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CORROSION RESISTANT LINER FOR TUBULAR ARTICLES

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FIG. 1.

FIG. 2.

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CORROSION RESISTANT LINER FOR TUBULAR ARTICLES

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3 Claims. (Cl. 137—75)

This invention relates to the art of protecting the surface of metallic tubular articles from corrosion and erosion and more particularly to the art of lining tubular articles with a corrosive resistant material so as to preserve the tubular body. Although the invention has other applications as will be apparent from the description proceeds, it has been found to be particularly advantageous for protecting the interior surfaces of vapor outlets of oil refining vessels, preheater tubes in a cracking coil and pipe lines used for transferring hot oils and vapors to different parts of oil refining or converting apparatus.

Experience has shown that under certain conditions, oil cracking apparatus and particularly the vapor outlets of the oil refining vessels, the tubes in the cracking coil and the pipes or conduits connecting the different parts of such apparatus are subjected to severe corrosive and erosive action by the hot oil undergoing cracking, to an extent such that the said pipes or conduits are relatively short lived and require numerous replacements and repairs.

Attempts have hitherto been made to protect these pipes from the corrosive and erosive action but such attempts have not proven entirely satisfactory because of practical difficulties.

Broadly stated, the object of the invention is to protect the surface of tubular members, particularly vapor outlets, preheater tubes and transfer lines used in oil refining apparatus, from corrosion and erosion resulting from the attack of corrosive and erosive agents normally present in the oil by lining the surface of the tubular member with a corrosion resistant material.

A more specific object of the invention is to provide a tubular member with a liner of corrosion resistant metal which may be readily applied to the surface of the tubular member and easily removed or replaced. Another object is to provide a pipe or other tubular article with a liner which is free to expand and contract without distortion and thus readily accommodate itself to differences of temperature which may exist during the operating cycles.

Other advantages will be apparent from the following detailed description.

For a clearer understanding of the invention, reference is now made to the accompanying drawings in which:

Fig. 1 illustrates an oil vessel in a conventional manner showing parts broken away to illustrate a liner applied according to the present invention to the vapor outlet of the vessel.

Fig. 2 is a cross section of a liner sleeve showing a ball joint gasket secured to one end thereof.

In the drawing the reference character 10 designates an oil vessel used for the refining of petroleum oils. The vessel may be of any desired form such as for example, a cracking or soaking drum, a separating chamber into which is discharged a stream of hot cracked products, a digester, a vapor dephlegmator or bubble tower, etc. The vessel 10 is provided with one or more nipples 11 projecting through the wall of the vessel and secured thereto by fusion welds. While only one nipple 11 is illustrated in the drawing it is to be understood that any desired number of such connections may be provided in the chamber depending upon the service to which the vessel is adapted.

The outer end of the tubular nipple 11 is provided with a curved circumferential flange 12 forming a shoulder against which a correspondingly curved bearing face 13 on an annular ring 14 is adapted to bear. The interior surface of the outlet 11 is protected against corrosion by a tubular corrosion resistant metallic sleeve 15 adapted to fit snugly against the interior surface of the outlet.

In the preferred embodiment of the invention illustrated in Figures 1 and 2, the outer end of the sleeve 15 is inserted within a ball joint gasket member 16 and united thereto by a fusion weld 17 bonding the bevelled end of the sleeve 15 with a corresponding bevelled face on the interior of the gasket member. The opposed faces of the gasket member 16 have configurations corresponding to the curved flange 12 and the corresponding curved flange 18 on the connecting tube 19. The shoulder 18 is adapted to form a bearing against which an annular ring 20 is adapted to abut. The annular rings or flanges 14 and 20 are provided with aligned openings for receiving connecting bolts 21.

The type of joint illustrated does not require that the connecting tube 19 be maintained in accurate alignment with the outlet 11 and permits a flexing of the joint to accommodate itself to stresses resulting from different temperature conditions of the respective parts when the vessel 10 is being operated.

The inner end of the sleeve 15 adjacent the vessel is preferably unconfined so that the sleeve may freely expand and contract without distortion and respond to varying temperature conditions during the operating cycle of the equipment.

The sleeve may be of any desired composition capable of resisting the corrosive agents normally present in the oil being refined. As an example...
a chromium nickel alloy containing 18% chromium and 8% nickel and the remainder chiefly iron may be used to advantage or a straight chromium alloy containing from 4 to 20 or more percent chromium with the remainder chiefly iron is also suitable. It is not the intention to limit the invention to the particular alloy as it will be apparent to those skilled in the art that a wide variety of corrosive resistant metals are now available and the particular alloy chosen will depend chiefly on the type of corrosion to which the apparatus is subjected.

Although the invention has other applications, some examples of which will be more particularly pointed out hereinafter, it has been found to be of advantage in connection with the vapor outlets to pressure vessels. As above pointed out these outlets are ordinarily connected to the vessel by means of a fusion weld and can be replaced only with extreme difficulty. By providing the outlet with corrosion resistant liner in the manner hereinbefore described, the life of the outlet may be materially lengthened.

It may be worth mentioning here that even if the fluid being transferred in the pipes seeps behind the liner at the free end, very little corrosion will result since the fluid is not permitted to circulate and consequently only a negligible amount of corrosive agents will come into contact with the body of the pipe. Particularly is this true in oil refining equipment in which case the oils or vapors which might seep behind the liner normally tend to build up a coke deposit which further aids in preventing the oils or vapors from contacting with the body of the steel pipe. By clamping the liner between the flange connections in the manner before described the liner sleeve may be readily removed and replaced by loosening the flange bolts.

Having described the preferred embodiment of the invention it is understood that variations and modifications amounting only to equivalents come within the scope of the invention.

We claim:

1. In combination with an oil refining vessel having an outwardly projecting neck portion provided with a circumferential flange for securing pipe connections thereto, a corrosion resistant liner disposed in said neck and adapted to protect the neck of the vessel against corrosive agents present in the oil, means securing one end of said liner to the flange of said neck, the inner end of said liner being free to expand and contract without distortion.

2. In an oil refining apparatus including a vessel adapted to contain hydrocarbons under relatively high temperature and pressure, a pipe connection for said vessel, a circumferential flange having a curved outer face on the outer end of said connection, a replaceable corrosion resistant metal sleeve within said pipe connection, an annular ring member having a curved face complementary to the curved face of said flange member and adapted to form a gasket therefor and means for integrally uniting said annular ring with the outer end of said sleeve.

3. In an oil refining apparatus including a reaction chamber having a pipe connection provided with a connecting flange having a concave bearing surface, a metal gasket member having a convex face complementary to the concave bearing face of said flange, a corrosion resistant metal liner slidably fitting within said pipe connection and means securing said liner to said gasket member.

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