April 7, 1931. T. E. MURRAY ET AL 1,799,633

BOILER WALL

Filed Dec. 1, 1925

Fig. 1.

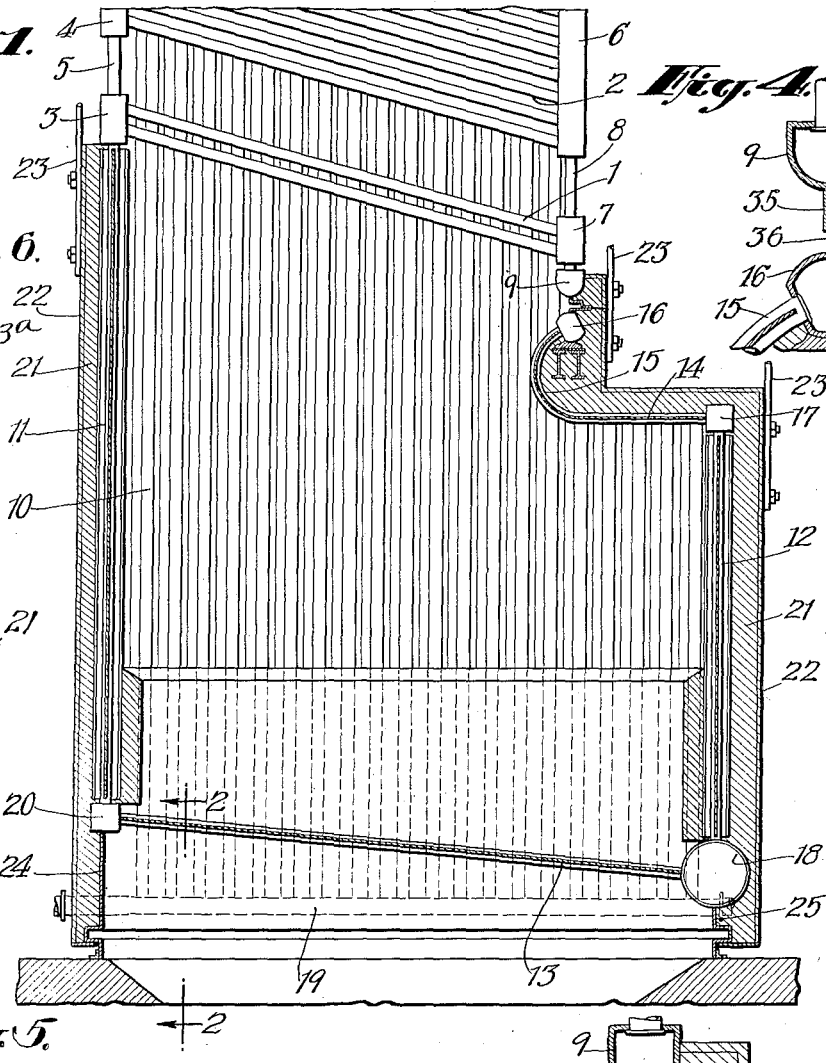


Fig. 4.

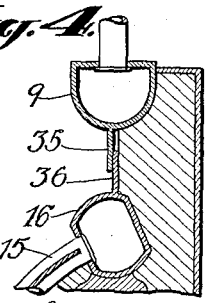


Fig. 6.

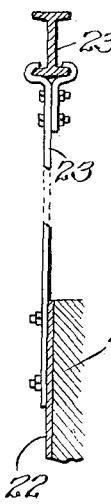


Fig. 5.

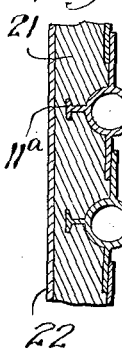


Fig. 2.

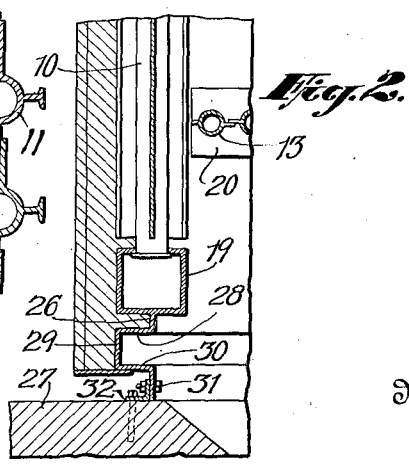
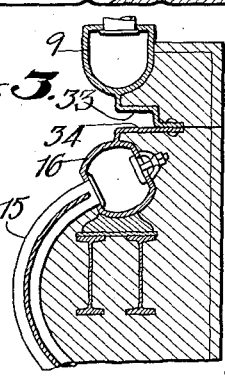


Fig. 3.



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UNITED STATES PATENT OFFICE

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BOILER WALL

Application filed December 1, 1925. Serial No. 72,456.

In a previous application of Thomas E. Murray, No. 61,387 filed October 9, 1925, there is illustrated a boiler with a set of upper tubes of a common type and with a set of water tubes lining the combustion chamber of the furnace and serving to utilize the radiant heat of the burning fuel to greatly increase the efficiency of the boiler. And in various other Murray applications there have been described boilers of the same general class. In such boilers there is a very considerable expansion under the high temperatures for which they are designed.

The present invention is directed to the providing of expansion joints at various points where they may be required in boilers of this and other types. The accompanying drawings illustrate embodiments of the invention.

Fig. 1 is a longitudinal section (with the tubing in elevation) cut away at the top, illustrating a boiler like that of application No. 61,387 referred to above.

Fig. 2 is a cross section on the line 2—2 of Fig. 1;

Fig. 3 is an enlargement of a joint between two headers of Fig. 1;

Fig. 4 is a similar view of a modification.

Fig. 5 is a horizontal section of a wall.

Fig. 6 is an elevation of an upper end of a support.

Referring to the drawing, there are carried above the combustion chamber approximately horizontal tubes of the ordinary style in two banks, 1 and 2, slightly inclined downward at their forward ends. Headers 3 and 4 at their higher ends are connected to each other by pipes 5 and lead the steam upward to any usual or suitable steam drum over head; whence the water passes downward by vertical headers 6 and 7 and pipes 8 to the lower ends of the horizontal tubes. The vertical headers 7 communicate at their lower ends with a cross header or mud drum 9.

In addition to the tubular system described above the furnace, the several walls of the furnace comprise vertical tubes 10 at the opposite sides, tubes 11 along the rear end wall, tubes 12 along the front end wall and tubes 13 along the bottom wall, the latter being horizontal or slightly inclined to facilitate circulation. The front wall has its lower portion offset and connected by an arch or roof with the upper portion, the arch comprising or being lined with horizontal tubes 14 extending upward at their inner ends and communicating with an upper cross header 16. Headers 17 and 18 are provided for the tubes 12. The tubes 10 of the side walls have a header 19 at their lower ends; and the tubes 11 of the rear wall have a similar bottom header 20. The several headers are connected by appropriate piping from their ends with a steam drum over head to provide a circulating system as described in detail in the aforesaid application No. 61,387.

The tubes are illustrated as provided with fins and flanges, of the type illustrated in the aforesaid application; but the present improvements are applicable to tubes of various styles and arrangements other than those shown. In the case illustrated the tubes have outside flanges 11^a (Fig. 5) imbedded in a layer or coating of refractory material 21 on the outside of which is a plate 22. The upper system of tubes may be enclosed and supported in any usual or suitable way. The lower walls are supported from above as, for example, by means of hangers 23 bolted to the upper portions of said walls and suspended from overhead beams 23^a, Fig. 6.

According to the present invention, expansion joints are provided at various points to permit expansion, particularly of the lower parts of the structure, under the intense heat to which the tubular walls are subjected, and to prevent the passage of air between the different parts.

As shown in Figs. 1 and 2 plates 24, 25 and 26 are provided, preferably welded to the under sides of the headers and extending down to the floor 27 through one or more bends adapted to be easily flexed as the walls expand and contract. The plate is shown bent outward at 28 then vertically at 29 to the bottom of the wall, thence inward at 30 and finally downward at 31 to connect with an angle 32 bolted to the floor. A similar joint is provided between the adjacent headers 9 and 16 comprising plates welded to the respective headers and provided with out-

wardly extending portions 33 and 34 which are riveted to each other at their outer edges. Similarly the joints at the bottom (Figs. 1 and 2) may be made of a plurality of plates instead of a single plate.

Various other styles of expansion joint may be used at all or any of the desired points. Fig. 4 illustrates an alternative type of joint in which the headers 9 and 16 are provided with welded fins 35 and 36 overlapping and arranged to slide on each other to accommodate the relative movement of the two headers.

The complete wall structure, comprising the water tubes and the refractory material, expands upward or downward. That is to say, the tubes and the refractory material in any wall expand together. And the joints illustrated take up this expansion for the complete wall section.

Various modifications may be made by those skilled in the art without departing from the invention as defined in the following claims.

What we claim is:

1. A boiler having an upper set of tubes with a header on their lower ends and a lower set of tubes with a header on their upper ends adjacent to the header of the upper tubes, said headers being parallel to each other, and an expansible member connected to said headers and extending across the space between them and adapted to permit relative movement of said headers toward and away from each other.

2. An expansion joint for a boiler having two headers adjacent to and spaced apart from each other, said joint comprising plates parallel with said headers, connected to each other along one edge and spaced apart and connected at their other edges to the respective headers.

In witness whereof, we have hereunto signed our names.

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