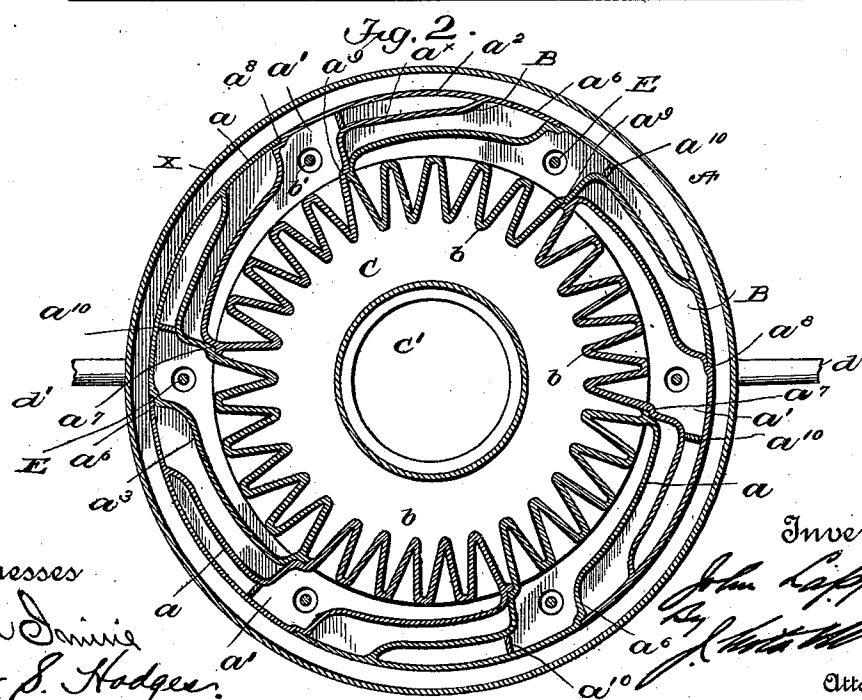
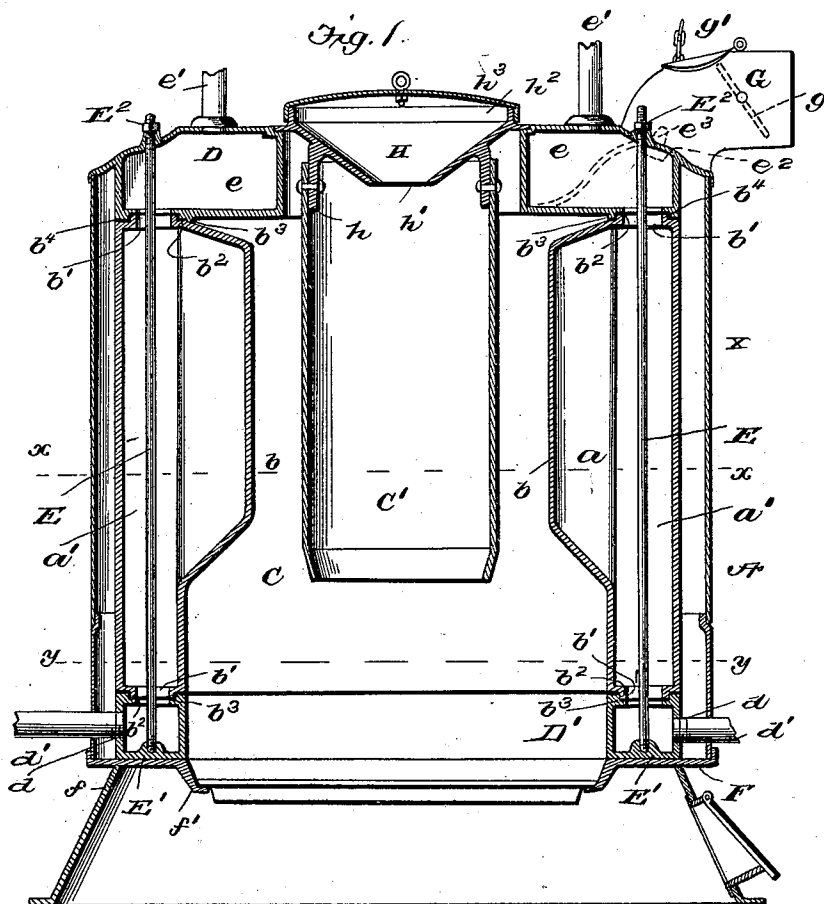


J. LAPP.
SECTIONAL BOILER.

No. 516,209.

Patented Mar. 13, 1894.



Witnesses

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Wm. S. Hodges.

Inventor

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(No Model.)

2 Sheets—Sheet 2.

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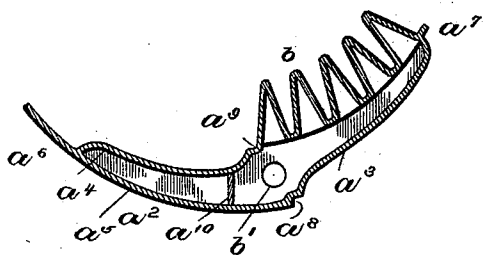
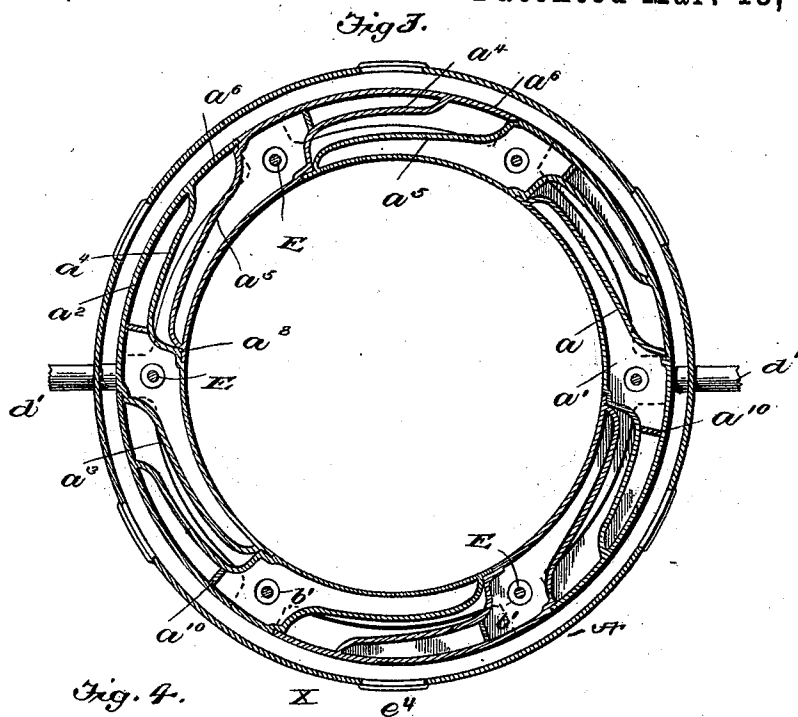
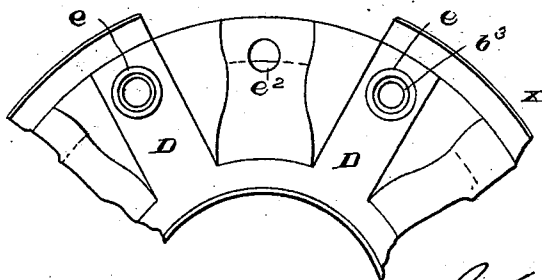


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN LAPP, OF ROCHESTER, NEW YORK.

SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 516,209, dated March 13, 1894.

Application filed February 27, 1893. Serial No. 463,938. (No model.)

To all whom it may concern:

Be it known that I, JOHN LAPP, of Rochester, in the county of Monroe and State of New York, have invented certain new and
5 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
10 same.

This invention contemplates certain new and useful improvements in sectional boilers and it has for its object to provide for a thorough circulation within the boilers that more
15 heat may be absorbed by the rapid currents of water passing over the fire surfaces, and whereby the cooler or more dense portion of the water readily displaces the lighter or heated portion, resulting in the generation of
20 a maximum quantity of very dry steam and preventing the liability of arresting circulation by steam pressure on the fire surface and avoiding pulsation or kicking in the boiler.

The invention consists primarily, of a boiler composed of a series of vertically disposed sections, each of said sections having an inner and outer curved elongated lateral arm or branch forming, each, an arc of a circle, said
30 sections when united constituting a complete circle and forming between their opposite overlapping faces hot air flues or passage-ways, the outer arm of each section overlapping the inner arm of the next adjacent section.
35

The invention further consists of a boiler composed of a series of vertical sections having each an outer curved elongated lateral arm or branch and an inner curved elongated
40 lateral arm provided with a fluted or corrugated face extending into the combustion chamber, said sections being interlocked and held in rigid relation to each other.

The invention further consists of a boiler composed of a series of corresponding interlocked vertical sections having overlapping lateral arms forming descending hot air flues, upper and lower rings or chambers into which
45 said sections open, and rods or bolts extended perpendicularly through the centers of said sections and united to said rings, whereby the parts are held in firm relation to each other.

The invention also comprises the detail

construction, combination and arrangement 55 of parts, substantially as hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings:—Figure 1 is a vertical sectional view illustrating my 60 improved sectional boiler, parts being broken away. Fig. 2 is a horizontal cross-section on line $x-x$, Fig. 1. Fig. 3 is a similar view on line $y-y$, same figure. Fig. 4 is a horizontal sectional view of one of the sections. Fig. 5 65 is a bottom plan view of a portion of the top ring.

In the description to follow the common or ordinary parts of a stove or furnace will be described only in so far as is necessary to a 70 clear understanding of the points that constitute my invention.

Referring to the drawings, A designates the boiler which is composed of a series of corresponding vertical sections a . Each section is approximately square at its center a' , 75 and from this point radiate two curved lateral arms or branches a^2 , a^3 said section being composed of inner and outer walls a^4 , a^5 , and having at one end a short lip or flange a^6 , and at the other end an elongated lip or flange a^7 . In the inner and outer angular points of the walls of each section are formed recesses a^8 , a^9 . When placed together the lips or flanges a^6 and a^7 fit snug in the recesses a^8 and a^9 , respectively, of the adjacent sections. The walls of the outer arm or branch of each section are connected by a vertical strip a^{10} which extends to within a short distance of the top and bottom of the section and serves to prevent the spreading of said walls by internal pressure and also acts as a separator between the ascending and descending currents of water. It is well known that the circulation of water in a boiler or the like is owing to the difference in specific gravity of two columns, the lighter column being directly over or adjacent to the source of heat. The latter column is being continuously displaced by the heavier or 100 more dense column. As the heat and circulation increase the friction or contact between the two columns causes them to intermingle to such an extent as to practically destroy their difference—gravity circulation is proportionately lost, and steam (and consequently pressure) is formed at bottom or source of heat, which further stops circula- 105

tion. Then the column of water is raised by pulsations and soon boils over. But in my boiler by introducing the vertical strip or plate a^{10} the columns are prevented from mingling and perfect free circulation of the lighter and heavier columns is had. This strip or plate is located at the inner end of each of the outer arms or branches and the colder or heavier column of water is always in this outer arm or branch, while the lighter or warmer column is in the inner arm or branch which is directly acted upon by the heat.

The overlapping arms or branches of adjoining sections form hot-air flues B which extend throughout the lengths of the vertical sections. The arms or branches of each section are curved to form an arc of a circle, and hence when all of the sections are properly positioned and secured together they constitute a complete circle, forming in themselves a round wall which is concentric with or parallel to the outer casing of the stove or furnace.

The inner wall of the inner arm or branch of each section, from a point a short distance above its lower end, is preferably fluted or corrugated to form a series of approximately V-shape pockets b which extend into the combustion chamber C to within a short distance of the magazine C', a series of hot-air passage-ways between said extensions being thus provided. In this way a maximum quantity of water is presented for direct action of the heat. The top and bottom plates of each section have central openings b' , and surrounding circular flanges b^2 designed to fit snug in corresponding sockets b^3 in upper and lower rings or chambers D, D', said sockets being formed in the bottom and top plates of said rings or chambers and surrounding circular openings therein. Gasket rings b^4 are located in these socketed openings. Into two or more socketed extensions d of ring or chamber D' open water supply pipes d' for feeding or supplying the vertical sections with water.

E represents perpendicular rods extended through the central openings of the sections and rigidly connected at their ends to the upper and lower rings or chambers, whereby the latter and said sections are firmly bound and held in fixed relation to each other. The lower threaded end of each rod engages a threaded hole in a thickened portion E' of ring D', while a nut E² is screwed on the upper end of said rod projected beyond the top of ring D. The top ring D is made hollow and encircles the magazine C' and is formed with a series of outwardly extended hollow chambers e corresponding in number with the series of sections which open thereinto. Hence through the agency of these chambers communication is had with the sections and the upper hollow ring. From the latter leads a pipe e' to convey away the steam. Intermediate of these chambers the top and bottom plates of the

ring D are united or made integral and in this portion are openings e^2 which are normally closed by plugs e^3 . Access can thus be had to the flues B for effecting the cleansing thereof, said openings being directly over said flues. The dirt brushed down in the flues can be removed through suitable doors, as e^4 , formed in the outer casing X opposite the lower ends of said flues.

F is a ring located in top of base f and upon which the dirt from the flues B will fall. This ring F has fingers f' designed to interlace with the grate fingers. A smoke-box G is located at top of boiler at one side and is provided with a damper g and a hinged grate g' serving as a draft check. The products of combustion pass into this smoke box after having descended through flues B and up between the outsides of the sections and the outer casing X. Direct communication can be established between the combustion chamber and smoke box by removing the plug e^2 located in the hole opening into said smoke box and in lieu of said plug a sliding valve may be substituted at this point.

The magazine C' is provided with an upper hopper-like casting H having depending lugs h rigidly attached to the upper end of said magazine. A central opening h' is formed in this casting and a circumferential flange h^2 serves to hold the cover h^3 in place. Thus a space is provided between the top of the magazine and under side of casting for the escape of gas. The delivery point of this hopper being lower than the upper edge of the magazine and being smaller in diameter, the natural draft of chimney produces a down draft when the cover is raised for any purpose, thus preventing any explosion or the escape of coal gas.

It will be understood that I also provide the usual doors for inspection of fire and for removal of ashes, and likewise the ordinary lower draft-door, but as these form no part of my invention further reference thereto is unnecessary.

From what has been said it will be seen that by means of my invention a perfect circulation is created in the boiler; that a maximum amount of heat will be absorbed by the water which is held in the line of passage of the products of combustion, and that the lighter or heated portion will be readily displaced by the cooler or more dense portion; and that the movements of the descending and ascending currents are guided by the division plates located in said sections.

It is well known that the circulation of water is due to the difference in specific gravity of two columns, hence the greater the height and separation the greater the result. Thus by means of the vertical sections constituting my improved boiler I provide for the greatest height of column, and by having a maximum surface for the direct action of the fire the greatest portion of the water is heated and expanded and hence can be readily displaced

by the cooler portion of the water, which is that farthest from the direct action of the fire. Thus circulation is maintained within each section under any firing and by reason
5 of the constant and rapid circulation a maximum amount of very dry steam is obtained.

The advantages of my invention are apparent to those skilled in the art, especially in the light of the foregoing. The important
10 features lie in the means employed for presenting a maximum water surface to the fire and in securing a perfect circulation of the water.

By providing the boiler sections with
15 curved lateral elongated arms or branches, the sections have a maximum holding capacity and but few sections are required to constitute the boiler, said sections when united constituting a complete circle which corresponds to the outer casing of the stove or furnace.

A boiler constructed in accordance with my invention has but a minimum number of sections and the parts can be readily united together. The heat is so distributed against the arms or branches at all points that the water is readily and thoroughly heated, and by providing the sections with the interior dividing strips or plates a complete circulation is obtained.
30

I claim as my invention—

1. A boiler consisting of a series of corresponding vertical sections having each two elongated lateral arms or branches each of
35 which is curved to form an arc of a circle, the arms or branches of each section overlapping one of the arms or branches of each of the adjoining sections forming hot air flues, as set forth.

2. A boiler consisting of a series of corresponding vertical sections having each two elongated lateral arms or branches each of which is curved to form an arc of a circle, one of said arms or branches being in closer
40 proximity to the heating medium than the other and of greater holding capacity, the arms or branches of each section overlapping one of the arms or branches of each of the adjoining sections, substantially as set forth.

3. A boiler consisting of a series of corresponding vertical sections having each inner and outer elongated lateral arms or branches curved to form an arc of a circle, said inner arm or branch having pockets extending
45 therefrom into the combustion chamber, the said arms or branches of each section overlapping one of the arms or branches of each of the adjoining sections forming descending hot-air flues, substantially as set forth.

4. A boiler consisting of a series of corresponding sections having each inner and outer elongated lateral arms or branches, said inner arm or branch having pockets extending into the combustion chamber, and a continuous plate connecting the walls of the section and located in said outer arm or branch
65

but not extending to the ends thereof, the arms or branches of each section overlapping one of the arms or branches of each of the adjoining sections, substantially as set forth. 70

5. The herein-described improved boiler, consisting of the series of corresponding sections having each two lateral arms or branches curved to form an arc of a circle, each of said arms or branches overlapping one of the
75 arms or branches of the next adjoining sections forming descending hot-air flues, the upper and lower rings having openings coincident with upper and lower central openings of said sections, said upper ring having a series of hollow domes or chambers, and said lower ring having water-receiving sockets, and nutted rods holding said rings and sections united, substantially as set forth.

6. A boiler consisting of a series of corresponding sections having each inner and outer curved arms or branches, said inner arm or branch being of greater water holding capacity than the outer arm or branch, and the continuous plate connected to the walls of said section and located in said lateral arm or branch, substantially as set forth. 90

7. A boiler composed of a series of corresponding sections forming a circle, each of said sections having two lateral arms or branches and consisting of inner and outer walls curved to form an arc of a circle, said inner wall being fluted or corrugated, and both of said walls having central recesses a^8 , a^9 , and at their ends provided with vertical lips or flanges a^7 , a^8 , substantially as set forth. 100

8. The herein-described improved boiler, composed of a series of sections having hot-air flues, and provided with upper and lower openings and surrounding flanges, the upper
105 and lower rings having socketed openings for said flanges, said upper ring having a series of hollow chambers into which said sections open, and intermediate covered openings located over said hot-air flues, substantially as set forth. 110

9. The herein-described improved boiler, composed of a series of sections having inner and outer curved overlapping portions forming hot-air flues, the upper ring having
115 a series of chambers corresponding to said sections and communicating therewith, and intermediate openings located over said hot-air flues, and plugs or covers for said openings, the lower ring having socketed extensions for the water supply and communicating with said sections, and the series of threaded rods for uniting said sections and rings, substantially as set forth.

In testimony whereof I have signed this
125 specification in the presence of two subscribing witnesses.

JOHN LAPP.

Witnesses:

J. R. PRICE,

GEO. A. WOLCOTT.