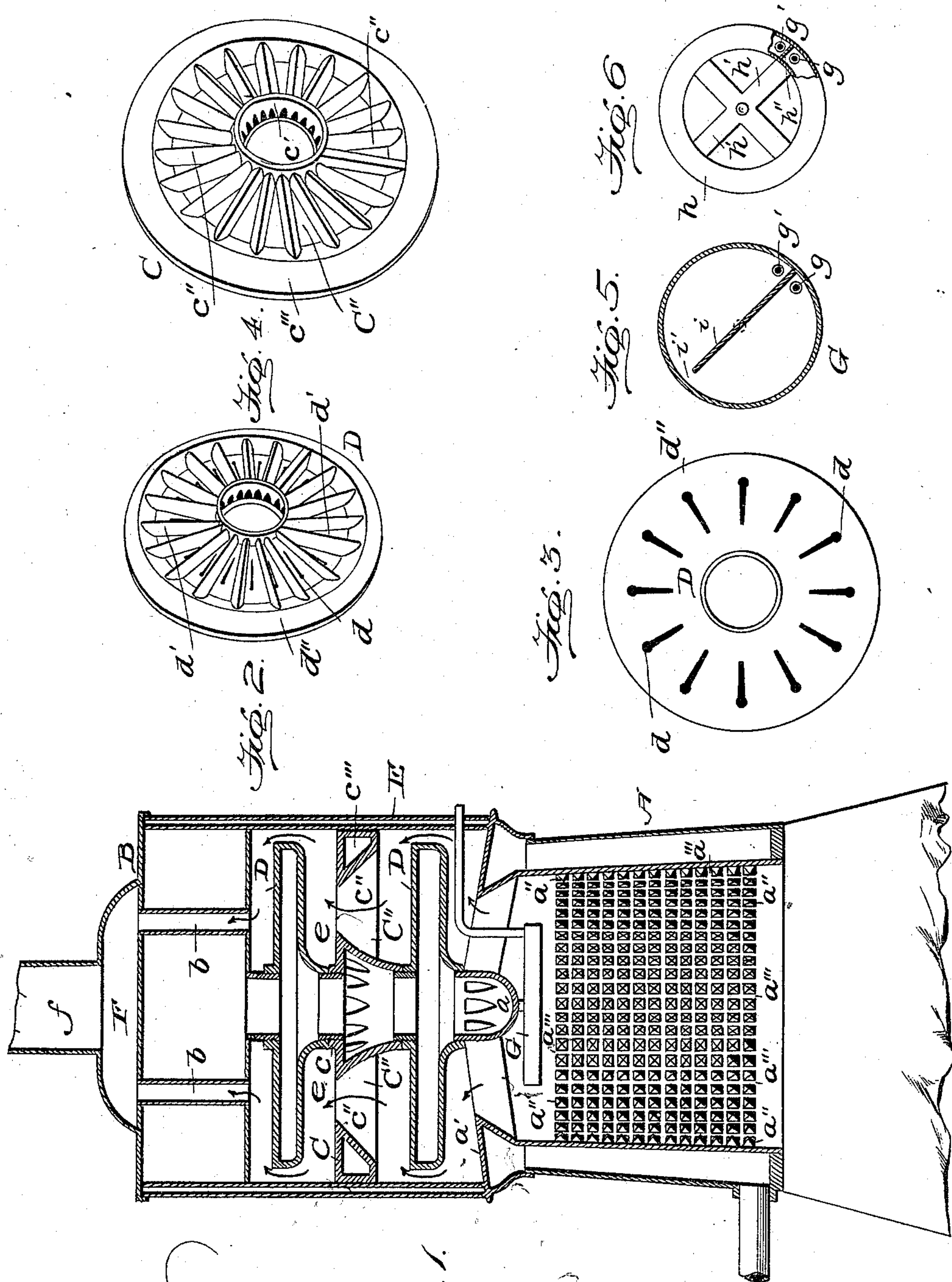


(No Model.)

W. H. PAGE.
SECTIONAL BOILER.

No. 533,395.

Patented Jan. 29, 1895.



Witnesses:
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UNITED STATES PATENT OFFICE.

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SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 533,395, dated January 29, 1895.

Application filed January 12, 1894. Serial No. 496,665. (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.

The nature of the present improvements in sectional boilers relates, first, to the employment of certain heat-deflecting and radiating hollow-sections which alternate with one or more water-heating flue-sections and afford an increased radiating surface, and said radiating sections are constructed to obviate unequal expansion and contraction so as to avoid the danger of fracture or breakage; second, to a novel form of fire-pot section with a large number of individual projections cast on the inside thereof and divided or separated by intersecting series of vertical and horizontal grooves or channels, said projections serving to keep the water in the hollow fire-pot-section from chilling the fire, whereby the fire can be kept as bright at the sides adjacent to the fire-pot as in the center of the bed of fuel, and, thirdly, to means whereby water can be heated in the boiler for supplying hot water for domestic purposes, all as will be hereinafter more fully described and pointed out in the claims.

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

Figure 1 is a vertical sectional view. Fig. 2 is a detail perspective view of one of the hollow heat-radiating or deflecting sections, looking at the bottom side thereof, and Fig. 3 is a top plan view of the section shown by Fig. 2. Fig. 4 is a like view of a water-heating flue-section. Fig. 5 is a detail view of a part of the fire-pot section, illustrating the individual projections on the interior thereof. Fig. 6 is a detail view of the water-heating circulating tank for supplying hot water for domestic purposes.

Like letters of reference denote corresponding parts in all the figures of the drawings.

A is the fire-pot section; B, the dome or upper section; and C, D, D, are the intermediate sections between the fire-pot, A, and the dome, B, which, in connection with the enveloping jacket, E, form the sectional boiler embodying my present invention.

The dome B is made in the form of a hollow casting to contain the hot water and steam that may be generated in the boiler, and through this dome extends the smoke-pipes, *b*, which conduct the smoke and products of combustion from the chamber, *e*, to the smoke-space, F, above the dome, B, from which smoke-space leads the exit pipe, *f*.

The flue section, C, of my boiler is cast with upper and lower nipples, *c*, *c'*, which are internally screw-threaded, a series of radial arms, *c''*, and a hollow rim, *c'''*, all of which are hollow and communicate to form spaces for the circulation of the water to be heated therein. This section C, is arranged between the dome, B, and the crown-sheet of the fire-pot, A, at a suitable distance from said parts, and the nipples, *c*, *c'*, of the section C, are connected with similar nipples on the sides of the adjacent sections, D, D, and these latter sections are connected in like manner, respectively, with the dome, B, and a water-receptacle or depression, *a*, in the crown sheet, *a'*, of the fire-pot, A, in such a manner that the water is free to circulate through the whole series of sections, A, B, C, D, D, forming the improved boiler. Said section, C, furthermore, has its radial hollow arms, *C'*, spaced to provide the smoke passages or flues, *C''*, between said arms, through and around which flues the heat and products of combustion are compelled to pass, as the section, C, is made of such diameter as to closely fit within the jacket, E, and thereby prevent, in a great measure, the passage of the products of combustion between the jacket, E, and the hollow rim, *c'''*, of the section.

The heat-deflecting and radiating sections, D, D, alternate with the flue section or sections, C, and it is evident that I can employ any desired number of these sections, C, D, according to the desired capacity of the boiler,

but in the accompanying drawings, illustrating one embodiment of the invention, I have only shown one section, C, and two sections, D. These sections, D, are disposed on opposite sides of the section, C, one between the fire-pot and the section, C, and the other between the dome, B, and the section, C, although this arrangement is not essential and is varied when more than one section, C, is employed. The sections, D, are made of less diameter than the section, C, and they do not contact with the jacket, E. Hence a space is provided between the jacket and each section, D, through which spaces the products of combustion are compelled to pass, as they cannot go through the sections D. Said sections, D, are hollow, similar to the flue-sections, C, and they have the radial arms, rim, and nipples, the latter being connected to the dome, the fire-pot and the flue-section, C, for continuous circulation of water; and these sections, D, provide increased radiating surfaces within the boiler and they serve to deflect the heat and products of combustion, to cause the same to take a sinuous or circuitous course around the edges of the section D, thence through the flues of the section, C, then around the other section, D, and so on until the heat passes through the smoke-pipes, b, and thence to the smoke-space, F.

If the sections D were cast to present a solid unbroken surface to the action of the heat and products of combustion, they would be subject to unequal expansion and contraction and liable to become broken or cracked; and to overcome this objection, I construct each section, D, in the manner shown by Figs. 2 and 3, which construction compensates for such unequal expansion and contraction and also serves to retain the heat, and deflect the current passing through the boiler. Each section, D, is cast in single piece with a series of narrow slots, d, which extend radially from the central opening for a suitable distance near to the hollow rim of the section, and on the lower side of this casting is the series of radial, hollow arms, d', and the hollow rims, d'', said arms extending from the nipples at the center of the section out to and joined with the rim, d'', and the arms are disposed alternately with relation to the narrow slots, d, in the webs between the hollow arms. This construction of the section insures absorption of the heat, as the ribs and flanges detain the same in a measure, so as to heat the water in the section, D, and the current of heat, smoke, &c., is caused to pass around the edges of the section D, with the possible exception of a small quantity of gas which may pass through the slots, d, while at the same time, the section is not liable to crack or break because the narrow slots, d, compensate for unequal expansion and contraction.

The fire-pot section, A, shown in Figs. 1 and 4, is cast hollow to contain water, as is usual in this class of boilers, and on its inner sur-

face, is cast a large number of individual projections, a'', which are arranged in series throughout the whole inner surface of the fire-pot, said projections being divided or separated by the series of vertical and horizontal grooves or channels, a'''. These projections are so well defined that they extend from the surface of the fire-pot and they serve to prevent the fuel from having direct contact with the walls of the fire-pot and also obviate the cold water in the water-space of the fire-pot from chilling the fire, serving a better purpose than the common fire-brick lining and enabling a bright fire to be kept at the sides of the fire-pot, just next to the walls thereof, as at the center of the bed of fuel.

In Figs. 1, 5, and 6 of the drawings, I illustrate a tank G within the boiler and circulating pipes, g, g', whereby cold water may be supplied to the tank and hot water conveyed to any suitable place for domestic purposes. This tank, G, is preferably located within the combustion chamber of the fire-pot, to be exposed directly to the heat and products of combustion therein, and the tank is attached to, or suspended from, the crown-sheet, a', of the fire-pot in any suitable way, said tank being arranged close to the crown-sheet so as to be out of the way. This tank is constructed to cause the cold water admitted by the inlet pipe, g, to circulate within the same so as to be heated therein and deliver hot water to the outlet pipe, g'. In Fig. 5, the tank consists of a hollow rim, h, with radial arms, h', and with a partition, h'', between the points where the inlet and outlet pipes are connected to the tank, but in Fig. 6, the shell of the tank is divided by a partition, i, equivalent to the partition, h'', and which partition i extends from one side of the tank nearly to the opposite side thereof, so as to leave a space, i', through which the cold water from the inlet pipe and one chamber can pass into the other chamber and thence to the outlet pipe. These pipes, g, g', extend vertically through one of the flues in the crown sheet of the fire-pot and then they are led horizontally through the casing, E, to the outside of the boiler, from which said pipes are continued to any desired place.

It is evident that changes 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 or sacrificing the advantages of my invention, and I therefore reserve the right to make such alterations as fairly fall within the scope of the same.

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

1. In a sectional boiler, a heat deflecting section consisting of a hollow hub, a hollow rim, a series of radial hollow arms united with said hub and rim, and slotted webs which fill the spaces between the radial arms, the hub

and rim, said webs presenting practically continuous surfaces with the arms, rim and hub to prevent the passage of heat through the section and deflect the heat and products of combustion around the hollow rim of said section, in combination with a fire pot, a dome, a casing, and a section of greater diameter than the heat-deflecting section to extend to the annular casing and coupled to the said heating section, substantially as and for the purposes described.

2. In a sectional boiler, a heat-deflecting section D cast in a single piece of metal with a series of narrow slots, hollow rim, and radial arms which alternate with said slots, combined with a fire-pot, a dome, and the flue-sections alongside of the heat deflecting section, substantially as described.

3. In a sectional boiler, the combination with a dome, of a fire-pot having its crown sheet provided with a water chamber, and the series of hollow sections, C, D, alternately disposed with relation to each other in a smoke chamber between the dome and crown sheet and having nipples which are connected to form a continuous water-circulating chamber through said fire-pot, dome and the sections, the section, C, having the smoke-flues, and the sections, D, presenting continuous surfaces for deflecting the heat and products of combustion but provided with slots to compensate for unequal expansion and contraction, substantially as and for the purposes described.

4. In a sectional boiler, a fire-pot provided

with a surrounding water space and having its inner surface cast with a multiplicity of projections or teats *a''* which are closely arranged in relation to each other and separated by intersecting grooves or channels, whereby the inner surface of the fire-pot is made up entirely of thickened metal to prevent the cold water from chilling the fire and dispense with the use of a fire brick lining, as set forth.

5. In a sectional boiler the combination with a fire-pot having its crown sheet provided with smoke flues, of a hollow heating tank suspended from said crown sheet within the fire-pot, and provided with a division wall and with inlet and outlet ports situated on opposite sides of said division wall, and the circulating pipes, substantially as and for the purposes described.

6. In a sectional boiler, the combination with a fire-pot having its crown sheet provided with smoke flues, of a suspended water-tank attached to the crown-sheet and divided by a partition into connected chambers, and inlet and outlet pipes connected to the tank on opposite sides of the partition and extending through one of the smoke-flues in the crown-sheet of the fire-pot, substantially as and for the purposes described.

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

WILLIAM H. PAGE.

Witnesses:

LUCIUS BROWN,
DONALD G. PERKINS.