

(No Model.)

3 Sheets—Sheet 1.

G. ENGEL.
STEAM BOILER.

No. 543,988.

Patented Aug. 6, 1895.

Fig. 1,

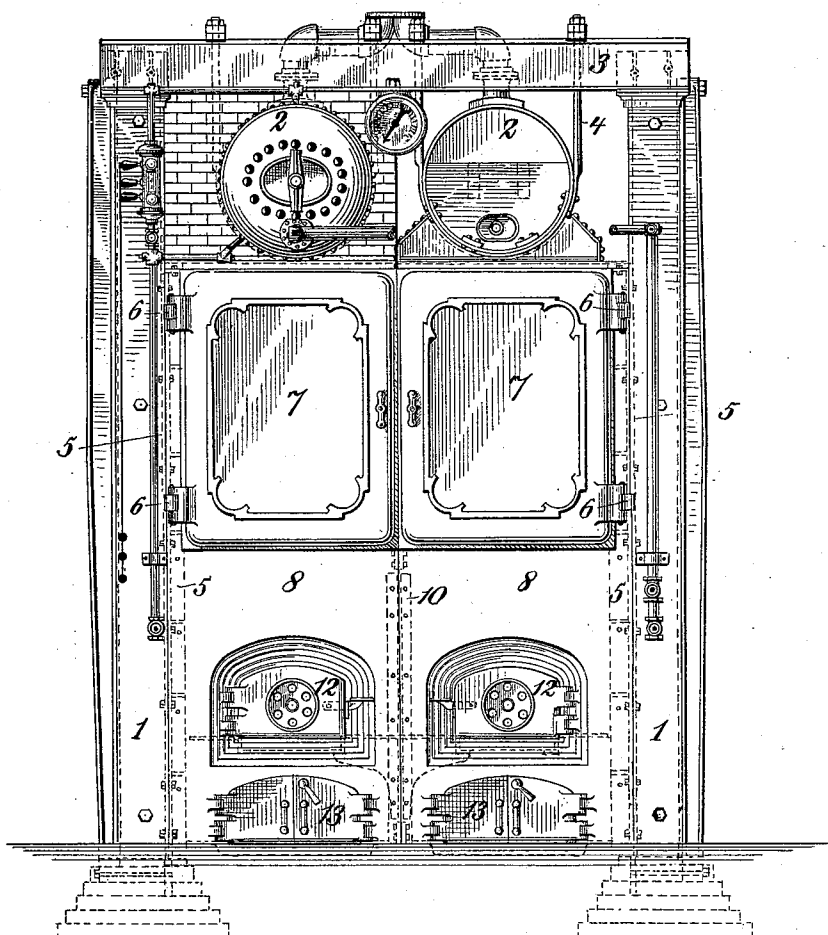
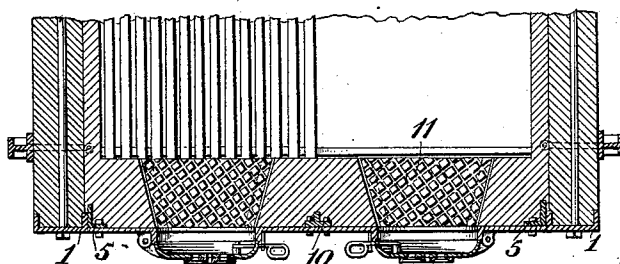


Fig. 3,



Witnesses:-

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Inventor:-

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His Attorneys.

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Fig. 2.

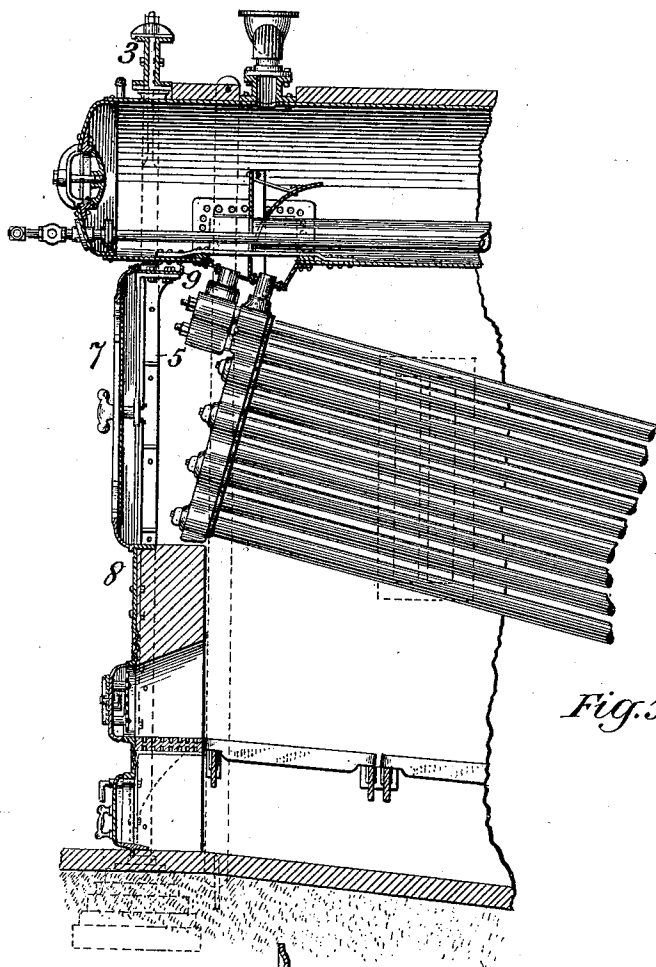


Fig. 4.

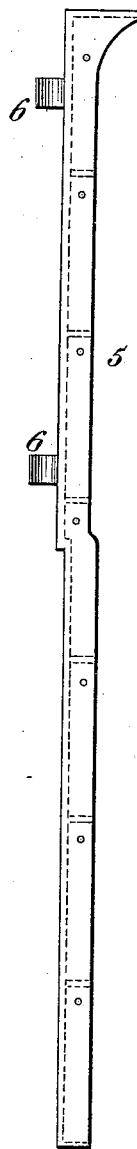


Fig. 5.

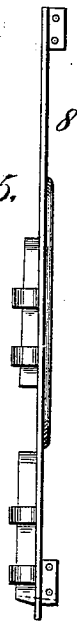
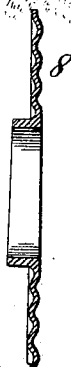


Fig. 6.



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Fig. 7.

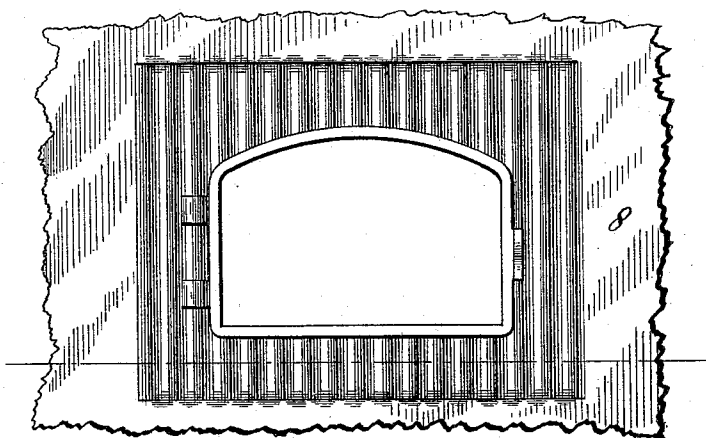
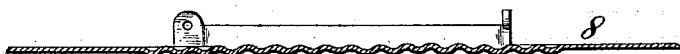


Fig. 8.



Witnesses:

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Geo. W. Craig Jr.

Inventor:

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By S. M. Marble & Sons
His Attorneys.

UNITED STATES PATENT OFFICE.

GODFREY ENGEL, OF SOUTH BALTIMORE, MARYLAND.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 543,988, dated August 6, 1895.

Application filed November 21, 1894. Serial No. 529,508. (No model.)

To all whom it may concern:

Be it known that I, GODFREY ENGEL, a citizen of the United States, residing at South Baltimore, in the county of Anne Arundel and State of Maryland, have invented certain new and useful Improvements in 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 invention relates to improvements in boilers, and consists in the novel construction and arrangement of the columns which support the boiler, in the novel means employed for supporting the front plates and doors of the boiler, in the novel construction of the front plates, and in the novel means employed for tying together the side walls of the boiler.

The objects of my invention are, first, to provide columns for supporting the boiler, which may be constructed of steel or wrought-iron, by rolling or other equally cheap process of manufacture, and which shall be so shaped that they will not project into and interfere with the continuity of the side walls of the boiler; second, to so arrange these columns that they may be protected from heat or gases from the furnace; third, to provide columns so formed that they may become a portion of the boiler-front, thereby reducing the number of parts required in the boiler-front; fourth, to provide means for supporting the front plates and doors from the columns; fifth, to provide means for supporting the front walls of the boiler; sixth, to provide means for tying together the side walls of the boiler; seventh, to provide means for connecting together and supporting from one common column the fronts of two boilers, which are set side by side, and, eighth, to so form the front plates that cracking of the same may be prevented about the furnace-doors. These objects are attained in the invention herein described and illustrated in the drawings, which accompany and form a part of this application, in which the same reference-numerals indicate the same or corresponding parts, and in which—

Figure 1 is a front elevation of a boiler constructed in accordance with my invention. Fig. 2 is a vertical section of the boiler, only

the front end being shown. Fig. 3 is a horizontal section of the boiler through the furnace-doors, only the front end of the boiler being shown. Fig. 4 is a side elevation of one of the angle-plates by which the front plates of the boiler and the front doors, which form the upper portion of the boiler-front, are supported. Fig. 5 is an end view of a front plate. Fig. 6 is a section of a portion of a front plate, taken through a furnace-door and showing the corrugations of the front plate about the furnace-door, by which cracking of the front plate is prevented; and Figs. 7 and 8 are an elevation and a horizontal section, respectively, of a portion of a front plate, showing a modified arrangement of the corrugations about the furnace-door.

The drawings show my invention applied to a boiler of the inclined water-tube type, but my invention is equally applicable to other types of boilers—as, for instance, to the ordinary tubular boiler—and I do not limit myself to the application of my invention to any particular type of boiler.

In the drawings, 1 1 are vertical columns, which constitute the supports for the front ends of the drums 2 2 of the boiler. The columns consist of channel-beams placed vertically with the smooth or flush side outward, the legs of the channels embracing the ends of the side walls of the boiler-setting. The columns are held to the brickwork by anchor-rods embedded in the brickwork and having at their ends anchor-plates similarly embedded. The vertical columns are connected across the top of the boiler by horizontal channel-beams 3 3 and from these horizontal channel-beams the drums 2 2 are suspended by straps 4 4 in the usual manner.

It will be observed that the channel-beams composing the columns 1 1 project inward only a very short distance, and, since only the legs project inward and merely embrace the walls, do not interfere with the continuity of the walls. Heretofore it has been customary to support the front ends of the drums by I-beams embedded in the brickwork, which by interfering with the continuity of the side walls weaken the walls and render them liable to crack and so to permit heat and gases from the furnace to injure the columns. These objections are overcome by forming the front

columns of channel-beams placed in the manner I have indicated. As the columns are connected at the top also and may be connected at other points, they form excellent stays for the side walls, holding the same together and preventing any spreading. They likewise are protected against any possible contact with furnace gases, and so are not likely to deteriorate. Moreover, they form part of the iron front of the boiler, thereby materially reducing the number of parts required in the boiler-front, and also reducing the weight and cost of the same.

To the inner sides of the columns 1 are secured vertical angle-plates 5 5, (shown in detail in Fig. 4,) the upper portions of which are flush with the surface of the columns 1 and are provided with sockets 6 6 to receive the pintles of the large front doors 7 7 which form the upper portion of the boiler-front. Just above the bottom line of these doors the angle-plates 5 5 are recessed or offset the thickness of the front plates 8 8 of the boiler-front, so that these plates are flush with the surfaces of the columns 1.

The tops of the angle-plates 5 5 are connected by a horizontal channel-beam 9, the outer side of which is flush with the outer surfaces of the columns 1 1, and the lower edge of which is slightly below the tops of the doors 7 7, so that these doors close tightly against it. The channel-beam 9 serves to brace the columns 1 1 and also to support the brickwork which surrounds the front ends of the drums 2 2.

Where boilers are set together in groups adjacent boilers can have common side walls between them and common columns for supporting the boilers. In such cases such columns will have angle-plates for supporting the front plates and doors bolted to both sides instead of to only one side, as shown in the drawings.

The front plates 8 8 are secured at the center to a plate 10, (shown in dotted lines in Fig. 1,) which is provided with laterally-projecting shelves which form supports for the dead-plates 11 and for the brickwork between the furnace-doors. At the sides of the boiler are other shelves embedded in the brickwork, which likewise support the dead-plates. To the front plates are hinged the furnace-doors 12 12 and the ash-pit doors 13 13. The portions of the front plate immediately around the furnace-doors are subjected to very considerable changes of temperature when the boiler is in use, and these changes occur suddenly and frequently at the times when the furnace-doors are opened for the purpose of caring for the fire, and are then closed. It has been found that the front plates frequently crack around the furnace-doors for this reason. To avoid cracking I form my front plates so that the metal around the furnace-doors may be free to expand and contract without producing too great internal stresses in the metal. This is done by forming in the plates grooves or corrugations which surround the furnace-

door. An additional advantage of this construction is that no side stresses are brought to bear upon the vertical columns 1 when the front plates expand or contract, as would be the case were the front plates uncorrugated, so that the columns may safely support much greater loads than would otherwise be the case.

Dead-plates are frequently ruined by warping before they have been worn out otherwise. To obviate this difficulty, I have constructed my dead-plate with deep and narrow grooves on both sides, which, while not weakening the plate unduly, permit expansion and contraction on either surface of the plate without danger of warping. Since the dead-plates so constructed do not warp, and only wear out owing to the burning away of the metal, after one surface has been burned out the plate may be inverted and the other surface used, thus practically doubling the life of the plate.

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

1. In a boiler, the combination, with the side walls, and vertical channel columns embracing the ends of said walls, of transverse beams connecting and bracing said channel columns, whereby said columns are enabled to act as stays for said walls, and means for suspending the boiler from said columns, substantially as described.

2. In a boiler, the combination, with the side walls, and vertical channel columns embracing the ends of said walls, of transverse beams connecting and bracing said channel columns, whereby said columns are enabled to act as stays for said walls, means for suspending the boiler from said columns, and front plates and doors for the boiler connected to and supported by said channel columns, substantially as described.

3. In a boiler, the combination, with the side walls, of vertical channel columns secured to said walls, and angle plates secured to said channel columns and supporting the front doors and front plates of said boiler, substantially as described.

4. In a boiler, the combination, with the side walls, of vertical channel columns secured to said walls, angle plates secured to said columns, recessed to receive the front plates of the boiler, and having sockets adapted to receive the pintles of the front doors of the boiler, and a beam connecting the tops of said angle plates and abutting against the upper edges of said doors when the latter are closed, substantially as described.

5. In a boiler, the combination, with the side walls, of vertical channel columns secured to said walls, a transverse beam connecting said columns, means for supporting the boiler drum from said beam, angle plates secured to said columns and supporting the front plates and doors, and a beam connecting the tops of said angle plates and support-

ing the front wall of the boiler, substantially as described.

6. In a boiler, the combination, with vertical columns at the side of the boiler, of front plates secured to and supported by said columns, and having in their surfaces corrugations adapted to permit expansion and contraction in said plates, whereby side stresses upon said columns are avoided, substantially as described.

7. In a boiler, the combination, with two front plates suitably supported at the sides,

and having suitable furnace doors therein, of a plate 10 connecting the adjacent edges of said front plates and having laterally projecting shelves for supporting the dead plates of the boiler, substantially as described.

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

GODFREY ENGEL.

Witnesses:

VICTOR K. McELHENY, Jr.,

ARTHUR KRAUSE.