

(No Model.)

2 Sheets—Sheet 1.

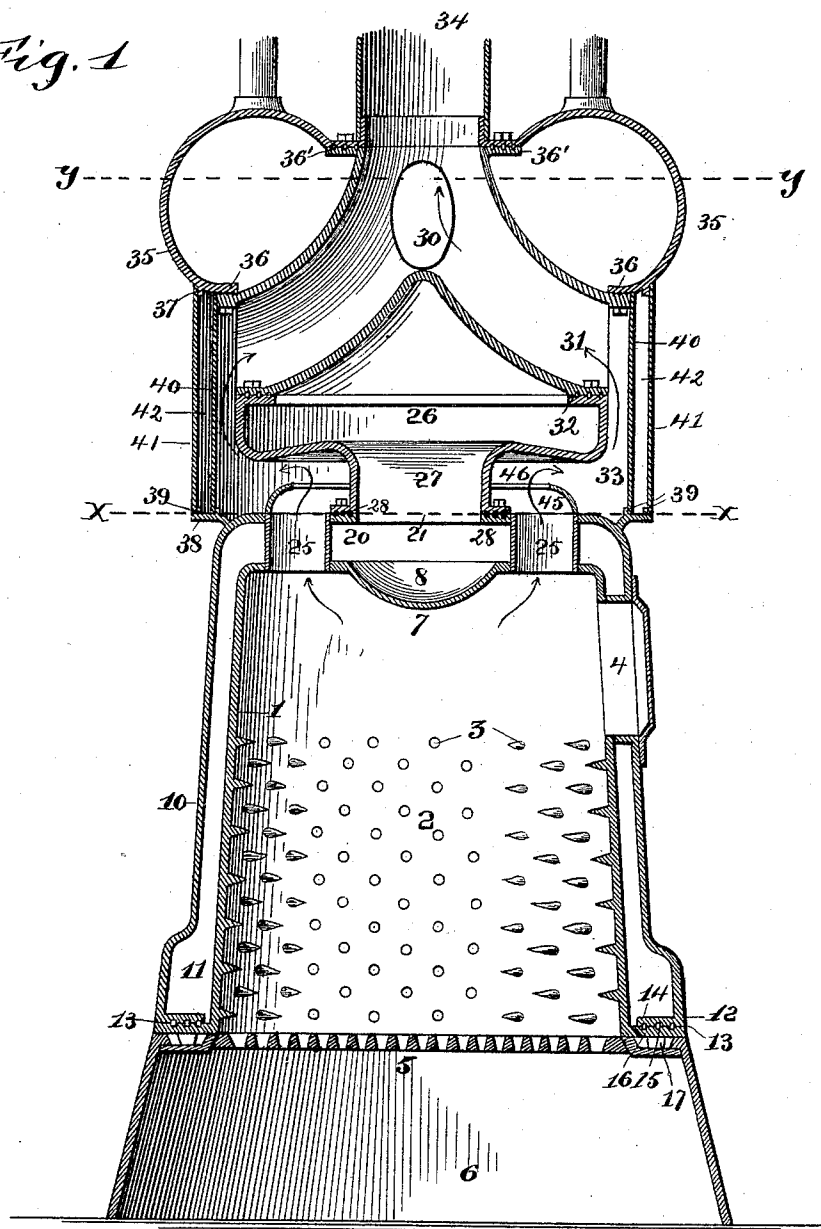
W. H. PAGE.

SECTIONAL STEAM BOILER.

No. 430,589.

Patented June 17, 1890.

Fig. 1



Witnesses:
J. M. McGiv. *J. M. McGiv.*
H. D. Perry *H. D. Perry*

Inventor:
William H. Page *William H. Page*
By his Attorneys,
Edw. C. Smith *Edw. C. Smith*

(No Model.)

2 Sheets—Sheet 2.

W. H. PAGE.

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Fig. 2

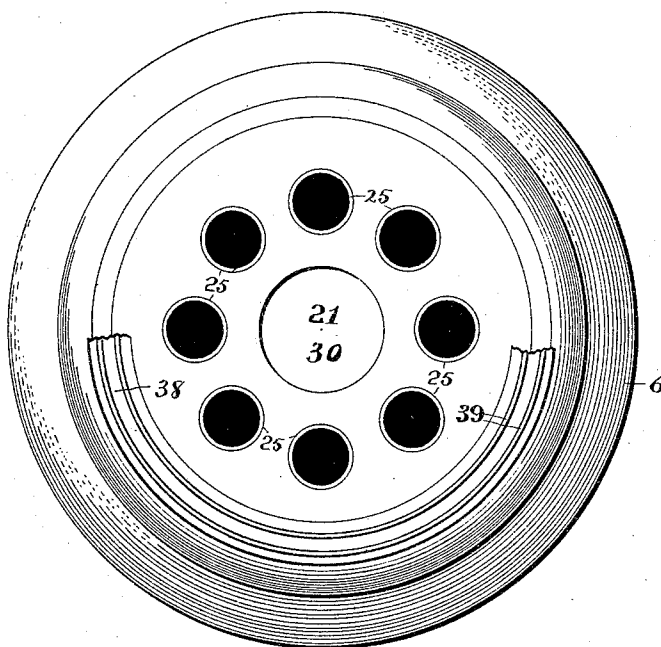
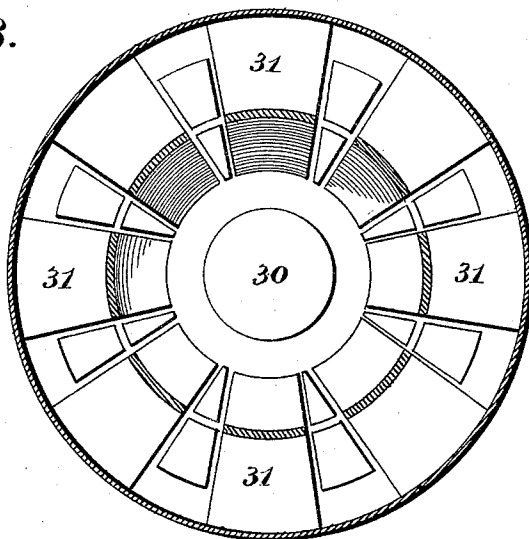


Fig. 3.



Witnesses:
J. B. McGirr.
N. J. Berukoff

Inventor:
William H. Page
By his Attorney
Edw. C. Smith

UNITED STATES PATENT OFFICE.

WILLIAM H. PAGE, OF NORWICH, CONNECTICUT, ASSIGNOR TO THE WM. H. PAGE WOOD TYPE COMPANY, OF SAME PLACE.

SECTIONAL STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 430,589, dated June 17, 1890.

Application filed January 10, 1890. Serial No. 336,550. (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 Steam-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 a sectional steam-boiler or heater; and it has for its object to materially increase the area or surface against which the flames and products of combustion act, to provide a continuous water-circulation from the base to the dome of the heater over the crown of the fire-box or combustion-chamber, to protect the dome against the direct action of the ascending heat and products of combustion, and to join the several parts or sections permanently together by tight joints.

With these and other ends in view my invention consists in the combination, construction, and arrangement of the several parts, as will be hereinafter fully described, and pointed out in the claims.

To enable others to understand my invention, I will now proceed to a detailed description thereof, in connection with the accompanying drawings, in which—

Figure 1 is a vertical sectional view through a steam-boiler embodying my invention. Fig. 2 is a horizontal sectional view on the line *xx* of Fig. 1, and Fig. 3 is a similar sectional view on the line *yy* of Fig. 1.

Referring to the drawings, in which like numerals of reference denote corresponding parts in all the figures, 1 designates the internal shell or casing of the combustion-chamber or fire-pot 2, which is provided on its inner surface with a continuous series of tapering protuberances 3, which extend from the lower edge of the shell to the door 4, provided in one side of the heater or boiler for the introduction of the fuel.

5 designates the grate, and 6 the ash-pit of the ordinary or any preferred form. The crown-sheet 7 of this internal shell of the combustion-chamber is provided with a central depression or bowl 8, which forms an en-

largement to the water-chamber immediately over the center of the combustion-chamber, obviates liability to crack the crown-sheet, and operates to divide the flame, so that it enters all of the series of smoke-flues equally, and around this central depression or bowl is formed a series of apertures to receive the lower extremities of the short smoke-flues, hereinafter described. This internal shell of the fire-pot is surrounded by and inclosed within an exterior concentric shell 10, which is of greater diameter than the internal shell and arranged out of lateral contact therewith to provide an intermediate water-chamber 11 between the two shells. The exterior shell 10 is flared or turned outward at its lower extremity, as at 12, to provide an enlarged lower portion to the water-chamber, as shown in Fig. 1, and thus the main body of the water-chamber, or that portion of said chamber above the enlargement 12, is of comparatively small area in cross-section, so that a thin sheet of water is maintained in said chamber, which is more quickly and easily heated by the heat of the combustion-chamber, and thus starts the water to circulating as soon as the fire is under headway.

The internal and exterior shells 1 and 10, which constitute the fire-pot, are joined together by a water-tight joint 13, which is attained by casting an outwardly-extending flange 14 on the internal shell, an inwardly-extending flange on the exterior shell, forming a series of coincident grooves or recesses 16 on the lapping flanges 14 15, and filling said grooves with cement and finally uniting the two shells by means of tap-bolts 17, which pass through said meeting flanges. The crown 20 of the exterior shell 10 extends over the crown-sheet 7 of the internal shell above the latter, so as to form a space or chamber between the crown-sheets of the two shells, which space communicates with the water-chamber 11, and in this crown 20 of the exterior shell is formed a large central opening 21 and a series of openings which align with the corresponding openings in the crown-sheet 7 of the internal shell. In practice I prefer to ream the coincident openings in the exterior and internal shells 10 and 11, respectively, and in said coincident openings are driven short smoke-flues 25, which flues

form water-tight joints with the exterior and internal shells, and serve as the means of uniting the upper ends of said shells together.

The dome of my improved heater or boiler consists of three separate castings or sections, which are constructed to form a water-chamber in the dome, a steam-space and smoke-flues, and an exit for the smoke and products of combustion. The lower section 26 of the dome is contracted at its lower extremity to form a mouth 27, which corresponds in size practically with the central opening 21 in the crown 20 of the exterior shell, and this lower member of the dome is united to the crown 15 of the external shell by means of a joint 28, which is formed by concentric grooves in the opposing faces of the lower member of the dome and the crown of the external shell, and a suitable filling of cement in said grooves, as shown. This lower section or member of the dome is flared or enlarged toward its upper end, so as to form an increased water-chamber and overhang all of the series of smoke-flues 25, so that the ascending heat and products of combustion act against the lower member or section of the dome and pass around the latter. The lower section or member of the dome is surmounted by a flue-section 30, which is cast in one piece of metal, and forms a series of flues 31, which correspond in number to the series of smoke-flues 25. The casting 30 is arranged immediately over the lower section 26 of the dome, and it is united thereto by a joint 32, which is formed by coincident grooves in the casting 30 and the lower section of the dome, and a cement filling in said grooves. The lower ends of the series of flues 31 open into a smoke-space 33, formed between the fire-pot, the dome-sections 26, 30, and 33, and a surrounding casing 40, the openings from the upper series of smoke-flues being in a plane at right angles to the openings from the lower series of vertical smoke-flues 25, and these smoke-flues 31 converge upwardly and inwardly to a common outlet 34, which is in the vertical center of the heater or boiler.

Around the intermediate or flue section of the heater or boiler, and upon said intermediate section, is placed the third annular member 35 of the dome, which is joined to the section 30 by joints 36 36' similar to the joints hereinbefore described. This top member or section of the dome is nearly circular in cross-section, as shown, and its inner wall or side is formed by the converging flues of the intermediate or flue section 30 of the dome, and as the flues of the section or member 30 of the dome are arranged to provide spaces between said flues, it is obvious that the upper section or member 35 of the dome communicates with the lower section 30 of the dome, and that the water of the boiler is free to circulate through the entire dome and around the combustion-chamber. The water-line is about midway of the upper section or member 35 of the dome, as shown in Fig. 1,

and the upper portion of said member 35 thus forms the steam-space to the dome of the heater or boiler. This upper member or section 35 of the dome overhangs the heater and projects laterally beyond the same, and on its lower curved surface I provide two or more annular ribs or flanges 37, for a purpose presently described.

Upon the upper curved part of the exterior shell 10 of the combustion-chamber is fitted a supporting ring or annulus 38, which is formed on its upper side with two or more annular ribs 39, that correspond with the ribs 38 on the upper section or member 35 of the dome, and between the ribs 38 39 of the dome-section 35 and the supporting ring or annulus are placed the vertical inclosing-casings 40 41, which are clamped or secured in place by the dome-section and supporting-ring and the flanges thereon. The inner casing 40 is arranged laterally of the dome-sections 26 and 35 and the exterior shell 10 to form the smoke-space 33, which surrounds the lower dome-section 26, and into which the smoke-flues 25 and 31 open, and the casing 41 is arranged laterally of the casing 40, out of lateral contact therewith, to provide an intermediate air-space 42 between the casings 40 and 41. (See Fig. 1.)

In the lower part of the smoke chamber or space 33 is arranged an annulus or deflecting-ring 45, which is curved in cross-section, so that its upper edge overhangs the series of vertical flues 25 and operates to protect the lower curved side of the dome-section 26 by preventing the full force of the ascending smoke and heat from acting directly against the said section 26. This deflecting-ring or annulus 45 is arranged around the depending portion or mouth 27 of the dome-section, so as to leave the intermediate smoke-passage 46 and the lower edge of the ring-rests on the crown of the exterior shell 10 of the fire-pot just at or outside of the edges of the vertical flues 25, the upper edge of said deflecting-ring or annulus terminating below the lower surface of the dome-section 26 to permit the ascending heat and products of combustion to pass freely below said dome-section, as is obvious from Fig. 1.

From the foregoing description, taken in connection with the drawings, it will be noted that I provide a water-chamber, which extends from the base of the combustion-chamber nearly to the top of the heater, and that the smoke-flues and space are circuitous and extend around the water-chamber of the dome, whereby a largely-increased area or surface is secured for the flame, heat, and other products of combustion to act against, and the heat is utilized to the best advantage and promotes economy of fuel and secures an increased volume of steam for heating purposes.

The parts or sections of the boiler are readily and easily fitted together, and they are all joined by a secure and water-tight joint.

Changes in the form and proportion of parts and details of construction can be made without departing from the spirit or sacrificing the advantages of my invention, and I would therefore have it understood that I 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 steam-boiler, the combination of a fire-pot having a central depression or bowl in its crown-sheet, the surrounding water-chamber, the series of smoke-flues, which are arranged around the central depression in the crown-sheet of the fire-pot and extend vertically through the crown-sheet and water-chamber, the dome having its water-chamber in communication with the corresponding chamber of the fire-pot, the smoke-space, and the exit-flues extending through the dome, as and for the purpose described.

2. In a steam-boiler, the combination of a fire-pot having the water-chamber and the series of vertical smoke-flues, the dome, which overhangs the smoke-flues of the fire-pot and is formed with the smoke-exit flues, the smoke-space around the dome, and a deflecting-ring arranged in the smoke-space partially between the vertical smoke-flues and the overhanging part of the dome, as and for the purpose described.

3. In a sectional steam-boiler, the combination, with a fire-pot having a surrounding water-chamber, of a sectional dome having its lower section secured to the upper shell of the jacket inclosing the fire-pot to communicate with the water-chamber therein and arranged to overhang the smoke-outlets from said fire-pot, the intermediate section of the dome being united to the lower section and provided with the smoke-exit flues, and the top section of said dome being united to the intermediate section in such manner as to communicate with the water-chamber of the lower section of the dome, as and for the purpose described.

4. In a sectional steam-boiler, the combination, with a fire-pot having the surrounding water-chamber, of a sectional dome having its lower section or member united to the upper shell of the jacket inclosing the fire-pot to communicate with its water-chamber, the intermediate section united to the lower section and formed with the converging smoke-exit flues, which are isolated from the chamber of the lower section of the dome, and the upper section surrounding the intermediate section and communicating with the water-chamber of the lower section, the inner wall or side of the top section being formed by the wall of the intermediate section, as and for the purpose described.

5. In a sectional steam-boiler, the combination of a fire-pot, a dome having the contracted lower portion immediately above the

fire-pot and having the upper overhanging portion thereof provided with a depending rib or ribs, the supporting-ring fitted on the fire-pot and likewise provided with a rib or ribs, and one or more casings secured between the rib or ribs of the supporting-ring and dome and arranged laterally of the lower part of the dome to form a smoke-space between the dome, the casing, and the fire-pot, as and for the purpose described.

6. In a sectional steam-boiler, substantially as described, the combination of the internal shell, the external shell arranged with relation to the internal shell to form a water-chamber which surrounds the fire-pot at the top and sides thereof, a dome arranged above the fire-pot within the water-chamber at the top of the fire-pot, the lower part of the dome being contracted and arranged over the fire-pot to form an intermediate smoke-space, the casing inclosing the dome and forming an annular smoke-chamber, and the converging smoke-flues, which extend through the water-chamber in the dome, said flues opening into the annular smoke-chamber and into a common smoke-outlet in the top of the dome, as and for the purpose described.

7. In a sectional steam-boiler, the combination of a fire-pot having a surrounding water-chamber which extends around the sides and over the top thereof, the dome opening into the water-chamber at the top of the fire-pot, a casing around the dome and forming an intermediate smoke-chamber, the vertical smoke-flues intermediate of the fire-pot and the smoke-chamber, and the converging smoke-flues, which extend from the annular smoke-chamber through the water-chamber in the upper part of the dome and open into a common smoke-outlet in the top of the heater, as and for the purpose described.

8. In a sectional steam-boiler, the combination of a fire-pot having a water-chamber which extends around the sides and over the top thereof, a dome having the lower part of its water-chamber contracted and communicating with the water-chamber above the fire-pot and overhanging the outlets for smoke and products of combustion from the fire-pot, a casing surrounding the dome and forming a smoke-chamber, the vertical flues extending from the fire-pot through the water-chamber above said fire-pot and opening into the space below the overhanging part of the dome, and the converging smoke-flues extending from the smoke-chamber through the water-space in the dome and opening into a common smoke-outlet in the top of the heater, as and for the purpose described.

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

WILLIAM H. PAGE.

Witnesses:

LUCIUS BROWN,
DONALD G. PERKINS.