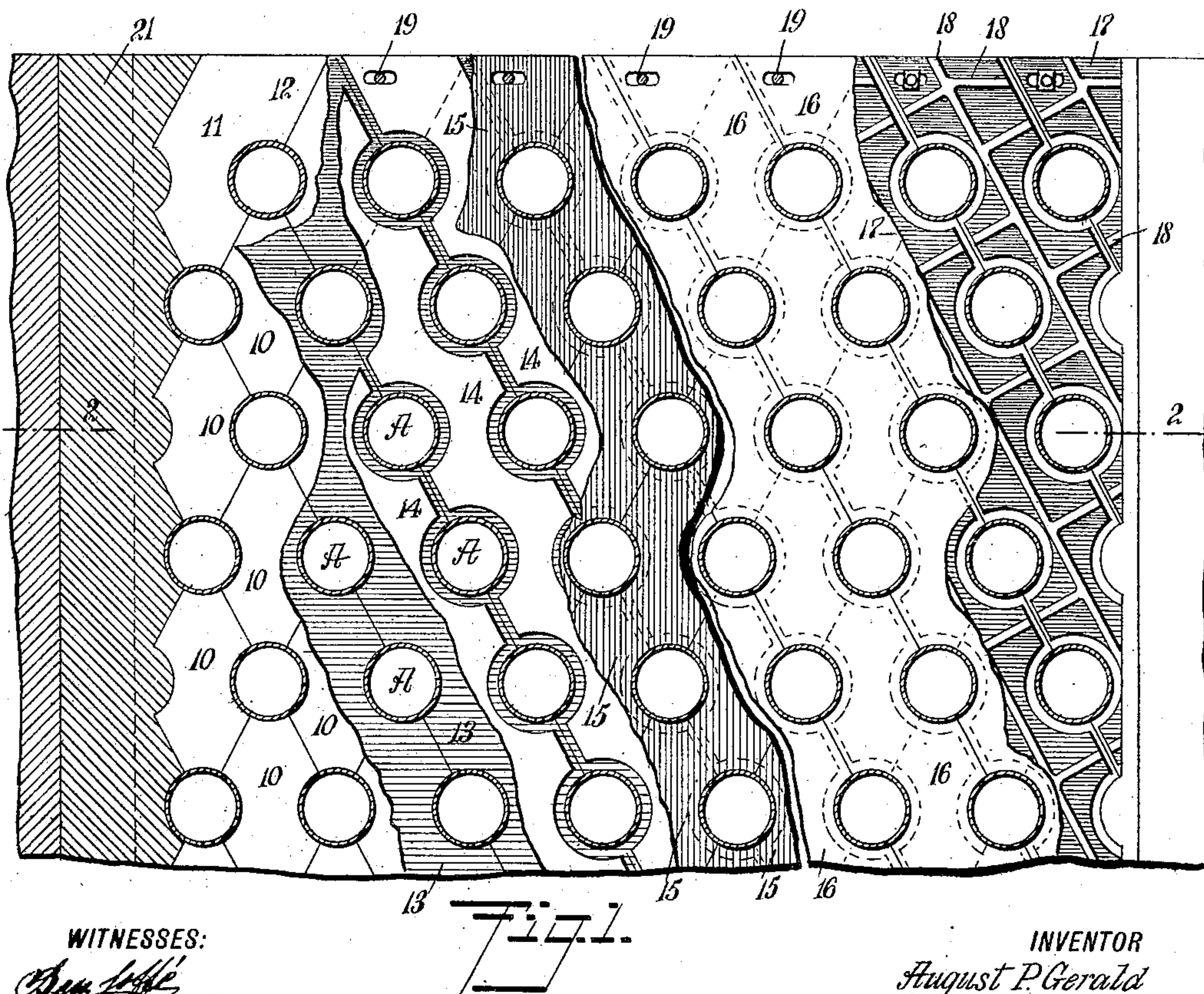
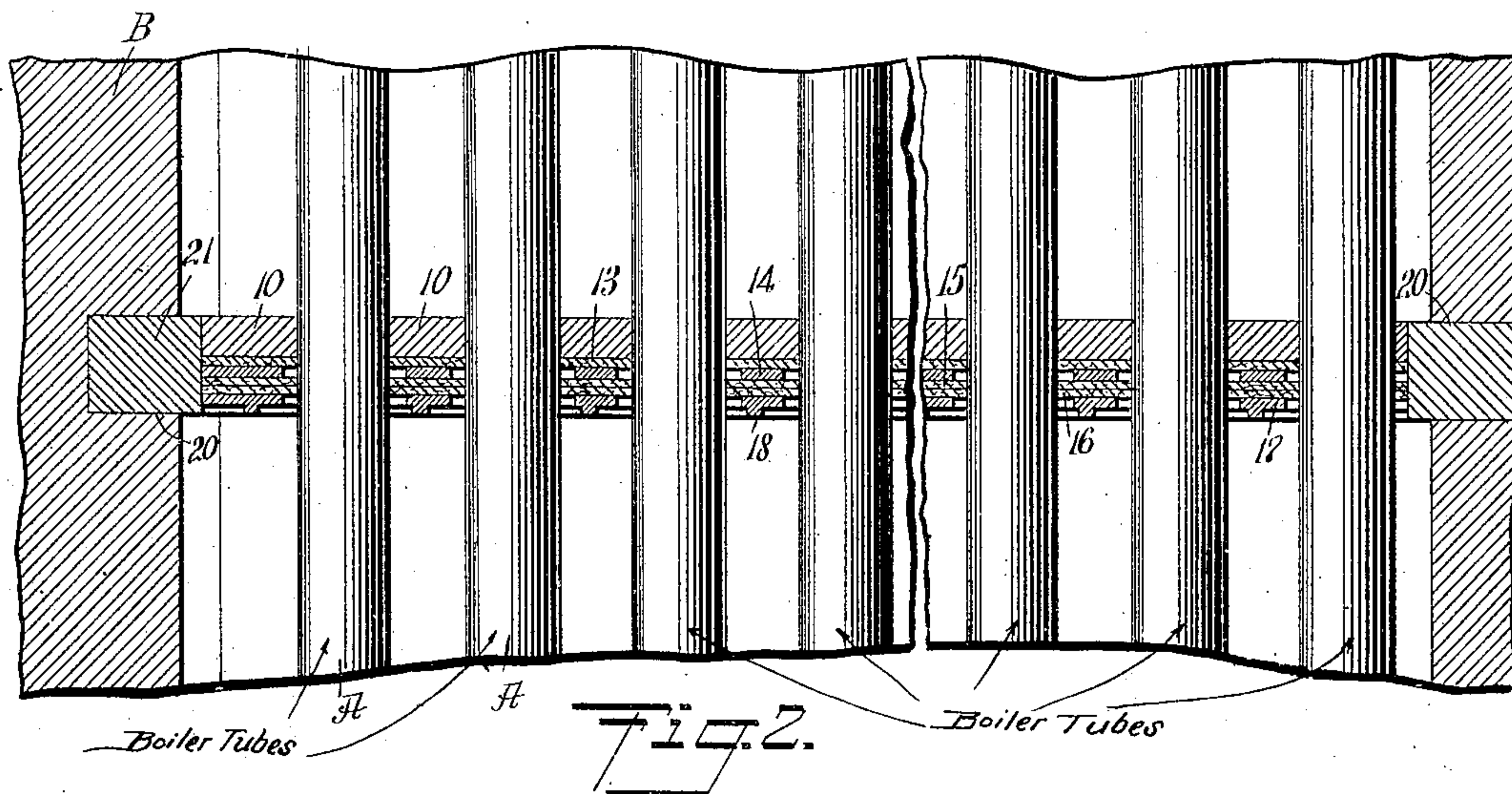


A. P. GERALD.
 FLAME OR BAFFLE BRIDGE FOR WATER TUBE BOILERS.
 APPLICATION FILED DEC. 16, 1909.

975,853.

Patented Nov. 15, 1910.



WITNESSES:

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AUGUST P. GERALD, OF JERSEY CITY, NEW JERSEY.

FLAME OR BAFFLE BRIDGE FOR WATER-TUBE BOILERS.

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Specification of Letters Patent.

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Application filed December 16, 1909. Serial No. 533,334.

To all whom it may concern:

Be it known that I, AUGUST P. GERALD, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and Improved Flame or Baffle Bridge for Water-Tube Boilers, of which the following is a full, clear, and exact description.

In many forms of water tube boilers, it is customary to provide a flame or baffle bridge extending transversely of the tubes in the form of a partition, so that the flame or gases of combustion will be compelled to travel between the tubes in one direction to the edge of the baffle or bridge, and thence back between the tubes upon the opposite side of said baffle or bridge. All of the tubes are thus brought into intimate contact with the gases a plurality of times, so that the latter are heated to the maximum extent. Baffle bridges of this character are commonly formed of specially designed tiles fitting between the pipes and supported in proper alinement by a cast metal backing. The backing often becomes warped and distorted, or becomes burned away, so that the gases may pass directly through the baffle bridge without being compelled to travel around the edge. When this occurs, the pipes are not properly heated by the gases, and a great waste of fuel results.

Among the important features of my invention are to provide more efficient means for supporting the tiles to form a substantially gas-tight joint around each water tube, which will not loosen by expansion and contraction; to readily support the side edges of the baffle bridge, and to provide specially constructed tiles for the upper and lower edges of the baffle bridge.

The invention consists in the arrangement and combination of parts pointed out in the claims, and one embodiment of which is hereinafter described in detail.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures, and in which—

Figure 1 is a transverse section through a portion of a boiler showing my improved baffle bridge, portions of said baffle bridge being broken away to show the several layers of which it is formed, and Fig. 2 is a substantially horizontal section on the line 2—2 of Fig. 1.

In my improved baffle bridge, I employ the ordinary form of tiles or fire-brick 10, which are arranged between the tubes A of the boiler, so as to support these tubes and space them apart. These fire-brick or tiles may vary in form, dependent upon the character of the boiler and the size and arrangement of the water tubes. The tiles shown are substantially diamond-shaped in vertical section, and each of the four angles or edges of each tile are cut away, so that the tile may fit in between four adjacent water tubes. When all of the tiles are in position, the edges of each tile will engage with the edges of four adjacent tubes and form a comparatively tight partition. Along the upper and lower edges of the baffle, I provide specially designed tiles or fire-brick 11, each of which has three of its edges corresponding to the three edges of the tile 10, but which has a triangular extension 12. When the upper and the lower courses of the tiles are formed of the tiles 11, the triangular extensions 12 present a substantially straight upper edge. If the upper course were formed of the tiles 10, it is evident that the upper edge of the series of tiles would be rectangular or zigzag, by reason of the substantially diamond formation of said tiles 10.

In engagement with one surface of the series of tiles, I provide a layer of fire-proof plates 13, preferably formed of asbestos. Each plate extends diagonally between two rows or tiers of water tubes, and at its edges it is provided with a series of semi-circular recesses or notches cut to receive and closely fit the sides of the water tubes. As each fire-proof plate, except those at the edges, extends the entire distance from the lower edge to the upper edge of the baffle, it is evident that the plates cover all of the meeting edges between the tiles which extend at an angle to the direction of the plates. These fire-proof plates being of asbestos, may be extended through between the tubes and then rotated to bring them into proper position, so as to closely fit the tubes. The asbestos being somewhat resilient, will permit of an expansion and contraction of the tubes of the boiler, but will continue to maintain a close engagement with the tube. Upon the layer of asbestos plates 13, I place a series of metal plates 14. These plates are of the same general form as the asbestos plates, but the recesses in the sides are somewhat larger, so that the metal plates do not

5 closely engage with the walls of the water tubes. This permits the free expansion and contraction of the tubes without any liability of injury to the latter, and also permits the metal plates to be more readily placed in position.

10 Upon the surface of the metal plates 14, I provide a series of asbestos plates 15, similar to the asbestos plates 13, but preferably extending at the opposite angle, that is, in Fig. 1, it will be noted that the asbestos plates extend upwardly and toward the left-hand edge, whereas the plates 15 extend upwardly and toward the right-hand edge, so that the plates 15 cover all of the joints between the plates 14. Upon the surface of the plates 15, I provide a series of plates 16, corresponding in all particulars to the plates 13 and breaking joints with the plates 15. 20 Upon the side of the baffle opposite to the tiles 10, I provide a series of plates 17, similar to the metal plates 14 except that their outer surfaces are provided with reinforcing ridges or flanges 18 extending longitudinally and transversely thereof. These plates 25 17 are spaced from the water tubes, so that the latter may freely expand and contract under temperature changes. The two series of plates 15 and 16 of heat-resisting material are held between the two series of metal plates 14 and 17. For holding all of the plates together, I provide a series of openings or apertures 19 through all of the plates adjacent their upper and lower edges, 35 and through which any suitable form of bolts or other securing members, as shown, may be secured. The metal plates give the necessary rigidity to the structure and hold the asbestos plates in position. The asbestos plates fit around the water tubes, so as to effectively prevent the passage of gases or flame along the exterior of the tube from one side of the partition or baffle to the other. 40 The flame and gases play directly upon the tiles 10, and these tiles are spaced from the metal plates 14 by the asbestos 13, so that the plates 14 cannot become unevenly or excessively heated to warp or distort the same. The different series of plates being arranged at different angles, all of the joints between the plates of one series, are covered by the plates of another series, so that there are no direct passages through the baffle. The outer metal plates 17 are on the rear or back 55 of the baffle, and thus are not so directly affected by the flame. The ridges or reinforcing flanges serve to prevent the distorting or warping of the plates, even should said plates become unevenly or excessively heated. 60

65 At the edges of the baffle, I provide the side walls B of the boiler with grooves or channels 20 of a width substantially equal to the thickness of said baffle. After the baffle has been placed in position, I insert a

form or temporary wall against each surface of the baffle adjacent the side wall B, and fill the groove or channel 20 with a self-hardening bonding material 21. This material may be formed of any suitable fire-proof cement or cementitious body, but preferably includes cinders and Portland cement as ingredients. This bonding material not only fills the groove or channel but extends out from the side of the boiler, so as to fill the substantially triangular spaces left between the side tier of tiles 10. The bonding material thus not only secures the baffle in place and holds it against lateral movement, but also seals the side edges of the baffle and prevents any flame or gases from escaping without traveling through the desired passage. It is, of course, evident that the upper or lower edge of the baffle may be sealed and secured in the same manner as the side edges. 70 75 80 85

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. The combination with the water tubes of a water-tube boiler, of a flame bridge made up of a plurality of layers, one of said layers including tiles disposed between the tubes, another of said layers including a series of strips of heat-resisting material, and another of said layers comprising a plurality of metal plates. 90 95

2. The combination with the water tubes of a water-tube boiler, of a flame bridge made up of a plurality of superimposed layers, one of said layers including a series of strips of heat-resisting material extending between the tubes in one direction, and another of said layers comprising a series of strips of heat-resisting material extending between said tubes at an angle to the first-mentioned strips and in a plane parallel thereto. 100 105

3. The combination with the water tubes of a water-tube boiler, of a flame bridge made up of a plurality of superimposed layers, one of said layers including a series of strips of heat-resisting material extending between the tubes in one direction, and another of said layers comprising a series of strips of heat-resisting material extending between said tubes at an angle to the first-mentioned strips and in a plane parallel thereto, and a series of metal plates in engagement with one of said layers of strips. 110 115 120

4. The combination with the water tubes of a water-tube boiler, of a flame bridge made up of a plurality of superimposed layers, one of said layers including a series of strips of heat-resisting material extending between the tubes in one direction and another of said layers comprising a series of strips of heat-resisting material extending between said tubes at an angle to the first-mentioned strips and in a plane parallel 125 130

thereto, and a series of tiles in engagement with one of said layers of strips.

5 5. The combination with the water tubes of a water-tube boiler, of a flame bridge made up of a plurality of superimposed layers, one of said layers including a series of strips of heat-resisting material extending between the tubes in one direction and another of said layers comprising a series of
10 strips of heat-resisting material extending between said tubes at an angle to the first-mentioned strips and in a plane parallel thereto, a series of metal plates in engagement with one of said layers of strips, and
15 a series of tiles in engagement with one of said layers of strips.

6. The combination with the water tubes of a water-tube boiler, of a flame bridge made up of a plurality of superimposed
20 layers, one of said layers including a series of strips of heat-resisting material extending between the tubes in one direction and another of said layers comprising a series of strips of heat-resisting material extending between said tubes at an angle to the
25 first-mentioned strips and in a plane parallel thereto, and a series of metal plates in engagement with one of said series of strips, said metal plates being spaced from said
30 tubes and said strips of heat-resisting material being in close engagement with said tubes.

7. The combination with the water tubes of a water-tube boiler, of a flame bridge
35 comprising a plurality of strips of asbestos extending in the same plane and between said tubes and in engagement therewith, and two series of metal plates upon opposite sides of said strips of asbestos and secured together and spaced from said tubes.
40

8. The combination with the water tubes of a water-tube boiler, of a flame bridge

comprising a plurality of strips of asbestos extending in the same plane and between said tubes and in engagement therewith, two
45 series of metal plates upon opposite sides of said strips of asbestos and secured together and spaced from said tubes, and a series of tiles upon the side of the bridge toward the flame.
50

9. The combination with the tubes of a water tube boiler, of a flame bridge formed of a series of tiles disposed between the tubes and constituting a wall at an angle to the direction of the tubes, a layer of heat-resist-
55 ing material in the form of strips adjacent one surface of the tiles and a series of metal plates adjacent the outer surface of said heat-resisting material.

10. The combination with the tubes of a
60 water tube boiler, of a flame bridge made up of a plurality of layers, one of said layers including tiles, another of said layers comprising a plurality of metal plates arranged substantially in the same plane, and another
65 of said layers including heat-resisting material between said plates and said tiles and closely fitting the tubes.

11. The combination with the tubes of a water tube boiler, of a flame bridge compris-
70 ing a plurality of layers, one of said layers comprising metal plates, another of said layers comprising heat-resisting material closely fitting the tubes, and another of said layers comprising a series of tiles arranged
75 between the tubes and in substantially the same plane.

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

AUGUST P. GERALD.

Witnesses:

CLAIR W. FAIRBANK,
PHILIP D. ROLLHAUS.