July 12, 1932. H. J. KERR 1,866,570

TUBE SUPPORT

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Fig. 1.

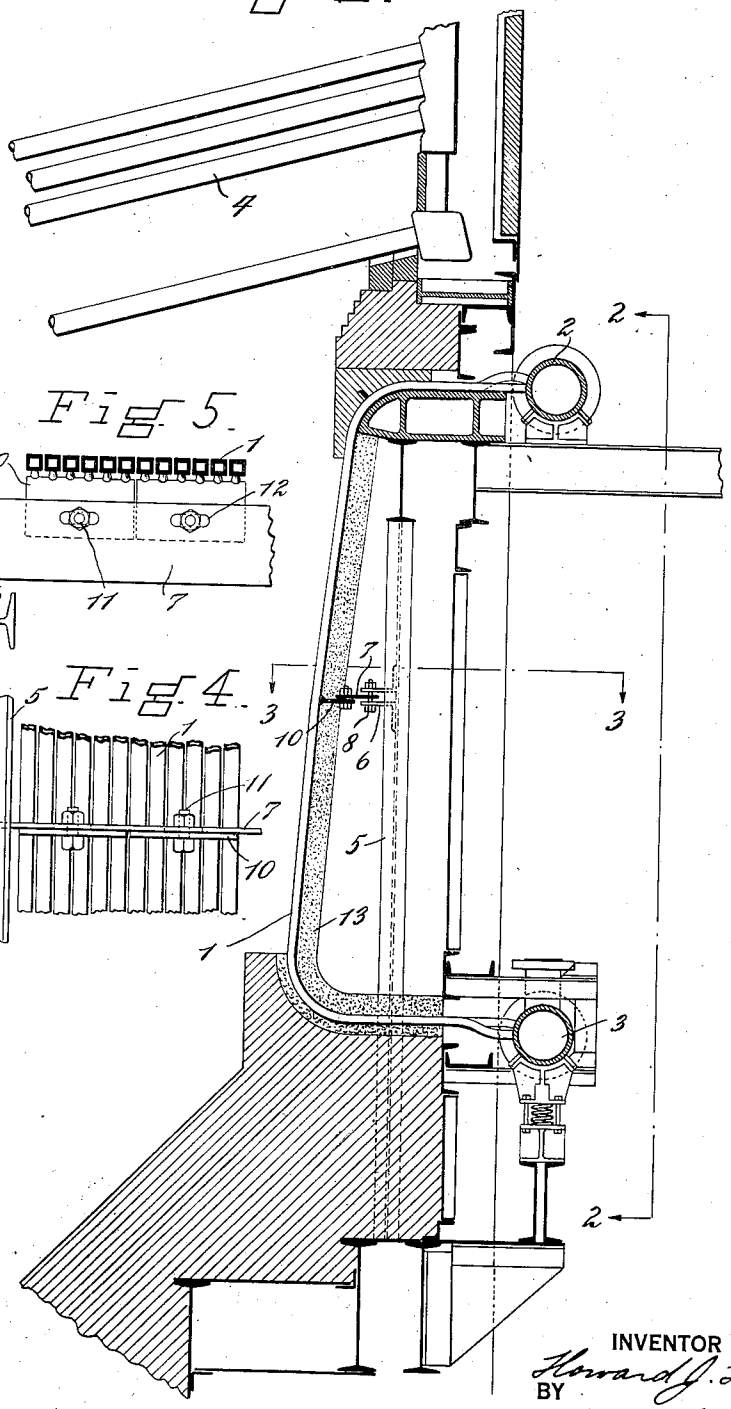


Fig. 5.

Fig. 4.

INVENTOR
Howard J. Kerr
BY
Gifford, Scull & Burgess
ATTORNEY

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Fig. 3.

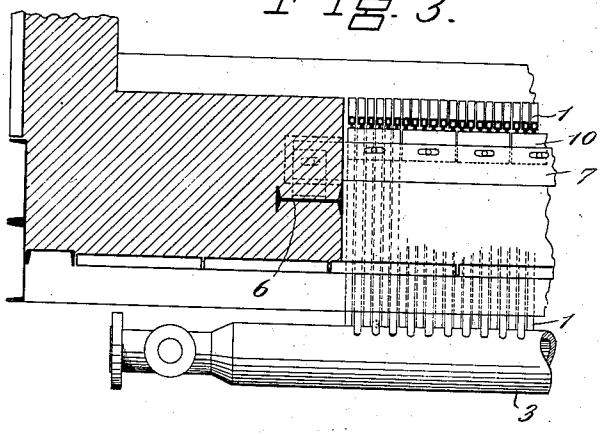
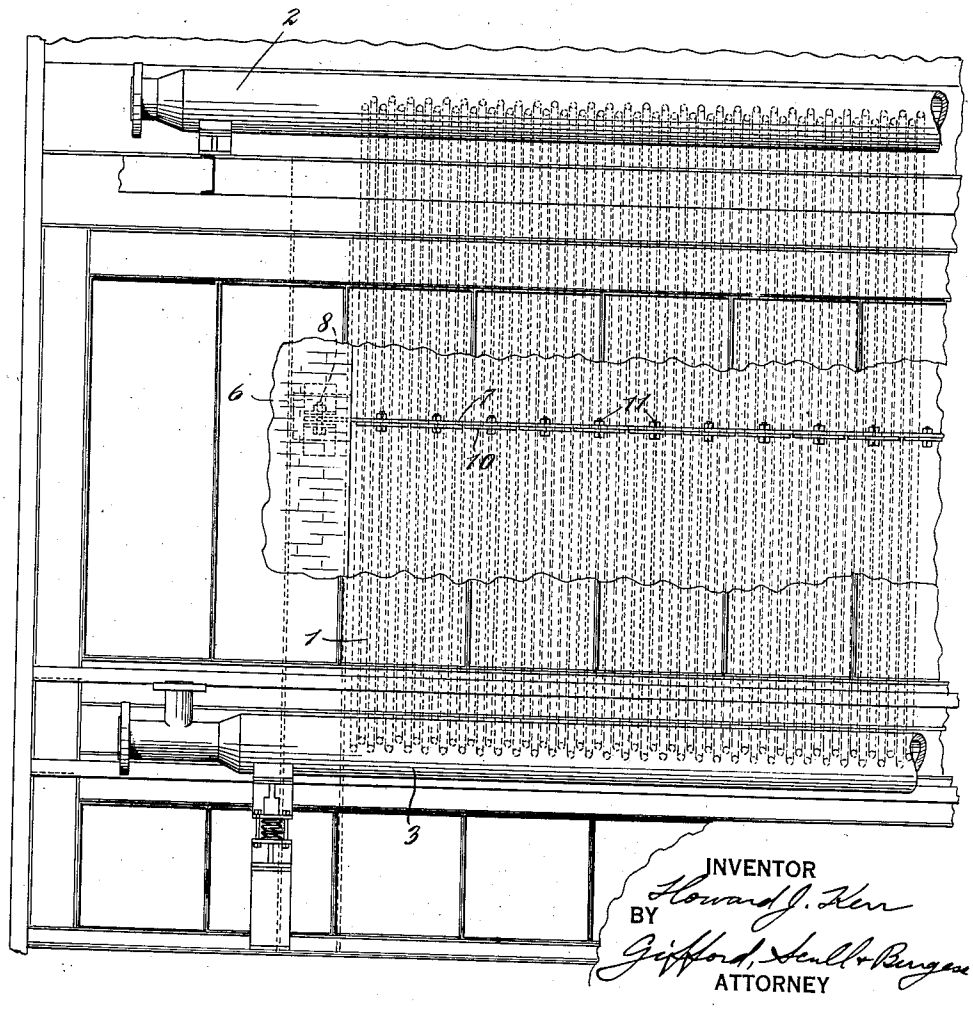


Fig. 2.



INVENTOR
Howard J. Kerr
BY
Gifford, Scull & Burgess
ATTORNEY

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Fig. 8.

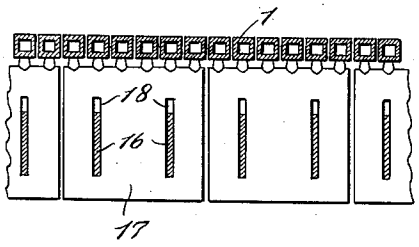


Fig. 9.

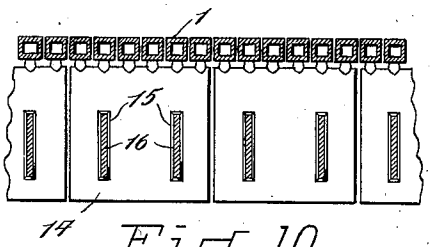


Fig. 10.

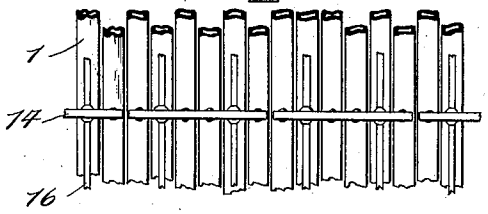


Fig. 6.

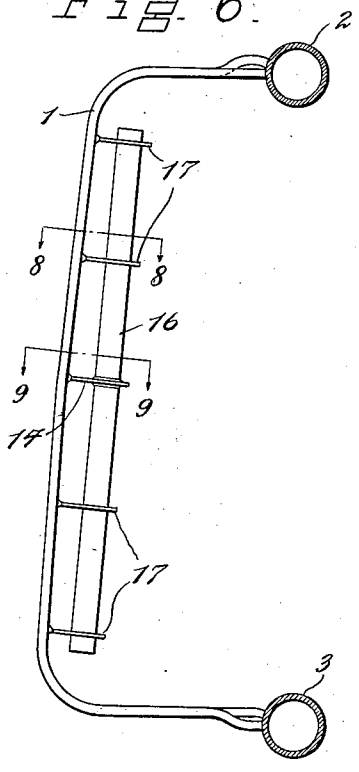
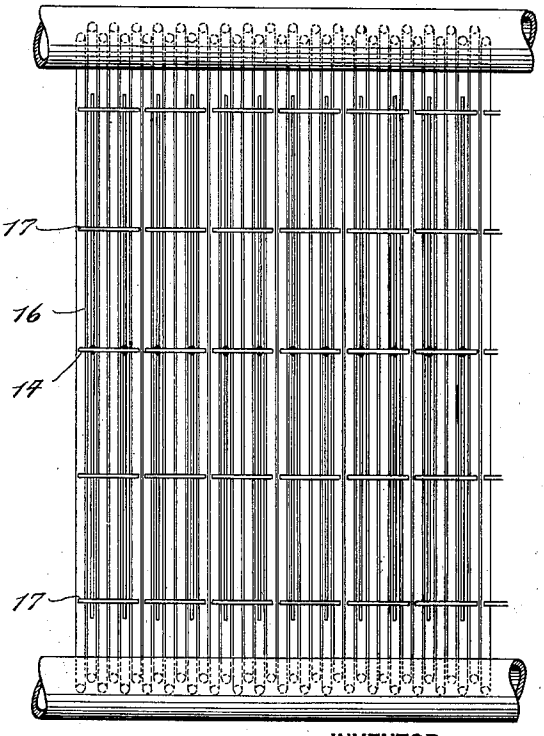


Fig. 7.



INVENTOR
Howard J. Kerr
BY
Gifford, Scull & Burgess
ATTORNEY

Patented July 12, 1932 1,866,570

UNITED STATES PATENT OFFICE

HOWARD J. KERR, OF WESTFIELD, NEW JERSEY, ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY

TUBE SUPPORT

Application filed June 18, 1929. Serial No. 371,910.

This invention relates to a novel and improved form of tube support particularly adapted for use with radiant heat superheaters, in connection with which it will be illustrated and described. In the accompanying drawings, I have shown selected embodiments of the invention, and referring thereto;

Fig. 1 is a vertical sectional view through a furnace and the lower part of a boiler showing a radiant heat superheater with the tubes supported according to one form of the invention.

Fig. 2 is a view taken on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary section taken on the line 3—3 of Fig. 1.

Fig. 4 is a view on an enlarged scale, and showing some of the structure appearing in Fig. 2.

Fig. 5 is a horizontal section through the structure appearing in Fig. 4.

Fig. 6 is a vertical sectional view through a superheater having the tubes supported according to a different form of the invention.

Fig. 7 is a view taken from the right of Fig. 6.

Fig. 8 is a section on the line 8—8 of Fig. 6.

Fig. 9 is a section on the line 9—9 of Fig. 6.

Fig. 10 is a view on an enlarged scale showing certain of the structure appearing in Fig. 7.

Referring first to Figs. 1 to 5 inclusive, I have shown the invention as employed with a radiant heat superheater in the form of tubes 1 exposed on their front faces to the heat from the furnace, and connected at their opposite ends to inlet and outlet headers 2 and 3. The superheater tubes are disposed in the wall of a furnace, as plainly shown in Fig. 1, the furnace in this illustration being used to supply heat to a boiler, some of the tubes of which are shown at 4.

Disposed outwardly from the superheater tubes are vertically extending fixed members 5 having mounted thereon angle plates 6. These angle plates are shown as arranged in pairs with horizontally extending legs spaced apart vertically so as to receive therebetween a horizontally extending buckstay 7, this buckstay being held in position by means of a bolt 8 passing through the two angle plates 6 and received within a slot 9 in the buckstay. While in this illustration I have shown one of these buckstays, it is to be understood that any other number may be used.

The tubes are arranged in a row, as shown, and are divided into groups, in this illustration each group including six tubes. All of the tubes in a group are welded or otherwise secured to a cross-piece 10, and these cross-pieces are preferably in the form of horizontally extending plates, the tubes being welded to the front edges of the plates, the plates being spaced from each other but overlapping the buckstay 7. Bolts 11 pass through openings in the buckstay and are received in slots 12 in the cross pieces, elongated in a direction transversely of the tubes, whereby a certain amount of movement may take place between the different parts and whereby ease of assemblage is achieved.

While the tubes 1 are shown bowed towards the furnace, nevertheless it is to be understood that the tubes may equally well be made straight, without departing from the invention. Similarly, while the tubes are shown square, so as to provide a substantially continuous face on the furnace side, it is of course to be understood that other forms of tubes may be employed. In practice, the spaces between adjacent tubes are closed with a moldable brick filling and the backs of the tubes are covered with a suitable insulating material 13.

Referring now to Figs. 6 to 10 inclusive, the tubes 1 are here arranged in groups, as in the previously described form, and the tubes in each group are secured to cross-pieces 14 similar in some respects to the cross-pieces 10. In this form, however, there is not used any fixed support to which these cross-pieces are secured, but instead, the cross-pieces are provided with horizontal slots 15 through which pass vertically extending stiffening plates 16, these plates being welded to the cross-pieces 14 where they pass therethrough. On either side of the cross-pieces 14 I have shown two other cross-pieces 17, two of these being above and two below the cross-pieces 14. As plain-

ly shown in Fig. 8, the plates 16 are received in slots 18 in the cross-pieces 17, and there is no fixed connection between these members so that the cross-pieces 17 may move with respect to the plates 16 and transversely of the tubes for the limited amount permitted by the slots 18.

I claim:—

1. In combination, a furnace wall having a row of tubes therein subjected to the heat of the furnace, a fixed support disposed exteriorly of the tubes, a cross-piece fixed to the backs of a plurality of tubes, a buckstay extending transversely of the tubes, expansible connections between said cross-pieces and said buckstay, and expansible connections between said buckstay and said support.

2. In combination, a furnace wall having therein a plurality of vertically extending tubes subjected to the heat of the furnace, a cross-piece connecting a group of said tubes and fixed thereto, a fixed support, and an expansible connection between said cross-piece and said support.

3. In combination, a furnace wall having therein a plurality of vertically extending tubes subjected to the heat of the furnace, a cross-piece connecting a group of said tubes and fixed thereto, a horizontally extending buckstay adjacent a plurality of said cross-pieces, and expansible connections between the buckstay and the cross-pieces.

4. In combination, a furnace wall having therein a plurality of vertically extending tubes subjected to the heat of the furnace, a cross-piece connecting a group of said tubes and fixed thereto, a horizontally extending buckstay adjacent a plurality of said cross-pieces, expansible connections between said cross-pieces and said buckstays, a fixed support, and expansible connections between the support and said buckstay.

5. In combination, a furnace wall having therein a plurality of vertically extending tubes subjected to the heat of the furnace, a plurality of plates each having one edge secured to a group of tubes, a horizontally extending buckstay, and bolts on said buckstay and passing through slots in said plates.

6. In combination, a furnace wall having therein a plurality of vertically extending tubes subjected to the heat of the furnace, a plurality of plates each having one edge secured to a group of tubes, a horizontally extending buckstay, and bolts on said buckstay and passing through slots in said plates extending transversely of the tubes.

7. In combination, a furnace wall having therein a plurality of vertically extending tubes subjected to the heat of the furnace, a plurality of plates each having one edge secured to a group of tubes, a horizontally extending buckstay, bolts on said buckstay and passing through slots in said plates extending transversely of the tubes, a fixed support, and a bolt and slot connection between said support and buckstay.

8. In combination, a furnace wall having therein a plurality of vertically extending tubes subjected to the heat of the furnace, a plurality of plates each having one edge secured to a group of tubes, each of said plates having a slot therein, and means disposed in said slot and limiting movement of the plate and the tubes secured thereto.

9. A radiantly heated steam superheater comprising a row of tubes disposed along a furnace wall, a fixed tube aligning support disposed outwardly of the tubes and extending transversely of the row, and independent cross-pieces between separate groups of the tubes and said support so constructed as to allow limited movement between each cross-piece and the support to maintain the general integrity of the superheater front while permitting bending movements of some of the tubes relative to others.

10. A radiantly heated steam superheater comprising, in combination, a furnace, a row of steam conducting tubes positioned along a wall of the furnace, connectors rigidly joining a plurality of the tubes to each other into one of several groups so that the tubes of each group move in unison relative to other groups and relative to the furnace wall, and aligning means extending lengthwise of the tubes of a group and slidably associated with the connectors of the group to permit endwise movement of the connectors relative to said means while preventing movement of the connectors transversely of said means.

11. A radiantly heated steam superheater comprising, in combination, a furnace, a row of steam conducting tubes positioned along a wall of the furnace, metallic sections each extending across and secured to a plurality of the tubes intermediate their ends and on the wall side of the tubes, a metallic guide member fixed intermediate its ends to one of said sections and extending lengthwise of the tubes joined by said sections, and lost motion connections between the other sections and said guide member for permitting outward or inward bending of the tubes of a group while maintaining the longitudinal operative position of the tubes in the group.

HOWARD J. KERR.