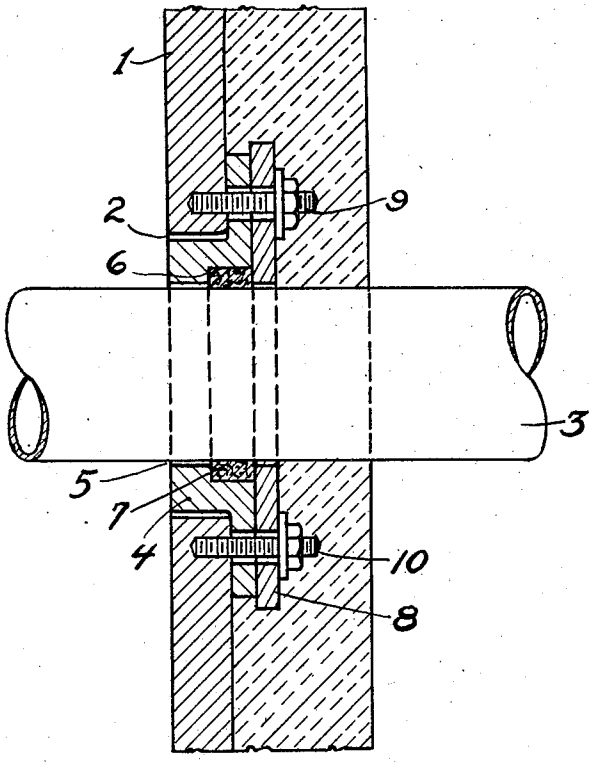
March 6, 1945. J. E. DONAHUE 2,370,782

FURNACE TUBE PLATE DESIGN

Filed Aug. 6, 1942



John E. Donahue Inventor

By P. A. Young Attorney

Patented Mar. 6, 1945 2,370,782

UNITED STATES PATENT OFFICE

2,370,782

FURNACE TUBE PLATE DESIGN

John E. Donahue, Elizabeth, N. J., assignor to Standard Oil Development Company, a corporation of Delaware

Application August 6, 1942, Serial No. 453,795

2 Claims. (Cl. 285—30)

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 has for a special object the provision of a substantially air-tight joint between an oil furnace tube and a furnace tube sheet or tube support by incorporation of a special removable sleeve and packing gland.

The invention and its objects may be fully understood from the following specification when read in conjunction with the accompanying drawing, in which the single figure is a vertical section through a portion of a tube sheet showing the arrangement of the principal elements.

Referring to the drawing, numeral 1 indicates a representative portion of a generally conventional furnace tube sheet, having an opening 2 into which is fitted a tube 3 and a flanged sleeve 4.

The sleeve 4 may be of either solid or split construction. Between sleeve 4 and tube 3 is a very narrow annular space 5. The sleeve 4 has an annular groove 6. Into this grooved portion is inserted packing material 7. The packing material may be any material of suitable soft, wear-resisting and resilient material capable of withstanding the effects of high temperature operation of the motion of the shaft 3, such as asbestos. A retainer plate 8 is attached to the flanged portion of the sleeve 4 and to the tube sheet 1 by means of a nut and bolt combination, as shown, 9 and 10. The bolt-nut combination is graphited before making secure, in order to permit easy dismantling.

The tube seal clearly furnishes a highly advantageous and practical means of sealing tubes in fairly close relation into furnace tube sheets. The seal is easy to construct and it eliminates air filtration into the furnace, thus contributing to better furnace control and operation economy. Furthermore, this type of air-tight seal or joint when used in a completed tube sheet and tube sheet assembly complete with leaders attached, affords seal for the individual tubes and this seal is independent of, and does not interfere with, the additional tube sheet insulation often required for the completed assembly. Moreover, the packing gland can be easily cleaned and repaired. An added feature is that in view of the narrow annular space between the tube 3 and the sleeve 4, sufficient clearance is provided for movement of the tube through the sleeve and for expansion of the tube at high temperatures.

The particular feature of the invention, as shown in the drawing, is that the tube 3 is centered in the tube sheet opening 2 through the medium of an easily removable sleeve 4, and held in air-tight adjustment by means of packing 7 held in the annular groove 6 of the sleeve. Thus, the sleeve-tube combination, attached rigidly to the tube sheet, furnishes a means of readily assembling tubes in furnace tube sheets in a simple and efficient manner and assurance of a gas-tight connection. Furthermore, dismantling and assembling of a tube can be easily effected by removal of the nut-bolt combination 9 which is easily available from the non-furnace side of the tube sheet plate.

It is believed obvious that the disclosure is capable of some variation within the scope of the inventive concept, as set forth in the above description, and the invention should not be considered limited by the foregoing specific embodiment as described for purpose of illustration only.

What is claimed is:

1. In a furnace, a tube support arrangement in which the tube is confined within a flanged sleeve having an annular groove portion as an enlargement on the non-furnace side, said sleeve being rigidly attached to the tube sheet, a soft, wear resisting and resilient material holding said tube in said groove portion of said sleeve in gas-tight connection and a plate through which said tube passes attached to the sleeve and tube sheet by nut and bolt connection.

2. A furnace tube seal comprising the tube passing through a flanged sleeve rigidly attached to a tube support sheet, said flanged sleeve having an annular groove portion on the non-furnace side, a plate through which tube passes attached to the said sleeve and said tube sheet by nut and bolt connection, and soft, wear resisting and resilient material filling space defined by said groove portion of said sleeve and said plate and holding said tube in gas-tight relation.

JOHN E. DONAHUE.