March 19, 1935. E. G. BAILEY 1,994,456

RESILIENT HOLDING MEANS

Original Filed July 9, 1927

Fig. 1.

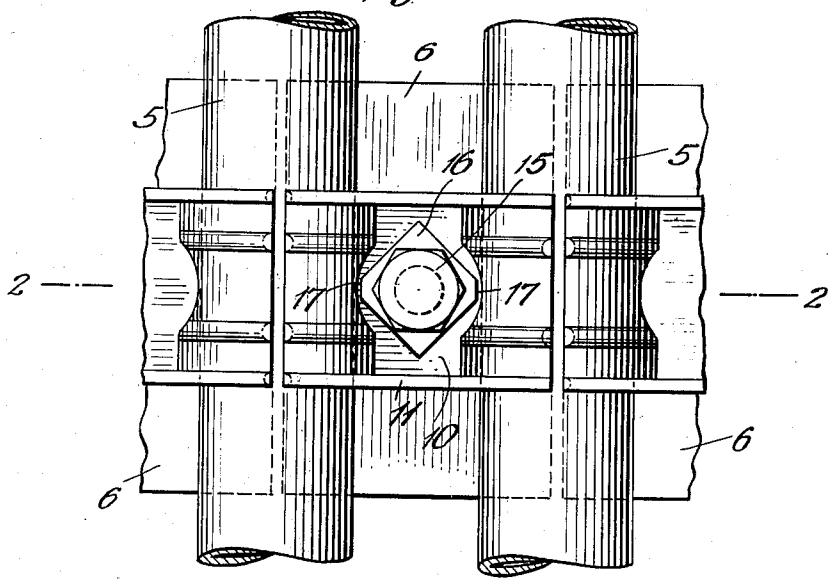


Fig. 2.

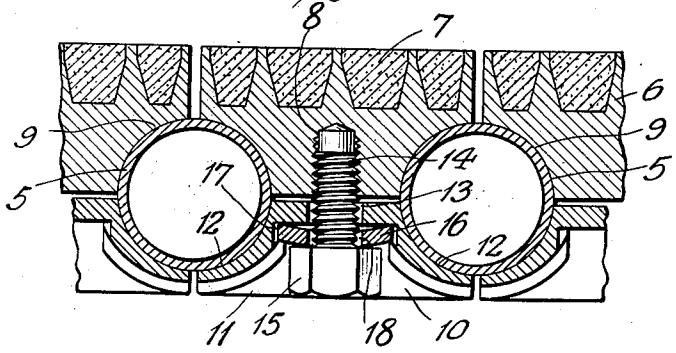
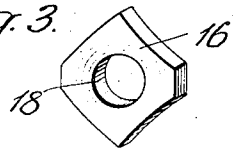


Fig. 3.



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RESILIENT HOLDING MEANS

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2 Claims. (Cl. 122—6)

By the present invention two members can be drawn toward each other under a yielding tension and can be moved short distances toward and away from each other while still maintaining the yielding tension on the members. In order to make the invention readily understood and to show a practical embodiment of the same, I will describe it in connection with tile or blocks that are held in firm but yielding engagement with water tubes to make up a water cooled furnace wall, but it is to be understood that the invention is not restricted to this particular use.

The invention will be understood from the description in connection with the accompanying drawing illustrating an embodiment of the invention, in which Fig. 1 is a front view partly broken away showing an application of the invention; Fig. 2 is a section along line 2—2 of Fig. 1; and Fig. 3 is a perspective view of a spring washer.

In the drawing reference character 5 indicates water tubes that may be installed in the walls of a boiler furnace and be connected to the water circulation system of the boiler for the purpose of keeping the walls cool. Metal blocks 6 that are provided with refractory material 7 on the furnace sides thereof have threaded holes 8 to receive screw-threaded bolts, and the ends of the blocks 6 are rounded as indicated at 9 to fit closely and have an extended contacting surface with the tubes 5.

Metal saddles or holding members 10 that are provided with strengthening ribs 11 and have rounded portions 12 to fit against the tubes 5, have holes 13 intermediate their ends through which threaded stud bolts 14 having heads 15, extend.

Spring washers 16 are interposed between the heads of the bolts 15 and the flat surfaces of the holding members 10 surround the holes 13. These washers are preferably square in shape and have their opposite corners cut away as indicated at 17, although other shapes may be used. The washers are made of a metal that will remain resilient even after being heated to considerably elevated temperatures. Special alloy steel that will hold its resiliency at temperatures of 600° or 700° F. have been found to be quite satisfactory in certain installations. Each washer is bent so that its opposite corners 17 will rest upon a flat surface of a saddle 10 while the middle portion through which the hole 18 extends is bent downwardly, or the washer is curved in one direction so that the portion intermediate the edges is offset from the line joining the opposite cut-away corners. It will be obvious that when the washers are made square and bent, as described, a large amount of metal will remain across the central portion even when the hole is cut out, thus giving great strength to resist bends. The washers may, however, be bent or curved at right angles to the way that has been shown and described.

In using the invention for keeping the tile 6 in place, the bolt 14 is screwed in a sufficient distance to cause the washer 16 to be partially straightened out, thus placing the bolt under tension but still making it possible for the block 6 and the saddle 10 to move relative to each other due to expansion and contraction. As the blocks move away from each other the washer 16 will straighten out, so as to become somewhat more nearly flat due to the fact that only its opposite corners contact with the supporting surfaces, and if the blocks 6 and the saddles 10 move slightly toward each other the central parts of the washer 16 will spring outwardly, thus keeping the bolts under tension and maintaining the parts in firm contact with the tubes 5.

I claim:

1. In fluid heat exchange apparatus, a row of spaced fluid conducting tubes constituting a furnace wall structure, heat conducting blocks bridging the tubes and arranged in proximity so as to present a furnace wall shielding the tubes from the radiant heat of the furnace, tube seat portions on each block closely fitting the tubes over their innermost surfaces with reference to the furnace to an extent of about 90° on each tube, intermediate block portions on each block located between the tube seat portions and extending between the mid-portions of adjacent tubes, backing members bridging the tubes on their outer sides with reference to the furnace and extending between adjacent tubes to positions in close proximity to the intermediate portions of the blocks, tension members extending through the backing members into the blocks into threaded engagement with the blocks so as to provide large and wide masses of the block on opposite sides of the tension member and in contact with the mid-portions of the tubes, and heat resisting resilient expansion take-up devices interposed between the outer ends of the tension members and the backing members to maintain yieldingly an adequate force pressing the blocks into good heat transfer contact with the tubes, said devices transmitting said tension force from the tension members to the backing members at

positions closely adjacent the tubes with a beam action.

2. In fluid heat exchange apparatus, a row of spaced fluid conducting tubes constituting a furnace wall structure, heat conducting blocks bridging the tubes and arranged in proximity so as to present a furnace wall shielding the tubes from the radiant heat of the furnace, tube seat portions on each block closely fitting the tubes over their innermost surfaces with reference to the furnace to the extent of a major portion of a quadrant of a cross section of the associated tubes, intermediate block portions on each block located between the tube seat portions and extending between the mid-portions of adjacent tubes, backing members bridging the tubes on their outer sides with reference to the furnace and extending between adjacent tubes to positions in close proximity to the intermediate portions of the blocks, tension members extending through the backing members and rigid with the blocks so as to provide large and wide masses of the blocks on opposite sides of the tension member and in contact with the mid-portions of the tubes, and heat resisting resilient expansion take-up devices interposed between the outer ends of the tension members and the backing members to maintain yieldingly an adequate force pressing the blocks into good heat transfer contact with the tubes, said devices transmitting said tension force from the tension members to the backing members at positions closely adjacent the tubes with a beam action.

ERVIN G. BAILEY.