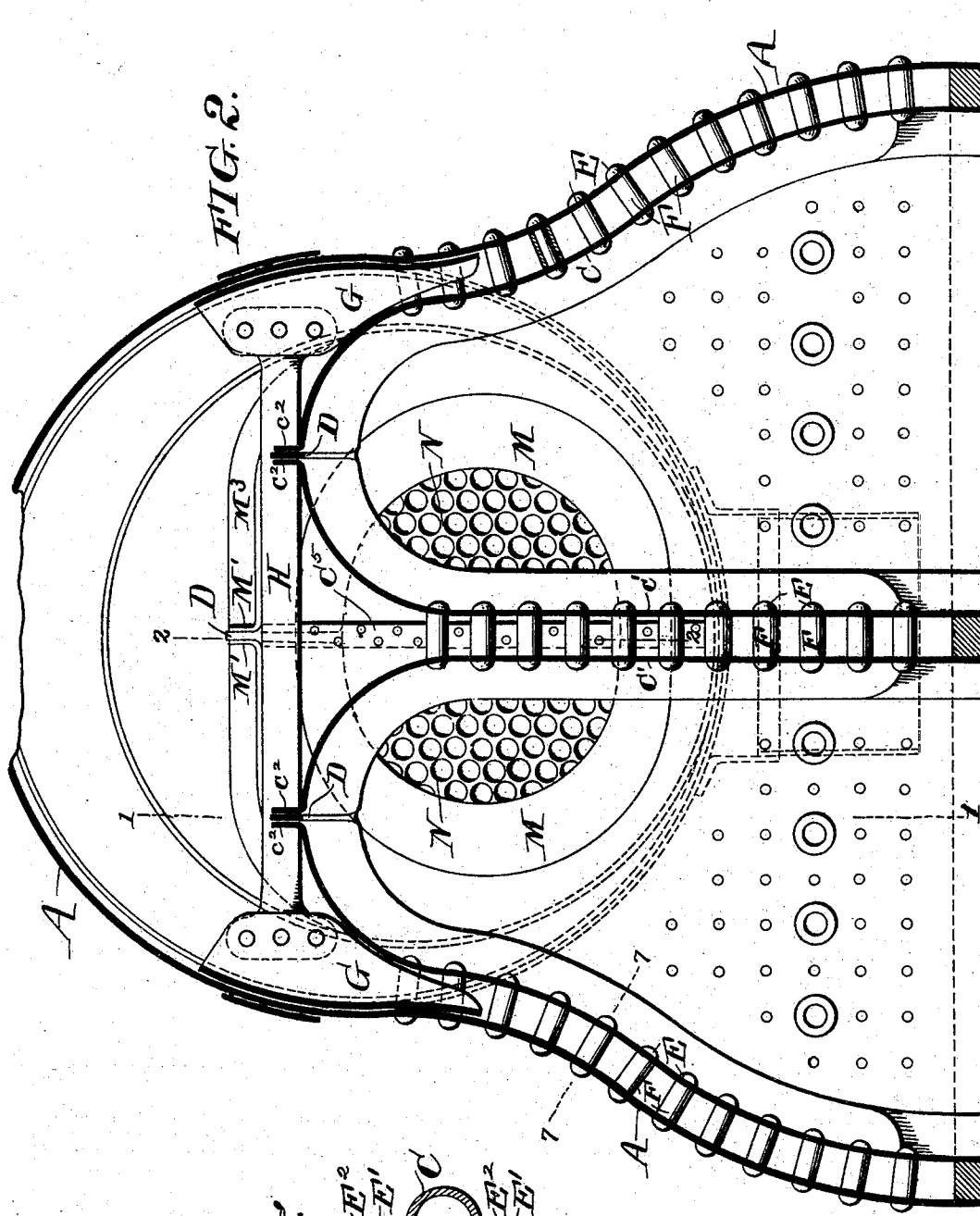


G. S. STRONG.
BOILER.

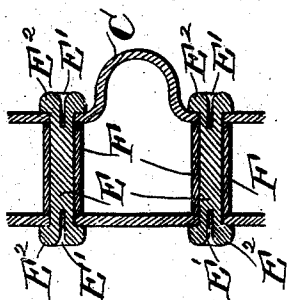
No. 505,543.

Patented Sept. 26, 1893.



WITNESSES:
Henry Dwyer
Stewart

FIG. 7.



INVENTOR:
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by his atty
Francis J. Chambers

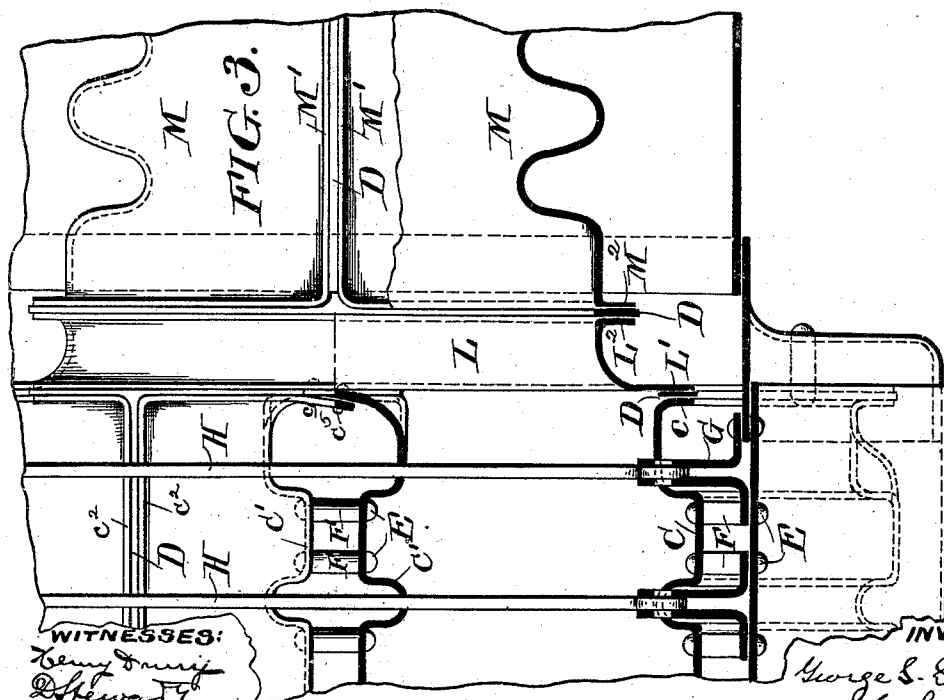
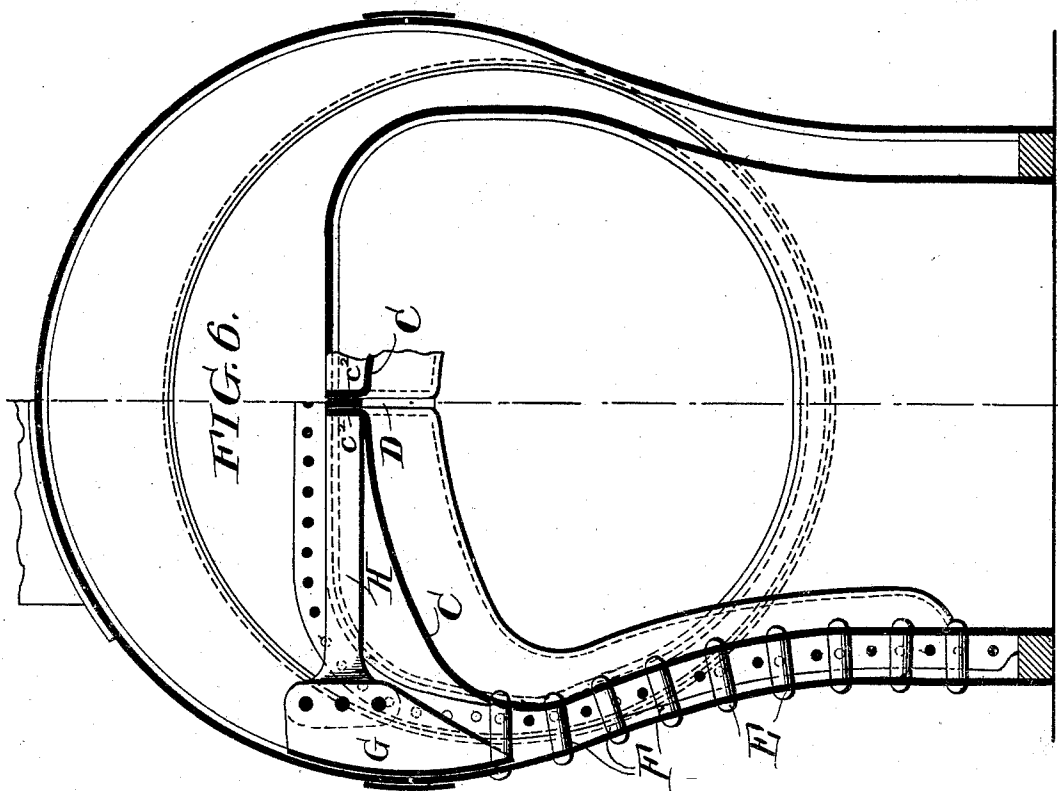
(No Model.)

4 Sheets—Sheet 3.

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BOILER.

No. 505,543.

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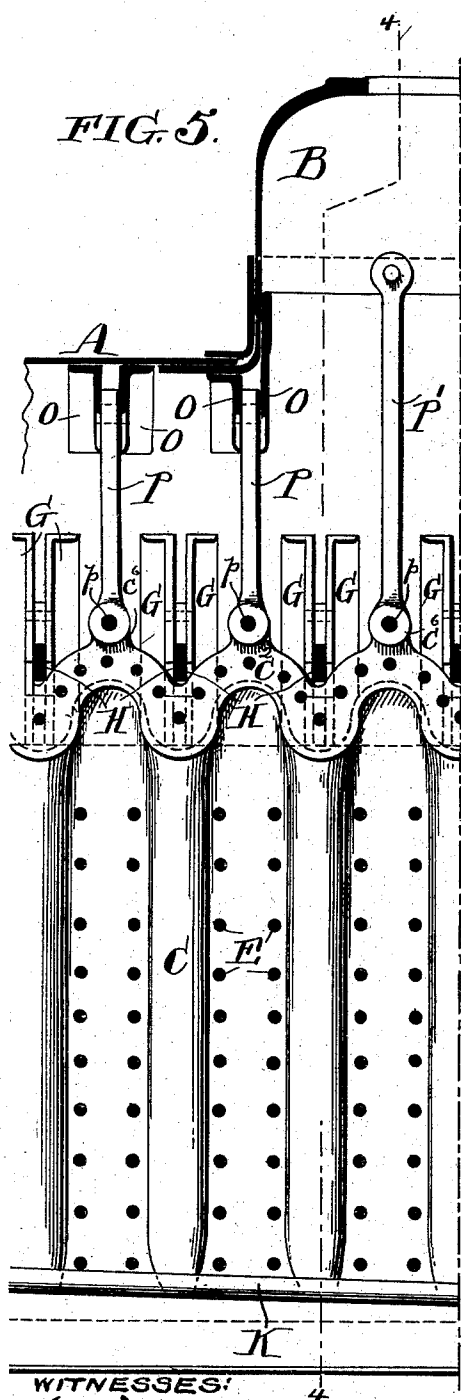
(No Model.)

4 Sheets—Sheet 4.

G. S. STRONG.
BOILER.

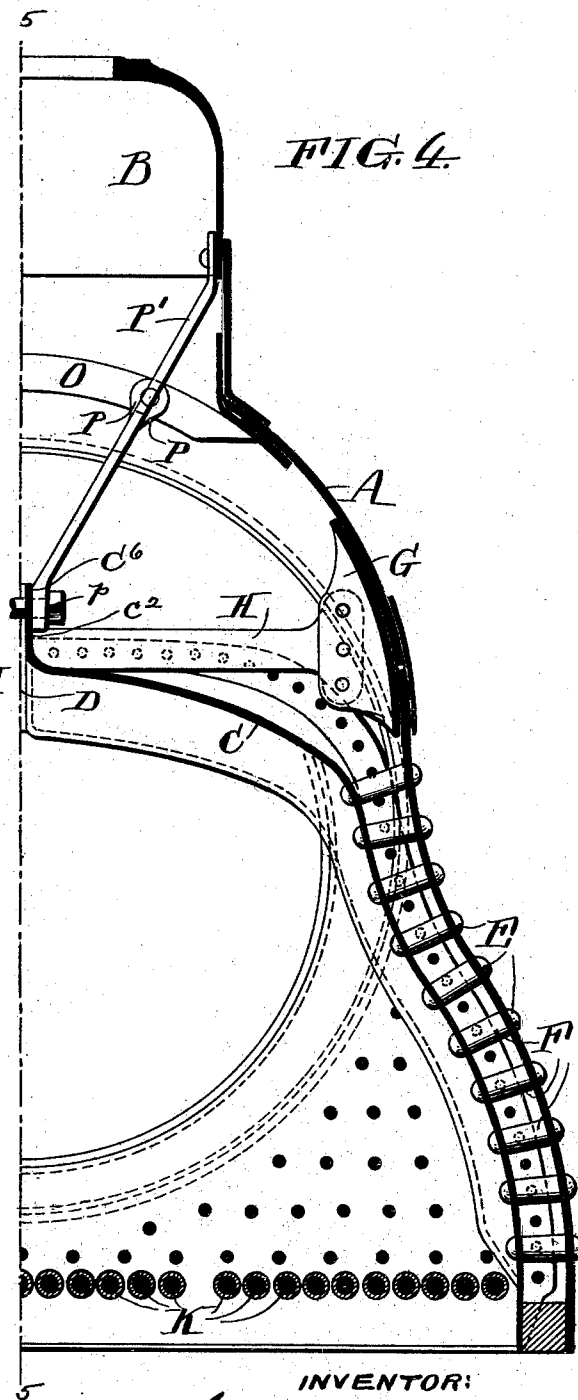
No. 505,543.

Patented Sept. 26, 1893.



WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE S. STRONG, OF NEW YORK, N. Y., ASSIGNOR TO JAMES N. GAMBLE,
OF DAYTONA, FLORIDA.

BOILER.

SPECIFICATION forming part of Letters Patent No. 505,543, dated September 26, 1893.

Application filed September 24, 1892. Serial No. 446,766. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. STRONG, of the city, county, and State of New York, have invented a certain new and useful Improvement in Boilers, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to the construction of boilers, and particularly to the construction of the fire-boxes and their immediate connections; my object being to simplify, cheapen and strengthen the boiler.

My invention relates to the same class of boilers as described and shown in my Patent No. 466,085 and involves many of the features claimed in said patent. By my new construction, however, I am enabled to construct the fire-box of two sheets of metal formed so as to not only diminish the number of seams, but to materially increase the strength of the boiler, and I also improve the construction of the combustion chamber.

Reference is now had to the drawings which illustrate my invention, and in which—

Figure 1 is a side elevation, the part showing the fire-box being taken on the line 1—1 of Fig. 2, and the part showing the combustion chamber being taken on the line 2—2 of Fig. 2; Fig. 2 a cross section on the line 3—3 of Fig. 1; Fig. 3 a horizontal section on the line 6—6 of Fig. 1. Fig. 4 is a cross section on the line 4—4 of Fig. 5, and Fig. 5 a longitudinal section on the line 5—5— of Fig. 4, these two figures illustrating the strengthening device which it is advisable to use with wide fire-boxes. Fig. 6 is a cross-sectional elevation illustrating my invention as applied to narrow fire-boxes, and Fig. 7 is a cross-section on the line 7—7 of Fig. 2.

A indicates the shell of the boiler; B, being the steam dome.

C C' indicate the walls of the fire-box.

In Figs. 1, 2 and 3 I have shown what are called double fire-boxes, the outer walls of each box being indicated by the letter C and the inner walls by the letter C'.

In Figs. 4, 5 and 6 a single fire-box is shown, the walls being indicated by the letters C C'. The walls of my fire-box are corrugated as described in my former patent; but in place

of having a separate crown sheet I continue the walls C or C' in an arched form until they meet forming the abutting edges with flanges C² which together with a metal strip D form Adamson's seams along the tube of the fire-box. The flanges it will be noted are corrugated to correspond with the corrugation of the sheets which by this construction are continued to the seam and do not vanish in the flange.

In the various forms of fire-boxes shown in the drawings I have illustrated practically the extremes of shapes which the corrugated and flanged plates would be required to take to form both the stays and crown of the fire-box and it will be seen that the shape of the plate in all cases is such as would readily permit it to be formed in dies. The sheets forming the side and crown of the fire-boxes are provided with flanges C⁴ where they are riveted to the back wall of the boiler, and with flanges C³ at their front ends. Where the sectional or double construction is employed the front edges of the plates C C' in front of the tube sheet or combustion chamber are lapped and riveted together as indicated at C⁵ in Fig. 3. The sides of the plates C are secured to the shell of the boiler by stays such in general character as are described and shown in my former patent; a section of tubing F abutting against the walls of the sheet and boiler shell and a rivet E passing through the sheet and shell and through the tube, its heads E² being riveted down on the inside of the fire-box sheet and outside of the boiler shell. I form these rivets, however, with central perforations E' extending in from each end (see Fig. 7.) and am enabled by this device to expand that portion of the rivet which passes through the metal sheets by introducing a conical tool into the perforation.

In case of a narrow fire-box such as that illustrated in Fig. 6 the shape of the box and the boiler is such as to effectually resist the pressure tending to collapse the fire-box. Where a wider fire-box is required it can be made sectional or double as illustrated in Figs. 1, 2 and 3, the form of each section being well adapted to resist collapsing strains, and the inner walls C' being united together by

stays F^8 such as are used in uniting the shell to the boiler and the outer walls of the fire box. Where, however, as in the case illustrated in Figs. 4 and 5 the fire box is both broad and flared it is necessary that the crown should receive extraneous support. This of course can be with advantages supplied to the other forms of fire-boxes, but I have illustrated it only in the construction shown in Figs. 4 and 5 where its advantage is most obvious. I provide the necessary support by means of stays P secured at their upper ends to the shell of the boiler and at their lower ends to the seam formed by the abutting edges of the sheets forming the fire-box. Preferably where this mode of support is to be used I form the seams C^2 with extensions C^6 perforated to receive a bolt P^2 , to which the ends of the stays P are attached. The upper ends of the stays P are most conveniently attached to the shell through the intervention of angle irons $O O$ riveted to the shell, and beneath the dome the stays are continued upward as indicated at P , riveted directly to the sides of the dome.

$G G$ are angle irons riveted to the sides of the boiler and used to support stay rods H which extend across from side to side above the fire box; in my new construction these stay rods extend through the lower corrugations of the flanges forming the seam and in this position are at the same time well situated to resist the strains to which they are subjected, and far enough above the corrugated sheets not to interfere with their proper cleaning.

L , Fig. 1, indicates one of several braces uniting the tube and sides of the boiler with its back.

J is the fire door.

$K K$ Figs. 4 and 5 indicate the grate bars or grate tubes and L indicates a throat plate having a flange L' forming a seam with front flange C^8 of the fire-box plates and having another flange L^2 forming a seam with a flange M^2 formed at the rear end of plates M which make up the combustion chamber in the construction shown. This combustion chamber is made of corrugated sheets of metal $M M$ at least two in number and each provided with flanges M' where they abut together and have a flange M^8 at their front edges where they are united to the tube sheet N . Like the fire-box sheets, the flanges running across the corrugations are corrugated so as to permit the corrugations of the different sheets to meet at the seams.

N' are the tubes extending from the tube sheet. The simplicity and strength of the fire box made from the corrugated sheets are of course obvious. I have shown an opening M^4 at the bottom of the fire box and a chamber M^5 extending down from it through a tubular extension A^4 of the boiler shell. The chamber thus formed can be used to hold small particles of fuel, and may if desired,

be provided with a grate so that these fuel particles can be burned in it.

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

1. In a boiler a fire-box having corrugated sheet metal walls and its crown formed by extending its walls in an arch shape and forming them with flanges C^2 where they abut and form a joint, said flanges following the corrugated outline of the sheets, so that the corrugations extend to and along the joint and an unbroken surface is presented in the fire-box.

2. In a boiler a fire-box formed of two corrugated metal sheets, having flanges along their top edges forming a seam at the top of the fire-box crown the flanges following the corrugations of the plates so that the corrugations extend to and along the seam and an unbroken surface is presented in the fire-box substantially as specified.

3. In a boiler the combination of a boiler shell, a fire box having corrugated walls and a crown formed by extending said walls in an arch form until they meet and form a seam as described, and stay links P secured to said seam inside the boiler and to the boiler walls substantially as specified.

4. In a boiler a combustion chamber M formed of metal plates corrugated in the center and having flanged edges M' where they abut together, said flanged edges following the corrugations of the plate whereby an unbroken surface is presented substantially as and for the purpose specified.

5. In a boiler the combination of the fire-box with a throat plate L forming seams with the rear ends of the fire-box plates and having its rear edge flanged and a combustion chamber M formed of plates flanged as described to form an Adamson seam with the rear flange of the throat plate.

6. In a boiler the combination of a fire box formed of two corrugated sheets bent to form the sides and crown of the fire-box and forming a seam along the crown thereof with a combustion chamber M formed of two corrugated sheets flanged at M' and abutted together substantially as specified.

7. In a boiler a corrugated sheet metal fire-box, in combination with the boiler shells and stays $E-F$ uniting the shells and the walls of the fire-box, said stays consisting of tubes F against which the walls of the shell and fire-box rest and rivets E extending through said walls and having their heads E^2 formed with perforations E' substantially as and for the purpose specified.

8. In a boiler the combination with the shell, of a fire box having its crown formed of two corrugated sheets of metal flanged where they meet at the center of the crown, said flanges being corrugated so that the corrugations extend to and along the seam, and stay rods H secured to the shell of the boiler and extending through the lower cor-

rugations at the top of the flanges forming the seam.

9. A boiler stay consisting of a tube F adapted to abut against and engage with the walls or shell which it is desired to stay and a rivet E adapted to extend through the tube F and through suitable holes in the boiler walls, said rivets having perforations E' in the ends of a suitable depth whereby when a

suitable tool is inserted in the perforations 10 E' the rivet will be expanded to fill the holes in the boiler walls and heads E² formed substantially as specified.

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Witnesses:

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FRANCIS T. CHAMBERS.