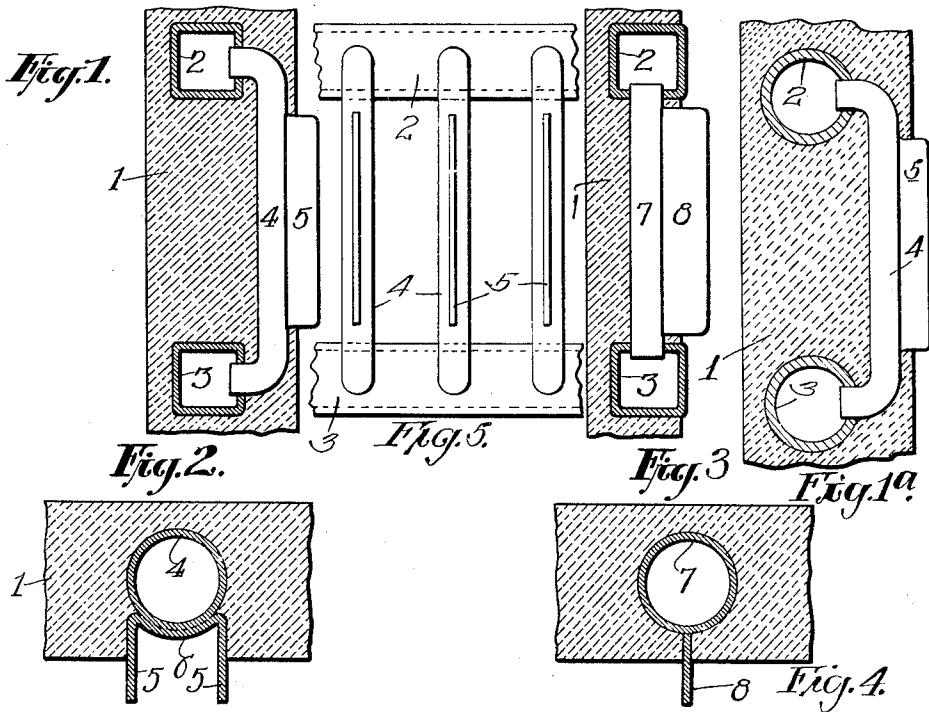


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T. E. MURRAY
SUPERHEATER

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UNITED STATES PATENT OFFICE

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SUPERHEATER

Application filed May 29, 1924. Serial No. 716,534.

In certain prior applications, for example, No. 678,443, I have shown and described boilers made with a water screen or water wall in the furnace proper composed of tubes located against the inner face of the furnace wall and having lateral fins extending over the spaces between the tubes by which the radiant heat from the furnace is readily conducted to the water in the tubes and by which a very high efficiency has been obtained in practice.

The present invention aims to provide superheaters utilizing the conducting efficiency of fins or flanges exposed to the radiant heat of the furnace and conducting such heat efficiently to the superheater tubes, which, however, are protected against direct exposure to the furnace heat. And the improvements described, though applicable chiefly to superheaters, may be employed in a variety of apparatus in which it is desired to apply the heat of a furnace to a liquid or a fluid passing through a tubular structure.

The accompanying drawings illustrate embodiments of the invention.

Fig. 1 is a longitudinal section of one style of superheater and Fig. 2 a cross-section of a modification thereof; Fig. 1^a is a view of a modification;

Figs. 3 and 4 are similar views of another style;

Fig. 5 is a view from the right of Fig. 1 with the wall structure omitted.

Referring to the embodiment of the invention illustrated, the wall 1 of the furnace may be of any suitable refractory material on the inner face where it encloses the tubes hereinafter described. Set in this inner portion of the wall are tubes 2 and 3 constituting the headers of a superheater. They may be ordinary round tubes, as shown in Fig. 1^a, or may be rectangular tubes as illustrated in the other views so as to require less thickness of the wall for the embedding of them. Superheater tubes 4 are arranged close to the inner face, that is the furnace side, of the wall 1 and have their ends bent backward to enter the headers. The tubes 4 are provided with flanges which project out into the furnace and are exposed directly to the heat thereof. A suit-

able form for the flanges is shown by Fig. 2. A pair of flanges 5 is obtained by bending sheet metal to a trough shape with a convex bottom 6 fitting the outer face of the tube 4 and welded thereto. A good welded joint should be made so as to ensure an area of contact equal at least to the combined thickness of the two flanges 5; the latter projecting for part of their width into the furnace, the base of the flanges and tube 4 being buried in and protected by the insulating material of the wall 1 to an extent depending on the character of the furnace, its temperature, and the rate of conduction of heat desired to the steam in the tubes 4.

The structure of Figs. 3 and 4 is similar in principle. The headers 2 and 3, however, are set with one face exposed toward the furnace. The tubes 7 run straight from the bottom of the header 2 into the top of the header 3 and are thus embedded to some extent in the wall throughout their length. Also in this figure, I have illustrated a different arrangement of flanges. Each tube 7 has a single flat flange 8 welded at its inner edge to the tube and projecting through the nonconducting wall and into the furnace chamber for a distance depending on circumstances.

In another pending application Serial No. 715,369, for heat conducting tubes filed May 23rd, 1924, I have described in detail the tubes and fins, and a variety of modifications thereof, such, for example, as the use of special metal for the fins to resist oxidation at high temperature, the use of different shapes, and the provision of interrupted fins to permit them to accommodate themselves better to the expansion caused by heat. All these features may be applied, as well as others, to the flanged tubes of the present application.

A suitable metal for the fins or heat conducting elements and one which is adapted at high temperatures to have a higher resistance to oxidation than the tubes is an iron alloy containing chromium and nickel and the like, although other known highly resistant metals or alloys may be used.

Though I have described with great particularity of detail certain embodiments of

my invention, yet it is not to be understood therefrom that the invention is restricted to the particular embodiments disclosed. Various modifications may be made by those skilled in the art without departure from the invention as defined in the following claims.

What I claim is:—

1. A heater comprising headers embedded in a furnace wall, tubes between said headers also embedded in said wall and heat conducting elements homogeneously united to said tubes and exposed to the heat of the furnace chamber.

2. A boiler superheater comprising tubes embedded in a wall of a boiler furnace and heat conducting elements united to said tubes and exposed to the heat of the furnace chamber.

3. A boiler superheater comprising tubes embedded in a wall of a boiler furnace and heat conducting elements united to said tubes and extending beyond the inner face of said boiler furnace wall.

4. A boiler superheater comprising tubes embedded in a wall of a boiler furnace and heat conducting flanges secured to said tubes and extending beyond the inner face of said boiler furnace wall.

5. A boiler superheater comprising headers embedded in a furnace wall, tubes between said headers also embedded in said wall and heat conducting elements secured to said tubes and extending beyond the inner face of said furnace wall.

6. A heater comprising tubes embedded in a furnace wall and heat conducting elements united to said tubes and projecting into the furnace chamber and exposed to the heat of the furnace chamber, said elements being formed at least in part of a metal of higher resistance to oxidation at high temperatures than the tubes.

7. A heater comprising tubes embedded in a furnace wall and heat conducting elements united to said tubes and projecting into the furnace chamber and exposed to the heat of the furnace chamber, said elements being formed at least in part of an alloy of iron chromium and nickel and at high temperatures having a higher resistance to oxidation than said tubes.

In witness whereof, I have hereunto signed my name.

THOMAS E. MURRAY.