Oct. 16, 1934. W. H. SCOTT ET AL 1,977,247

TUBE HANGER

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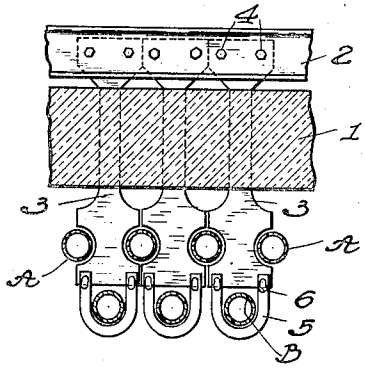


Fig. 1

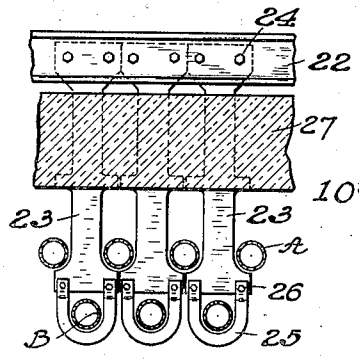


Fig. 7

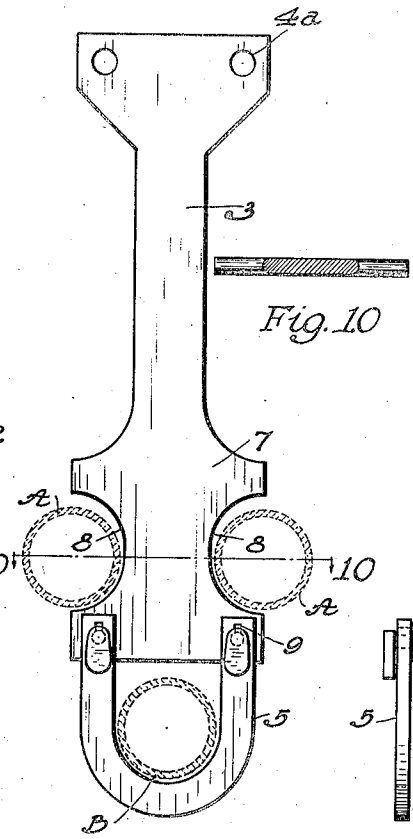


Fig. 2

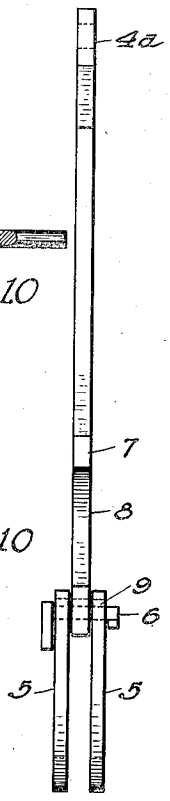


Fig. 3

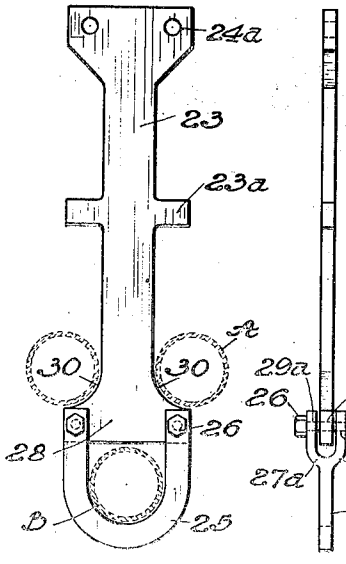


Fig. 8

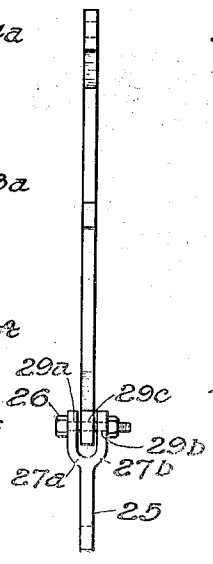


Fig. 9



Fig. 5

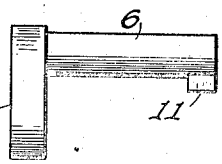


Fig. 4



Fig. 6

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TUBE HANGER

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8 Claims. (Cl. 122—510)

This invention relates to improvements in tube hangers or supports. In furnaces, and particularly oil cracking and oil reducing furnaces, in which tubes are suspended for heating purposes it is frequently desirable to suspend the tubes in a plurality of horizontal rows. Thus, in oil stills, this arrangement of suspending tubes is frequently desirable. Our invention has for an object an arrangement whereby tubes may be suspended in a plurality of horizontal banks in such fashion that the individual hangers or supports may be readily removed and replaced without the necessity of disarranging the entire assembly of supports.

Our invention involves specifically, furnace tube supports which are subjected to intensely high temperatures requiring that supports be made of special heat resistant alloys. These alloys usually contain high percentages of chromium and are rather fragile and difficult to machine. Other objects will be apparent as our description proceeds.

Our invention is illustrated in the accompanying drawing in which Figure 1 illustrates an assembly of one type of tube hanger or support arranged in accordance with our invention; Figure 2 shows in detail an elevation view of one of our improved tube hangers; Figure 3 shows an edge or side view of this type of tube hanger; Figure 4 shows an elevation view of the keyed pin means used in attaching the U-shaped members to the main part of the tube hanger; Figure 5 shows an end view of the weighted end of the pin; Figure 6 shows an end view of the keyed end of the pin; Figure 7 shows an assembly of a modified arrangement of tube hanger. Figure 8 shows in detail an elevation view of the modified tube hanger; and Figure 9 shows an edge or side view of this modified type of tube hanger. Figure 10 shows a horizontal section taken along the line 10—10 of Figure 2.

As shown in the drawing, reference 1 indicates the flat suspended arch or roof of a furnace. Thus, for example, it may be the top or roof of the combustion chamber of an oil still. 2 indicates a suitable metallic supporting member such as a channel to which the tube hangers 3 are attached by means of suitable elements such as bolts 4. In the arrangement illustrated in Figure 1 of the drawing we have shown two rows of oil tubes, the upper row being indicated by A and the lower by B. Since the individual hangers are similar a better understanding of our design thereof will be obtained from a consideration of Figure 2, it being understood that the hangers are placed in juxtaposition in a plane which is at right angles to the axes of the tubes which are to be supported by the hangers.

The hanger 3 is provided at its upper end with bolt holes 4a by means of which the hanger is supported from the roof of the furnace. Toward the lower portion of the hanger the body thereof is made somewhat wider than any of the remaining part of the support or bracket except the top thereof. This widened portion 7 is provided with two semi-circular indentations 8 adapted to cooperate with adjacent and opposed indentations upon adjacent supports and for the purpose of embracing and supporting the tubes A. Adjacent the bottom of the holder or bracket are two keyed holes 9. A pin 6, provided at one end with a weight 10 and at the other end with a key 11, is provided for insertion through a key in the U-shaped member 5 and thence through the keyed orifice 9 of the hanger or bracket 3 in order to provide readily removably supporting means for attaching the stirrups or U-shaped members 5 to the plate 3. When the U-shaped members 5 are attached to the holder 3 the said U-shaped members afford a support for the tubes B.

The mode of attaching the U-shaped members to the bracket is readily apparent from this description, thus the keyed end of the pin 6 is inserted with both key 11 and weight 10 in an upward position. The key thus passes through the keyed orifice in the U-shaped member 5, the corresponding keyed orifice in the bracket 3 and the corresponding keyed orifice of the second U-shaped member 5. When the key has thus been inserted through all three elements the pin is permitted to turn through an angle of 180°, in which position the weighted end 10 tends to maintain it. In this position the U-shaped members 5 are firmly attached to the bracket 3 but may be readily removed by the simple expedient of turning the pin to an angle of 180° from its normal position and withdrawing the keyed end of the pin through the keyed orifice member of the U-shaped members 5 and bracket 3.

The modified arrangement shown in Figures 7, 8 and 9 is somewhat similar in that the brackets or holders 23 are supported from the channel member 22 by means of suitable bolts 24. The support elements 23 are arranged in juxtaposition in a plane which is perpendicular to the axis of the tubes which are to be supported, as shown in Figure 7 of the drawing. Since the individual tube holders 23 are identical a somewhat better understanding of the construction may be obtained by consideration of Figures 8 and 9 of

the drawing. The upper end of the holder 23 is cored with suitable holes 24*a*. In order to assist in keeping contiguous elements in proper position and also to serve as a seal in the tile arch we have provided near the middle of the holder 23 suitable shoulders 23*a*. These shoulders we have found to be of assistance but not essential. Near the lower extremity of the holder 23 we have provided a shoulder 28, the upper surfaces of which are rounded as shown at 30 to provide partial support for tubes A. It will be apparent that when two or more of the holders 23 are in juxtaposition the rounded portions 30 of adjacent holders will afford a semi-circular support for the tubes A.

Near the lower end of each plate 23 we have provided bolt holes 29. A removable U-shaped member 25 is supported from the main tube hanger 23 by means of bolts 26. The extremity of each leg of the U-shaped member 25 is shaped in the form of a yoke or fork adapted to embrace the lower end of the hanger 23. Bolt holes 29*a* and 29*b* are cored through each element of each yoke in such a fashion that a bolt may be passed through each leg of the yoke, 27*a* and 27*b*, and through the bolt holes 29*c* of the holder 23. It will be readily apparent that we have provided means for the ready assembly and removal of U-shaped member 25.

Our invention is an improvement over the type of tube hanger shown in U. S. Patent 1,815,750 granted to George W. Watts. The tube hangers disclosed in the Watts patent and in this application are usually required to be of cast construction because of the difficulty of machining these alloys. One of the most suitable alloys for the purpose consists of 80% nickel and 20% chromium. Due to the construction and the mechanical properties of the alloy, difficulty must unavoidably be found in the failure of an occasional tube hanger, particularly in an oil furnace in which both tubes and tube hangers are subjected to intensely high temperatures. Moreover, the tubes subjected to these high temperatures sometimes bulge or fail. In the arrangement shown in the Watts patent the removal of a defective hanger or defective tube necessitated the removal of all of the hangers which function to suspend a single tube. In our arrangement a defective support may be readily removed and replaced by a perfect one without the necessity of removing the entire assembly of hangers for a given tube and also without the necessity of removing any tubes.

Moreover, the point of most frequent failure in the tube hanger shown in the prior art was that portion of the hanger below and directly embracing the lowermost row of tubes. This was because the lower extremity of the tube holder was close to and more directly exposed to the source of greatest heat in the furnace. Our improved tube hanger avoids this difficulty in several ways. In the first place, the U-shaped members may be made somewhat thicker than, or of different and more heat resistant material than the main portion of the tube support. Moreover, if the U-shaped member fails it may be readily replaced without the delay and difficulty caused by removing the entire tube hanger or all of the supports of a given tube.

It must be apparent that we have shown and described an improved tube hanger which is not subject to the drawbacks of the prior art and which may be readily employed in supporting tubes in furnaces which are designed to function at extremely high temperatures but which may readily be used in refrigerators.

Since many different embodiments of this invention, apparently differing widely, may be made without departing from the spirit thereof, it is to be understood that we do not limit ourselves to the foregoing description except as indicated in the following patent claims.

We claim:

1. A furnace structure including a plurality of rows of horizontal tubes, a support, and a plurality of tube holders depending from said support, each holder having parts co-operating with parts of adjacent holders for carrying two tubes of one horizontal row of tubes and each holder having holder means for supporting one tube of another horizontal row of tubes, said holder means being detachable from said holder and from said tube.

2. A furnace structure including a plurality of rows of horizontal tubes, a support, and a plurality of tube holders depending from said support, each holder having parts co-operating with parts of adjacent holders for carrying two tubes of one horizontal row of tubes and each holder having at its lower extremity detachable holding means for supporting one tube of another horizontal row of tubes, said detachable holding means comprising a pair of U-shaped members adapted to enclose the tube in parallel planes, each perpendicular to the axis of the tube.

3. A furnace structure including a plurality of rows of horizontal tubes, a support, and a plurality of tube holders depending from said support, each holder having parts co-operating with parts of adjacent holders for carrying two tubes of one horizontal row of tubes and each holder having at its lower extremity detachable holding means for supporting one tube of another horizontal row of tubes, said detachable holding means comprising a pair of U-shaped members adapted to enclose the tube in parallel planes, each perpendicular to the axis of the tube, the upper ends of said U-shaped members being secured to said holder by means of removable pins.

4. A furnace structure such as is claimed in claim 3 in which one U-shaped member is supported on each side of the holder and in which the pin members are weighted at one end thereof and keyed at the other end thereof, being thus adapted for ready insertion into and removal from key-shaped bores in the holder and the extremities of the U-shaped members.

5. A tube hanger construction, for suspending a bank of tubes in a furnace, the tubes in one row of the bank being staggered with respect to the tubes in another row of the bank and parallel therewith, comprising, a support, a plurality of brackets depending from said support, each bracket having parts cooperating with parts of adjacent brackets, at adjacent edges thereof, for carrying two tubes of one of said rows and each bracket having holder means for supporting one tube of said other row, said holder means being detachable from said bracket and from said tube.

6. A tube hanger comprising a member adapted to be suspended from a support, a stirrup for embracing a tube in a plane transverse to the axis of the tube and removable pins for detachably securing said stirrup to said member, said pins being laterally weighted at one end and being keyed at the other end, said member and said stirrup having keyways corresponding to the keys on said pins.

7. A tube hanger construction for suspending

a bank of tubes in a furnace, the tubes in one row of the bank being staggered with respect to the tubes in another row of the bank, comprising, a plurality of brackets, each bracket being provided with a plurality of corresponding tube engaging surfaces for supporting the tubes in different horizontal planes and different vertical planes, each of said brackets have a vertically extending portion adapted to be secured to and to depend from a portion of the roof structure of the furnace, said brackets, when secured to the roof structure and disposed in alignment with one another in substantially one plane transverse the axis of the tubes and in juxtaposition to one another, each supporting one tube in cooperative conjunction with a contiguous bracket and each having at its lower extremity detachable holding means for supporting another tube independently of every other bracket in the same plane, said detachable holding means comprising a pair of U-shaped members adapted to enclose the tube in parallel planes each perpendicular to the axis of the tube, one of the U-shaped members being located on each side of the bracket and detachably secured thereto by pin members weighted at one end thereof and keyed at the other end thereof, said holders and said U-shaped members having key-shaped holes thus adapting the assembly for ready insertion and removal of the pin members in the attaching and detaching of the U-shaped members.

8. In a furnace, a plurality of tubes disposed in a plurality of superimposed horizontal planes, the axes of said tubes being disposed in substantially parallel alignment, means for supporting said tubes in said position in said furnace, said means comprising a plurality of tube supporting brackets and tube supporting stirrups, at least a portion of each said stirrup being detachable from its supporting bracket and shaped to support a tube therein, said stirrup being attached to its supporting bracket by means of keyholes in said stirrup which register with like holes in said bracket and key members insertable in said holes.

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