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1,945,548

RADIANT HEAT SUPERHEATER

Original Filed Jan. 10, 1928

Fig-1

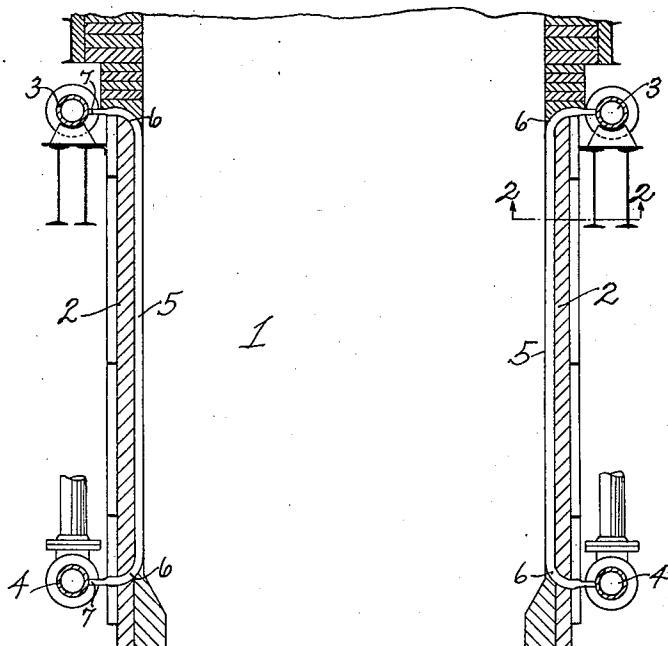


Fig-4

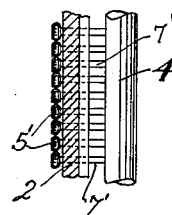


Fig-3

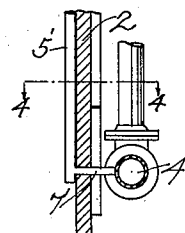


Fig-2

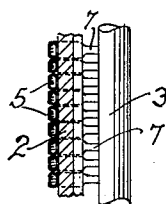


Fig-5

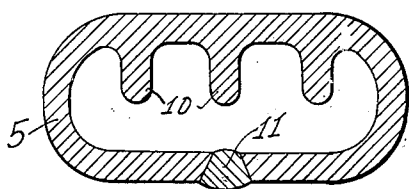
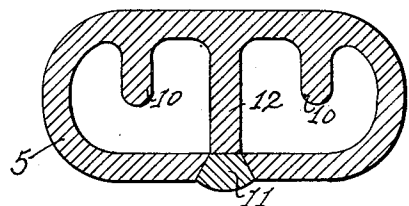


Fig-6



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RADIANT HEAT SUPERHEATER

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2 Claims. (Cl. 122—481)

This invention relates to a superheater, and particularly to the tubes that are especially adapted to increase the heat transfer rate. The arrangement is particularly useful in superheaters subjected to temperatures where there might be trouble through burning of ordinary superheater tubes, as is the case with superheaters which receive radiant heat from the furnace.

The invention will be understood from the description in connection with the accompanying drawing, in which Fig. 1 is a vertical section through a furnace partly broken away showing an illustrative embodiment of the invention; Fig. 2 is a section along the line 2—2 of Fig. 1; Fig. 3 is a section similar to Fig. 1 partly broken away showing a modification; Fig. 4 is a section along the line 4—4 of Fig. 3; Fig. 5 is a section through one of the tubes on an enlarged scale; and Fig. 6 is a similar section showing a modification.

In the drawing, reference character 1 indicates a furnace for a boiler, the walls of the furnace being shown at 2, outside of which walls are located upper superheater headers 3 and lower superheater headers 4. The headers are connected by tubes 5, a large port on of which lies along the inside walls of the furnace and the ends are bent as shown at 6 and extend through the walls of the furnace and enter the headers 3 and 4. The tubes are flat along the portions that extend through the walls and along the inside of the walls and are reduced in cross section and made round, as shown at 7, where the tubes enter the headers. The flat portions of the tubes 5 that lie along the inside walls of the furnace are nearly wide enough to contact with each other so that the tubes receive most of the radiant heat from the furnace without permitting much of the radiant heat to pass between the tubes and heat the walls.

In the modification shown in Figs. 3 and 4, the flat portions 5' of the tubes are straight and lie along the inside of the walls and the ends thereof are connected by round nipples 7' to the headers 3 and 4 that are expanded into the superheater headers.

The flat portions of the tubes are preferably provided with one or more longitudinal inner fins or ribs 10 as most clearly shown in Fig. 5. The tubes may be made by providing a flat sheet of metal with the fins or ribs 10 extending longitudinally thereof near the middle portion and then bending the edges of the plate until they come into proximity to each other, whereupon the edges are welded together as indicated at 11 to complete the tube.

In the modification shown in Fig. 6 the central fin or rib 12 is made wider than the others, so that when the edges of the plate are welded together as shown at 11 they will also be welded to the edges of the fin or rib 12, thus making a tube that will withstand higher pressures without danger of being deformed from the desired shape.

The ribs 10 are sufficiently extended to provide the interior of the tube with a surface greater in extent than that of the outer surface of the tube. Furthermore, the ribs should have a section sufficiently large, particularly in the portion thereof adjacent to the tube, readily to conduct the heat from the interior of the tube to the tubular member. Additionally, the tubular members themselves should be sufficiently thick readily to conduct the heat from the front side thereof to the back, all as illustrated in the drawing. By forming the superheater tube in this manner, the heat is more readily transferred from the tube itself to the steam inside of the tube than would otherwise be the case, and the tube is thereby less likely to be damaged. This feature is particularly important where the tube is subjected to the radiant heat of the furnace in the manner illustrated in the drawing.

We claim:—

1. In combination, a furnace, a superheater comprising a flattened tube one side of which is subjected to the radiant heat of the furnace, one side of said tube being provided on its interior with a rib extending across and attached to the other side of said tube and extending along substantially the entire length thereof.

2. In a radiantly heated steam superheater, a furnace, a row of flattened tubes having their front and back walls of considerably greater area than their side walls and presented to the furnace so that the front walls are directly exposed to the radiant heat of the furnace, metal projections of substantial length extending from the front walls of the tubes to their back walls and united thereto so as to prevent tube distortion by equalizing the metal temperatures of those walls, and means connected to the tubes to provide for the passage of steam therethrough.

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