(No Model.)

H. G. KEASBEY.

FEED WATER HEATER.

No. 525,551. Patented Sept. 4, 1894.

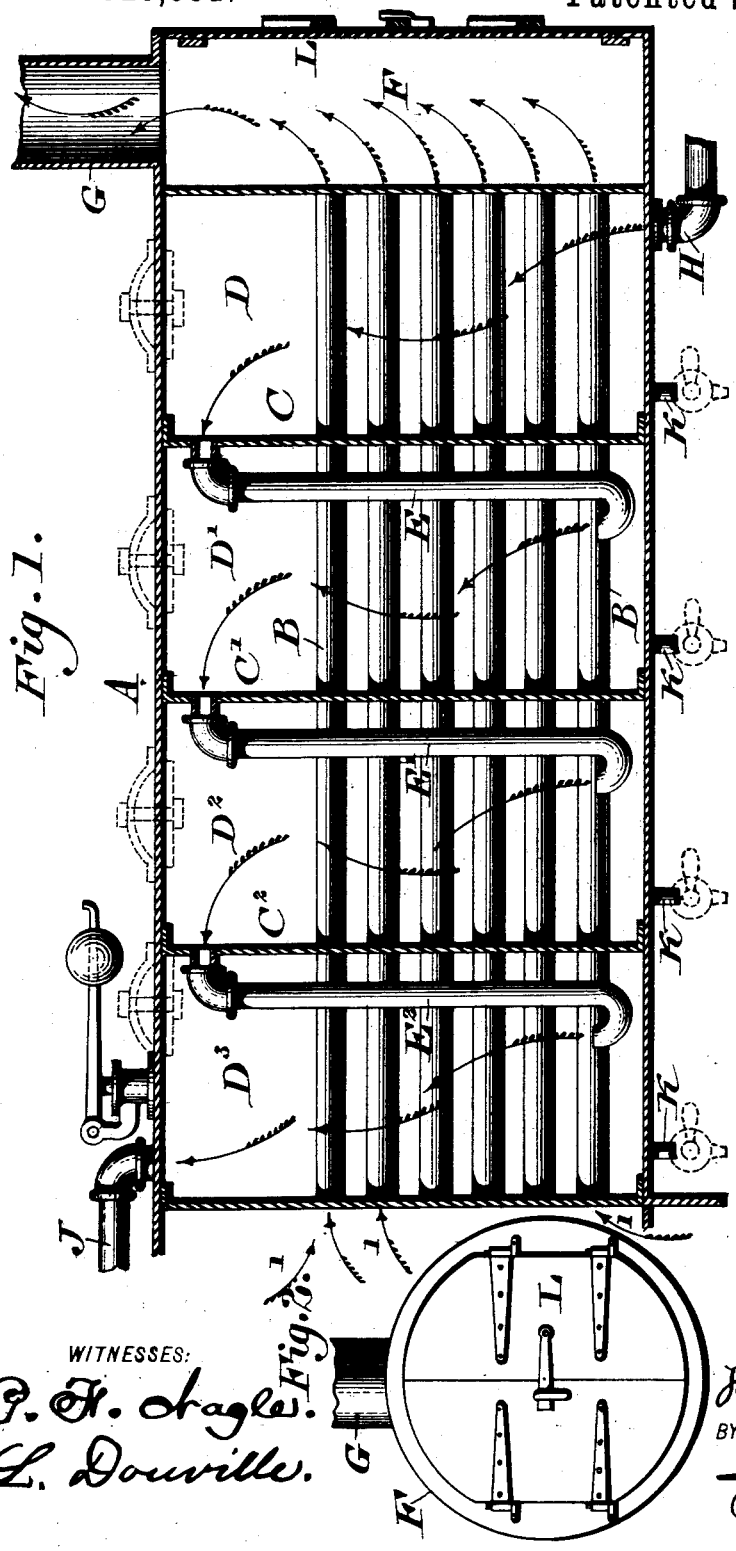

Fig. 1.

Fig. 3.

WITNESSES:

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HENRY G. KEASBEY, OF AMBLER, PENNSYLVANIA.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 525,551, dated September 4, 1894.

Application filed January 18, 1894. Serial No. 497,243. (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 drawings.

My invention consists of a feed water heater, economizer and purifier which is preferably constructed separately from the boiler, but is so arranged relative thereto that the hot gases and products of combustion constitute the only heating medium for the heater, said gases being conducted directly to the heater through a suitable flue, after having been preferably first utilized in the boiler, and said heater being formed of a shell with partitions therein, and pipes adapted to direct the water from the top of one chamber to the bottom of another chamber, and subjecting it to the action of gas or hot air flues, whereby it is effectively heated, the heating being gradual, as the water enters the boiler where the temperature is the lowest, and leaves the same where the temperature is the highest, the construction and operation being hereinafter fully set forth.

Figure 1 represents a partial longitudinal section and partial side elevation of a feed water heater, &c., embodying my invention. Fig. 2 represents an end view thereof on a reduced scale.

Similar letters of reference indicate corresponding parts in the two figures.

Referring to the drawings: A designates a shell having flues B therein, said shell being suitably connected with a steam boiler, whereby the gases or products of combustion thereof enter said flues, as indicated by the arrows 1.

Within the shell A are partitions or diaphragms C, C′, C^2, which divide the same into chambers D, D′, D^2, D^3 to which partitions are connected the pipes E, E′, E^2, which are within the shell and form communications between the top of one chamber and the bottom of the adjacent one.

At the end of the shell, opposite to the boiler, is a chamber F, which forms a communication between the flues E and smoke stack G for directing the gases, &c., from the flues into said stack.

Connected with the chamber D is a water supply pipe H and with the chamber D^3 is a water discharge pipe J. The chambers have connected with them the pipes K for cleansing, emptying and general blow-off purposes. The shell is also provided with man or hand-holes, and closing plates therefor, and a safety valve for evident purposes.

The operation is as follows: Water is directed into the chamber D, through the pipe H, and the same rises in said chamber until it reaches the opening at the top of the partition C, leading to the pipe E, whereby it is directed by said pipe to the bottom of the chamber D′, where it is discharged, it then rising in said chamber and reaching the opening in the partition C′ and entering the pipe E′, whereby it is discharged at the bottom of the chamber D^2, and so the water continues its passage until it finally reaches the pipe J, by which it is directed into the boiler or other place of service, it being noticed that the water takes a passage through the boiler in somewhat zig-zag course, so that it is subjected to the heating action of the several flues as it flows past the same, it being also seen that the water is gradually heated, it entering the boiler where the temperature is the lowest, and discharging where the temperature is the highest, and thus the heating of the water is effectively accomplished. The sediment may be removed through the pipes K, the latter also providing means for cleaning the shell and exterior of the flues, and general blow-off purposes.

The chamber F is provided with doors L, which permit access to the said chamber, and the interior of the flues E for purposes of cleansing and repairs.

In two applications filed by me of even date herewith, Serial Nos. 497,244 and 497,245, for feed water heaters and steam boilers respectively, I have disclosed and claimed a construction adapted in one case to be utilized in connection with a suitable source of steam heat alone, both ends of said heater having an inclosed chamber and the location of steam inlet and outlet and drips therefor being arranged with this especial object in view. In the other case, the feed water heating device and

the boiler proper are combined into one 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 with partitions therein forming separate chambers, pipes connected with said partitions forming a zig-zag passage for the water through the shell, and flues in said chambers with which the water contacts in its zig-zag course, said shell being connected with the flue of a steam boiler and having its flues receive the gases or products of combustion therefrom, said parts being combined substantially as described, forming an improvement in feed water heaters, economizers and purifiers, as set forth.

2. A feed water heater consisting of a shell having partitions therein, forming water chambers, flues passing therethrough, one end of said flues being adapted to be in communication with the flue of a steam boiler, and to receive the hot gases or products of combustion therefrom, the other end terminating in a chamber provided with a stack, pipes within said shell forming a communication between the top of a water chamber and the bottom of an adjacent water chamber, a water inlet pipe leading into the bottom of the water chamber farthest from the inlet end of the products of combustion, and a discharge pipe leading from the top of the water chamber nearest the inlet for said products of combustion, said parts being combined substantially as described.

3. A feed water heater and purifier consisting of the shell A, having flues therein, one extremity of said flues terminating in a chamber at one end of said shell, said chamber being provided with a stack G, the other end of said shell being in communication with the flues of a boiler, and adapted to receive the products of combustion therefrom, partitions C, C′, and C^2 in said shell forming water chambers D, D′, D^2, &c., and pipes E, E′, and E^2 leading from the top of one water chamber to the bottom of another, a water supply pipe leading into the water chamber adjacent to the stack, and an outlet pipe leading from the water chamber nearest the inlet end of said flues, said parts being combined substantially as described.

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Witnesses:
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