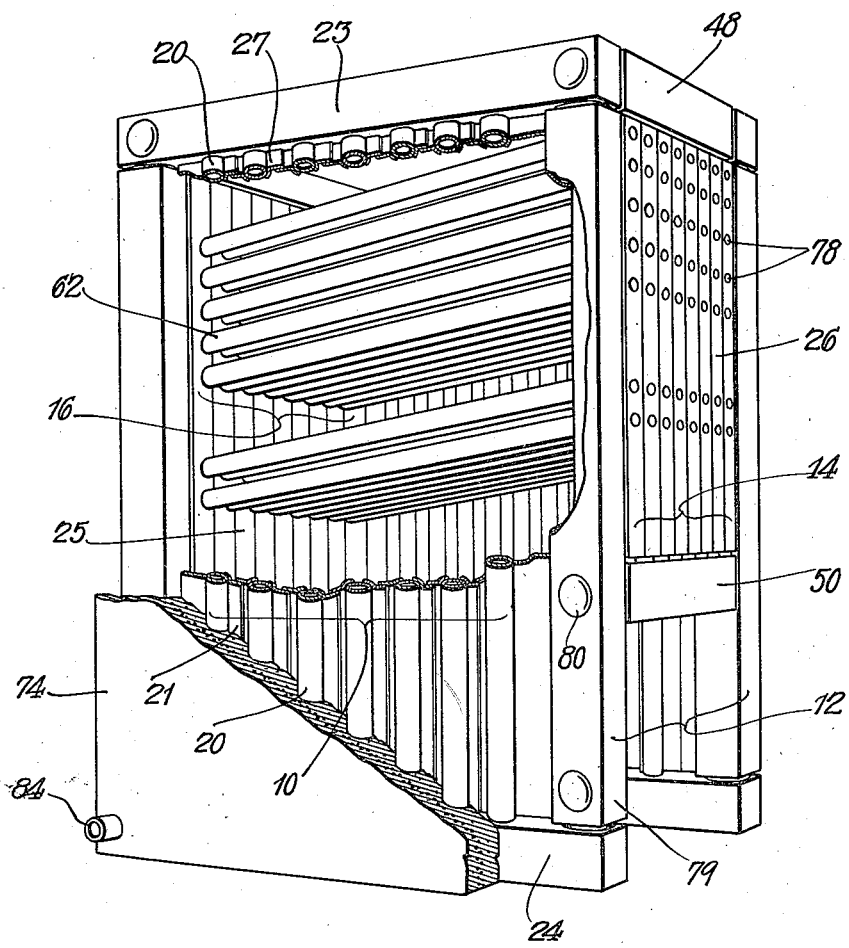
July 8, 1941. T. E. MURRAY 2,248,891

BOILER AND OTHER HEAT EXCHANGERS

Original Filed May 31, 1923 2 Sheets-Sheet 1

Fig. 1.



INVENTOR

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Fig. 2.

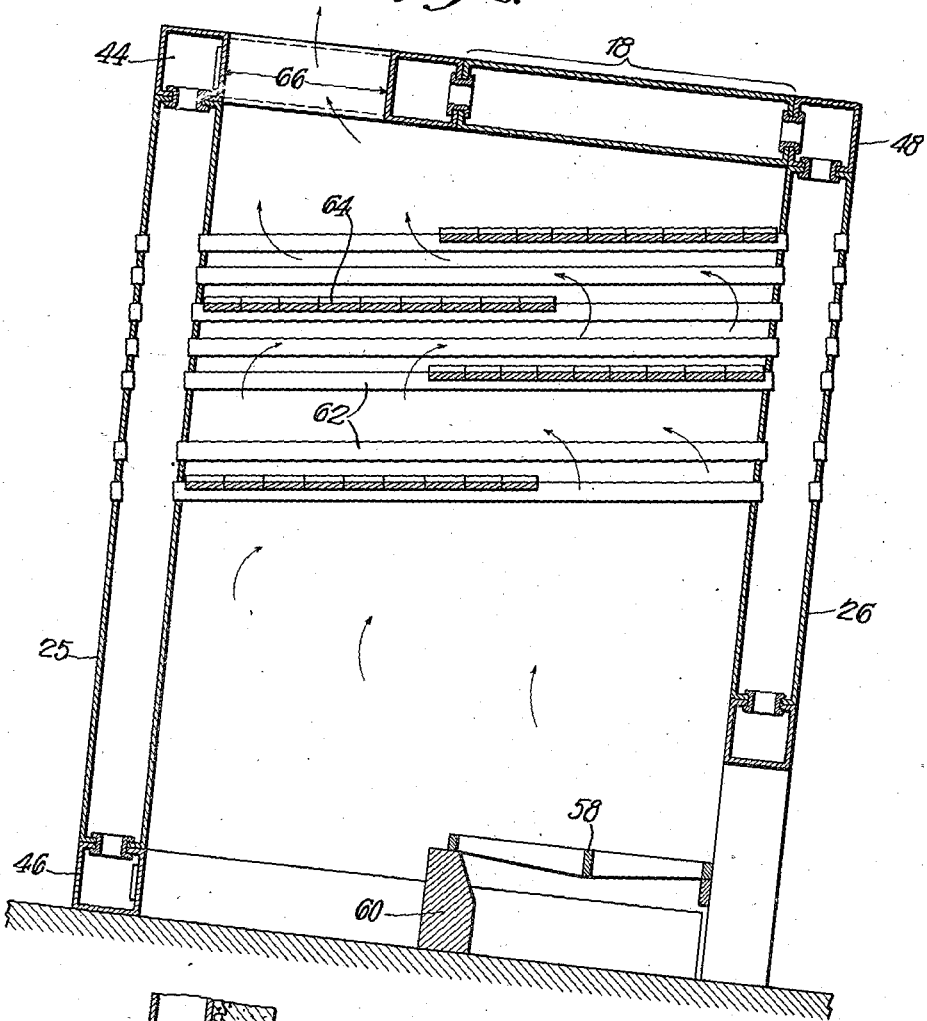


Fig. 3.

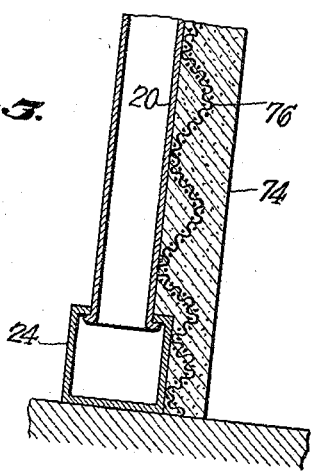
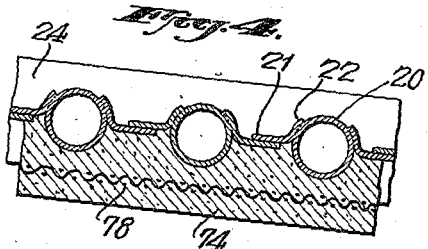


Fig. 4.



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UNITED STATES PATENT OFFICE

2,248,891

BOILER AND OTHER HEAT EXCHANGERS

Thomas E. Murray, deceased, late of Brooklyn, N. Y., by Joseph B. Murray and Thomas E. Murray, Jr., executors, Brooklyn, N. Y., assignors to Metropolitan Engineering Company, a corporation of New York

Original application May 31, 1923, Serial No. 642,427. Divided and this application May 29, 1936, Serial No. 82,412

4 Claims. (Cl. 122—235)

In Thomas E. Murray's Patent No. 2,042,618, of June 2, 1936, granted on a previous application, Ser. No. 642,427, filed May 31, 1923, there is described a stationary steam generator having overhead water tubes heated by convection, below which is a furnace having a combustion chamber with walls composed of upright tubular elements as hereinafter described.

The present application is a division of said application of 1923 and is directed to a certain sub-combination of the complete boiler claimed in the parent application.

In the accompanying drawings, Fig. 1 is a perspective view of the boiler partly broken away; Fig. 2 is a diagrammatical longitudinal section of the same; Fig. 3 is a horizontal section of a detail, and Fig. 4 is a vertical section of the same.

Referring to the embodiment of the invention illustrated, the boiler comprises side walls 10 and 12, a front wall 14 and rear wall 16, and a top wall or roof 18.

The side walls 10 and 12 are formed of a series of upright units comprising tubes 20 with lateral metal extensions such as the flanges 21, for instance, Fig. 4, welded to the tubes or otherwise attached thereto with good heat conducting joints. Inner curved portions 22 partly overlying the tubes facilitate such a welded connection.

The tubes 20 are connected into the circulation of the generator, communicating at the top and bottom, respectively, with hollow headers 23 and 24.

The rear wall 16 of the boiler is formed of a multiplicity of upright tubular sections 25 which may be similar to the members 20, 21, or may be ordinary tubular headers, and which are united at the top and bottom to transverse headers 44 and 46 (Fig. 2). The hollow members 26 forming the front wall 14 are connected at the top to a header 48, and at the bottom to a header 50 by communicating nipples or other suitable connection.

The header 50 is elevated to leave an opening for the entrance of a known type of stoker. Instead of such stoker, the boiler can be fired manually, in which case fire doors and ash pit doors, not shown, will be provided.

The boiler may be provided with a suitable grate diagrammatically shown at 58, Fig. 2, and bridge wall 60 and boiler tubes 62 extending approximately horizontally overhead and heated chiefly by convection. The tubes 62 communicate at their opposite ends with the hollow header members 25 and 26. Suitable baffles 64, such as tile, water tubes or brickwork, are secured in known manner to the boiler tubes so as to cause the products of combustion to follow a sinuous path through the boiler. A flue opening 66 is formed in the roof, leading to the stack.

The tubular side walls are combined with an outer layer or covering of refractory material, such, for example, as the layer or sheathing 74 of plastic insulating material held in place by a reinforcement of woven wire mesh 76 which is bent to the shape shown in Fig. 4 and welded or otherwise secured at intervals on the tubular units, either the tubes 20 or the projections 21, or both. This insulating material can be plastered on after the metal work has been erected and, if desired, may be enclosed by a thin sheet metal shell. This insulating material may be a magnesia mixture or plastic compounds of asbestos and like heat insulators.

The boiler tubes 62 may be of the usual round shape secured to the hollow headers 25 and 26; these being provided with openings opposite the ends of the tubes, which openings are closed by suitable plugs 78. The upright hollow corner tubes 79 are provided with plugged openings 80 which give access to the interior. Similar openings and plugs may be used in the various members for insertion of tools in assembling, or for cleaning sediment or scale.

The feed water may be introduced at one or more points and for this purpose, there is shown in Fig. 1 a pipe 84 entering the lower header 24. Similar feed pipes may be located at the opposite side of the boiler, or the feed water can be supplied from a common header to several of the tubular members 20.

The boiler walls may be supported in the usual manner on a floor or other foundation. Or, walls of the kind described can be hung or suspended from the structural beams or girders in a power house or other building.

In the parent application above identified, the claims are directed to the complete tubular system of the boiler illustrated with its overhead tubes and its tubular side wall covered with insulating material. The present application is directed to the sub-combination constituting the side wall, whether used in connection with the other elements of the tubular system completely illustrated, or used in boilers of the various different types to which such side walls are applicable.

Generally, in boilers of the type under consideration, the walls of the furnace have been made of refractory brickwork exposed directly to the heat of the flame and carrying the weight of

the overhead structure, or a large part of it. Such walls have had a comparatively short life, requiring frequent repair or replacement. The present invention is chiefly distinguished in that the tubes constitute the principal part of the wall and carry most or all of the weight of the refractory or insulating material. The life of the wall, cooled by the rapid circulation of water, is practically unlimited. The plastic material by its insulating properties conserves the heat within the furnace and is at the same time protected from excessive wear by the cooled metal structure between it and the fire.

What is claimed is:

1. A steam generator having a wall for the absorption of heat from the combustion of fuel in a combustion chamber which comprises spaced vertical tubular elements subject to expansion and vibration independently of one another and having heat absorbing and heat transferring projections extending sidewise into the spaces between said tubes, a layer of heat insulating material covering a surface of said wall and in close contact with the surface of said tubes and a reticulated retaining means extending in and through said heat insulating material and welded at spaced intervals to said tubular elements to unite and hold said heat insulating material to said tubular elements.

2. A steam generator having a wall for the absorption of heat from the combustion of fuel in a combustion chamber which comprises spaced vertical tubular elements subject to expansion and vibration independently one of another and having heat absorbing and heat transferring projections extending sidewise into the spaces between said tubes to form a substantially continuous wall, a layer of heat insulating material covering a surface of said wall and in contact with the surface of said tubes and retaining means comprising woven wire mesh extending in and through said heat insulating material and at spaced intervals connected by welding to said tubular elements to unite and hold said heat insulating material to said tubular elements.

3. A steam generator having a wall for the absorption of heat from the combustion of fuel in a combustion chamber which comprises spaced independent vertical tubular elements having extensions into the spaces between said tubes to form a substantially continuous heat absorbing wall, said tubular elements being independent of each other to permit independent expansion and contraction, a layer of heat insulating material covering a surface of said wall and in close contact with the surface of said tubular elements and retaining means extending in and through said heat insulating material from one point to another of said tubular elements and being united at said points directly to said tubular elements to hold said heat insulating material on the surface of said tubular elements.

4. A steam generator having a wall for the absorption of heat from the combustion of fuel in a combustion chamber which comprises independent vertical spaced tubular elements having extensions into the spaces between said tubes to form a substantially continuous heat absorbing wall, a layer of heat insulating material covering a surface of said wall in close contact with the surface of said tubes, and retaining means for said heat insulating material attached at successive close intervals directly to said tubes and extending from one interval to the next in and through said heat insulating material to hold it in close contact with said tubes while permitting freedom of movement of said tubes.

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Executors of the Estate of Thomas E. Murray, Deceased.