

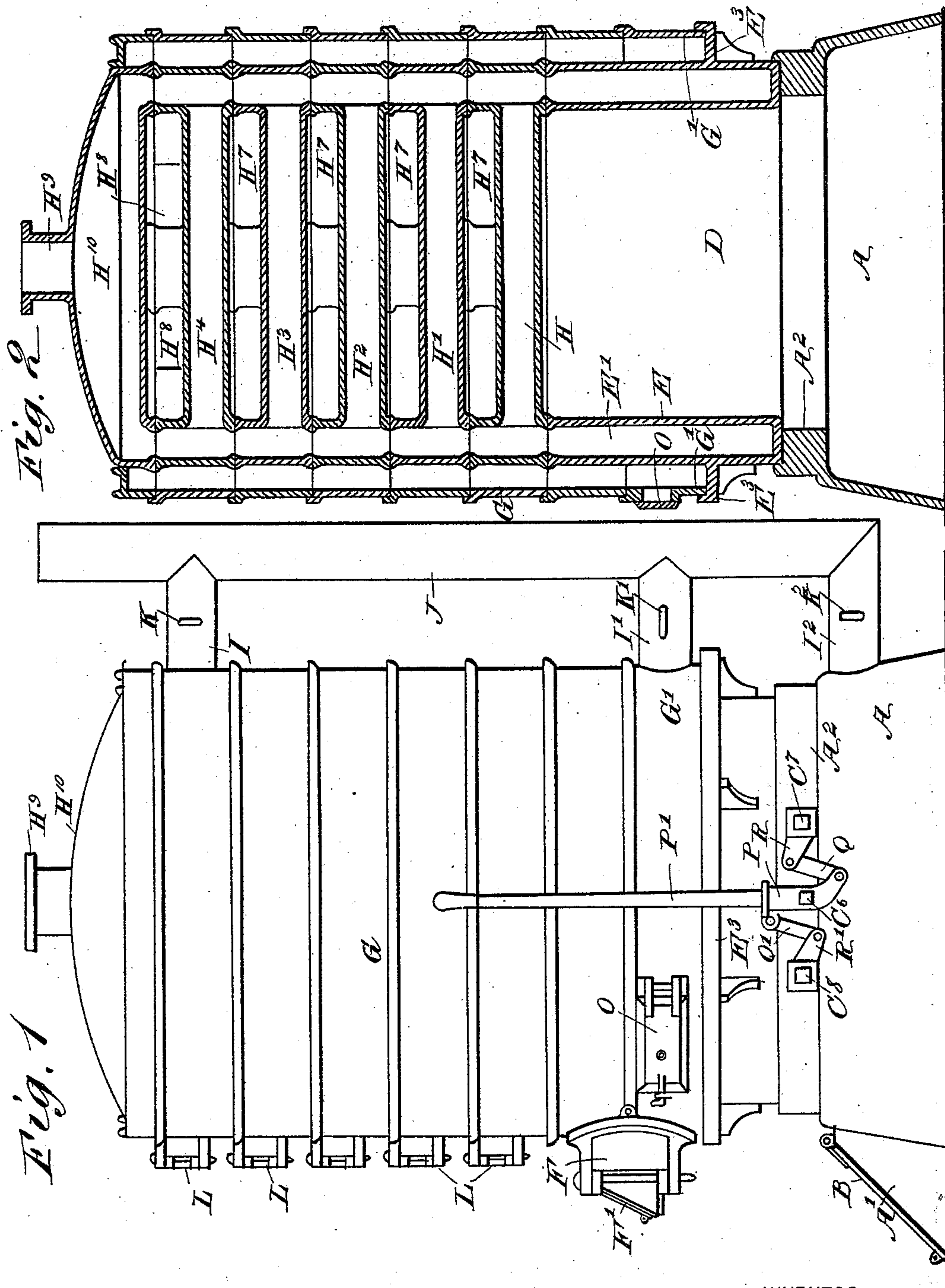
(No Model.)

2 Sheets—Sheet 1.

B. F. CONNER.
BOILER.

No. 528,762.

Patented Nov. 6, 1894.



WITNESSES:

C. Neveux
C. Sedgwick

INVENTOR

B. F. Conner

BY

Munn & Co
ATTORNEYS.

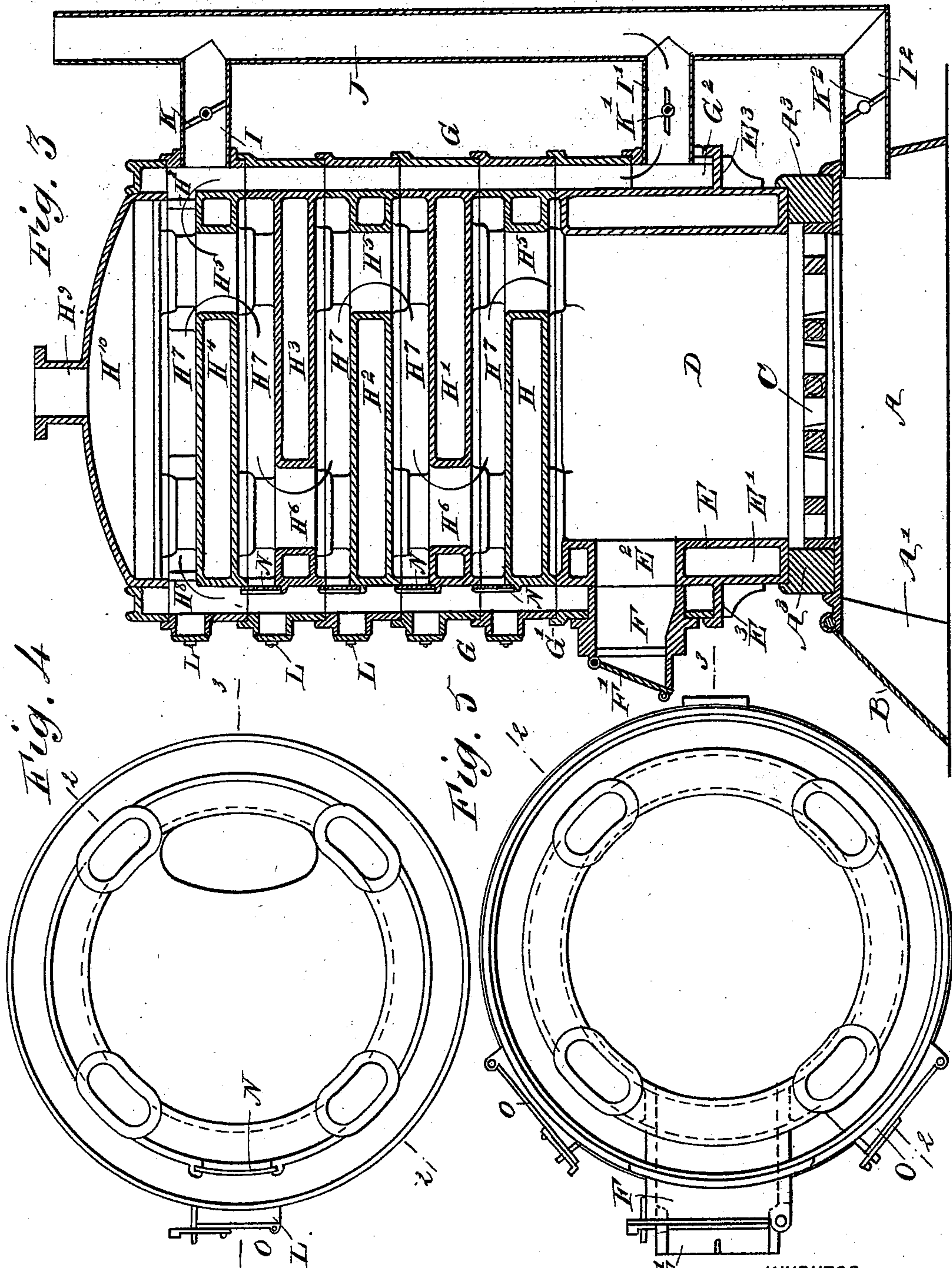
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UNITED STATES PATENT OFFICE.

BENJAMIN FRANKLIN CONNER, OF COLUMBIA, PENNSYLVANIA.

BOILER.

SPECIFICATION forming part of Letters Patent No. 528,762, dated November 6, 1894.

Application filed December 13, 1893. Serial No. 493,576. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN FRANKLIN CONNER, of Columbia, in the county of Lancaster and State of Pennsylvania, have invented a new and Improved Boiler, of which the following is a full, clear, and exact description.

The invention consists principally of a series of water circulating sections, set one on top of the other and forming a passage for the smoke and gases, and an exterior shell surrounding the said sections and into which leads the upper end of the said smoke passage.

The invention consists of certain parts and details, and combinations of the same, as will be hereinafter described and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a transverse section of the same on the lines 2—2 of Figs. 4 and 5. Fig. 3 is a sectional side elevation of the improvement on the lines 3—3 of Figs. 4 and 5. Fig. 4 is a plan view of one of the removable sections of the boiler; and Fig. 5 is a similar view of the fire box.

The improved boiler is provided with a base A forming an ash pit and provided at its front with an inclined offset A' carrying an ash pit door B, through which the ashes can be removed from the pit.

The base A is provided at its upper end with a ring A² having two removable sections A³ located opposite each other and bolted or otherwise secured to that part of the ring formed integral with the base A. In this ring A² is arranged the grate C and above this grate is formed the fire box D made cylindrical and forming the interior of the lowermost water section E, set on top of the ring A².

This water section E is provided with the water circulating space E' and with a transverse opening E² leading to the fuel inlet F provided with the usual door F' and set into the lowermost section G' of a shell G. The lowermost section of the shell G is set on an annular flange E³ forming part of the lowermost water section E, as plainly shown in

Figs. 2 and 3. The shell G surrounds part of the lowermost section E and the several water sections H, H', H², H³, H⁴ and H¹⁰, set one on top of the other with the section H, on top of the section E.

The water section H forms the top for the fire box D and is provided at its rear end with a vertical opening H⁵ through which the smoke and gases arising from the fuel burning in the fire box D can pass to enter the space H⁷ formed between the water section H and the next following section H', as plainly shown in Figs. 2 and 3. In this section H' and at the front end thereof, is arranged an opening H⁶ connecting the space H⁷ between the sections H and H' with a similar space H⁷ between the sections H' and H².

The next following section H² is provided at its rear with an opening H⁵ similar to the opening in the section H, while the other following section H³ has its opening H⁶ at the front end, and the section H⁴ in turn has its opening H⁵ at the rear end, so that the said openings alternate at the front and rear of adjacent sections. The smoke and gases thus arising from the burning fuel pass upward, then from the rear to the front and from the front to the rear, and so on, along the several sections, so as to completely heat the several water sections in their passage to the uppermost space H⁷ between the sections H⁴ and H¹⁰. This space is connected by openings H⁸ with the space G² between the shell G and the exterior of the sections H, H', H², H³, H⁴ and H¹⁰, so that the smoke and gases now pass downward on the outside of the said sections to heat the outer walls thereof.

The shell G is preferably made in sections similar to the water sections, as plainly shown in the drawings, and the section below the top section is connected by a draft pipe I with the vertically-disposed flue J connected with the chimney. The lowermost section G' is connected by a pipe I' with the flue J and the lower end of the latter is connected by a pipe I² with the ash pit formed in the base A.

The several pipes I, I' and I² are provided with valves K, K' and K² to open or close the said pipes whenever desired, and for the purpose hereinafter more fully described. It is understood that the several water sections H, H', H², H³, H⁴ and H¹⁰ are in communication

with each other, and the section H is also in communication with the water space E' of the lowermost section E. The uppermost section H¹⁰ forms the usual dome of the boiler and is provided with an outlet H⁹ for carrying off steam or the heated water, according to the use made of the boiler for generating steam or for heating the water only.

In order to enable the operator to clean the spaces H⁷ between the several water sections, of any soot or other impurities accumulating therein, doors L are provided in the shell G, and opposite these doors in the walls of the water sections H, H', H², H³ and H⁴, are formed sliding doors N, leading to the spaces H⁷. Thus, when a door L is opened access is had to the corresponding door N, so that the latter can be moved upward to give the operator access to the corresponding space H⁷ for inserting brushes or other cleaning tools to remove the soot and other matter accumulating in the said spaces. Cleaning doors O are also arranged in the lowermost shell section G' for removing soot passing into the lower part of the shell G, at the time of cleaning the spaces H⁷.

The grate bars constituting the grate C are provided with suitable trunnions C⁶, C⁷, and C⁸ respectively, mounted to turn in suitable bearings in the ring A², and on one end of the trunnion C⁶ is secured an arm P formed at its upper end with a socket carrying the hand lever P' adapted to be taken hold of by the operator to shake the grate. The arm P is pivotally-connected at opposite sides of the shaft C⁶ by links Q and Q' with arms R and R' respectively, secured on the forward ends of the trunnions C⁷ and C⁸ respectively. See Fig. 1.

During the time of raking the fire or when removing the ashes, the operator opens the valve K² so that loose ashes can readily pass through the pipe I² into the flue J to be carried to the chimney.

When it is desired to give a very strong and direct draft the operator opens the valve K so that the smoke and gases after circulating around the several water sections pass from the uppermost space H⁷ directly into the pipe I and to the flue J. The valve K is then closed; but when it is desired to give an indirect draft the valve K is closed and the valve K' is opened so that the smoke and gases circulate down the shell G to finally pass through the pipe I' to the flue J.

By the arrangement described, the heat generated by the burning fuel in the fire box D is utilized to the greatest advantage to heat the water in the sections, and it requires but a comparatively short time to heat the water to generate steam, or to circulate the water through the radiators in case the boiler is used in a hot water system.

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

1. A boiler comprising a series of flat water circulating sections, set one on top of the other, each of said sections being provided with water openings and having a single flue passing vertically through it at one side thereof, the flue being arranged alternately at the rear and front of adjacent sections, a horizontal space arranged between the top and bottom surfaces of adjacent sections and with which the said vertical openings or flues communicate, the said vertical flues and horizontal spaces forming a smoke and gas passage communicating at its lower end with the fire box, and an exterior shell surrounding the said sections and into which leads the upper end of the said smoke passage, substantially as shown and described.

2. A boiler comprising a water circulating section, the inner wall of which forms the sides of the fire box, a series of flat water circulating sections set one on top of the other, the lowermost of said sections forming the top of the fire box, each of said sections being provided with water openings and having a single vertical flue near one side thereof, the flue being arranged alternately at the rear and front of the adjacent sections, a horizontal space arranged between adjacent sections and with which the vertical flues communicate, the vertical flue and horizontal spaces forming a passage for the smoke and gases communicating with the fire box at the rear thereof, an exterior shell surrounding the said sections and into which opens the upper end of the smoke passage, a flue connected with a chimney, valved pipes leading from the upper and lower ends of the shell to the flue, and a valved pipe connecting the ash pit with the said flue, substantially as shown and described.

3. A boiler, comprising a water circulating section the inner wall of which forms the sides of the fire box, a series of horizontal water circulating sections set one on top of the other, the lowermost of said sections forming the top of the fire box a space being arranged between the said horizontal sections, a vertical opening or flue arranged alternately at the rear and front of adjacent sections and communication with the space above and below the section, the said vertical flues and spaces between the sections, forming a passage for the smoke and gases, an exterior shell surrounding the said sections and into which leads the upper end of the said smoke passage, doors arranged in the said shell, and doors in the said water circulating sections and located opposite the doors in the shell, to give access to the horizontal part of the said smoke passages, substantially as shown and described.

BENJAMIN FRANKLIN CONNOR.

Witnesses:

JOSEPH W. YOCUM,
HENRY S. HERSHEY.