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SUPPORTS FOR ELEMENTS OF SUPERHEATERS AND OTHER HEAT EXCHANGERS

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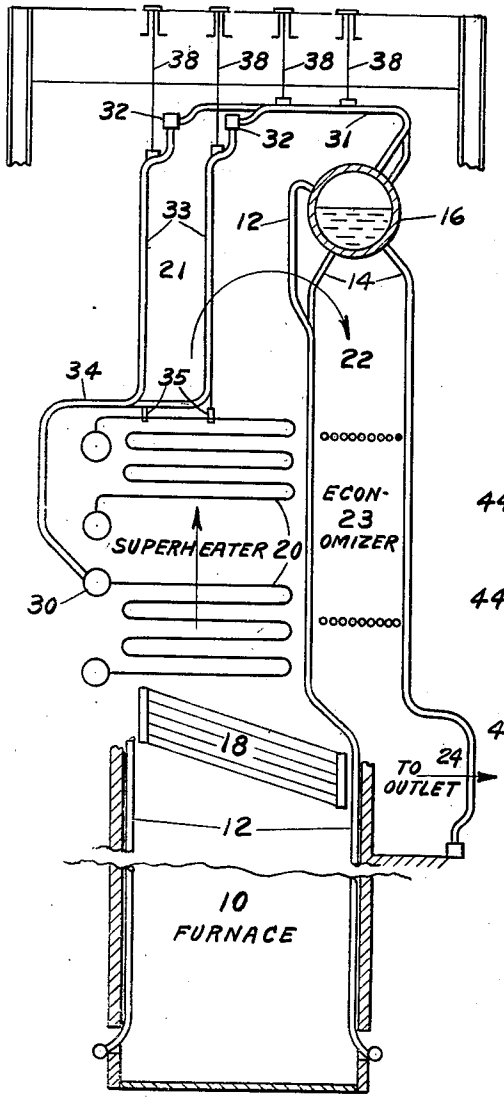


Fig. 1.

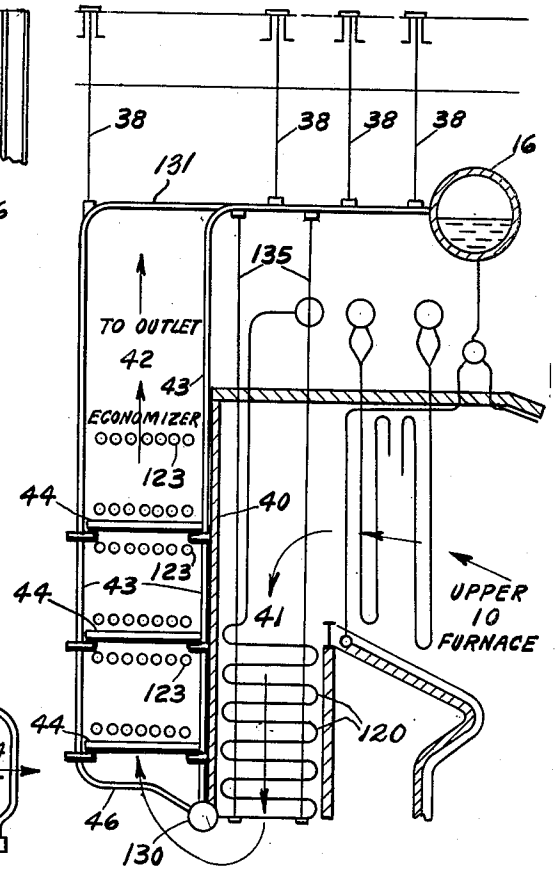


Fig. 2.

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SUPPORT FOR ELEMENTS OF SUPERHEATERS AND OTHER HEAT EXCHANGERS

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4 Claims. (Cl. 122—510)

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This invention relates to improvements in steam superheaters of the kind comprising tubular element loops disposed in a gas passage located mainly below the steam and water drum of a boiler.

It is the general object of the invention to provide improved means for supporting a steam superheater cooled at least in part by circulation therethrough of a fluid which is at a lower temperature than the gases contacting their surfaces which shall be such that the superheater is supported wholly from structural parts located externally of the gas passages of the apparatus, and also such as to permit free expansion of the parts of the superheater.

It is a particular object of the present invention to provide improved simple and efficient fluid cooled means for supporting within a vertical gas passage the substantially horizontal loops of the elements of a steam superheater independently of the walls of the said passage, and independently both of the boiler casing and of any steam generating or water circulating tubes of the boiler.

In addition, the invention seeks to provide a superheater in which not only will the entire weight of the superheater be carried from external structural parts with at least part of the supports for the elements in the gas passage cooled by circulation therethrough of a fluid which is at a lower temperature than the gases contacting their surfaces, but in which the elements and their supports will constitute a complete self-draining unit.

In a superheater according to this invention the element loops are supported independently of the walls of said passage by hangers depending from the horizontal reaches of piping leading to the saturated steam feed header from the boiler drum.

An ancillary object is to afford steam cooled supporting means for other heat exchanger elements disposed in a gas passage parallel to that for the superheater with the saturated steam leads disposed to the side walls of said passage to cool them and also afford supports for said elements.

In the drawings:

Figure 1 is a diagrammatic elevational view of a water tube boiler provided with superheater elements supported in accordance with the present invention, the lower portion of the furnace being omitted and,

Figure 2 is a similar diagrammatic view of another boiler installation in which support is afforded also to an economizer by saturated steam tubes that supply the superheater.

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In Figures 1 and 2 similar parts will be designated by the same reference numerals wherever appropriate. Referring first to Figure 1, the numeral 10 designates a furnace having walls cooled by steam generating tubes 12 supplied with water through downcomers 14 from a steam and water drum 16 located a substantial heighth above the furnace 10. From the furnace 10 the products of combustion flow over other steam generating surface 18 and then over the looped heat absorbing elements of the superheater 20 that extend back and forth across the vertical gas pass 21. From the upper end of pass 21 the gases flow into the downpass 22 and over the economizer or feed water heater 23 located therein and thence to the boiler offtake 24. The inlet header 30 for the superheater 20 is supplied with saturated steam from the steam and water drum 16 through the piping 31 which extends transversely across the upper end of the gas pass 21 and thence downwardly to the header 30. In the arrangement shown the piping 31 includes intermediate headers 32 feeding vertical sections 33 of the piping which extend downwardly to a position just above the superheater with bent portions 34 extending horizontally above the superheater in positions close to the latter. Attached to these horizontal portions 34 of the saturated steam leads to the superheater header 30 are ends of hangers 35 connected with the elements of the superheater 20 for suspending the elements in the gas passage 21. The piping 31, from which the superheater 20 is thus suspended, is in turn supported from the structural steel work of the boiler through hangers 38. With the above construction the supports for suspending the superheater 20 in a gas passage are cooled by the saturated steam flowing from the drum 16 to the inlet header 30 at a temperature lower than the gases contacting the supports with the result that the necessity of providing expensive heat resisting alloys in these superheater supports is obviated.

In Figure 2 the superheater 120 is located in a downpass with its inlet header 130 positioned at the lower end of the baffe 40 that separates and serves as a common wall between the downpass 41 in which the superheater is located and the up-flow pass 42 in which the economizer 123 is located. In this arrangement vertical portions 43 of the saturated steam leads 131 extend downwardly close to opposite interior walls surfaces of the pass 42, serving not only to cool

these walls but also to provide supports for the structural beams 44 on which the tubular elements of the economizer 123 are carried. One of the vertical portions 43 of the saturated steam leads extends along and cools the baffle 40 between the gas passes 41 and 42 and terminates in the header 130 located at the lower end of the baffle which position as shown is also below the main portion of the superheater. The vertical portions 43 of the saturated leads for the superheater that extend along the opposite wall of pass 42 have horizontal portions 46 extending back across the gas passage 42 below the economizer 123 for connection to the header 30.

In both arrangements described above it is to be noted that the saturated steam tubes 31 or 131 connected with the steam and water drum 16 of the boiler serve as fluid cooled supports for the hangers that suspend the superheater elements in the gas passages. Portions of these saturated steam leads are extended transversely across the gas passages and are in turn suspended from beams and structural steel parts of the boiler outside the gas passages and are free to expand or contract independently of the boiler. In the form illustrated in Figure 2 the saturated steam leads extending to the supply header for the superheater also provide cooled supports for the beams on which the economizer tubes are carried.

What I claim is:

1. In a water tube boiler having a steam and water drum disposed at one side of a vertical gas passage through which products of combustion flow from the boiler furnace on their way to the boiler offtake; a superheater having its heat absorbing elements disposed in said gas passage in a location below said drum; a header for supplying steam to the superheater located on the side of said gas passage remote from said drum in a position adjacent the lower part of said superheater; piping connected to said drum extending transversely across said gas passage in a position above said superheater elements and downwardly along the outer wall of said passage to said header; and supporting devices attached to the transverse reach of said piping and depending therefrom for connection to said superheater elements to support the latter.

2. In a water tube boiler having a steam and water drum positioned in a location above a furnace from which products of combustion flow through two vertical gas passages positioned in side-by-side relation at one side of said drum and communicating for serial gas flow at one end of baffle means separating said passages; a superheater having its heat absorbing elements disposed in the passage nearer said drum in a location below the latter; a header supplying steam to said superheater located adjacent the lower end of said baffle; other heat exchange elements disposed in the other gas passage above said header; piping connected to said drum and extending transversely across said first passage and downwardly along and close to the side of said baffle facing said other passage to said supply header; and means attached to the portions

of said piping along said baffle for affording support to the heat absorbing elements in said other passage.

3. In a water tube boiler having a steam and water drum positioned in a location above a furnace from which products of combustion flow through two vertical gas passages positioned in side-by-side relation at one side of said drum and communicating for serial gas flow at one end of baffle means separating said passages; a superheater having its heat absorbing elements disposed in the passage nearer said drum in a location below the latter; a header for supplying steam to said superheater located adjacent the lower end of said baffle; other heat exchange elements disposed in the other gas passage above said header; piping connected to said drum and extending transversely across said first passage and downwardly along opposite interior walls of said other passage to position below said heat absorbing elements therein and thence to said supply header; and means attached to the portions of the piping along said walls for affording support to the heat absorbing elements in said other passage.

4. In a water tube boiler having a steam and water drum positioned in a location above a furnace from which products of combustion flow through two vertical gas passages positioned in side-by-side relation at one side of said drum and communicating for serial gas flow at one end of baffle means separating said passages; a superheater having its heat absorbing elements disposed in the passage nearer said drum in a location below the latter; a header for supplying steam to said superheater located adjacent the lower end of said baffle; other heat exchange elements disposed in the other gas passage above said header; piping connected to said drum and extending transversely across said first passage and downwardly along opposite walls of said other passage to positions below said heat absorbing elements therein and thence to said supply header; and means attached to the portions of the piping along said walls for affording support to the heat absorbing elements in said other passage; and supporting devices attached to the transverse reaches of said piping and depending therefrom for connection to said superheater elements to support them.

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