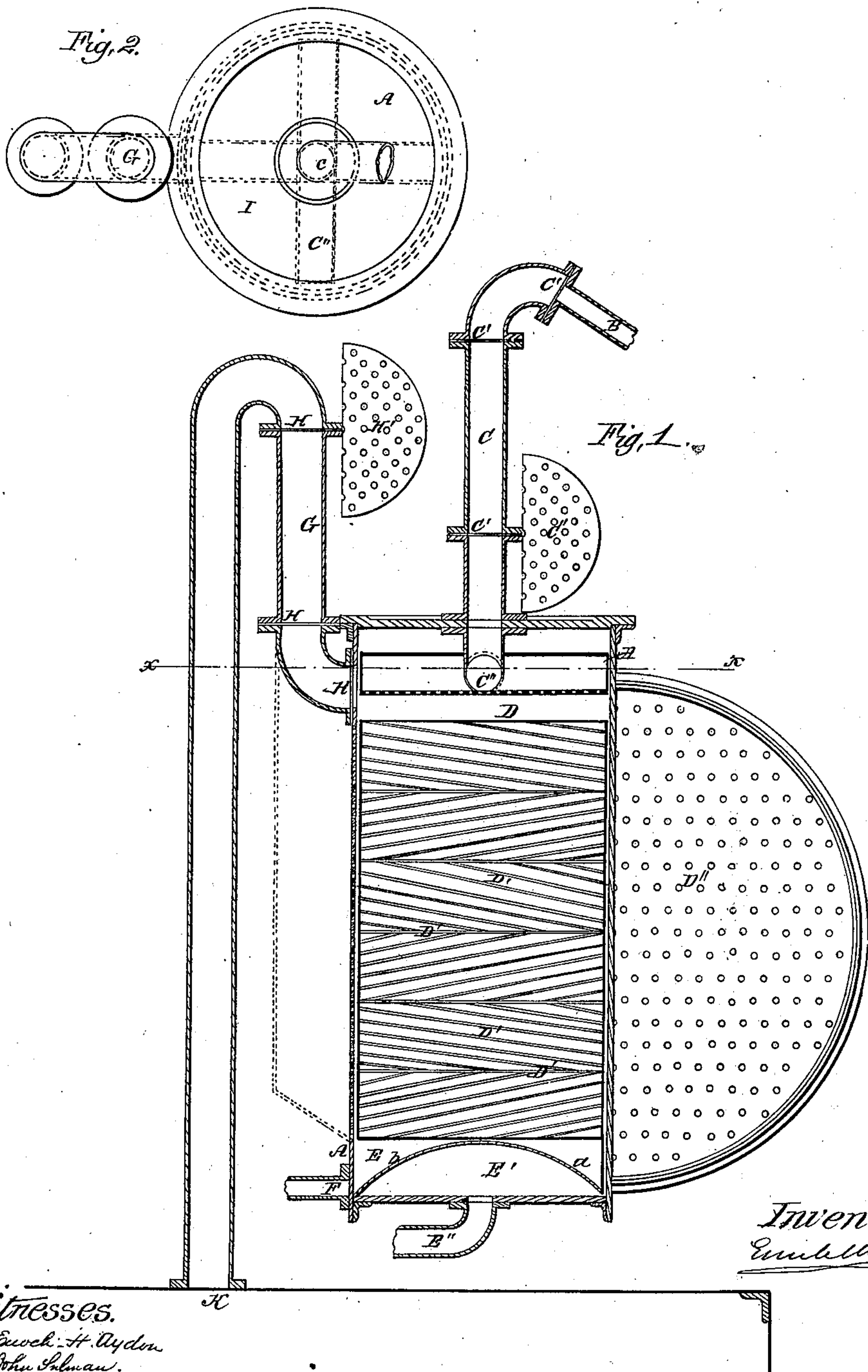


L. E. C. Martin,

Steam-Boiler Condenser.

N^o 43,750.

Patented Aug. 2, 1864.



UNITED STATES PATENT OFFICE.

LOUIS EMILE CONSTANT MARTIN, OF LONDON, ENGLAND.

IMPROVEMENT IN FEED-WATER HEATERS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 43,750, dated August 2, 1864.

To all whom it may concern:

Be it known that I, EMILE MARTIN, of the city of Paris, in the Empire of France, have invented a new and useful Apparatus for Supplying Water to Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a vertical section through the center of my apparatus as applied to a steam-boiler, and Fig. 2 is a horizontal section through the same at the line *xx* of Fig. 1.

In many localities where the use of steam as a motor is necessary the waters required for steam-boilers are either so impure or carry in solution so large a proportion of earths or salts that they rapidly incrust the boiler and steam-pipes, thus requiring the boiler and pipes to be often cleaned, and not infrequently producing explosions.

Now, it is the object of my invention to divest all the supply-waters for steam-engine boilers of their impurities before entering the boiler, but more particularly to cause the carbonate and sulphate of lime to be separated from the water, and prevent their accumulation upon the inner surfaces of the boiler, for these earths are found in many waters and in large proportions; and to this end my invention consists in forcing the supply-water into the receiver in small drops by passing it through minutely-perforated plates on its way to the receiver, in increasing the internal surface of the receiver by a series of perforated removable plates, and in heating the water in the receiver by a jet of superheated steam to facilitate the separation of its impurities.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

I construct a cylindrical metallic steam-tight receiver, A, of strength sufficient to sustain an equal pressure of steam with the boiler K of the engine. The top of the receiver A constitutes a narrow chamber that is divided by a perforated diaphragm, C''. The main body of the receiver A is occupied by an internal cylinder that contains numerous perforated metal plates, D', which may be arranged in horizontal or inclined planes and permanently attached to the internal cylinder

or made removable separately therefrom. These plates are all perforated with numerous small openings, as shown at D'', and must, whether permanent or movable, be at such a distance apart as to permit a free circulation of the supply-water between them. The plates D' separately, or the internal cylinder containing them, may be removed at convenient periods, and when cleaned or deprived of their accumulated impurities they may be replaced with little labor or inconvenience and without endangering the bursting of the boiler. The bottom of the receiver A contains a chamber, E, to receive the purified supply-water, and a chamber, E', formed by a convex diaphragm, *a b*, to receive a jet of superheated steam from the centrally-attached pipe E''. The upper chamber receives a pipe, G, which is attached to the boiler at K, and a pipe, C, connected with the force-pump by a pipe, B. The joints of the pipes C and G all contain perforated diaphragms, the former at H H H, the perforated diaphragms being seen at H', and the latter at C' C' C', the perforated plates being shown at C''. A space is left between the outer and inner cylinders to permit the passage of the steam from the pipe E'' through proper openings in the diaphragm *a b* and leave it free to circulate around and between the cylinders and up through the perforated plate D', as shown in Fig. 2, and escape through the pipe G to the steam engine boiler at K. The chamber E is connected with the boiler by a pipe, F, that terminates near its bottom, and thus the purified water is supplied in the quantity required, for it is manifest that the proportions between the receiver and boiler must be such as that the one will fully meet all the requirements of the other.

The operation is as follows: The supply-water, being received in a continuous quantity through the pipe B, is broken into drops or minutely subdivided into spray by being forced through the perforated diaphragms in the enlarged portion of the pipe C, and when it enters into the upper chamber it begins to acquire heat from the superheated steam that had been admitted into the lower chamber, E', and passed from thence around and between the cylinders. In its continued course through the perforated diaphragms D' to the chamber it (the supply-water) rapidly accumulates heat, or reaches the boiling-point

when the steam generated from it ascends through the perforations in the diaphragms, and escapes to the boiler at H with the steam from chamber E''. By dividing the water thus a very large surface is exposed to the superheated steam and to the minutely-perforated plates, so that the impurities, earths, salts, and all other matters held in solution are mechanically almost wholly separated within the heater, and the heavier and adhesive portions accumulate on these plates or diaphragms and the inner surface of the internal cylinder, whence they can be easily removed, while the purified water passes through the pipe F to the boiler.

It is obvious that the superheated steam to be used in my apparatus may be generated and heated by an independent furnace; but I prefer to use the steam from the engine-boiler and superheat it by suitable arrangements in the furnace thereof, and that if valves are required to keep the superheated steam and that generated in the heater always in motion

toward the pipe G, while the water is always in motion through the heater from the pipe B to the boiler, the same may be used without affecting the principle of my invention.

What I claim therein as new, and desire to secure by Letters Patent of the United States, is—

1. A heater for the supply-water of steam-boilers, having removable plates, whether separate or united, with an internal cylinder, when constructed, arranged, and operating substantially in the manner and for the purpose set forth.

2. The combination of the perforated diaphragms C' with the pipes C and the diaphragm C'' in the upper chamber of the heater A, constructed substantially as and for the purpose set forth.

EMILE MARTIN.

Witnesses:

ENOCH H. AYDON,
JOHN SULMAN.