Dec. 4, 1934. E. G. BAILEY 1,982,623

FURNACE WALL

Original Filed June 9, 1927

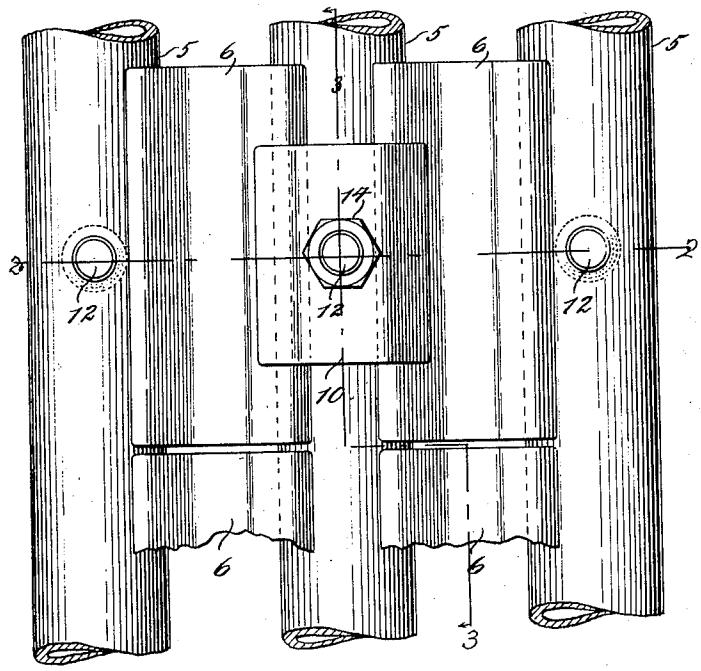


Fig. 1.

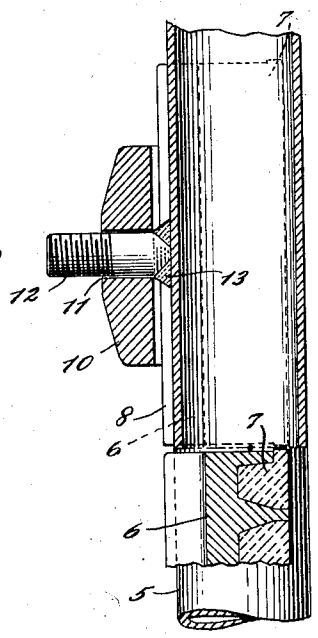


Fig. 3.

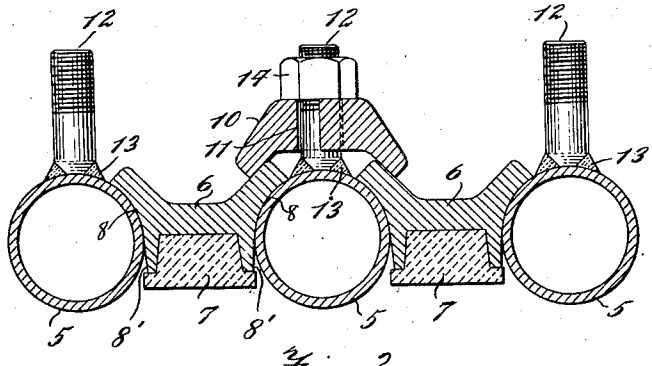


Fig. 2.

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By his Attorneys

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UNITED STATES PATENT OFFICE

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FURNACE WALL

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16 Claims. (Cl. 122—6)

This invention relates to furnace walls that comprise water tubes in contact with which, tile are assembled. The invention is particularly useful in connection with furnaces for boilers in the walls of which furnaces, water tubes are located that are connected to the circulation of the boiler for the purpose of keeping the walls cool. It is to be understood, however, that the invention is not restricted to this particular use. By the present invention, the tile can be securely held in contact with the tubes in such a manner that they can be readily removed and replaced without disturbing other tile.

The invention will be understood from the description in connection with the accompanying drawing, in which Fig. 1 is a side view of a wall illustrating the invention, Fig. 2 is a section along the line 2—2 of Fig. 1, and Fig. 3 is a section along the line 3—3 of Fig. 1. In the drawing, reference character 5 indicates the tubes that may be arranged in a row along a furnace wall, through which tubes cooling fluid may be circulated for keeping the wall cooled. Each tile 6 is made up of a back metal portion upon the front or furnace side of which refractory material 7 is applied. These tile have extending edge portions or wings that are rounded, as indicated at 8, to fit against the tubes 5 along extended surfaces in order to provide good heat conductivity between the tile and tubes. If desired, heat conducting cement may be interposed between the tile and tubes to increase the rate of heat transmission between the two. The tile are so shaped that they may be put in place from the outside to cause their rounded surfaces to contact with the corresponding surfaces of the tubes. For this reason, the opposite sides of the tile are made slightly converging, as indicated at 8'.

The tile 6 are kept in firm engagement with the tubes by means of clamps and bolts. The clamps 10 are made slightly wider than the spaces between adjacent tile when they are installed on the tubes, and have sloping outer edges to bear against the outer surfaces of the wing portions 8 of the tile. The clamps are provided with holes 11, through which screw threaded stud bolts 12 extend. The ends of the stud bolts 12 are welded to the tubes 5, as indicated at 13. The bolts 12 are welded to the tubes preferably so as to extend at right angles to the plane of the row of tubes. Nuts 14 on the bolts serve for pressing the clamps 10 in firm engagement with the wings 8 of the blocks 6. The tile 6 are put in place between the tubes with their wing portions 8 bearing against the tubes and the clamps 10 are slipped over the bolts 12 and the nuts 14 are tightened, thereby keeping the tile in place. When it is desired to remove a tile, it is only ncessary to loosen the corresponding clamps and the tile can be easily taken out, as the wedge shaped or converging edges thereof avoid the danger of the tile becoming stuck in place. It will also be obvious that the tile 6 serve to some extent as spacing members between the tubes to keep the same at fixed distances apart. Also, in view of the fact that the contacting surfaces between the clamps 10 and the tile 6 are approximately parallel to the corresponding tube surfaces, slight movements between the clamps and tile can take place due to expansion and contraction without loosening the tile.

I claim:

1. A furnace wall comprising tubes, wedge-shaped tile extending between said tubes with the wedges pointing toward the furnace side, diverging flanges along the outer edges of said tile, and clamps for said tile, said clamps being attached to said tubes and having portions diverging at approximately the same angle as said flanges and overlapping said flanges.

2. A wall comprising tubes, tile for said tubes having edges diverging at an acute angle to said wall and contacting with said tubes only outside of the plane passing through the center lines of said tubes, and clamps for said tile having correspondingly diverging edges, the edges of said tile being between said tubes and the edges of said clamps on the clamp side of the center line of said wall.

3. A furnace wall comprising tubes, tile having portions extending between said tubes, said portions being spaced from said tubes on the inner side of the plane of the center lines of said tubes, diverging flanges along edges of said tile contacting with said tubes, and clamps for said tile, said clamps being attached to said tubes and having portions diverging at approximately the same angle as said flanges overlapping said flanges.

4. In a fluid cooled furnace wall, a row of spaced tubes, furnace wall elements positioned between the tubes and each having parts diverging toward positions exteriorly of the furnace, and U-shaped clamping devices each acting upon two of said elements on opposite sides of a tube to tend to pull said elements toward each other and prevent wedging apart of adjacent tubes in the direction of the wall.

5. In a furnace constituting a part of fluid heat exchange apparatus, a row of spaced wall cooling

tubes, heat conducting wall blocks extending into the spaces between the tubes and being in heat exchange relation thereto, clamping devices acting on the tubes for pressing the blocks into heat exchange relationship thereto, and inter-engaging portions on the blocks and the clamping devices for preventing the tubes from being wedged apart transversely of the wall when the wall is being assembled, there being a separate row of clamping devices for each tube with each clamping device bridging two adjacent blocks across a tube.

6. In a fluid cooled furnace wall, a row of spaced tubes, heat conducting wall blocks substantially closing the spaces between the tubes and having oblique portions contacting with the tubes, clamping devices having oblique portions corresponding in their angularity to that of the oblique portions of the blocks and reacting thereagainst to take up block and tube expansion by relative movement of the oblique portions of the blocks and said devices.

7. In a furnace wall, a row of spaced wall cooling tubes, wall blocks extending into the spaces between the tubes and being in heat exchange relationship with the tubes, clamping devices for securing the blocks in position, and interengaging portions on the blocks and the clamping devices having surfaces extending obliquely relative to a plane passing through the longitudinal axes of a plurality of the tubes, the blocks and clamping devices having relative movement in such oblique direction to prevent the wedging apart of the tubes during the assembly of the furnace.

8. In a furnace constituting a part of fluid heat exchange apparatus, a row of spaced wall cooling tubes, heat conducting wall blocks extending into the spaces between the tubes and being in heat exchange relation thereto, clamping devices acting on the tubes for pressing the blocks into heat exchange relationship thereto, and interengaging portions on the blocks and the clamping devices for preventing the tubes from being wedged apart transversely of the wall when the wall is being assembled, each clamping device including a part embracing the interengaging portions of two adjacent wall blocks.

9. In a furnace constituting a part of fluid heat exchange apparatus, a row of spaced wall cooling tubes, heat conducting wall blocks extending into the spaces between the tubes and being in heat exchange relation thereto, clamping devices acting on the tubes for pressing the blocks into heat exchange relationship thereto, and obliquely positioned interengaging portions on the blocks and the clamping devices for preventing the tubes from being wedged apart transversely of the wall when the wall is being assembled, there being a separate row of clamping devices for each tube with each clamping device bridging two adjacent blocks across a tube, two of said obliquely positioned portions on each clamping device forming with the remainder of the device a V-shaped structure embracing the interengaging portions of blocks on opposite sides of a tube.

10. In fluid heat exchange apparatus, a furnace having a row of fluid conducting tubes extending in the direction of a wall thereof, wedge-shaped wall blocks secured to the tubes and each having flanges diverging toward a position exteriorly of the furnace wall and contacting with the tubes, and means for pressing the flanges against the tubes radially thereof.

11. In a fluid cooled furnace wall, a row of spaced tubes, heat conducting wall blocks substantially closing the spaces between the tubes and having oblique portions contacting with the tubes, clamping devices having extensions reacting normally against said oblique portions to take up block and tube expansion by relative movement of the oblique portions of the blocks and said extensions, the clamping devices acting constantly to bind the blocks against the tubes.

12. In a furnace, spaced tubes along a wall thereof, wall elements between adjacent tubes, clamping devices anchored to the tubes and bridging adjacent wall elements across a tube, and coacting projecting portions on the clamping devices and wall elements whereby the clamping devices act as tension members holding the tubes against any substantial wedging apart.

13. In a furnace wall constituting a part of fluid heat exchange apparatus, a row of spaced wall cooling tubes, heat conducting wall blocks extending into the spaces between the tubes and being in heat exchange relation thereto, clamping devices on the tubes for pressing the blocks into heat exchange relationship thereto, and interengaging portions on the blocks and the clamping devices for causing the tubes to be maintained in substantially constant spacing or preventing the tubes from being wedged apart transversely of the wall.

14. In a furnace wall, spaced tubes, closure members fitting each tube over a portion of its circumference and bodily insertible in the spaces between the tubes from positions exteriorly of the furnace, and clamping devices for pressing each closure member against the tubes, the clamping devices including means for preventing the widening of the spaces between the tubes.

15. In a furnace wall, spaced tubes, closure members fitting each tube over a portion of its circumference and bodily insertible in the spaces between the tubes from positions exteriorly of the furnace, and clamping devices for pressing each closure member against the tubes, the clamping devices including means for exerting a force in the plane of the wall between the closure members and the tubes to prevent spreading of the tubes.

16. In a furnace wall, spaced tubes, closure members fitting each tube over a portion of its circumference and bodily insertible in the spaces between the tubes from positions exteriorly of the furnace, and clamping devices for pressing each closure member against the tubes, the clamping devices including means for exerting a force in a plane passing through the tubes to prevent the widening of the spaces between the tubes.

ERVIN G. BAILEY.