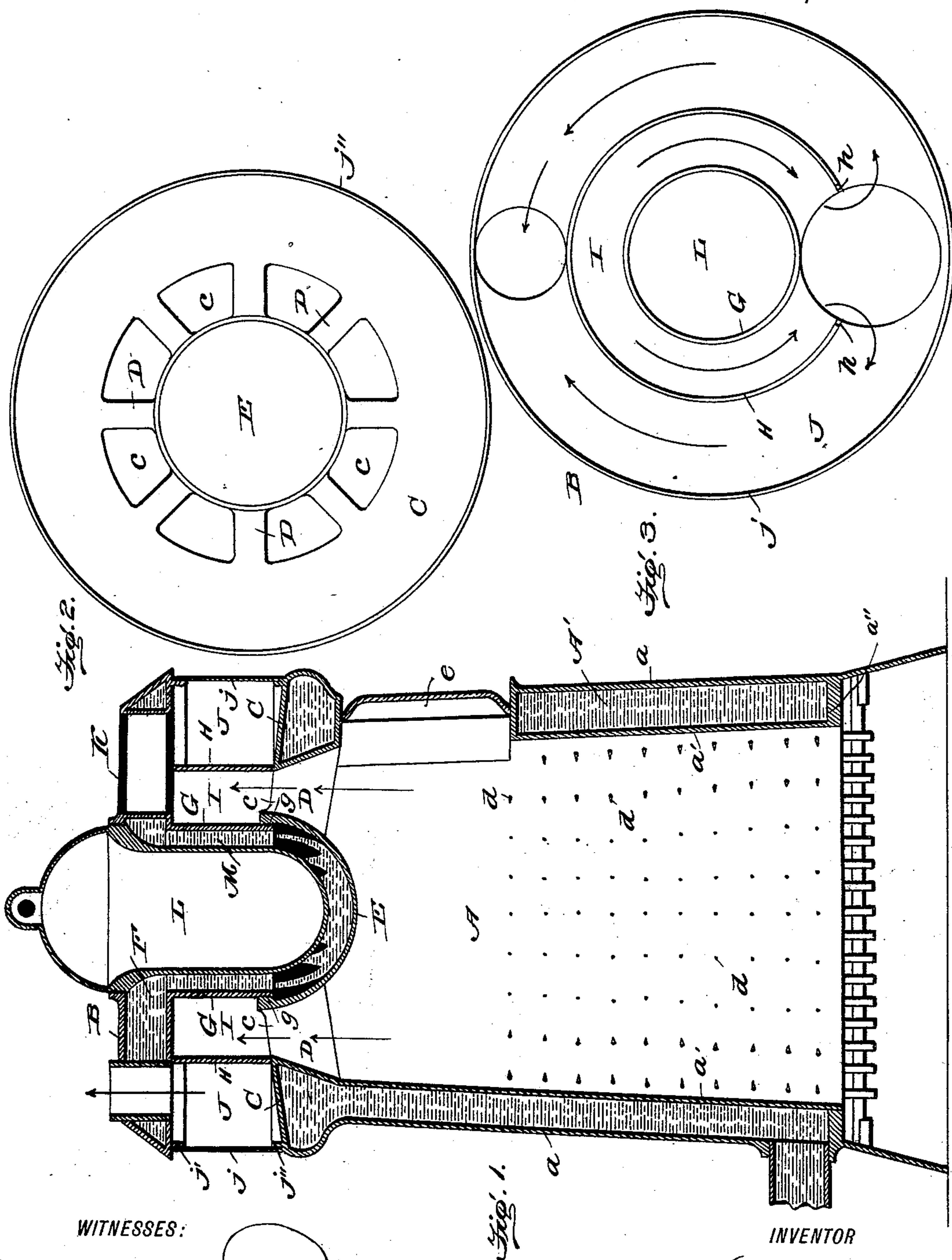


(No Model.)

W. H. PAGE.
SECTIONAL BOILER.

No. 500,507.

Patented June 27, 1893.



WITNESSES:

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SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 500,507, dated June 27, 1893.

Application filed January 18, 1893. Serial No. 458,832. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. PAGE, a citizen of the United States, residing at Norwich, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Sectional Boilers; and I do hereby 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.

My present invention relates to improvements in sectional boilers more particularly designed for heating hot water for use in hot-water circulating systems for heating houses, stores, shops, and other places; and the objects of the invention are, first, to provide a novel form of fire pot adapted to the circulation of water within and around the same, which will be adapted to upper sections of any desired form, and which will prevent the water therein from chilling the fire within the pot; secondly, to provide a novel form of upper or top section adapted for receiving a vessel to heat the contents thereof and also to provide for the circulation of water therein and for the escape of smoke and products of combustion the heat in which is utilized to the best advantage; and finally to so construct and arrange the parts of the furnace that an expansion-tank can be used in connection therewith, which tank is adapted for operating a regulator to control the draft automatically through the furnace.

With these and other ends in view, the first part of my invention consists of a fire pot cast or made of a single piece of metal and comprising the inner wall, an outer wall surrounding the inner wall and forming therewith an intermediate water chamber, and a crown sheet having vertical smoke flues and hollow radial arms which connect the surrounding water chamber with a central bowl or depression arranged in the crown-sheet.

The second part of my invention consists in the combination with the crown sheet of a fire pot provided with the central bowl or depression, of a top section having a water chamber in its upper part and with two depending annular flanges or rings, the inner flange or ring being connected with the cen-

tral depression or bowl of the crown sheet and the outer flange or ring resting upon the crown sheet outside of the smoke flues therein, and an external casing arranged between the top or upper section and the crown sheet of the fire pot. The two surrounding flanges or rings of the upper section are arranged to form a smoke chamber between them, and one of said flanges having an opening at one side thereof to permit the products of combustion to pass from the inner smoke chamber into the outer smoke chamber formed by and between the outside flange or ring and the external casing. The products of combustion are thus caused to pass from the smoke flues of the crown sheet into an inner smoke chamber and thence around an outside smoke chamber between the fire pot and the upper or top section of the furnace; and in this top section is provided a vertical opening in which a vessel can be placed for the purpose of heating the contents of the same. This will be found very advantageous when the furnace is used in small stores or shops where it is very often desired to boil water, or for heating glue, or for various other purposes.

The invention further consists in the combination of a fire pot having the central depression or bowl in its crown sheet, an upper section provided with a water chamber and with a depending ring or flange which is connected with the upper part of the central bowl or depression, and an expansion tank secured in the upper part of the top section and fitting in the depending flange or ring thereof and in the depression or bowl in the crown sheet, said expansion tank being arranged out of contact with said depending flange or ring and with the depression or bowl so as to leave an intermediate water chamber in which the water is free to circulate through the water chamber in the fire pot, the depression or bowl thereof, the chamber between the expansion tank and the depending flange, and the water chamber in the top section of the furnace.

The invention further consists in the novel combination of devices and peculiar construction and arrangement of parts as will be hereinafter more fully described and particularly pointed out in the claims.

I have illustrated my improved sectional boiler in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a vertical sectional view through the boiler. Fig. 2 is a top plan view looking down upon the crown sheet of the fire pot, the upper section and the external casing of the boiler being removed. Fig. 3 is a bottom plan view of the top or upper section of the furnace, the fire pot and the external casing being omitted.

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

A designates the fire pot of my improved sectional boiler, and B is the top or upper section of the boiler. This fire pot is constructed or cast in a single piece in contradistinction to a fire pot in which the parts thereof are made or cast in separate pieces and united or joined together by peculiar joints, an example of which is disclosed in my prior patent of June 17, 1890, No. 430,589. In this form of boiler, the internal and external walls of the fire pot are cast in separate pieces and joined at the base by means of groove and cement joints, and the door casing is also cemented onto the external wall of the fire pot. But in my present invention, the external and internal walls of the fire pot, and the crown sheet thereof, are made or cast in a single piece of metal, and said crown sheet has transverse smoke flues and hollow radial arms which form a continuous water passage for the circulation of water from the surrounding chamber to the central bowl or depression in the crown sheet of the fire pot.

The external and internal walls, *a*, *a'*, respectively, of the fire pot are cast integral with the connecting web *a''* at the bottom of the walls, and the crown sheet *C* of the fire pot is also integral with the internal and external walls *a*, *a'*. This crown sheet is pierced with transverse passages *c*, *c*, forming the smoke flues for the passage of the products of combustion from the fire pot; and these smoke flues are separated by the radial hollow arms *D* which communicate with the upper part of the water chamber *A'* formed by and between the walls *a*, *a'*, the inner ends of the hollow radial arms *D* discharging into a bowl or depression *E* formed in the center of the crown sheet, as clearly shown. The inner surface of the internal wall *a'* of the fire pot is provided with a multiplicity of projections or points *d* which extend entirely around the internal wall and for a suitable distance above the grate; and these projections *d* serve to keep the fuel in the fire pot from having direct contact with the internal wall *a'*, and thus prevent the cold water entering the chamber *A'* from chilling the fire in the fire pot. The usual feed door *e* is provided in the side of the fire pot above the projections or teeth *d* therein, and below the fire pot is arranged the grate and ash pit, which may be of the ordinary or any preferred construction. This fire

pot may be used in different styles of boilers and in connection with one or more upper or top sections of any preferred style; but in a low down boiler specially adapted for hot water heating and for use in stores or shops, I prefer to use the upper section *B* illustrated more particularly by Figs. 1 and 3 of the drawings. This top section *B* is provided with a water chamber *F* in its upper part and with two flanges or rings *G*, *H*, which are preferably arranged concentric with each other. This top or upper section *B* and its depending flanges also constitute a single piece or casting, as they are made integral with each other, and adapted to be quickly and easily fitted and connected to the fire pot. The top section has a vertical central opening formed therein which extends through the water chamber *F* therein, and the inner depending flange *G* is concentric with this opening, said flange *G* depending from the top section for a suitable distance. This inner depending flange *G* is designed to be connected with the crown sheet of the fire pot around the central depression or bowl thereof; and as one means for easily and cheaply connecting the central flange or ring of the top section with the crown sheet, I provide the bowl or depression, at its upper edge, with a series of screw threads with which engage similar screw threads formed on the lower part of the depending flange *G*, the screw threaded joint between the bowl of the crown sheet flange *G* of the top section being indicated at *g* in Fig. 1 of the drawings. The external integral flange *H* of the top section is arranged around the internal flange *G* and at a suitable distance therefrom to form an intermediate smoke chamber *I*; and these flanges *G*, *H*, of the top section are so disposed that when the boiler is put together the external integral flange *H* will rest on the crown sheet *C* outside of the smoke flues therein so that the smoke and products of combustion which pass through the smoke flues in the crown sheet will be discharged directly into the smoke chamber *I* between the inner and external flanges *G*, *H*, of the top section. The external integral flange *H* of the top section is provided, at the front side of the boiler, with a transverse passage or opening *h*, through which the smoke and products of combustion from the chamber *I* may pass into an outer surrounding smoke chamber *J* which is formed by and between the internal flange *H* and an external metallic casing *j*. This casing *j* is arranged around the flange or ring *H* of the top section and nearly flush with the sides of the fire pot and the water chamber of the top section, and this casing *j* is held or confined in position by flanges *j'*, *j''*, provided on the opposing faces of the top section and the crown sheet, near the peripheries thereof, as shown by Fig. 1. The top section is further provided with a vertical opening *K* which extends through the water chamber *F* in the top section and communicates with the smoke chambers *J*, *I*,

at the opening *h* provided in the outer flange or ring *H* of the top section; and in this opening *K* can be fitted any suitable vessel which is thus adapted to have its bottom exposed to the action of the heat contained in the products of combustion as they pass through the opening *h* between the chambers *I*, *J*, in the top section of the boiler. The products of combustion are not permitted to escape directly from the internal smoke chamber *I* into the exit pipe, but they are caused to pass horizontally from the inner smoke chamber through the opening *h* at the front of the boiler and then pass backward around the outer smoke chamber *J* to the pipe-hole at the rear side of the boiler, whereby the heat in the escaping products of combustion are utilized to the best advantage in heating the water contained in the chambers of the top section and the radial arms *D* of the crown sheet.

In a boiler adapted for heating water for use in water circulating systems, it is desirable to automatically control the draft passing through the ash pit of the furnace or boiler, and to the accomplishment of this end, I have constructed the top section *B* and the fire pot in the manner described so that an expansion tank *L* can be fitted in the flange *G* of the top section and the depression or bowl of the crown sheet, which tank is adapted to be filled with water and to be connected with an automatic draft regulator, one example of which is shown and described in my pending application filed August 8, 1892, Serial No. 442,502. This tank *L* is cast or made in a single piece, and it is imperforate so that it does not communicate with the water chambers in the boiler.

The tank is fitted in the central opening and the flange or ring *G* of the top section, and with its bottom in the depression or bowl in the crown sheet, but the walls of the tank do not contact with the flange *G* or the depression so that a surrounding space *M* is provided in which the water is free to circulate around the tank, the water passing from the chamber *A'* through the radial arms *D* in the crown sheet, thence to the depression or bowl, the chamber *M*, and the chamber *F* in the top or upper section *B* of the boiler.

The operation and advantages of my invention will be readily understood and appreciated by those skilled in the art from the foregoing description taken in connection with the drawings.

I am aware that changes and alterations in the form and proportion of parts and details of construction of the mechanisms herein shown and described as an embodiment of my invention can be made without departing from the spirit of the invention, and I therefore reserve the right to make such modifications as fairly fall within the scope of my invention.

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

1. In a sectional boiler, the fire-pot comprising an inner wall, an outer wall surrounding said inner wall and forming therewith an intermediate water-chamber, and the crown sheet provided with a central bowl or depression and the hollow radial arms which communicate with said central bowl or depression and with the surrounding water chamber, said radial arms forming between themselves the vertical smoke flues which extend through the crown sheet between the bowl or depression therein and the inner wall of the fire pot, substantially as and for the purpose described.

2. In a sectional boiler, the fire-pot cast in a single piece and comprising the inner wall, an outer wall surrounding said inner wall and joined thereto at its lower edge by an integral web, and the crown-sheet provided with the central bowl or depression and the spaced hollow arms which form between themselves the vertical smoke-flues and which communicate respectively with the central bowl or depression and with the chamber between the inner and outer walls, substantially as described.

3. In a sectional boiler, the fire-pot comprising the inner wall, an outer wall joined to the inner wall at its lower edge by an integral web, and the crown sheet, all cast in a single piece, said inner wall provided with the integral projections on its inner surface, and the crown sheet having the central bowl or depression and the spaced hollow arms which form between themselves the vertical smoke flues and which communicate respectively with the depression or bowl and with the chamber between the inner and outer walls, substantially as and for the purpose described.

4. The combination with a fire pot having the central chamber and the transverse smoke flues in its crown sheet, of a top or upper section containing a water chamber, and the vertical walls between the crown sheet and the top section and forming therewith the inner and outer smoke chambers *I*, *J*, substantially as described.

5. In a sectional boiler, the combination with a fire pot having the crown sheet provided with the vertical smoke flues and the central depression or bowl, of a top section provided with a water chamber and with two depending rings or flanges arranged within the edge of said section, one of the flanges or rings being connected with the crown sheet around the central depression therein and the other flange resting on the crown sheet outside of the plane of the smoke flues, thereby forming a smoke chamber *I* between the two flanges or rings *G*, *H*, and an external casing between the top section and the crown sheet

and forming with the flange H an external smoke chamber J, substantially as and for the purpose described.

6. In a sectional boiler, the combination of
5 a fire pot having its crown sheet provided with the depression and the vertical smoke flues, the top section having the integral concentric depending flanges or rings G, H, arranged to form a smoke chamber I between
10 the same, one of said flanges being connected to the crown sheet around the central depression therein and the outer flange bearing on the crown sheet outside of the line of the smoke flues, substantially as and for the purpose described.

7. In a sectional boiler, the combination of a fire pot having its crown sheet provided with the transverse smoke flues, the top section having a water chamber, and the vertical
20 walls arranged between the crown sheet and the top section and forming therewith the internal and external smoke chambers I, J, substantially as and for the purpose described.

8. In a sectional boiler, the combination of
25 a crown sheet provided with the transverse smoke flues and the central depression, the top section having the water chamber, the vertical walls between the top section and the crown sheet and forming the central water
30 chamber M and the two connected smoke chambers I, J, said vertical wall between the

inner wall and the external wall being provided with the transverse opening h and the top section having a vertical opening K, for the purpose described substantially as set
35 forth.

9. In a sectional boiler, the combination, of a fire pot having its crown sheet provided with a central bowl or depression and the smoke flues outside of said bowl, the top section having a water chamber, the annular vertical wall or partition I between the top section and the crown sheet and having its lower edge connected to the bowl or depression
40 within the line of smoke flues in the crown sheet, and the depending tank suspended within the water chamber of the top section, the annular vertical wall, and the bowl or depression in the crown sheet, whereby a narrow water chamber M is provided between
45 the annular vertical wall I, the bowl and the suspended tank and the contents of said chamber are subjected to the direct action of the escaping products of combustion which impinge against the bowl and the annular wall,
50 substantially as and for the purpose described.

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

WILLIAM H. PAGE.

Witnesses:

LUCIUS BROWN,

FRANK H. PATRICK.