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TUBE SEAL

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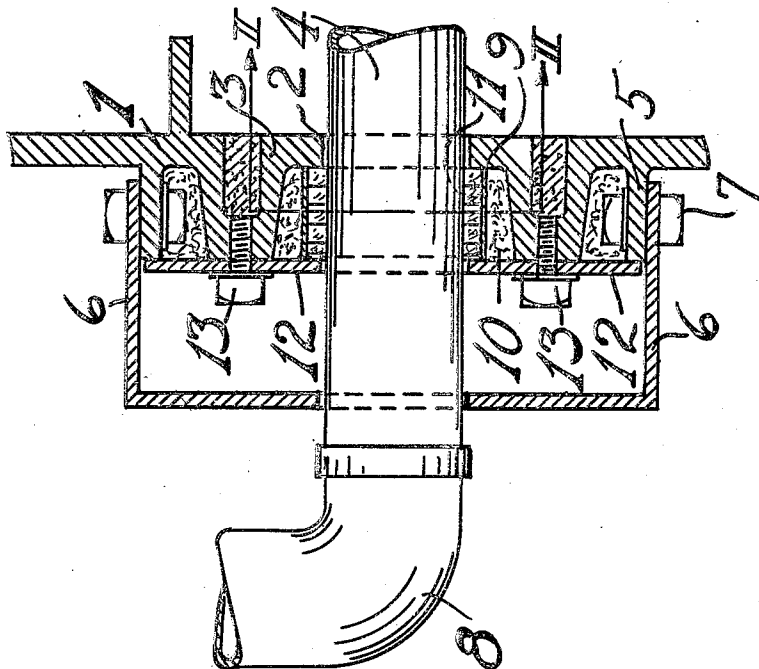
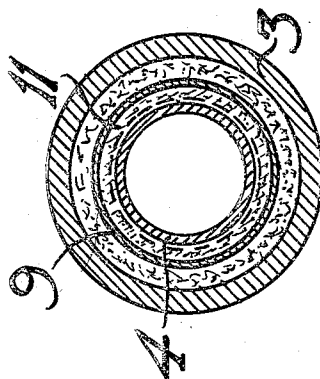


FIG-1



SECTION II-II

FIG.-2

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TUBE SEAL

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5 Claims. (Cl. 285—45)

This invention relates to a method and means for mounting furnace tubes and the like. More particularly the invention relates to a mount for oil furnace tubes, and it is a special object to provide a substantially fluid-tight joint between an oil furnace tube and a furnace tube-sheet or tube support.

The invention and its objects may be fully understood from the following specification when read in conjunction with the accompanying drawing, in which:

Fig. 1 is a vertical section through a portion of a tube-sheet showing the arrangement of the principal elements;

Fig. 2 is a cross sectional view taken along the line II—II in Fig. 1.

Referring to the drawing, the numeral 1 designates a generally conventional oil furnace tube-sheet having a tube opening 2, and provided with an annular flange 3 projecting from the sheet surface around the tube opening to form an opening of varying diameter. The tube 4 extending outwardly through the opening 2 forms with the inner surface of the flange 3, an annular, walled receptacle or cavity in which it is customary to place a packing and sealing material, such as fire clay, in order to support the tube and prevent the escape of gas from the furnace or the entrance of air. Surrounding the flange 3 and concentric therewith, another flange 5 supports an annular shield or housing 6, which is secured to the flange 1 by means of stud bolts 7. The tube 4 passes through the shield as shown and may be connected to the next tube below or above by means of a return bend fitting 8.

The difficulty ordinarily encountered in the conventional arrangement is that the fire clay used to pack the cavity surrounding the tube 4, having a different coefficient of expansion than that of the tube, and being naturally brittle, is cracked and loosened by expansion of the tube when heated. Also, even slight vibration of the tube in the opening of the sheet 1 may cause destruction of the clay packing.

To eliminate such conditions, an arrangement is now provided in which an annular packing ring 9 is inserted in the cavity, encircling the tube 4. The ring 9 is of somewhat larger diameter than the tube, preferably of a metal having a lower coefficient of expansion than that of the tube and approaching more closely that of the fire clay. Between the ring and the sheet wall of the cavity, the ordinary packing of fire clay is inserted as shown at 10, while between the ring and the tube some such fire-proof and resilient

material 11 as asbestos rope, is tightly packed to within a short distance from the outer end of the ring 9. An annular cover plate 12 is then applied in order to close the outer end of the packing cavity. This plate is preferably in one piece and with the housing is applied before the application of the return bend 8. However, if desired, the plate may be in sections properly secured to the flange 3 and to each other. Normally the cover plate 12 will be secured to the flange 3 by means of the stud bolts 13.

In operation, when heat is applied to the tube, rearwardly of the sheet 1, it expands longitudinally and radially to an extent determined by its coefficient of expansion. The ring 9 is also affected by heat transmitted to it principally through the tube sheet 1, but as this ring 9 is of a metal having a lower coefficient of expansion than the tube 4 and as it is subjected to a slightly lower temperature, it does not expand either as rapidly or to such an extent as does the tube. Therefore, the resilient packing 11 is compressed between the tube and ring, absorbing a greater part of the radial expansion which takes place and avoiding cracking or deterioration of the fire clay surrounding the ring. Likewise, the resilient material 11 being only in frictional contact with the tube 4 and not bonded thereto as would be the conventional fire clay packing, permits the tube 4 to expand and move longitudinally in the setting without damage thereto. Ordinarily, compression of the resilient material causes flattening and longitudinal extension thereof to the extent that it will completely fill the annular space and bear against the inner face of the cover plate 12. Upon cooling of the tube, however, the resilience of the material 11 causes it to be substantially restored to shape. Quite apparently a resilient seal of the type provided also functions to reduce or dampen any vibration of the structure as a whole, which may be occasioned by vibrational movement of the tubes.

It should be obvious that the disclosure is capable of some variation within the scope of the inventive concept set forth, and the invention should not be considered as limited by the foregoing specific embodiments described for the purpose of illustration, but only by the appended claims.

I claim:

1. A furnace tube mounting of the character described, comprising a tube sheet having a plurality of walled receptacles on its outer face, a tube end extending into each receptacle through said sheet, an annular sleeve over each tube end,

disposed in spaced, concentric relation to the tube and to the receptacle walls, a resilient seal between each tube and sleeve, a non-resilient packing in each receptacle surrounding the sleeve, and a cover for the receptacle having an opening concentric with the tube.

2. A furnace tube mounting according to claim 1, in which said resilient seal between the tube and sleeve is disposed in spaced relation with respect to the outer end of said sleeve.

3. In a furnace, a tube support having an opening of varying diameter, a furnace tube extending through the opening, a packing ring of larger diameter than the tube surrounding the tube in the relatively larger portion of the opening, packing filling the space between and bonded to the ring and support, the packing having a lower coefficient of expansion than the tube, the ring having a coefficient of expansion intermediate that of the tube and packing, and resilient packing material between and in frictional contact with the ring and tube.

4. In a furnace, a tube support having an opening of varying diameter, a furnace tube extending through the opening, a metallic ring of larger diameter than the tube surrounding the tube in the relatively larger portion of the opening, fire clay filling the space between and bonded to the ring and support, the fire clay having a lower coefficient of expansion than the tube, the ring having a coefficient of expansion intermediate that of the tube and packing, and asbestos packing material between and in frictional contact with the ring and tube.

5. In a furnace tube mounting of the character described comprising a tube sheet having a walled receptacle in its outer face, a tube end extending into the receptacle through said sheet, an annular sleeve over the tube end disposed in spaced concentric relation to the tube and to the receptacle wall, a resilient seal between the tube and sleeve, and a non-resilient packing in the receptacle surrounding the sleeve.

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