

(No Model.)

F. GROTE.
SECTIONAL BOILER.

No. 515,584.

Patented Feb. 27, 1894.

Fig. 1.

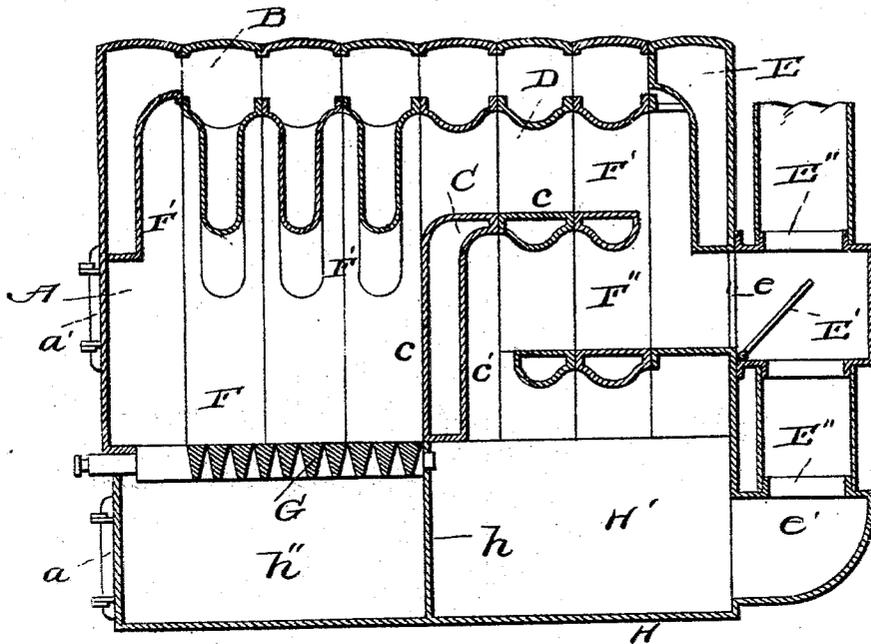


Fig. 2.

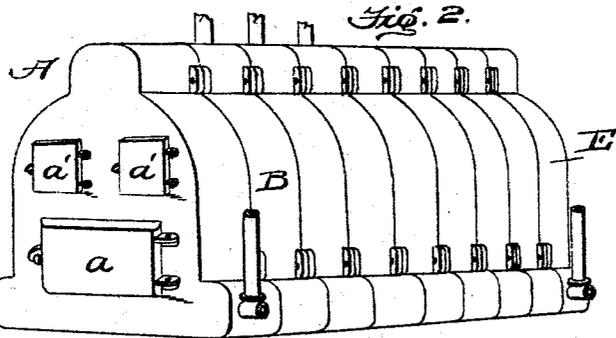


Fig. 4.

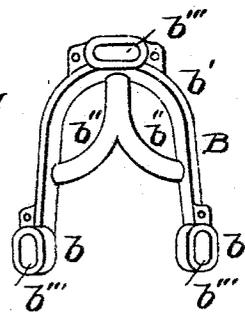


Fig. 3.

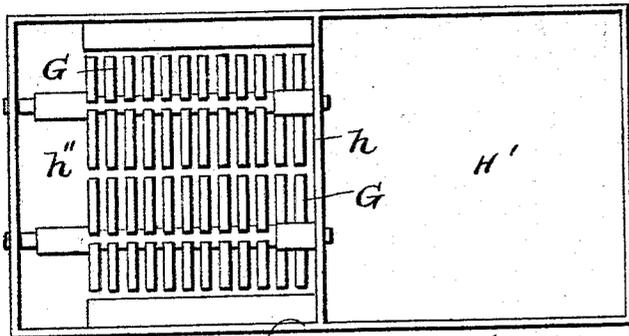
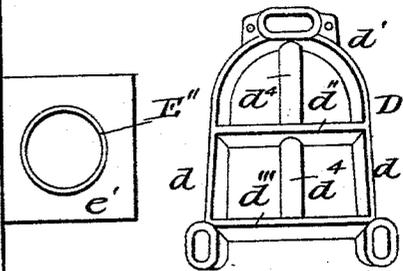


Fig. 5.



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Witnesses.

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UNITED STATES PATENT OFFICE.

FERDINAND GROTE, OF EVANSVILLE, INDIANA.

SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 515,584, dated February 27, 1894.

Application filed October 5, 1893. Serial No. 487,226. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND GROTE, a citizen of the United States, residing at Evansville, in the county of Vanderburg and State of Indiana, have invented certain new and useful Improvements in Sectional Boilers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in hot water boilers of that class constructed of a series of sections which are united laterally together to provide passages for the products of combustion and spaces for the circulation of water; and the object I have in view is to increase the area or surface within the boiler exposed to the action of the flames and products of combustion in a boiler constructed in sections which can be varied in number to increase or diminish the heating capacity of the boiler without necessitating a change in the form or construction of the other parts of the boiler.

To the accomplishment of these ends, my invention consists of a boiler having one of its sections constructed to form a bridge wall and the adjacent sections thereto constructed to form the crown sheet and a return flue which leads the heat and products of combustion back from the rear part of the boiler, thence back to the bridge wall, and then discharges the products of combustion through a soot chamber that communicates with the chimney or uptake, all of the sections having water legs and drop flues which communicate to provide a continuous chamber for the circulation of water which is thus exposed in thin bodies to the action of the heat and products of combustion passing through the flame passage and the return flue of the boiler, all as will be hereinafter more fully described and particularly pointed out in the claim.

To enable others to more readily understand my invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a vertical longitudinal central sectional view through my boiler. Fig. 2 is a perspective view of the series of connected sections, with the base omitted. Fig. 3 is a plan view of the base of the boiler, showing the grates mounted in said base and the soot chamber. Fig. 4 is a detail view, in side elevation, of one of the sections that forms a part of the combustion chamber of the boiler, and Fig. 5 is a similar view, in side elevation, of one of the sections constructed to form a part of the flame passage and the return flue of the boiler.

Like letters of reference denote corresponding parts in all the figures of the drawings, referring to which—

A denotes the front section of the boiler, B, B, the fire box sections, C the section constructed to form the bridge-wall, c, D the return flue sections, and E is the back or rear section, all of which are fitted and bolted laterally together so that the flame and water spaces thereof are brought into proper alignment to form the complete boiler.

I may employ a series of two, three or more of the sections B to form the fire box F immediately over the grates G, the sections B being of the form shown by Fig. 4 of the drawings. By reference to this figure it will be noted that the section B is cast in a single piece of metal with the water legs *b*, the arched top or crown *b'*, the drop flues *b''* which communicate at the upper end with the arched top or crown *b'* and which diverge at the sides to form the branches that connect with the water legs *b*, and *b'''* are the nipples on the sides of the crown and at the extremities of the water legs, whereby the sections may be fitted laterally together so that the water spaces in the sections B are brought into alignment and form a continuous space for the circulation of the hot water. Of course, these sections B are constructed with hollow walls forming the narrow or comparatively thin spaces for containing the water to be heated, and when the sections B are properly connected the arches *b'* form the crown sheet of the boiler while the water legs *b, b*, in conjunction with the drop flues, form the fire box or combustion chamber F immediately over the grates G.

The section C of the boiler has the arched

crown adapted to align with the sections B and D to form the continuous crown sheet, but this section C is constructed with a hollow bridge wall, *c*, which rises a suitable distance above the grates G. Any desired number of sections B may be provided between the front section A and the fire or bridge wall-section C according to the size of the fire box desired. This section C is constructed, similar to the other sections B, D, with hollow walls forming a space or chamber for the hot water, and it is provided with nipples and flanges whereby the section C can be bolted to adjacent sections B, D, so that its water spaces will communicate with the water spaces in the crown and legs of the sections, B, D.

The sections D are of the form shown in Fig. 5 of the drawings, being cast hollow in a single piece to form the water legs *d*, *d*, the crown or arched portion *d'*, the horizontal middle bar *d''*, the lower horizontal bar *d'''*, and the vertical drop flues *d⁴* which connect with the hollow horizontal bars *d''* and *d'''* and with the arched crown *d'*, the entire section D being cast hollow to form the chamber in which the hot water is free to circulate. This section D is further provided with the nipples at its arched crown and at the extremities of its water legs to enable it to be connected with adjacent sections to provide for communication between its water chamber and the corresponding chambers in the adjacent sections of the boiler; and when the sections D are properly connected together and to the bridge-wall section C, the portion between the arched crowns *d'* and the middle horizontal bars *d''* form the crown sheet and bottom of the flame passage F' that runs through the whole series of sections B, C D, as will be understood by Fig. 1, while the portion of the sections D between the horizontal bars *d''* and *d'''* form the return flue F'' by which the heat and products of combustion can be led from the back section E of the boiler to the bridge-wall *c* and thence deflected through a soot-chamber, presently described, the back section E being so constructed that it will reflect the heat and products of combustion when the same impinge against said back section after passing through the flame passage formed by the crown sheet and the bars *d''* of the sections D, while the bridge-wall section C is constructed at its bottom to form an opening or passage *c'* which permits the products of combustion to pass from the return flue F'' to the soot chamber in the base H. The back or rear section E is cast in a single piece to present an unbroken wall to the products of combustion and provided with the water space or chamber and the nipples whereby it may be coupled to the section D next adjacent thereto; and said rear section is provided, in line with the return flue F'', with a discharge opening *e* which may be closed by a damper E'. With this discharge opening *e* communicates the flue or

uptake E'', and this uptake has a pipe connection *e'* with the base H so that the uptake connects also with the soot chamber in the base to carry off the products of combustion after they have passed through the soot chamber which, in Fig. 1, I have shown at H'.

The front section A of the boiler is constructed in a single casting similar to the back or rear section E, with the exception that it is furnished with a fuel-door *a* and with two or more cleaning doors *a'*, see Fig. 2; and said front section has the water space and the nipples whereby it may be bolted to the adjacent section B.

It will thus be observed that I provide a boiler consisting of a series of sections each constructed with a water chamber that communicates with adjacent sections when they are properly bolted together, and that certain of the sections provide the crown sheet, the flame passage, and the return flue on all sides of which the water is subjected to the action of the flame and products of combustion passing through the boiler, while at the same time provision is made, by increasing or diminishing the number of sections B and D, for varying the capacity of the boiler without necessitating any change in the structure of the front, back and bridge-wall sections A, E and C, respectively.

The base H is made independent of the sectional boiler, proper, and this base is divided by a transverse vertical partition *h* which forms the soot chamber H' at the rear of the base and the ash pit *h''* at the front of the base. The grates G are supported in the front part of the base, below the combustion chamber F and between the bridge-wall *c* and the front section A of the boiler. These grates are preferably of the form known to the art as rocking grates, and the longitudinal grate bars are journaled in the partition *h* and the front wall of the base, but I do not strictly confine myself to this particular form of the grate nor to the manner in which the grate is supported as I am aware that other kinds of grates can be used and that the grate can be differently sustained below the combustion chamber.

In operation, a fire is built on the grate and the flame and products of combustion pass upward and thence rearward along the crown sheet and flame passage, the flames playing around the drop flues in the sections B and D. If the damper E' is open, the products of combustion pass direct to the uptake, but if it is closed, the flames and products of combustion are deflected by the back section E and pass thence to the return flue to impinge against the rear side of the bridge wall and from thence pass into and through the soot chamber and thence to the uptake.

My improved boiler is especially designed for heating residences, public buildings or other structures by what is known as the hot water circulating system, but if preferred

steam may be generated therein and carried to the radiators.

It is evident that changes and modifications in the form and proportion of parts and details of construction of the boiler herein shown and described as an embodiment of my invention can be made by a skilled mechanic without departing from the spirit or sacrificing the advantages of my invention, and I therefore reserve the right to make such modifications and alterations as fairly fall within the scope of my invention.

What I claim as new, and desire to secure by Letters Patent, is—

In a sectional boiler, the sections, B, each cast in a single piece and consisting of the water legs, arched crown and drop flues, *b''*, which connect the crown and water legs, and the sections, D, each consisting of the water

legs, *d*, the parallel horizontal cross tubes, *d''*, *d'''*, connecting the water legs, and the vertical tubes, *d⁴*, connecting the tubes, *d'''*, *d''*, and arched crown, in combination with the section, C, cast with the hollow bridge wall, *c*, and arranged between and united to the adjacent sections, B D, the front section, A, the rear section, E, having the outlet and the damper, and a base divided, by a vertical partition, *h*, into an ash pit and a soot chamber, the latter communicating with the outlet of the rear section, E, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

FERDINAND GROTE.

Witnesses:

WM. HARTMAN,
GEORGE VOEGELIN.