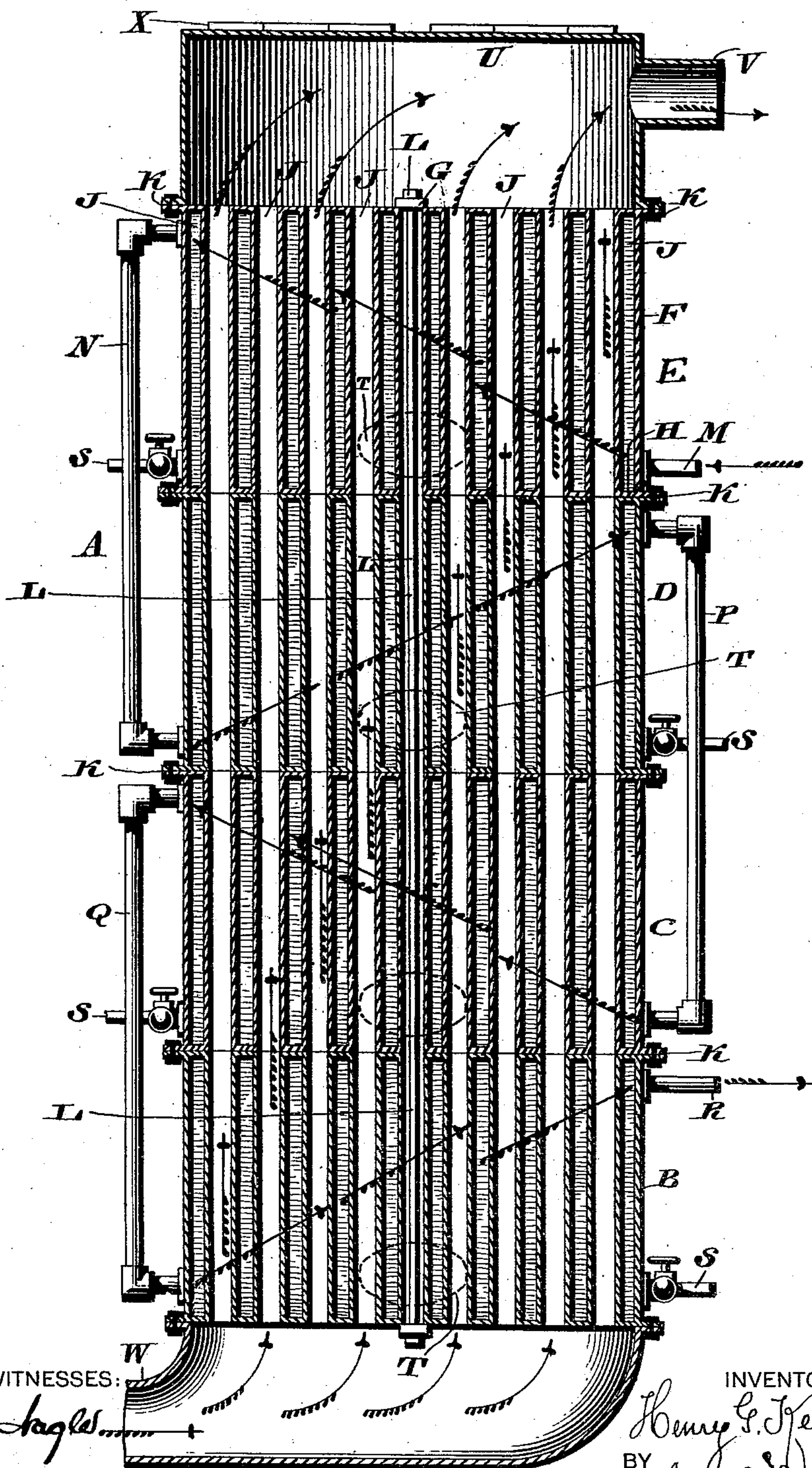


(No Model.)

H. G. KEASBEY.
FEED WATER HEATER.

No. 543,689.

Patented July 30, 1895.



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. 543,689, dated July 30, 1895.

Application filed April 17, 1895. Serial No. 546,150. (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, &c., which improvement is fully set forth in the following specification and accompanying drawing.

My invention relates to a novel construction of feed-water heater; and it consists of a plurality of separable sections or chambers, which are readily assembled together and adapted to be placed in an upright position in a smoke-stack, or adjacent to a boiler or furnace, the hot gases and products of combustion which have been first utilized in the boiler forming the only heating medium for said heater, and the water contained therein being effectively heated by being conducted successively from that portion of the heater where the temperature is lowest to the hottest portion thereof, and being eventually conducted therefrom to a boiler or other point, provision being made for obtaining ready access to the interior of the chambers and flues, all as will be hereinafter set forth.

The figure represents a vertical sectional view of a feed-water heater embodying my invention.

Referring to the drawing, A designates the feed-water heater, which is composed of the hollow chambers B, C, D, and E, which are superimposed upon each other, and in the present instance are four in number, although it is evident that the number of these chambers may be increased or diminished according to requirements.

As the above chambers are all substantially alike, a description of one will suffice for all, reference being had to the upper chamber E. The said chamber is composed of a cylindrical or other shaped shell F, to each end of which is suitably attached the tube-sheets G and H, in which are expanded or otherwise secured the flues J. Each chamber has attached to its shell, at a point near the junction of the latter and the tube-sheets, suitable ears, lugs or angle-irons K, whose abutting portions are held together by bolts or similar devices when the chambers are assembled and placed in juxtaposition to each other.

It will be obvious that other means than those shown may be used for holding the chambers in position—*e. g.*, a rod or bolt L extending through each section may be employed, the ends thereof being engaged by nuts, keys, or other devices.

M designates the inlet for the feed-water, which is located at the lower portion of the upper chamber, near the lower tube-sheet of the same.

N designates the outlet-pipe connecting the two upper chambers, and it will be noticed that said pipe has one end connected to the upper portion of said upper chamber, while its other end is connected to the lower portion of the adjacent chamber D. In like manner the upper portion of the chamber D is connected by the pipe P to the lower portion of the chamber C; and the upper portion of the latter is connected by the pipe Q with the lower portion of the chamber B, while the hot water is conducted by the pipe R from the upper portion of the chamber B to a boiler or elsewhere. Each of the chambers B, C, D, and E is provided with a blow-off pipe S, which is attached to the lower portion thereof, where the movement of the water is the least, and consequently the largest amount of sediment will be deposited. The several chambers may be further provided with man-holes T, and safety-valves may also be provided if desired.

U designates a hood or casing which is attached to the upper chamber E, into which the hot gases and products of combustion are discharged after having first imparted their heat to the contents of the chambers below, said gases eventually escaping from the hood through the outlet V.

W designates an inlet-flue for the hot gases and products of combustion, the latter being conducted thereinto after they have been first utilized in a boiler. The said hood U may be provided with a door or doors X, which admit of access of the smoke-flues J, for the purpose of removing ashes, soot, &c., therefrom whenever desired, it being remembered that all the flues J are in substantial alignment with each other.

The operation is as follows: The several chambers having been assembled in the manner shown, it being noticed that the pipes N

and Q are preferably diametrically opposite to each other, in order that the water may be obliged to traverse as much of the heating surface as possible while passing through each chamber, the feed-water, having been introduced through the pipe M, rises as it becomes heated in its contact with the hot surfaces and is conducted by the pipe N to the lower portion of the chamber D, thence from the upper portion of the latter by the pipe P to the lower portion of the chamber C, and thence to the chamber B, and, finally, by means of the outlet pipe R, to the boiler or other desired point, it being noticed that since said water enters the heater at the point where the temperature is lowest and is discharged therefrom at the point where the temperature is highest the heating will be gradual and effective and only the hottest water will be withdrawn therefrom.

By making the parts in sections, as shown, the heater can be readily taken apart for transportation, and in case of accident to one of the sections or chambers the same can be readily removed and repaired or a new one inserted in position, as is evident.

Each chamber can be readily blown off and access had to the interior by means of the manholes.

The heater may be placed in a smoke-stack or may be placed in an upright position at the rear of a boiler or furnace.

I am aware that it is not broadly new to construct a feed-water heater in sections or to provide the same with water-circulating pipes located exteriorly thereto, and to such construction I herein make no claim, the

present invention being in the nature of an improvement on my prior patent, No. 525,553, granted September 4, 1894, and being designed to cover the specific structure of a feed-water heater which is based upon the general construction shown in said patent and to show and protect the best manner of assembling and operating said feed-water heater.

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

A feed water heater, consisting of a plurality of separable sections, provided with fire tubes, superimposed upon each other, means for securing said sections in position, connections between said sections extending from the upper portion of one section to the lower portion of the adjacent section, and from the upper portion of the latter to the lower portion of the next section, the feed water inlet being in the lower portion of the upper chamber, and the hot water outlet leading from the upper portion of the lowest chamber, in combination with a suitable inlet for the products of combustion attached to said lower section, and a hood or casing having an outlet therefrom, attached to the upper section, whereby the water is rapidly and effectively heated, being introduced in the coolest portion of the heater and discharged from the hottest portion thereof, substantially as described.

HENRY G. KEASBEY.

Witnesses:

AUGE CLERICY,
FRANCOIS LONA.