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PREVENTION OF CORROSION FATIGUE FAILURES

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3 Claims. (Cl. 148—6.5)

This invention relates to the operation of repeatedly stressed steel having all or a part of its surface immersed in a fluid containing at least small amounts of oxygen, the primary object being to prevent corrosion fatigue failure of the steel or other localized corrosion effects of an objectionable nature.

There are various examples of steel operating under the above described conditions, it being generally recognized that fatigue failure of steel working in fluid, such as water, containing at least small amounts of oxygen, are attributable to localized corrosion creating pits where stress concentrates repeatedly until cracks develop. There are various remedies, some contemplating the removal of oxygen from the water and others the addition of corrosion inhibitors to the water. These schemes are all more or less objectionable because of expense, lack of results, and other factors.

According to the present invention, the trouble under discussion is eliminated, or at least greatly retarded, by the addition of colloids to the water or other fluid contacting the surface of the steel. It has been found that relatively small amounts of colloids, when added to the fluid containing oxygen, function to keep this oxygen dispersed throughout the fluid and thus prevent oxygen concentrations, this in turn preventing the localized corrosion effects required to initiate fatigue failures of the character mentioned. In other words, the invention is a method of retarding corrosion fatigue failure of steel having a surface immersed in fluid containing oxygen, which includes constantly keeping the oxygen dispersed throughout the fluid to prevent localized corrosion of the steel, by the use of colloids dispersed throughout the fluid to prevent oxygen collections or concentrations.

As little as 2 per cent. colloids produce the above described effect in water saturated with free oxygen at normal temperature and pressure. Thus it has been found that 2 per cent. of bentonite (nearly 100 per cent. colloidal clay) in water containing sufficient oxygen to normally cause the rapid development of corrosion fatigue failure of repeatedly stressed steel specimens immersed in this water will greatly prolong the time before failure occurs under such conditions. Such a small percentage of colloid does not materially alter the viscosity of the fluid. As a result the principles of the invention are, for example, applicable to boiler water. Colloids other than bentonite clay may be used, provided they are of such a character as to produce a colloidal dispersion evenly throughout the fluid, whereby to hold any oxygen contained by the fluid in an evenly dispersed condition.

The exact mechanism by which colloids prevent localization of attack under these conditions is not known with certainty but is thought to be due to the adsorption of free oxygen on the minute colloidal particles.

It will be understood more or less colloidal matter, or other reagents to prevent localization of corrosion, must be used to produce the desired effect depending upon the composition of the fluid and other factors.

It is to be understood that the corrosiveness of the fluid containing the colloidal matter in the absence of stress is only slightly reduced, but any corrosion resulting from its contact with the steel will be evenly distributed over the surface of the steel immersed in the fluid, thereby eliminating the condition required for corrosion fatigue failure.

I claim:

1. A method of retarding corrosion fatigue failure of steel having a repeatedly stressed surface immersed in fluid containing oxygen, including constantly keeping the oxygen dispersed throughout the fluid to prevent localized corrosion of the steel.

2. A method of retarding corrosion fatigue failure of steel having a repeatedly stressed surface immersed in fluid containing oxygen, including constantly keeping the oxygen dispersed throughout the fluid to prevent localized corrosion of the steel by the use of colloids dispersed throughout the fluid to prevent oxygen collections.

3. A method of retarding corrosion fatigue failure of steel having a repeatedly stressed surface immersed in fluid containing oxygen, including constantly keeping the oxygen dispersed throughout the fluid to prevent localized corrosion of the steel by the use of about 2 per cent. or more colloids dispersed throughout the fluid to prevent oxygen collections.

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