J. H. Ames,

Steam Separator for Boilers.

No. 46,203. Patented Feb. 7, 1865.

Fig. 1.

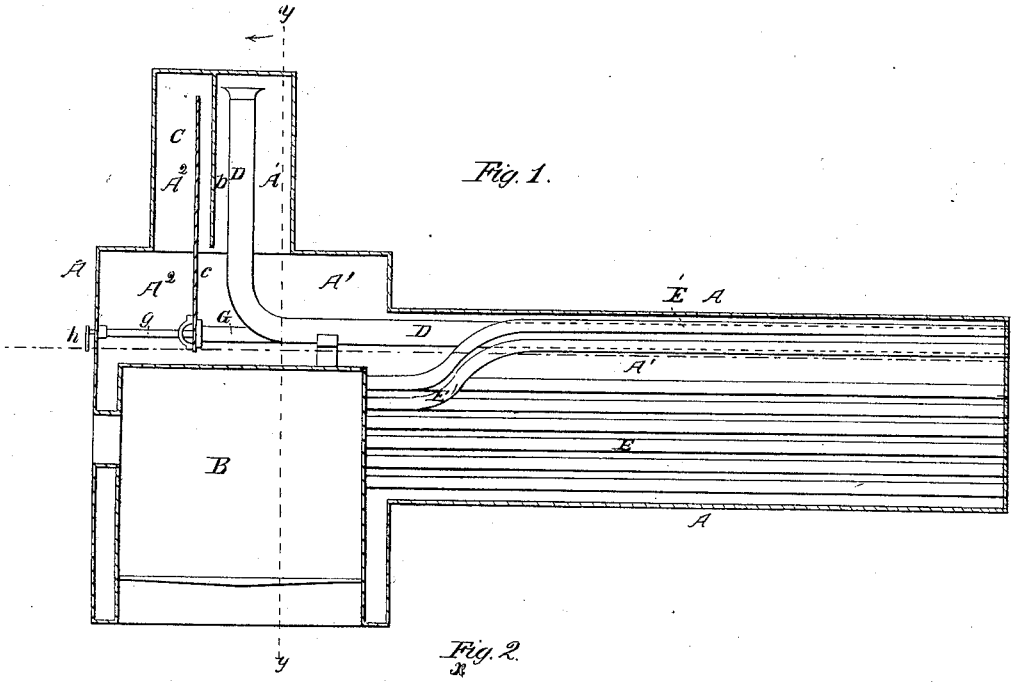
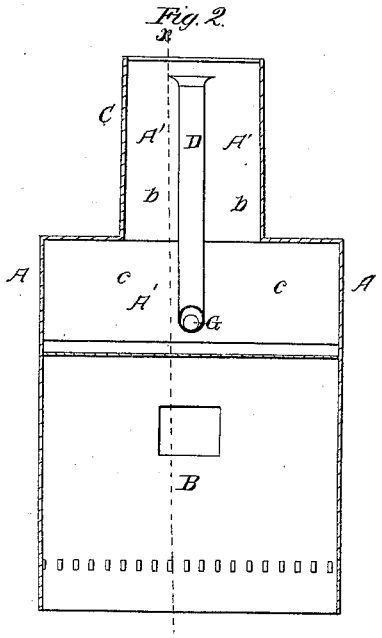


Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN H. AMES, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **46,203**, dated February 7, 1865.

To all whom it may concern:

Be it known that I, JOHN H. AMES, of Baltimore, county of Baltimore, State of Maryland, have invented a new and useful Improvement in Superheating Steam in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a vertical longitudinal section through a steam-boiler, taken in the plane indicated by the red line *x x*, Fig. 2. Fig. 2 is a cross-section through Fig. 1, taken in the vertical plane indicated by red line *y y* thereon.

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

This invention relates to a novel improvement in steam-boilers, whereby one portion of the steam-space therein is adapted for superheating the steam and another portion is adapted for producing saturated or common steam, both of said spaces being so formed that a uniform water-level can be maintained in the boiler, and the steam which is generated in either one or both spaces conducted into the steam-pipe and there mixed together in suitable proportions, as will be hereinafter described.

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

In the accompanying drawings I have represented my invention applied to a horizontal boiler, although I do not limit its use exclusively to this form of boiler.

A represents the shell of the boiler; B, the fire-place; C, the steam-dome, and D the steam-pipe which conducts the steam to the chests. These parts may all be constructed and arranged in the usual or in any suitable manner.

E represents the flues leading horizontally through the water-space of the boiler; and E′ represents flues which lead from the fire-place B upward above the water-level and out at the opposite end of the boiler. These flues or tubes E′ are prevented from being injured by the heat of the fire in fire-place B by arranging their forward ends beneath the water-level, and when thus submerged in the water these ends will not be liable to injury, while the main portion of these flues are conducted through the steam-space A′, as shown in Fig. 1. The steam-space A′ is separated from a steam-space, A^2, at the forward end of the boiler by means of diaphragm-plates *b c*, which are arranged in a vertical position, but in different planes, so that there will be a space between them, and also a narrow space at the bottom of the plate *c*, as shown in Figs. 1 and 2. These diaphragms *b c* are arranged in front of the vertical portion of the steam-pipe D, so as to collect the saturated or common steam in the steam dome C′ and in the space A^2 below this dome. By thus arranging the diaphragms it will be seen that there will be a uniform pressure in both of the steam-spaces, and consequently a uniform water-level.

The steam which is generated in the main boiler-space A′ is superheated by the fire-flues E′, which are arranged as above described, and the steam which is generated in the forward steam-space, A^2, is saturated with moisture, or what is commonly termed "wet steam." These two forms of steam, which are produced in the same boiler, I propose to mix in certain proportions if it is found that the superheated steam alone is injurous to the material of the engine, and to effect this mixture practically I apply a secondary pipe, G, to the steam-pipe D, which communicates with the steam-space A^2, containing the saturated steam. In the forward end of this secondary pipe I apply a valve of any suitable form, which is operated by means of the stem *g* and crank *h*, leading through the front sheet of the boiler, as shown in Fig. 1. By opening the valve just described the steam in space A^2 will escape into the steam-pipe D and mix with the steam which was superheated in the space A′, and thus mixed the superheated steam becomes less elastic and less injurious to the engine. By regulating the size of the valve-opening through which the surcharged or saturated steam escapes into the steam-pipe D the proportions of the two forms of steam can be varied at pleasuce.

In order to be understood with respect to the foregoing description of my invention, I will make the following statement as to the theory thereof: I do not claim that a total separation of the two characters of steam is effected; but I propose to effect separation enough to accomplish all that is necessary for regulating the temperature of the main body of the steam and still maintain the equilibrium of the water levels and pressure. In my ar-

rangement a natural mixing is intended in proportion of three-fourths hot steam to one-fourth wet steam, or otherwise, as the case may require. Upon the supposition that the surface of the fire-box does half the work of evaporation, then, as a matter of more complete control, the valve in the pipe G is placed as near the water level as practicable, so as to get steam of the utmost saturation. The pipe G, being the shortest and most direct path, would of course be followed by the steam, and in case the temperature was nor sufficiently reduced by the mixing at the mouth of the pipe D a still further reduction would take place at the junction G D. When the engine is under way, the currents tend toward the mouth of the main pipe. When standing, whether they are in a state of isolation or not makes no difference. I do not believe the temperature of the main body can to any extent affect that of the steam behind the diaphragm, for of necessity the currents are in opposite directions. If steam is a convector and not a conductor of heat, then this must hold good. Would not the effect of the hot steam upon that separated by the plates be much the same as that arising from applying heat to the top of a vessel of water or the junction of two steams of different temperatures with a common outlet.

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

1. The arrangement of flues E′ E′, substantially as and for the purposes set forth.

2. Producing superheated and saturated steam in a boiler and separating these two forms of steam from each other without injuriously interrupting the water-level, substantially as described.

3. Mixing together superheated and saturated steam in the steam pipe within the boiler, substantially as described.

Witness my hand in the matter of my application for a patent for improvement in superheaters for steam-boilers.

JOHN H. AMES.

Witnesses:
L. F. FRICK,
JOHN A. SMITH.