Oct. 8, 1935. H. LIESSENBERG 2,016,787

BOILER

Filed March 2, 1934

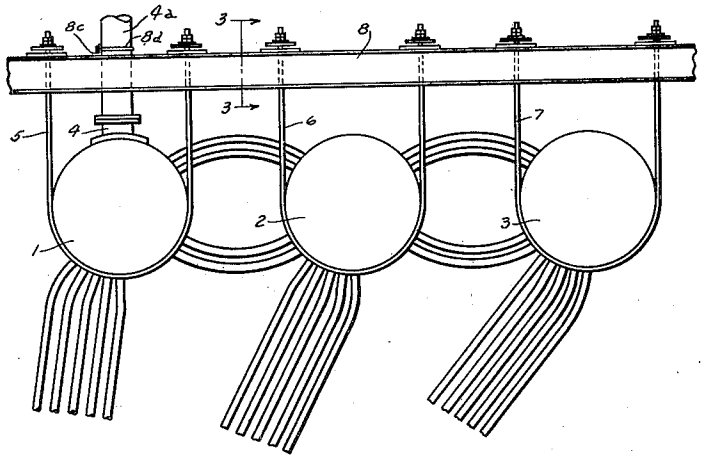



FIG. 1.

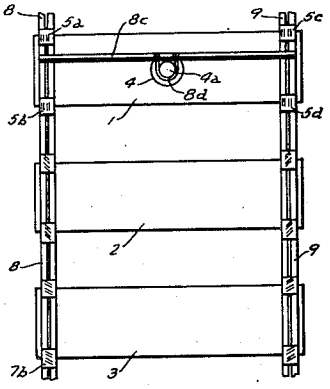



FIG. 2.

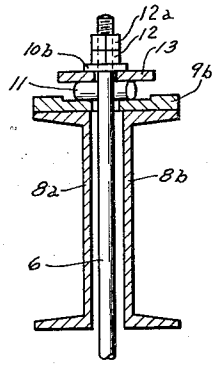



FIG. 3.

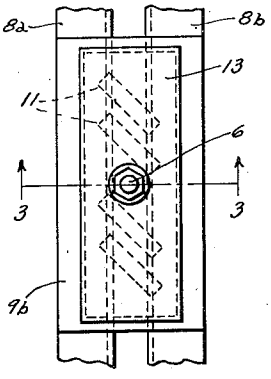



FIG. 4.

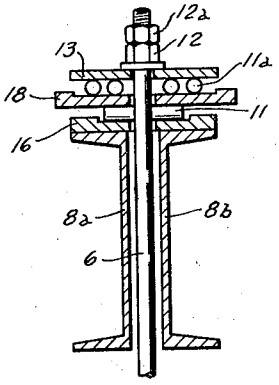



FIG. 5.

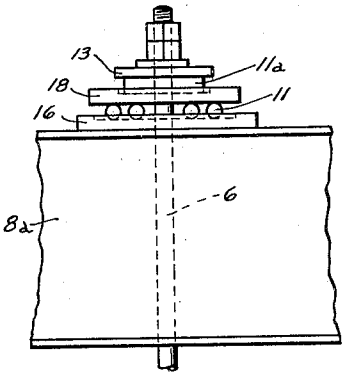



FIG. 6.

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## BOILER

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Application March 2, 1934, Serial No. 713,644

3 Claims. (Cl. 122—510)

This invention relates to boilers and is concerned particularly with means for supporting the boiler proper.

Ordinarily the boiler proper is supported on steel work separate from the brick-work of the boiler-housing so that the two can expand independently. This is the method of suspension with which the present invention deals. The object of the present invention is to provide improved means for supporting the boiler on such independent steel work. The particular novel points of the invention will be pointed out more definitely in the claims. Some specific embodiments of the invention are described in the following specification and illustrated in the drawing filed herewith. In the drawing Fig. 1 is a fragmentary view of a water tube boiler showing its three upper drums supported in accordance with my invention; Fig. 2 is a diagrammatic top view of the boiler of Fig. 1; Fig. 3 is an enlarged sectional view on line 3—3 of Fig. 1; Fig. 4 is a top view of Fig. 3; Fig. 5 is a view similar to Fig. 3 showing a variation; and Fig. 6 is a view at right angles to Fig. 5.

Underlying my invention is the fact that a boiler expands and contracts in all directions with temperature variations. In a boiler of the Stirling type for example, there will be expansion in a direction from front to back as well as in a direction transverse to the boiler, i. e. parallel to the axes of the drums. The expansion and contraction of the boiler parts results in general in movement of one part relatively to another. The present invention facilitates this movement so that no strains will be produced thereby in the boiler. By my invention the movement at any given point of support always occurs in the same line and at the same temperatures each point of support will always be in the same position.

Referring first to Figs. 1 and 2, reference numerals 1, 2, and 3 designate the three boiler drums. Steam is taken off drum 1 through nozzle 4 and pipe 4a. As will be brought out more fully below, my invention requires that some one point of the boiler be fixed so that it will not move horizontally relatively to the supporting steel work. This point is, in the form illustrated, the nozzle 4. The pipe 4 is shown fixed relatively to this steel work by means of the members 8c and U-bolt 8d. As will be clear from the discussion, the fixed point might be some other point in the boiler. The three boiler drums are suspended by U-shaped hangers, three of which are visible in Fig. 1 and are designated by the numerals 5, 6, and 7. Three more are at the farther ends of the drums 1, 2, and 3 directly behind the hangers shown. The fixed steel work to which these hangers transmit the load includes two horizontal beams 8 and 9. Each of these beams comprises, in the form illustrated (see Figs. 3 and 4), two channels 8a and 8b. The constructions are generally alike at all points of support, that at the left branch of the U-shaped hanger 6 being shown in detail. A plate 9b rests on the two channels. The left end of the hanger 6 extends through between the two channels 8a and 8b and through an opening in the plate 9b, as well as through a second plate 13 and the washer 10b, and has on its upper end the adjusting nut 12 and locknut 12a. Between plate 13 and the plate 9b are interposed parallel rollers 11—11, there being in the form illustrated two such rollers at each side of hanger end 6.

The direction in which the rollers 11—11 are placed at the various points of support relatively to the fixed point 4 is important. With point 4 fixed, the drum 1 expands or contracts in a direction parallel to its axis as well as in a forward and backward direction that is transverse to its axis. The direction in which motion at the points 5a, 5b, 5c, and 5d occurs will be very nearly parallel to the axis of the drum. The rollers, to make this motion possible without straining the suspension strap in any way, are therefore placed so that their axes are substantially at right angles to the axis of the drum.

At other points the position of the rollers 11 will be different. For example, at the point 7b the motion due to expansion or contraction will be a component of the forward and backward expansion of the boiler and the transverse expansion. This can be quite accurately calculated and the rollers are placed in such a position that they are at right angles to the expected movement.

For other points similar calculations are made and the rollers placed in proper position.

With the rockers properly placed, it will be clear that expansion and contraction of the boiler will occur without throwing any stress on the boiler parts or on the suspending rods.

Instead of accurately calculating the movement which may be expected at any given point relatively to a fixed point of reference, provisions may be made so that no matter what the direction of the movement is, no stress will be thrown on the boiler parts. Figs. 5 and 6 illustrate a form having such provisions. The steel work 8a—8b supports a plate 16 on which are located the rollers 11—11. A plate 18 in turn rests on them and sup-

ports the rollers 11*a*—11*a* which in turn support the plate 13. The two sets of rollers are placed at some angle, preferably a right angle, to each other, thereby providing free universal motion in a horizontal plane. The hanger end 6 extends between the rollers of each set and through the plates 16, 18, and 13 and carries at its upper end the nuts 12 and 12*a*. The arrangement evidently permits movement of the supported point in any horizontal direction.

What I claim is:

1. In a boiler having a plurality of drums, means to support said drums comprising in combination horizontal steel work above the drums, U-shaped straps in which the drums rest, plates above and parallel to the steel work, means to transfer the load from the straps to the plates, and means comprising sets of rollers to transfer the weight from the plates to the steel work.

2. In a boiler having a drum, the combination of horizontal steel work above the drum, means fixing one point of the boiler relatively to the steel work as to movement in all horizontal directions, a U-shaped metal strap in whose rounded portion the drum rests and whose straight legs extend upward, apertured horizontal plates through which said legs extend, means to transfer the weight supported by said legs to said plates, and rollers interposed between said plates and said steel work to transmit the weight to the steel work.

3. Apparatus according to claim 2, the rollers under each plate comprising two superposed sets at an angle to each other.

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