Nov. 5, 1963 J. J. REAGAN ETAL 3,109,423

FIRED TANK HEATER SEAL

Filed June 28, 1962

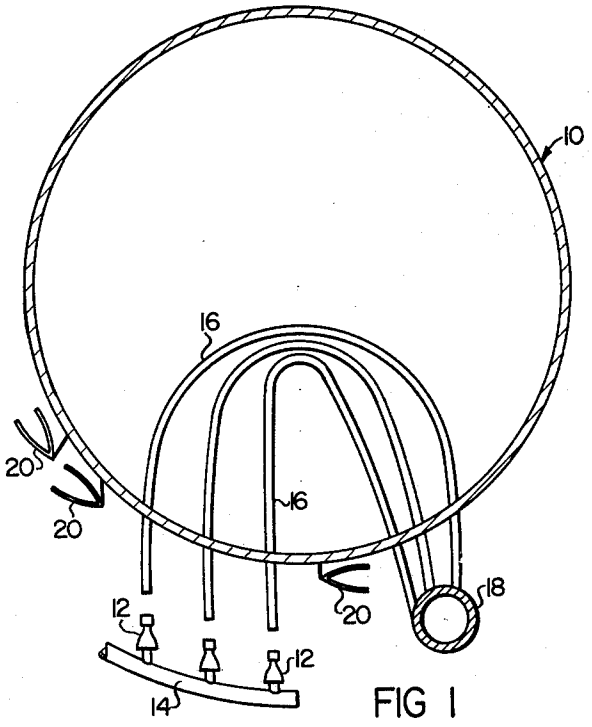


FIG 1

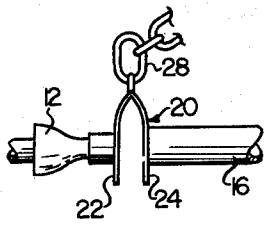


FIG 3

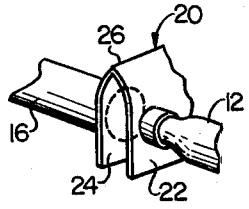


FIG 4

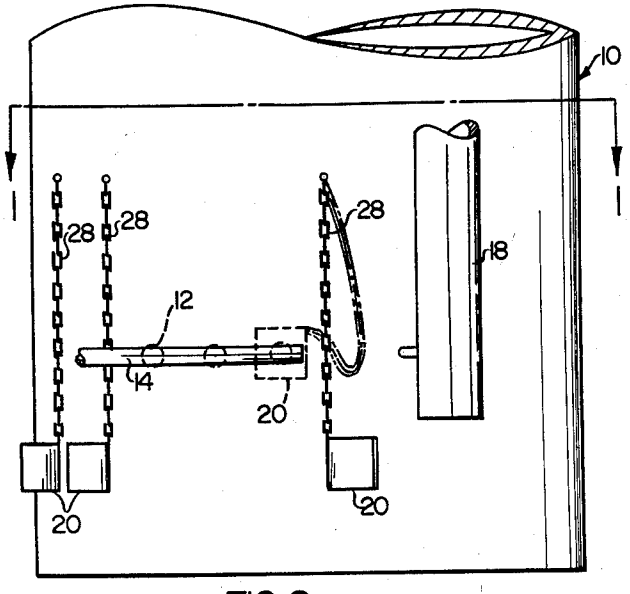


FIG 2

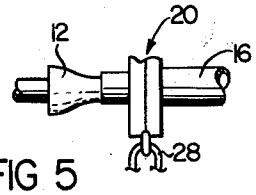


FIG 5

INVENTOR.
JOHN J. REAGAN &
MARVIN L. PAYNE

BY Oberlin, Maky & Donnelly

ATTORNEYS

United States Patent Office 3,109,423 Patented Nov. 5, 1963

3,109,423

FIRED TANK HEATER SEAL

John J. Reagan and Marvin L. Payne, Parma, Ohio, assignors to The Standard Oil Company, Cleveland, Ohio, a corporation of Ohio

Filed June 28, 1962, Ser. No. 206,074
4 Claims. (Cl. 126—360)

This invention relates in general to fired tank heaters and more particularly to means for sealing the idle firetubes of the heater during periods when less than the total number of burners are in operation.

The conventional fired tank heater used to maintain or raise the temperature of the tank contents comprises a plurality of firetubes, gas burners individually associated therewith at corresponding open ends of the same, and a common exhaust stack. Regulation of the heat input to the contents of the tank is provided by varying the number of burners operating or fired at a given time, and when less than all are operative, which often occurs, heat is lost through the one or more unused tubes. This heat loss occurs as a result of ambient air being drawn through the idle firetube or firetubes by the draft in the common stack which will exist even when all burners are off and of course is much more pronounced when some of the burners are operative. Heat lost in this manner must normally be replaced by burning additional fuel.

It has, for example, been found by testing one such installation that the average temperature rise of ambient air drawn through idle firetubes was on the order of 150° F., with the velocity of the air stream through such tubes varying from 400 to 1400 feet per minute. This considerable temperature rise is of course produced by extraction of heat from the tank contents and must be replaced as aforementioned.

It is therefore a primary object of the invention to provide such a fired tank heater equipped with sealing means for eliminating heat losses resulting as discussed above in operation with one or more idle firetubes.

The noted sealing means serve, moreover, to prevent dust and the like from entering the idle firetubes and to improve the draft conditions for any operating burner or burners in operation.

Another object is to provide firetube seals which are of simple construction, inexpensive, and easy to apply to obtain varying desired sealing conditions of the heater.

Other objects and advantages of the present invention will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawings:

FIG. 1 is a transverse sectional view taken on lines 1—1 of FIG. 2 showing in simplified form a fired tank and heater provided with firetube seals in accordance with the invention;

FIG. 2 is a fragmentary elevation of the tank in which the seals are shown in solid lines in an inoperative condition, and one of the seals is shown in dotted lines in a particular sealing condition;

FIG. 3 is a side elevation, on an enlarged scale, of a burner and associated firetube with the seal in interposed sealing position;

FIG. 4 is a perspective view of the FIG. 3 assembly and

FIG. 5 is a top view of such FIG. 3 assembly.

Referring now to the drawings in detail, reference numeral 10 designates a cylindrical tank for containing material to be heated or maintained at an elevated temperature, such as, for example, molten asphalt. It will be understood that the tank itself may be of any suitable construction, with the details thereof not forming a part of the present improvements.

Several gas burners 12 are provided in spaced relation adjacent the side of the tank, with these burners served by a common supply conduit 14 from a source of the combustible mixture used. Each burner 12 may have a suitable control valve (not shown) whereby the flow of gas thereto can be independently controlled, and shut off. Firetubes 16 extend in a preferably curved path through the tank 10, with each having having an open end in close spaced relation to a gas burner and the opposite tube ends commonly communicating with an exhaust stack 18 vertically disposed exteriorly of the vessel to convey the combustion products to a removed point for appropriate disposition thereof. The firetubes 16 are preferably curved better to accommodate expansion thereof during heating.

The heater structure thus described is well known; a simple configuration has been shown and other configurations could as well be employed.

The new firetube seals are designated at 20 and are preferably made from an appropriately sized resilient steel sheet folded generally along the longitudinal centerline to provide a pair of leaf sections 22 and 24, interconnected at the fold line 26. A chain 28 is preferably welded or otherwise connected at one end to each seal, the other end of each chain being secured to the wall of the tank 10 by any suitable means, whereby the seals during periods of none-use hang conveniently adjacent the burner assembly as shown in solid lines in FIG. 2. It will be obvious that the hanging of the seals as shown merely insures the availability of the seals when needed and thus any suitable means can be provided for such purpose.

When the operation of the heater calls for a burner to be shut off and this is done, the end of the associated and now idle firetube is sealed by interposing the seal 20 associated therewith between this burner and the firetube end as shown by way of example in dotted lines in FIG. 2. As shown most clearly in FIGS. 3–5, diverging leaf sections 22 and 24 of the seal 20 respectively contact the opposed ends of the gas burner and associated firetube, and the relative separation is such that the resilient leaf sections are forced inwardly against such opposed ends for spring holding of the seal in place. Although in FIG. 2 only a single seal 20 is shown in sealed position, with the remaining firetubes remaining open and operative, it will be apparent that if desired all three of the seals or other desired combinations of seals can be moved to sealing positions.

It will be evident that the firetube seals are extremely simple and easy to use for eliminating the otherwise experienced heat losses discussed above through idle tube draft. The burners are used to assist in operative positioning of the seals, and no structural modification of an existing heater installation on the order described is necessary to realize the very practical benefits afforded by the use of these seals.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

We, therefore, particularly point out and distinctly claim as our invention:

1. In combination with a vessel; heater means therefor comprising at least one gas burner at the exterior of the vessel, at least one firetube extending through the vessel

with an open end thereof in spaced opposition to said burner, and tube sealing means having leaf sections normally separated more than the spacing of said firetube end from said burner, said sealing means being insertable between said burner and tube end upon forcing of said sections together and thus held by spring contact with the same, the section of the sealing means overlying the end of said firetube being imperforate and closing such end against admittance of air.

2. The combination of claim 1 wherein said sealing means is a single piece of general V-shape.

3. In combination with a vessel; heater means therefor comprising a plurality of gas burners at the exterior of the vessel, firetubes associated with said burners extending through the vessel, with the open ends thereof respectively in spaced opposition to said burners, and a common stack for said firetubes; and a plurality of firetube seals, a single firetube seal adapted to be associated with each of said burner and associated firetube, each of said firetube seals having resilient leaf sections normally separated more than the spacing of said firetube ends

from the burners, said firetube seals being insertable between said associated burners and tube ends upon forcing of said sections together and thus held by spring contact with the same, each of said firetube seals being imperforate and closing the associated firetube end against admittance of air.

4. The combination of claim 3 wherein each of said firetube seals is a single piece of general V-shape.

References Cited in the file of this patent

UNITED STATES PATENTS

866,943	Long	Sept. 24, 1907
1,202,736	Kling et al.	Oct. 24, 1916
1,442,017	Watry	Jan. 9, 1923
1,464,069	Gerber	Aug. 7, 1923
1,567,131	Flinn	Dec. 29, 1925
1,626,301	Rhodes	Apr. 26, 1927
1,751,533	Taylor	Mar. 25, 1930
1,821,726	Saporta	Sept. 1, 1931
2,288,731	Newlon	July 7, 1942
3,060,922	Wilson	Oct. 30, 1962