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2,223,215

MOUNTING DEVICE FOR BOILER CASINGS

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FIG. 1.

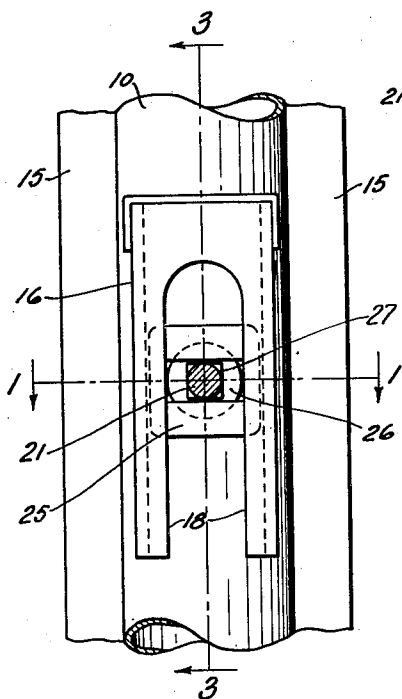
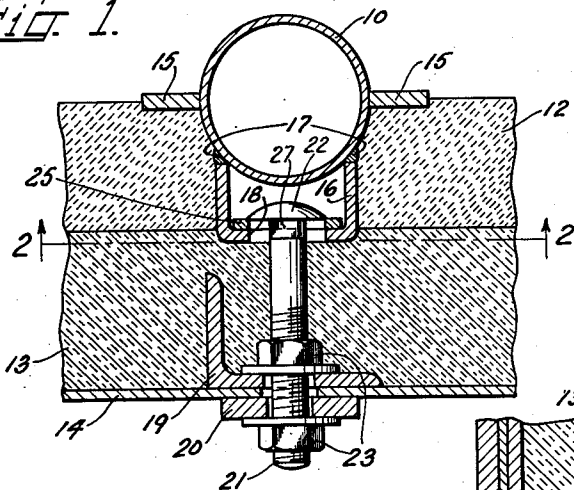


FIG. 2.

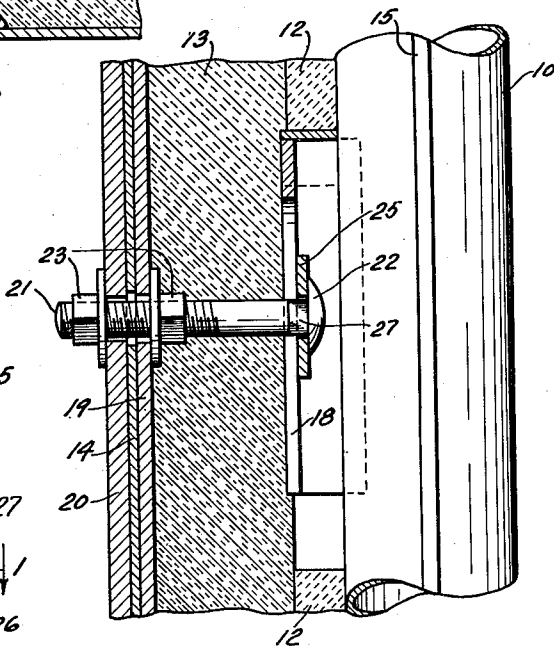


FIG. 3.

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MOUNTING DEVICE FOR BOILER CASINGS

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4 Claims. (Cl. 122-6)

This invention relates to casings for heat exchange apparatus and particularly to an improved means for attaching casing plates to heat exchange tubes in such apparatus.

5 The invention will be described as utilized in the wall of the furnace of a steam generating boiler, although it is capable of wider more general application as will be apparent. In boiler furnaces a typical wall construction includes fluid
10 circulating tubes which line the furnace side of the wall and in back or outwardly of these tubes refractory in the form of a tile, plastic or the like, then an insulating material and finally the boiler casing. This casing is usually made of steel
15 sheets held against the insulation by being attached to the boiler tubes.

During operation of the furnace the wall tubes absorb heat which is transferred to the fluid therein and a tube assumes a temperature approximately that of the fluid. The tile backing
20 up a tube assumes a somewhat lower temperature, the insulation is still cooler and the casing has a temperature somewhat above that of the surrounding room. Due to the differences in expansion between the heated tubes and the comparatively cool casing there is a relative movement and provision must be made in the fastenings which hold the casing to the tube for adequately accommodating these relative movements
30 under expansion.

It is an object of this invention to provide improved means for holding the furnace casing in spaced relation with the furnace tubes which will adequately and freely allow for relative movement
35 between them.

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

Figure 1 is a horizontal sectional view through the wall of a furnace and shows a typical wall tube with the casing secured thereto in accordance with the present invention, the section being
45 taken on the line 1-1 in Fig. 2;

Figure 2 is a sectional elevation taken on line 2-2 in Fig. 1 with the insulation and refractory of the wall removed; and

50 Figure 3 is a sectional elevation on the line 3-3 in Fig. 2.

In the drawing the numeral 10 designates a vertically disposed fluid circulating tube which is backed up on the side away from the furnace of the boiler by refractory 12, insulation 13 and a
55 steel sheet or plate 14 forming part of the boiler

casing. Tube 10 may be provided with fins 15 which aid in the radiant heat absorption from the furnace and also in protecting the refractory 12. On the outer side of tube 10 a channel-shaped metallic member 16 is welded to the tube
5 with the longitudinal edges 17 of its flanges disposed against the tube so as to parallel the major axis of the tube. The web of channel member 16 is provided with a slot 18 which extends inwardly from one end edge along its major portion. As
10 illustrated slot 18 is open at the bottom end edge of the channel.

Casing plate 14 is provided on its inner side with a stiffening member 19 having a flange extending toward the inside of the wall and a plate
15 20 lies opposite said stiffening member on the outside of the casing. A bolt 21 having its head 22 located within the U of channel 16 passes through plate 20, casing 14 and stiffener 19, these three members being clamped firmly together in
20 spaced relation to tube 10 by nuts 23 and washers located on the bolt at opposite sides of plate 14. A plate or shoe 25 is slidably guided within channel member 16 and is so shaped and proportioned that it does not turn therein. Shoe 25 is provided
25 with a transverse slot 26 of a width or height to fit snugly but slidably over a squared portion 27 directly under the head 22 of bolt 21 so as to prevent turning of the latter while permitting movement of the bolt transversely in the
30 slot. With the parts in assembled relation slot 26 in shoe 25 intersects slot 18 in channel member 16 at right angles and parts of both register with bolt 21 passing therethrough.

It will be seen that in this construction the bolt
35 21 is rigidly clamped at right angles to casing plate 14 and its stiffening members and is also held at right angles to the tube 10 and the associated channel member 16. Difference of expansion vertically between tube 10 and casing
40 plate 14 is accommodated by vertical sliding movement of the bolt 21 and shoe 25 relatively to channel 16 and tube 10 as permitted by slot 18. The relative horizontal difference in movement between the tube 10 and casing plate 14 is
45 accommodated by a transverse movement of the bolt 21 in slot 26 of shoe 25. With this construction it is impossible for bolt 21 to cock at an angle with respect to casing plate 14 and therefore with respect to tube 10 and its channel member 16,
50 with the result that the bolt is free to slide in both directions and will not bind.

As illustrated in the drawing it is assumed that the tubes 10 and casing plate 14 are suspended from above. When cold the bolt 21 would
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be positioned near the lower end of the slot 18 in channel 16. When heated the tube expands downwardly more than the casing so that the bolt 21 moves upwardly in the slot 18. Should the tube and casing plate be supported from below, the whole assembly would be inverted for then the tube would expand upwardly more than the casing plate. The relative positions of slot and bolt may thus be accommodated to the relative expansions in any direction. Obviously the relative positions of the bolt 21 within the slot 26 of shoe 25 may be shifted to one side to suit a cold position.

Our improved design has the further advantage in that the tubes can be removed into the furnace without the necessity of dismantling either the tile, the insulation or the casing. For this purpose, as best shown in Fig. 3, the tile 12 has been omitted for a distance below the channel member 16 thus forming a pocket into which the bolt head 22 and shoe 25 can be lowered after the outside nut 22 has been loosened. Since the insulation 13 is rockwool or similar yieldable material, the inner end of bolt 21 may be canted downwardly so that shoe 25 disengages channel member 16, thereby releasing tube 10 for removal. The channel member may be fastened to two adjacent tubes, particularly if the tubes are without fins and closely spaced, such as bifurcated tubes, the legs of the channel being welded to each one of the tubes. The channel then serves as a spacing and stiffening member between the adjacent tubes as well as a part of the yielding spacing means for the tubes from the casing.

Although an illustrative embodiment of our invention has been described in detail, there are many changes and variations that may be made without departing from the invention and therefore it is desired and intended to include all such changes and variations within the scope of the appended claims.

What we claim is:

1. In combination with a heat exchange tube; a channel member attached along the longitudinal edges of its flange portions to said tube and having its web or base portion formed with a slot extending inwardly from one end edge thereof; a shoe slidably mounted on the inner face of the web of said channel and restrained from turning movements in said channel, said shoe being provided with a slot intersecting and extending at right angles to the slot in the web of said channel; and a fastening bolt disposed with its head located within said channel and having a shank extending through aligned portions of the slots in said shoe and channel and formed adjacent said head with a portion so fitting the slot in said shoe as to inhibit turning of the bolt while permitting relative movements of said bolt and shoe in the direction of the major axis of the slot in the latter.

2. In combination with a heat exchange tube; a channel member attached along the longitudinal edges of its flange portions to said tube and having its web or base portion formed with a slot extending inwardly from one end edge thereof; a shoe slidably mounted on the inner face of the

web of said channel and restrained from turning movements in said channel, said shoe being provided with a slot intersecting and extending at right angles to the slot in the web of said channel; and a fastening bolt disposed with its head located within said channel and having a shank extending through aligned portions of the slots in said shoe and channel and formed adjacent said head with a portion so fitting the slot in said shoe as to inhibit turning of the bolt while permitting relative movements of said bolt and shoe in the direction of the major axis of the slot in the latter, a structural member having an aperture through which the shank of said bolt extends; and nuts on said bolt positioned at opposite sides of said structural member for securing it in spaced relation to said tube.

3. In a wall structure including a substantially vertically disposed heat exchange tube; a channel member having the longitudinal edges of its flange portions welded to said tube parallel to the axis thereof and having its web portion formed with a vertical slot extending from one end edge thereof parallel to the longitudinal axis of said tube; a shoe slidably mounted in said channel and restrained from turning movements in said channel, said shoe being formed with a horizontally extending slot intersecting the vertical slot in the web of said channel; a bolt disposed with its head located within said channel and having a shank extending through aligned portions of the slots in said shoe and channel and formed adjacent said head with a portion so fitting the slot in said shoe as to inhibit turning of the bolt while permitting relative transverse movements of said bolt and shoe; a casing plate having an aperture through which said bolt shank extends; nuts on said bolt positioned at opposite sides of said casing plate for mounting it in spaced relation to said tube; and filling material between said channel and said casing plate.

4. In a furnace wall having water cooled furnace tubes arranged on the inner face and a casing on the outer face, spacing means between the tubes of the casing comprising members fastened to said tubes, each member having a portion in a plane parallel to said casing, a slot in said portion extending parallel to the longitudinal axis of said tubes, a shoe constructed and arranged to slide in said slot in the direction of said axis but restrained from revolving about or moving in the direction of an axis at right angles to the plane of the casing, said shoe having a slot extending at right angles to the slot in said member and a fastening bolt disposed with its head located on the side of the shoe toward the tubes and having a shank extending through the slot of the shoe and formed adjacent said head with a portion fitting the slot in said shoe to prevent revolving the bolt while permitting movement of said bolt in the direction of the major axes of both of the slots, the thread end of said bolt being rigidly fastened to the casing at right angles thereto.

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