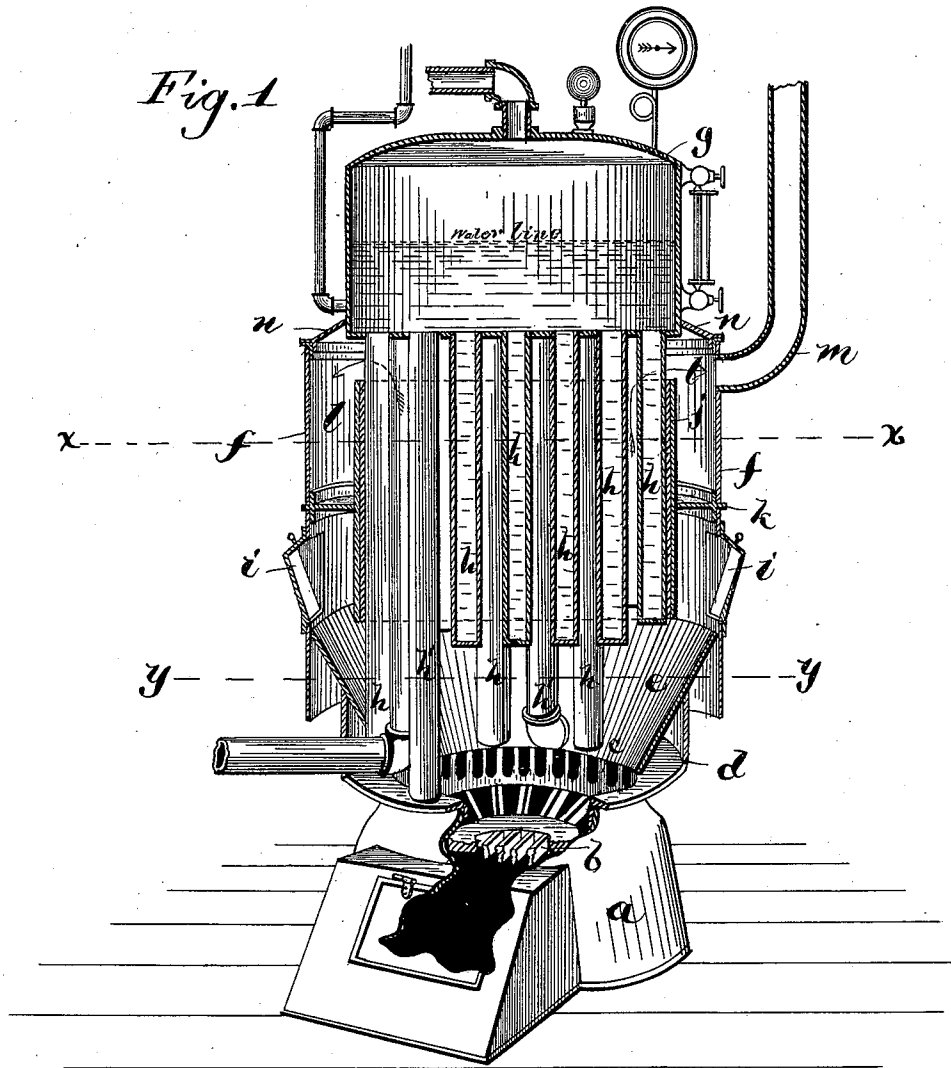


C. GORTON.  
SECTIONAL STEAM BOILER.

No. 402,667.

Patented May 7, 1889.



Witnesses:  
*J. B. McGinnis*  
*H. E. Peck*

Inventor:  
*Chas. Gorton*  
*per O. C. Duffy*  
*Atty*

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Fig. 5.



Fig. 2.

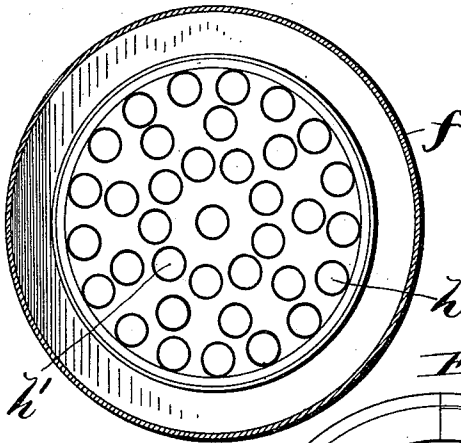


Fig. 3.

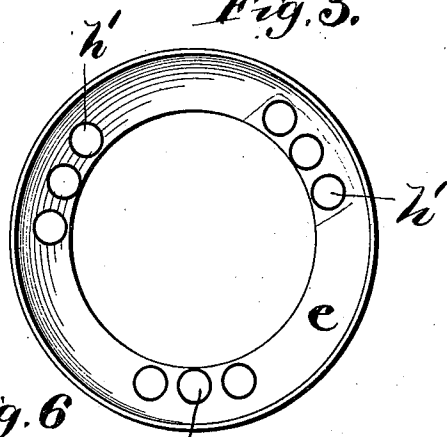


Fig. 6.

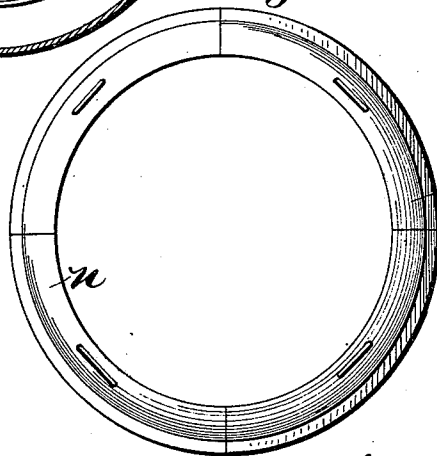


Fig. 7.

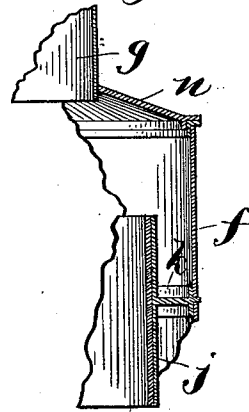
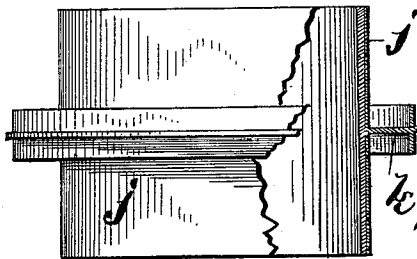


Fig. 4.



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# UNITED STATES PATENT OFFICE.

CHARLES GORTON, OF NEW YORK, N. Y.

## SECTIONAL STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 402,667, dated May 7, 1889.

Application filed August 30, 1888. Serial No. 284,122. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES GORTON, of New York, in the county of New York and State of New York, have invented certain  
5 new and useful Improvements in Sectional Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable  
10 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 part of this specification.

My invention relates to an improvement in  
15 low-pressure steam-boilers sectional in character, and more especially designed for use in connection with steam or hot-water heating systems for houses, &c.

My present invention is more especially intended as an improvement in the construction shown in Patent No. 334,657, issued to me January 19, 1886; and the object of the present invention is to so change and modify  
20 the construction that soft coal can be used as fuel, when desired, by forming the ring that closes the top of the smoke-chamber in removable sections and allowing free access of  
25 a brush or the like to the smoke-passages when one or more sections of said ring are removed, whereby the passages can be readily cleaned even when the boiler is in operation; also, to simplify the construction and reduce the number of parts to produce a cheaper boiler which can be constructed in smaller  
30 sizes for heating small houses and private residences.

A further object is to so construct the fire-pot and water-tubes that a reservoir for fuel shall be formed between the jacket surrounding the tubes, the lower tubes, and the outer casing, and to provide said reservoir with fuel-pockets located at intervals around the exterior casing, and to use this construction in connection with a basket or other grate  
35 deeper in the middle. By this construction the fuel will be distributed from the sides all over the grate until the coal is all fed down from the coal pockets and reservoir between the tubes and outer casing. There is also  
40 formed an extended combustion-chamber between the actual fire and the tubes, and, as the gases and products of combustion cannot

pass up through the coal and off unconsumed, they have to pass into the combustion-chamber, which is of such size and directly surrounded by incandescent coal and metal that  
55 the gases are thoroughly consumed therein beneath and around the lower tubes and caused to evolve the greatest amount of heat possible, and the draft and circulation are  
60 such that the gases are held in the combustion-chamber until they are wholly ignited and consumed and mixed with the proper amount of air to produce the greatest heat and most perfect combustion, air being admitted to the coal and combustion chamber  
65 around the upper and outer edge of the grate or fingered ring even after a considerable depth of ashes has accumulated upon the bottom of the grate, thus keeping a sharp  
70 clear fire automatically fed, and in which all the gases are consumed to evolve heat that will produce the greatest effect.

With these ends in view my invention consists in certain novel features of construction  
75 and combinations of parts, more fully described hereinafter, and particularly pointed out in the claims.

Referring to the accompanying drawings, Figure 1 is a partial longitudinal vertical section of the complete generator. Fig. 2 is a cross-section on line *xx*, Fig. 1. Fig. 3 is a cross-section on line *yy*, Fig. 1. Fig. 4 is a detail view, partly broken away, of the jacket encircling the tubes. Fig. 5 is a detail view,  
80 partly broken away, of the annulus, angular in cross-section, which supports the boiler. Fig. 6 is a detail top plan of the top ring formed in removable sections. Fig. 7 is a detail section of the removable top ring and the  
85 upper portion of the casing at the smoke-chamber.

It will be readily seen that in Fig. 1 the boiler is shown provided with the usual attachments—such as safety-valves, damper-regulator, gates, &c.—which form no part of my invention, and hence will not be further described.

In the drawings, *a* indicates the base of the generator, provided with a suitable grate, *b*, preferably of the basket form, or deeper in the middle than at the periphery, and provided around its upper edge with a finger-ring, *c*, to admit air to the fire from the sides  
90  
100

through the coal. The outer casing and boiler are supported by an annulus, *d*, angular or L-shaped in cross-section, as shown, and resting upon the base around or just above the finger-ring. The lower edge of the downwardly and inwardly converging ring *e*, forming the sides of the fire-pot, rests upon the horizontal portion of the supporting-annulus, forming an annular dead-air space between the sides of the annulus and the converging ring *e*.

*f* indicates the outer inclosing-casing, to which the upper edge of the ring *e* is secured or against which it bears, and the casing extends down below the upper edge of said ring to or near a level with the supporting-annulus or top of the base, forming a dead-air space, as seen.

A steam-drum, *g*, is located at the top of the casing, and is preferably cast in one piece, with suitable apertures in its bottom sheet, in which the drop water-tubes *h* are secured, and with openings in its top and sides for various other purposes. The drop-tubes *h* are screwed into the bottom sheet of the steam-drum and depend from the same, preferably in concentric circles, (see Fig. 2,) extending down within a certain distance of the fire-pot. The tubes in the outer circle are arranged in sets—that is, every alternate suitable number (preferably three) of tubes are longer than the others, extending directly down through the fire-pot and resting upon the horizontal portion of the supporting-annulus *d*, the converging ring forming the fire-pot being notched or cut away for the passage of the tubes, as shown in Fig. 3. It will thus be seen that there will be spaces left between the long sets of tubes. The remaining tubes of the outer circle and the inner tubes end in or about the same plane with the upper edge of the ring *e*. Opposite each set of short tubes or between the sets of long tubes the outer casing is provided with fuel-pockets *i*, located just above the converging ring forming the fire-pot.

It will be readily seen that fuel, when passed into the fire-pot through the coal-pockets, slides down and spreads out laterally and evenly over the fire, and to further facilitate the lateral spreading of the fuel the long tubes comprising each set *h'* are arranged in a straight line, (see Fig. 3,) instead of in arcs of the outer circle of water-tubes, thus bringing the end tubes of each long set nearer the outer casing.

The outer circle of water-tubes is surrounded by a cylindrical metallic shell, *j*, which preferably extends to the lower edges of the short tubes, and does not extend to the upper ends of the tubes, but leaves a suitable space between its upper edge and the crown-sheet of the steam and water chamber. If desired, the tubes can be tightly wrapped with asbestos within the shell *j*, for keeping the heat in and around the water-tubes. It should be further observed that there is an

annular space between the outer casing, *f*, and shell *j*, which space is divided just above the fuel-pockets by an annular ring, *k*, cutting off the draft through the coal between the shell *j* and casing *f*. The shell, as is clearly evident, forms the inner wall of the coal-reservoir.

The water-tubes are located a suitable distance apart, and the products of combustion pass upwardly around the same and within the shell *j* to the bottom of the steam and water chamber, from which they are deflected laterally out through the space between the bottom sheet and top edge of shell *j* into an annular smoke-chamber, *l*, between shell *j* and outer casing, *f*, and closed at the bottom by ring *k*, and from said chamber the products of combustion can pass off through suitable exit-pipes, *m*.

The steam and water drum *g* is smaller in diameter than the outer casing, and rests upon and is directly supported by the water-tubes, and the space between the upper edge of the outer casing and the steam-drum is closed by a removable ring, *n*, formed in any desirable number of separate sections. It should be observed that this ring forms the top of the smoke-chamber, and is removable to enable a brush or other instrument to be inserted through the smoke-chamber and space between the shell *j* and the bottom sheet to the water-tubes, and thereby readily and easily clean the smoke-passages between the same at any time, and thereby enable soft coal to be used as a fuel. The sections of the removable ring *n* are held in position and prevented from slipping by an angle flange placed around the top edge of the casing *f* and flanges in the lower edges of the ring-sections to engage said flange, as clearly shown in Fig. 7.

The whole weight of the boiler and steam-drum is sustained by the sets of long tubes *h'* resting upon the supporting-annulus, and said long tubes act as substitutes for the water-leg, which is not employed in the present construction. The lower ends of two or more of said long tubes can be provided with outbends, through which the water can be introduced or discharged to keep up the circulation.

It is evident that the herein-described boiler is as well adapted for hot-water heating as for use as a steam-generator; hence it is in no way confined to use as a steam-boiler.

What I claim is—

1. In a steam-generator or hot-water heater, the combination of a base, a supporting-annulus angular or L-shaped in cross-section and resting on the base, a grate deeper in the middle, a downwardly or inwardly converging fire-pot resting on the annulus, a fuel-reservoir around the side of the fire-pot, and a series of coal-pockets around the outer shell, substantially as described.

2. In a steam-generator, the combination, with a downwardly or inwardly converging

fire-pot, a coal-reservoir around and above the same, coal-pockets, a nest of water-tubes above the fire-pot, and sets of water-tubes extending down through the fire-pot on each side of the coal-pockets, substantially as described.

3. In a steam-generator, the combination, with the fire-pot having an annular side feed, of a boiler located above the same and comprising a steam-drum, and a nest of drop-tubes arranged in circles and depending from the drum and ending above the fire-pot, every alternate suitable number of tubes in the outer circle being extended down through the fire-pot to the base, and serving as water-legs and supporting the boiler, substantially as described.

4. In a steam-generator, the combination, with a base and a supporting-annulus angular in cross-section and resting upon the base, of a ring forming the sides of the fire-pot and having its lower edge resting upon said annulus, a boiler provided with drop-tubes, a suitable number of which are extended downwardly to rest upon the annulus and support the boiler, and a casing inclosing the boiler and resting on the ring.

5. In a steam-generator, the combination of the converging fire-pot, an annular side feed, and coal-pockets, and a nest of water-tubes arranged in circles above the fire-pot, the tubes in the outer circle being arranged in sets, every alternate set extending down through the fire-pot on each side of the coal-pockets to allow the coal to freely feed downwardly and spread laterally, substantially as described.

6. The combination of the fire-pot, a fuel-reservoir, fuel-pockets for the same, an outer casing, a nest of depending water-tubes formed in circles, the tubes in the outer circle being formed in sets of long and short tubes, the tubes in each set of long tubes being arranged in a straight line, an asbestos covering around the outer circle of tubes, and a cylindrical shell

inclosing the asbestos covering, substantially as described.

7. In a steam-generator, a fire-pot, in combination with an outer casing, a nest of water-tubes inclosed by a cylindrical shell forming an annular smoke-chamber between its upper portion and the outer casing, with communication between the upper portion of the space between said water-tubes and the smoke-chamber, a ring cutting off outside communication of the smoke-chamber and fire-pot, and one or more exits for the smoke-chamber, substantially as described.

8. In a steam-generator, the combination, with the annular smoke-chamber, the water-tubes, a cylindrical shell inclosing the water-tubes, but leaving a communicating space between the upper portion of the smoke-chamber and upper portion of space around the tubes, and a removable ring formed in sections closing the top of the smoke-chamber, for the purpose described.

9. In a steam-generator or hot-water heater, the combination of a base, a supporting-annulus L-shaped in cross-section and resting upon the base, an inwardly and downwardly converging ring having its lower edge resting upon the horizontal part of the annulus to form an inwardly-converging fire-pot, the annulus forming a dead-air space around the fire-pot, a casing resting upon the upper edge of the ring and provided with coal-pockets above the upper edge of the ring, and a boiler in the casing and above the fire-pot, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

CHARLES GORTON.

Witnesses:

GEORGE F. HARRIMAN,  
JOSEPH P. CASEY.