(No Model.)

D. SMITH & H. P. GOLDRICK.

BOILER.

No. 522,805. Patented July 10, 1894.

Fig. 1.

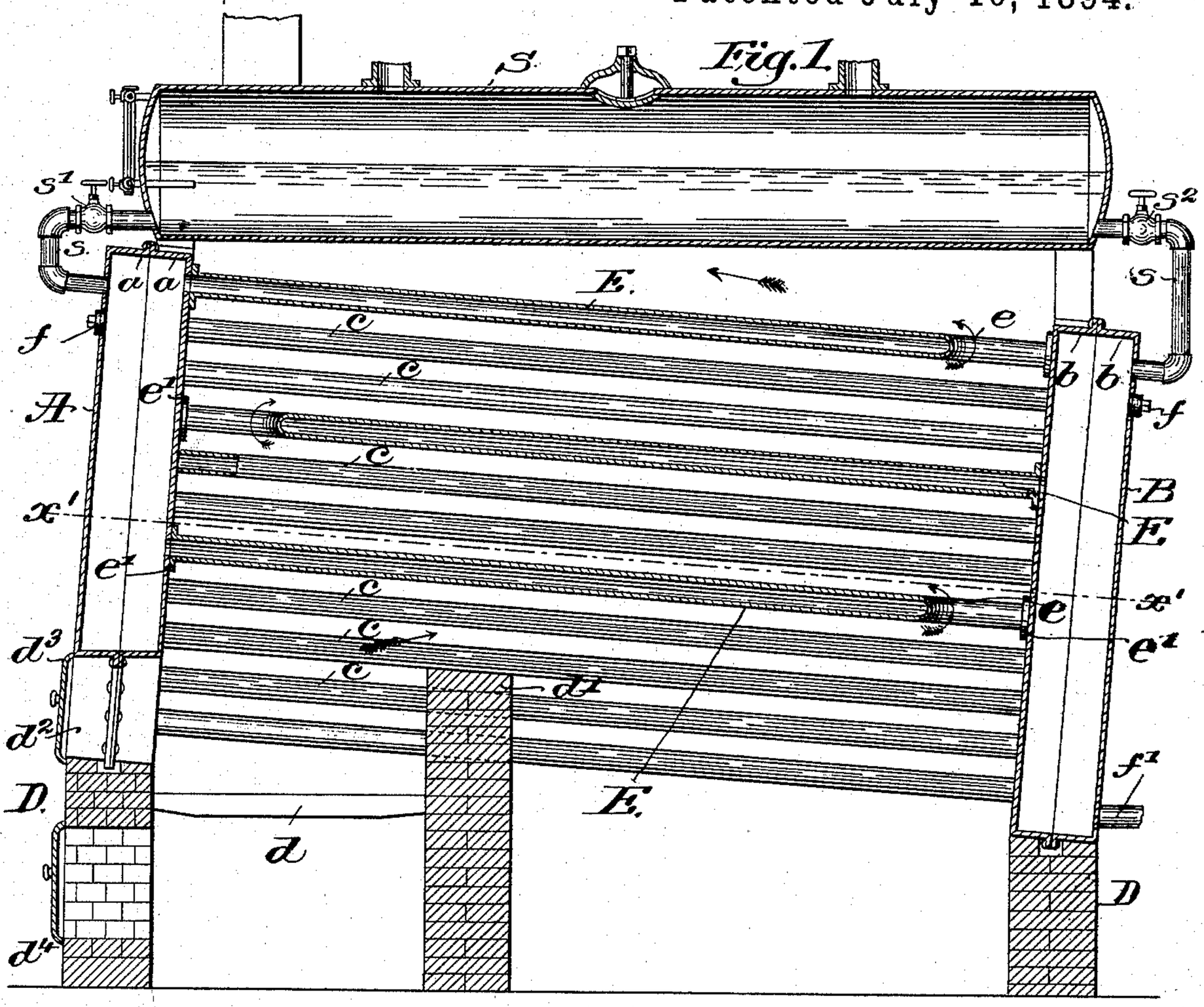
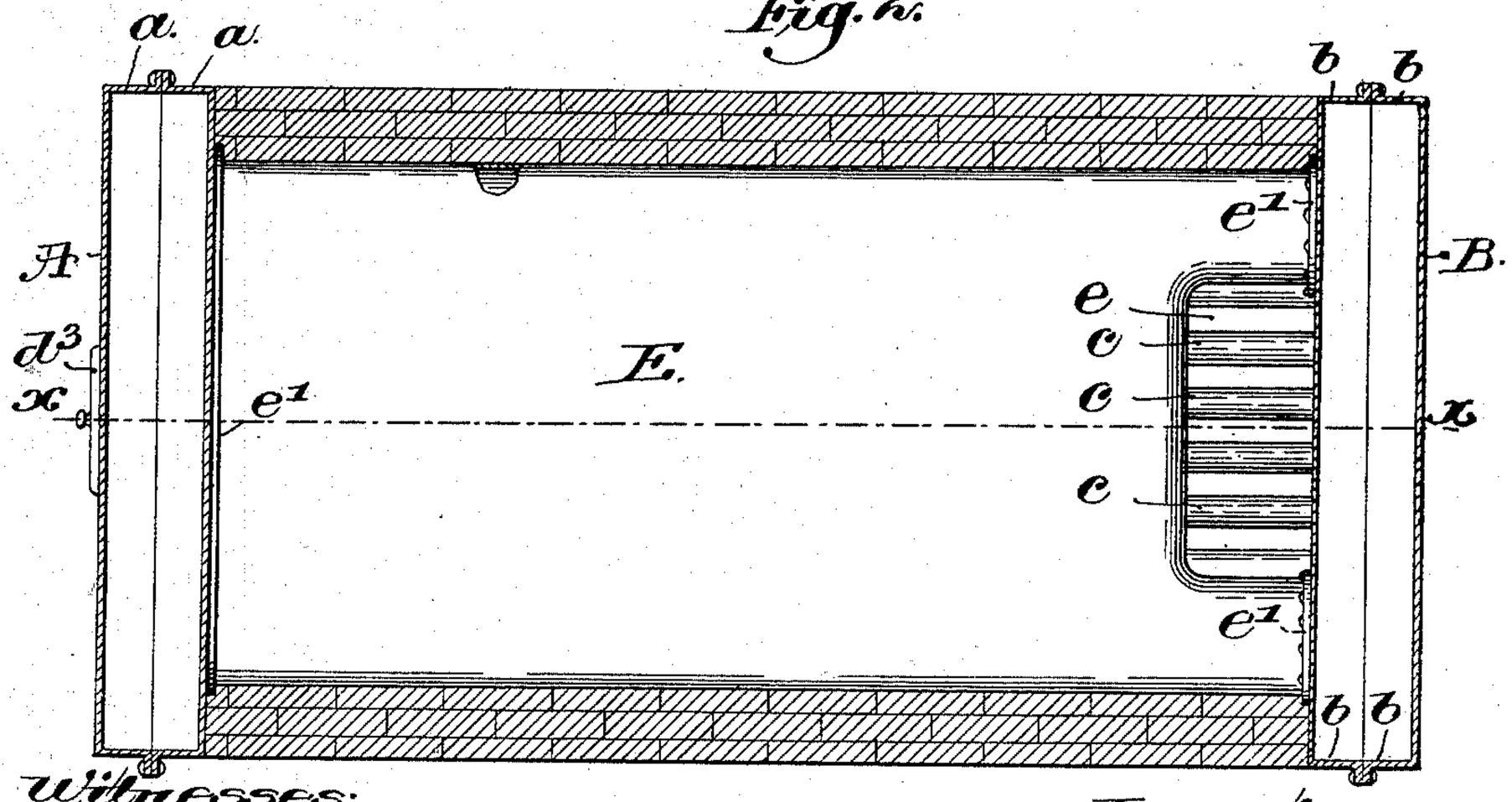


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

DAVID SMITH AND HENRY P. GOLDRICK, OF NATICK, MASSACHUSETTS.

BOILER.

SPECIFICATION forming part of Letters Patent No. 522,805, dated July 10, 1894.

Application filed March 21, 1894. Serial No. 504,519. (No model.)

To all whom it may concern:

Be it known that we, DAVID SMITH and HENRY P. GOLDRICK, both of Natick, county of Middlesex, State of Massachusetts, have invented an Improvement in Boilers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to boilers for use in connection with hot water systems or for generating steam.

Our improved boiler is of a type commonly known as a water tube boiler, it comprising two headers constructed in a manner to be described, and connected by a plurality of water tubes.

The principal feature of our invention consists in providing one or more horizontally arranged water tables interposed between two horizontal series of tubes, said water table or tables having at one end an opening through which the products of combustion are compelled to pass. In the preferred construction we employ two or more of these water tables with the openings referred to located in the respective tables at opposite ends of the boiler, thereby compelling the products of combustion in passing through the chimney to pursue a more or less circuitous course, whereby all parts of the boiler are subjected to a substantially uniform degree of heat. The water inlet is at the lowest point of the boiler, the water entering one of the headers, and when the boiler is to be used for the purpose of hot water heating, the water outlets are arranged along the tops of the headers. When, however, the boiler is to be used for generating steam, the headers are at their upper ends connected in suitable manner with a horizontal steam drum, suitable valves being provided by which to cut off this steam drum when the boiler is to be used for hot water heating.

In the drawings, Figure 1 represents in vertical longitudinal section one form of boiler embodying this invention, the section being taken on the dotted line *x*—*x*, Fig. 2, and Fig. 2, a horizontal section on the dotted line *x'*—*x'*, Fig. 1.

Referring to the drawings, A, B, represent the front and rear headers respectively, each header being formed of two sheets or plates with their edges turned over to form lips *a*, *a*, *b*, *b*, which are flanged along their abutting edges and bolted or riveted together, as shown, said headers being stayed by tie-bolts, if found desirable, though none are herein shown.

The headers A, B, are arranged preferably in a slightly inclined position, as shown, and one at a level slightly below the other, said headers being connected by several horizontal series of water tubes *c*, *c*, which latter are expanded into the inner sheets of the headers in suitable or usual manner.

The fire is shown carried upon a grate *d* set in the masonry D inclosing the boiler, and with its rear end resting in suitable pockets formed in the bridge wall *d'*. Access to the grate is had through an opening d^2 formed in the front header and normally closed by a suitable door d^3; access to the ash pit being had through a usual opening normally closed by a suitable door d^4.

In accordance with this our present invention we provide a series of water tables E, herein shown as three in number, the first arranged between the second and third horizontal row of tubes, the second between the fourth and fifth, and the third above the topmost horizontal row; but the number and arrangement of such tables may be otherwise varied, as found desirable, without departing from the scope of this invention. Each of the water tables is shown as provided with an opening or flue *e* at one end, the openings in the successive tables being preferably staggered, that is, arranged respectively at opposite ends of the boiler to obtain a circuitous passage of the products of combustion in flowing to the chimney or up-take. The opening in the lowermost table, as herein shown, is at the rear of the boiler; the opening in the middle table at the front of the boiler, and the opening in the topmost table again at the rear of the boiler, while the up-take is shown, and preferably, at the front of the boiler, thereby compelling the products of combustion from the fire upon the grate to pursue the course indicated by the arrows. As herein shown the water tables are flanged, as at *e'*, at their ends

and bolted or riveted to the inner tube sheets of the headers, the said sheets being perforated to establish an open communication between the interiors of the headers and the interiors of the water tables, so that a constant flow or circulation of water is maintained through the said headers which will thereby furnish considerable area of heating surface for the generation of steam or raising the temperature of water.

In the boiler shown we have provided the steam drum S, arranged in usual position at the top of the boiler and connected at its opposite ends by pipe loops *s*, *s*, with the tops of the respective headers A, B, suitable valves *s'*, *s*², being interposed in the respective connections *s*, *s*, for a purpose to be described. Along the tops of the headers we have arranged a series of outlets normally closed by threaded plugs *f*, *f*, and at the bottom of the rear header we have shown the water inlet *f'*.

The operation of the boiler is as follows, viz:—For generating steam the valves *s'*, *s*², are opened and the boiler filled with water to the level shown and a fire started upon the grate, the circuitous passage of the products of combustion quickly and uniformly heating the water tubes and generating steam which collects in the top of the drum for use. When it is desired to use the same construction of boiler for hot water heating, the valves *s'*, *s*², are closed and the outlet pipes for the hot water system screwed into the openings normally closed by the plugs *f*, *f*, the return pipe being connected with the inlet or inlets *f'*.

The novel features of our improved boiler are, we believe, as follows: first, the use of water tables interposed between the horizontal rows of water tubes, to compel circuitous passage of the products of combustion, and at the same time furnish additional heating surface for raising the temperature of the water; the peculiar construction of headers and the manner of securing the water tables; the connections *s*, *s*, between the headers and the drum, and the valves in and to control the said connections; and the construction of a single boiler such as enables it to be used for both steam and hot water purposes.

This invention is not limited to the particular construction herein shown, for the same may be varied without departing from the scope of the invention as claimed.

Having described our invention, and without limiting ourselves as to details, what we claim, and desire to secure by Letters Patent, is—

1. In a boiler, the combination with two headers, and water tubes connecting the same and arranged in substantially horizontal rows, of one or more water tables arranged between horizontal rows of tubes, and in open communication with the respective headers, said water tables having openings through which the products of combustion are compelled to pass, substantially as described.

2. In a boiler of the class described, the combination with two headers, and water tubes connecting the same and arranged in substantially horizontal rows, of one or more water tables provided with openings through which the products of combustion are compelled to pass, the openings in adjacent tables being staggered to compel circuitous passage of the products of combustion, the said water tables furnishing a heating surface in addition to that of the water tubes for raising the temperature of the water maintained in constant circulation therethrough, substantially as described.

3. In a boiler of the class described, the combination with headers, and water tubes connecting the same, of a water inlet at or near the bottom of one of said headers, one or more water outlets at or near the top of one of said headers, a plug or plugs to normally close said outlet openings, the same to be removed for connection of hot water pipes, and a steam drum arranged above the said headers, connections joining the same to said headers, and valves controlling said connections whereby said boiler is readily changeable for use in connection with steam or hot water, substantially as and for the purpose specified.

4. In a boiler of the class described, two headers, each consisting of plates having inturned lips flanged at their edges and bolted together, in combination with water tubes, and water tables connecting the same, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

DAVID SMITH.
HENRY P. GOLDRICK.

Witnesses:
CHAS. Q. TIRRELL,
THOMAS SMITH.