July 8, 1941. T. E. MURRAY 2,248,890

BOILER

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Fig. 1.

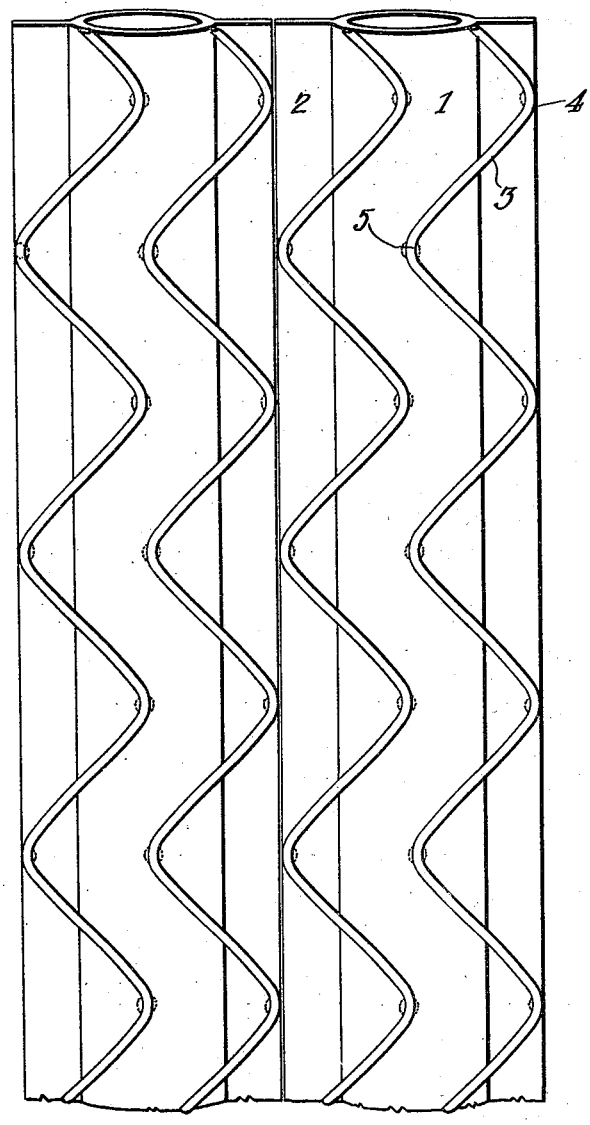

Fig. 2.

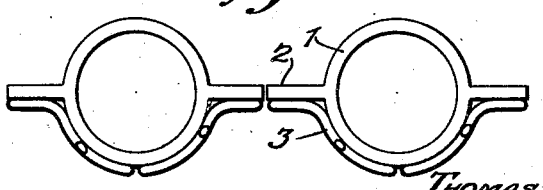

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Fig. 3.

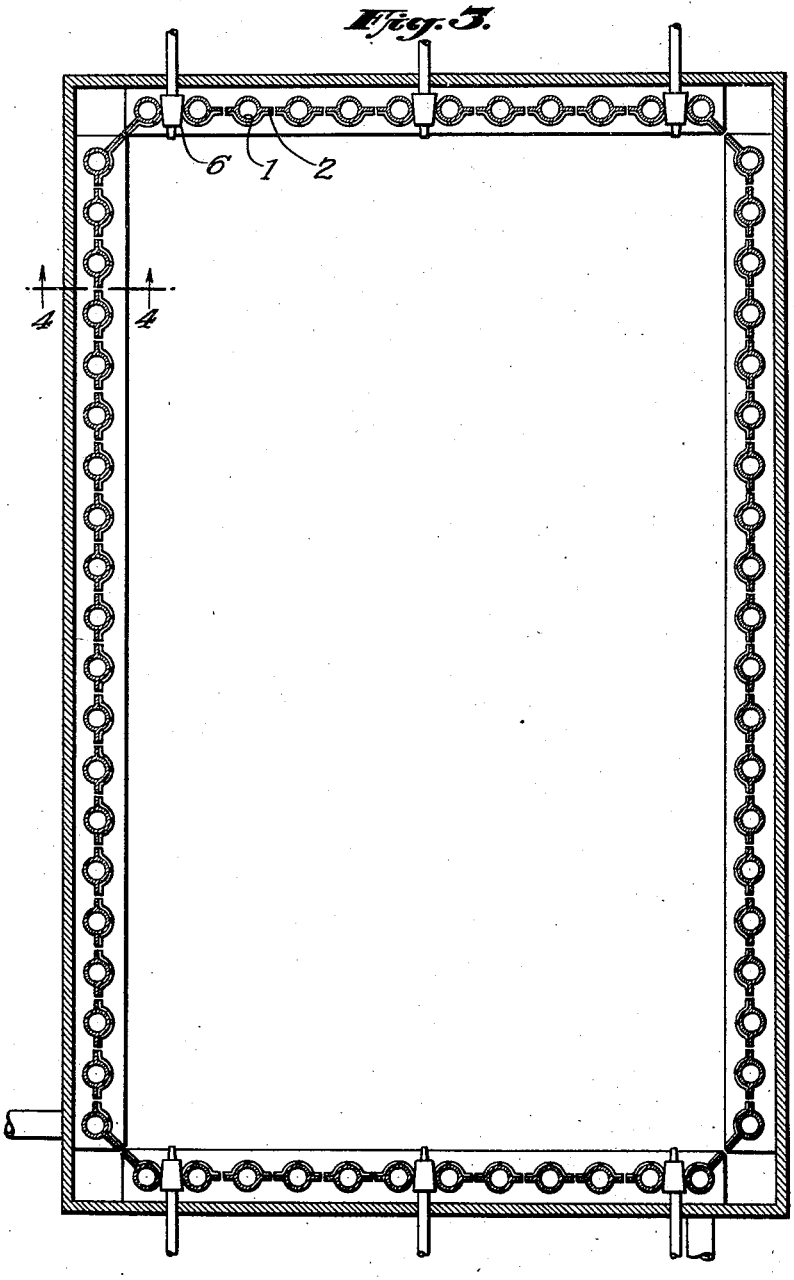
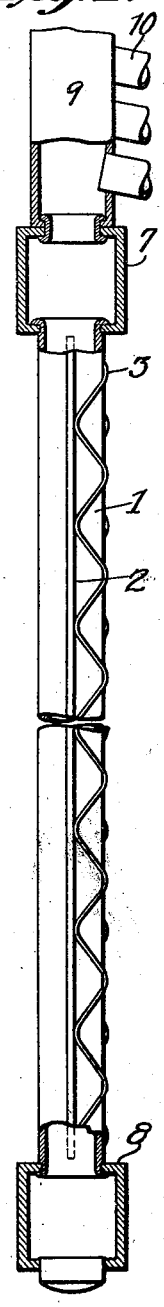


Fig. 4.



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Patented July 8, 1941 2,248,890

UNITED STATES PATENT OFFICE

2,248,890

BOILER

Thomas E. Murray, Brooklyn, N. Y.; Joseph Bradley Murray, Thomas E. Murray, Jr., and John F. Murray, executors of said Thomas E. Murray, deceased, assignors to Metropolitan Engineering Company, a corporation of New York

Application May 20, 1927, Serial No. 192,836

7 Claims. (Cl. 122—235)

In certain previous applications Nos. 177,533 and 177,534 dated March 23, 1927, I have described certain boiler constructions involving a wall or a lining of water tubes exposed to the direct radiant heat of the fire in the furnace and particularly useful in connection with nozzle burners using pulverized coal and similar fuels.

In such boilers there is a tendency for the fine ash in the flame, called "fly ash" to form a thin loose coating on the pipes. This has advantages in operation in providing a refractory curtain between the comparatively cold surfaces of the water pipes and the flame which avoids excessive cooling of the latter. Ordinarily the accumulation of this ash is irregular and not dependable.

The present invention provides means for holding the ash on the exposed surfaces and maintaining it reasonably well distributed over such surfaces.

The accompanying drawings illustrate an embodiment of the invention—

Fig. 1 is a perspective view of the upper end of a pair of tubes;

Fig. 2 is a plan of the same;

Fig. 3 is a horizontal section of the combustion chamber of a boiler;

Fig. 4 is a vertical sectional view of the same, on the line 4—4 of Fig. 3.

Fig. 1 shows the surface which is exposed to the heat and on which the ash deposit is to be caught and retained. Each of the tubes 1 is provided with lateral flanges 2 extending in the direction of the length of the wall and preferably located in the spaces between the tubes and constituting additional heating surfaces for securing rapid generation of steam. It is desired to secure the ash on the surfaces of the tubes, the fins and any similar parts which may be exposed. For this purpose I propose to provide projections on the exposed surfaces.

In the case illustrated such projections are secured by means of wires 3 lying against the surfaces to be protected and extending sinuously in the vertical direction. They may be fastened by welding at the points where the wire bends such as 4 and 5. The deposit of ash is loose and can be largely removed by shaking or brushing, and where the surfaces are smooth there is no certainty that the ash will be retained. But by providing a certain degree of roughness over the entire surface, the ash is prevented from falling and is retained in sufficient quantity to give the desired protection. The wires 3 will also be largely coated. The appearance of the wall after a short period of use will be that of a red hot or white hot refractory surface.

Fig. 3 shows a combustion chamber enclosed on its four sides by walls of tubes 1 of the type shown in detail in Figs. 1 and 2. At intervals in the length of the end walls, there are nozzle burners 8 which project into the combustion chamber a mixture of air and powdered coal. Such burners will be varied in number and location according to the particular capacity and design of boiler.

It is with such nozzle burners that the present invention is particularly useful. They project a flame of extremely high temperature against the tubular water walls so that the protection of the ash is particularly important; and at the same time they project the very fine ash also against the tubular water walls and thus in a very short period build up the desired protective coating.

As soon as the deposit of ash has accumulated, it presents the appearance of a white hot wall of refractory material which serves to aid in the rapid combustion of the fuel which is supplied in large volume by the burners. At the same time, it shields the tubes and fins from excessive temperature and rapid burning out. The ash will deposit only on a comparatively cool surface and will build up only to a thickness balanced by the cooling effect of the circulating water and the heating effect of the flame.

Fig. 4 illustrates one of the tubes 1 between upper and lower headers 7 and 8. The upper horizontal header 7 communicates at intervals with vertical headers 9 at the upper ends of the inclined tubes 10 which extend across above the combustion chamber.

The construction above described is covered in my previous application No. 642,725, filed June 1, 1923, now Reissue No. 18,748, and is described here merely by way of fuller illustration of the present invention.

Various other ways may be adopted of securing the desired projections, such as the application of wire mesh and various other forms of projection or by suitably roughening the surfaces of the tubes and the fins themselves.

The invention is applicable not only to water tubes such as are illustrated, but to various other parts of a boiler which are subject to exposure to excessive heat such for example as steam drums, headers, etc.

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

What I claim is:

1. A boiler having a wall of water tubes spaced

apart and having heat conducting extensions from said tubes into the spaces between said tubes to form a substantially continuous wall and heat conducting elements to retain heat refractory material comprising rod-like elements secured to said tubes by welding and each said rod-like element extending transversely of the length of said tube and close to the surface thereof.

2. A boiler having a wall of water tubes spaced apart and having heat conducting extensions from said tubes into the spaces between said tubes to form a substantially continuous wall and heat conducting elements to retain refractory material on said surface comprising rod-like elements secured on the face of said individual tubes each said rod-like element extending at angles transverse to the length of said tube and in close proximity to the surface thereof.

3. A boiler having a wall of water tubes spaced apart and having heat conducting extensions from said tubes into the spaces between said tubes to form a substantially continuous wall of independent tubes each said tube having an individual means on its face to retain refractory material and comprising a vertical sinuous rod welded to said tube and said extensions and lying flat against the surfaces of said tube and extensions.

4. A boiler having a wall of water tubes spaced apart and having heat conducting extensions from said tubes into the spaces between said tubes to form a substantially continuous wall of independent tubes and means on a face of said tubes to retain heat refractory material each comprising a vertical sinuous rod secured to said tubes and to said extensions and lying flat against the surfaces of said tubes and extensions.

5. The boiler of claim 3 in which said sinuous rods are welded to said tube and extensions at the bends of said rod.

6. A heat transfer element for boilers and the like which comprises a tubular element having sidewise heat conducting extensions and rod-like elements welded to the surface of said tube and extensions and each said rod-like element extending transversely to the length of said tube.

7. A heat transfer element for boilers and the like which comprises a tubular element having sidewise heat conducting extensions and a sinuous rod extending longitudinally and flatly against said tube and extensions to provide transversely extending rod-like elements on the face of said tube.

THOMAS E. MURRAY.