Aug. 6, 1935. J. R. KRUSE 2,010,672

BOILER HEADER

Filed Jan. 9, 1934

Fig. 1.

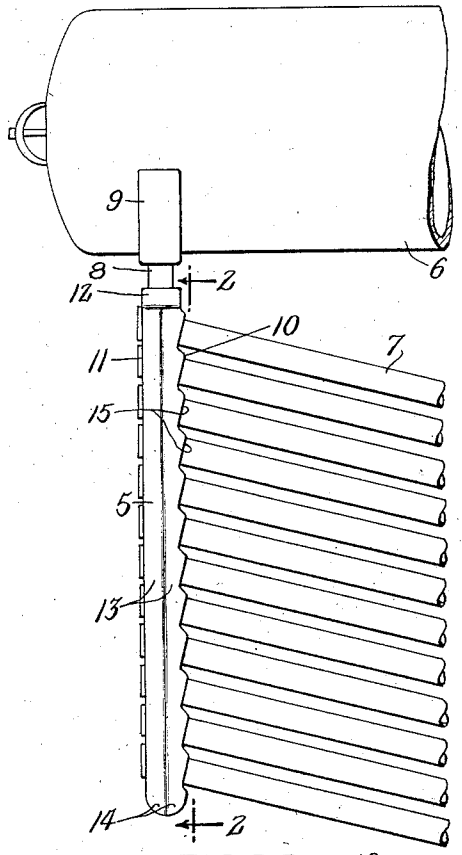


Fig. 2.

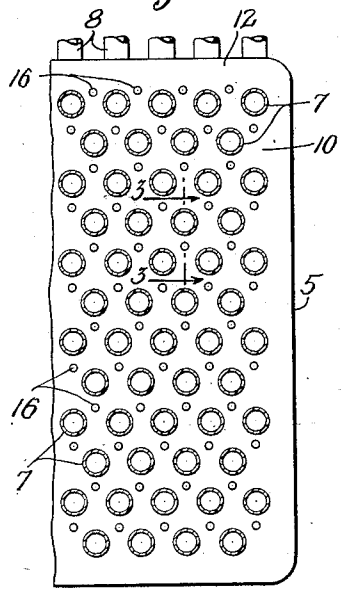


Fig. 3.

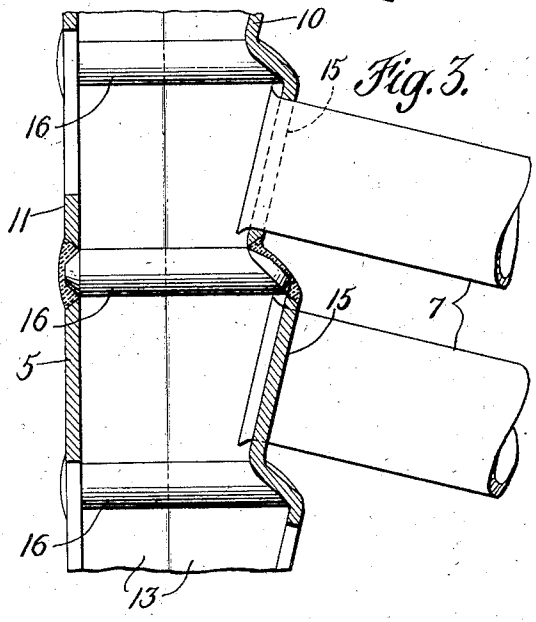
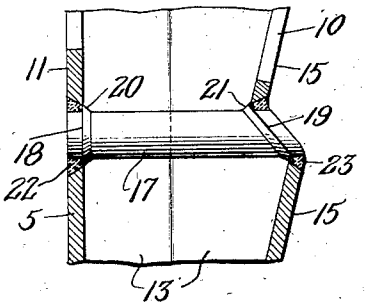


Fig. 4.



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BOILER HEADER

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5 Claims. (Cl. 122—360)

This invention relates to boiler headers and has for its primary object the provision of a box header for use in boilers having boiler tubes inclined from the horizontal which is adapted to be mounted in a vertical position.

Another object resides in the provision of a staybolted boiler header adapted to be mounted in a vertical position and having surfaces for accommodating inclined tubes which are normal to the longitudinal axis of the tubes.

A further object resides in the provision of a header for a tube boiler having a tube sheet corrugated to receive the tubes, a flat hand hole sheet and stay rods welded to the sheets for tying them together.

Another object is the provision of a stay rod for use in boiler headers affording an exceptionally large weld area which permits of a very easy welding operation.

How the foregoing, together with such other objects and advantages as may hereinafter appear or are incident to my invention are realized, is illustrated in preferred form in the accompanying drawing, wherein—

Fig. 1 is a fragmentary side elevational view of a header constructed in accordance with my invention applied to a boiler;

Fig. 2 is a fragmentary section taken transversely of the boiler on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary cross section through the header taken on the line 3—3 of Fig. 2; and

Fig. 4 is a still further enlarged fragmentary cross section illustrating a stay bolt detail.

In the drawing I have illustrated my improved header 5 applied to a tube boiler having a longitudinal steam and water drum 6 and a plurality of boiler tubes 7 inclined from the horizontal, the header being connected to the drum by means of a plurality of nipples 8 and a cross box 9.

The header 5 in this instance, is of welded construction and comprises a tube sheet 10, a hand hole sheet 11 and an upper cap piece 12. The tube and hand hole sheets are each provided with end flanges 13 and a bottom flange 14, which flanges are welded together to provide welded seams. The upper cap piece 12 is of cupped form and is welded to the tube and hand hole sheets to complete the header.

The tube sheet 10 is of corrugated form, the construction being such that a plurality of inclined surfaces 15 are provided for the reception of the boiler tubes 7, it being pointed out that the amount of inclination of these surfaces is such that the inclined boiler tubes extend at right angles thereto and so that the header will assume a vertical position in the boiler. Stated in another way, the surfaces 15 are inclined with respect to the general plane of the header and are normal to the longitudinal axis of the boiler tubes 7.

The header is stayed by means of a plurality of stay rods or stay bolts 16 extending from the tube sheet to hand hole sheet and secured in place by means of welds at the sheets, as clearly shown in Fig. 3.

Through the employment of stay bolts welded to the tube and hand hole sheets, I am enabled to provide a header having a corrugated tube sheet for accommodating inclined boiler tubes in such a way that the header may be vertically disposed. I am also enabled to get the corrugations close enough together to maintain the usual tube spacing necessary to obtain efficient heat transfer. In this connection I desire to point out that if screw stay bolts were used, then flat surfaces for accommodating them would have to be provided between the corrugations, which would make the tube spacing too great.

Another feature of my improved header resides in the fact that although the tube sheet is corrugated, the hand hole sheet is flat, which reduces the cost of construction.

Among the advantages of my vertical type of header is the reducing of the space required for the length of the boiler setting, it being apparent that if the header shown as well as the downcomer header at the other end of the boiler were placed at an angle with respect to the longitudinal drum and at right angles to the inclined boiler tubes, considerably more space would be required lengthwise of the boiler setting.

In Fig. 4, I have illustrated a stay rod or bolt 17 which is provided with shoulders 18 and 19, in this instance in the form of collars 20 and 21 which constitute backing-up portions for the welds 22 and 23, this being a very desirable feature for fusion welding. These backing-up portions may be designed to fit either a flat surface or a corrugated surface as indicated in this figure. It will be seen that this type of stay bolt affords an exceptionally large weld area which permits of a very easy welding operation.

While I have shown my invention applied to a longitudinal drum boiler, it is to be understood that it is applicable to other types of boilers such as cross drum boilers, for example, and that a downcomer header of similar construction to the

upcomer header shown in the drawing is provided.

I claim:—

1. In a box header for a tube boiler having a tube sheet and a hand hole sheet, said tube sheet being provided with corrugations extending continuously in general parallel direction to the rows of tubes and each of said corrugations having a flat portion to receive the tubes, the combination of stay rods welded to the sheets for tying them together, one end of said stay rods being welded to said tube sheet in the corrugations between tubes to a portion not normal to the stay rod.

2. A header for boilers, having boiler tubes inclined from the horizontal said header having a corrugated tube sheet with horizontally extending portions inclined from the general plane thereof for receiving the tubes, said portions being normal to the longitudinal axes of the boiler tubes and other more steeply inclined portions connecting said tubes receiving portions, and rods welded in place to stay the header, one end of said rods being welded to said tube sheet in said more steeply inclined portions of the corrugations between tubes, said corrugations being closely spaced to provide a close vertical spacing of the boiler tubes.

3. In a boiler the combination of a vertically disposed header and inclined boiler tubes secured in said header, said header having a tube sheet with corrugations extending continuously in general parallel direction to the rows of boiler tubes, certain portions of said corrugations being provided with portions inclined so as to be normal to the longitudinal axes of the tubes, a hand hole sheet, and stay rods welded to said sheets for tying them together, one end of said stay rods being welded to said tube sheet in the corrugations between tubes to a portion not normal to the stay rod.

4. A welded boiler header comprising sections welded together, one section being a tube sheet provided with corrugations extending continuously in general parallel direction to the rows of boiler tubes, each of said corrugations being provided with a surface normal to the longitudinal axes of inclined boiler tubes to be received thereby, another section being a flat hand hole sheet, and stay rods welded to said sheets, one end of said stay rods being welded to said tube sheet in a portion of the corrugations between tubes more steeply inclined to the header.

5. In a box header for a tube boiler having a tube sheet and a hand hole sheet, said tube sheet being provided with corrugations extending continuously in general parallel direction to the rows of tubes and each of said corrugations having a flat portion to receive the tubes, the combination of stay rods welded to the sheets for tying them together, one end of said stay rods being welded to said tube sheet in the corrugations between tubes to a portion not normal to the stay rod, said stay rods having portions adjacent the sheets for backing up the welds.

JOHN R. KRUSE.