will be hereinafter set forth.

The figure represents a partial longitudinal section and partial side elevation of a feed water heater, &c., embodying my invention.

Referring to the drawing: A designates a shell within which are partitions B, forming chambers C, C', C<sup>2</sup>, C<sup>3</sup>, and pipes D, D', D<sup>2</sup>, which extends from the top of one partition to the bottom of the chamber which said pipe occupies.

Connected with the chamber C is a water supply pipe E and with the chamber C<sup>3</sup> is a discharge pipe F, it being evident that after water enters the chamber C, it rises in the same, and is directed by the pipe D to the bottom of the chamber C', where it is discharged. The water then rises in said chamber and is discharged by the pipe D' into the chamber C<sup>2</sup> at the bottom thereof, and so on with the pipe D<sup>2</sup> and chamber C<sup>3</sup>, the water thus being directed in zig-zag course throughout the chambers of the boiler, and being subjected to the action of the flues B with which the water comes in contact in said course, said flues being heated by steam which is directed by a pipe G from a source of supply into a chamber H, which is formed on the end of the shell A, adjacent to the chamber C<sup>3</sup> thereof, the same having the flues B in

communication with the same, it being evident that the steam enters the chamber H through the pipe G, and is directed into the flues B, thus heating the water in the chambers C<sup>3</sup>, C<sup>2</sup>, C', C, the heating being gradual as the temperature of the chambers increase, the chamber C<sup>3</sup> being the highest temperature, since the exhaust steam enters the flues B in said chamber C<sup>3</sup>, while it discharges where the flues are in the receiving chamber C, the steam in its low temperature then entering the chamber J, which is connected with the shell A opposite to the chamber H, and provided with a discharge pipe K. The shell is also provided with blow-off pipes L, and the chambers H and J with blow-off pipes M for removal of sediment or deposit, &c.

Man or hand-holes are formed in the shell and partitions also if desired, and covering plates provided for the same, whereby access may be had to the interior of the shell for purposes of cleansing, repairs, &c.

In two applications filed by me of even date herewith, Serial Nos. 497,243 and 497,245, for a feed water heater and steam boiler respectively, I have shown and claimed a construction adapted in one case to utilize hot gases and products of combustion alone, one end of the heater being open and adapted to be connected with the flue of a boiler and to receive the said hot gases therefrom, the other parts being also arranged with this especial object in view. In the other case the feed water heating device and the boiler proper are combined into a single structure, one end chamber of the same terminating adjacent to the fire box, above which is the steam dome, and the connections from the top of one chamber to the bottom of an adjacent chamber being made preferably partially exteriorly of the same. To none of the above constructions do I make claim in the present application.

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

1. A shell having partitions therein, forming separate water chambers, flues through said chambers, pipes connected with said partitions, forming communication between the chambers in zig-zag order through the heater, said flues terminating at their extremities in

closed chambers, one of which is adapted to serve as an inlet for live or exhaust steam, and the other as an outlet chamber for the same, said parts being combined substantially as described.

5 2. A feed water heater and purifier, consisting of a shell having inclosed chambers in both its ends, one of which is adapted to serve as an inlet for live exhaust steam, and  
10 the other as an outlet chamber for the same, flues connecting said chambers, partitions forming water chambers between said steam

chambers, a water inlet pipe leading into the bottom of one of said water chambers, a pipe leading from the upper part of a chamber to  
15 the lower part of the adjacent chamber, and a water discharge pipe leading from the upper part of the chamber adjacent the inclosed steam inlet chamber, said parts being combined substantially as described.

HENRY G. KEASBEY.

Witnesses:

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