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METHOD OF PICKLING ALLOYS

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This invention relates to methods of pickling ferrous alloys containing relatively high percentages of chromium.

The alloys to which this invention particularly relates includes what are commonly grouped under the head of "stainless steel".

Within this group of alloys are those which contain relatively high percentages of chromium, in the neighborhood of from about 12% to 18%. Some of these alloys contain nickel, some silicon. All of them are relatively low in carbon and some contain other metalloids.

The scale formed on most of these alloys, especially when the same are box annealed, is so resistant to pickling solutions that it is difficult, if not impossible, to remove the same by any pickling method heretofore known to me.

An object of this invention is to provide a method of pickling such alloys or articles made therefrom which will completely remove all scale and give to the finished article an even, white or nearly white surface.

In carrying out my invention I pickle the articles made from alloys of the above group in a nitric acid pickle having a concentration of from about 50% to about 70% with the temperature of the pickle ranging from 240° F. down to 180° F.

I find that as the concentration increases the temperature may decrease; but I also find that with high concentrations and high temperatures the time element is reduced. The higher the concentration, however, the lower may be the temperature, as long as the concentration and temperature are kept within the above range.

If sheets formed from these alloys are pickled in accordance with the above method they will take on a dark peacock like discoloration, and I have found that if the above pickling method is followed by a short two-step method such discoloration will not only disappear, but the articles if sheets, will attain a beautiful white, or nearly white matte surface.

This subsequent two-step method of treatment consists in first treating the pickled sheets with a dilute non-oxidizing acid such as hydrochloric acid, and then following this treatment by a nitric acid dip of almost any concentration or temperature. This will remove the discoloration or peacock hues, and will give to the articles a white or nearly white, even matte surface.

The first step with the hot concentrated acid is preferably carried on in a tank having a cover with a centrally located upwardly projecting pipe or tube such as is used in nitric acid manufacture. This will keep the atmosphere above the tank breathable, and the vertical pipe or tube will serve to condense the hot vapors and conduct the same back into the pickling bath.

The tank which contains the concentrated pickle may be heated in any desired manner, either by direct flame, or by suitable steam coils. If the coils are located within the tank, the coils as well as the tank will have to be made from a metal which will resist the action of the pickling acid. This applies to the cover of the tank and also to the vertical pipe extending upward from the cover, since the vapors which arise will be more or less concentrated.

I have found that sheets, for instance made from the alloys to which this invention particularly relates may be thoroughly pickled in the first step with the concentrated hot acid after the level of the acid in the tank is so low as not to cover the sheets. The hot vapors from the concentrated acid apparently work equally well as the acid itself, and this is so even though the sheets are in relatively close contact, one with the other.

While I have merely described the fundamental principles of this invention, it will be apparent to those skilled in the art that various changes, modifications, substitutions, additions and omissions may be made without departing from the spirit and scope of the appended claim.

What I claim as new and desire to secure Letters Patent on, is:—

The method of treating articles made from chromium iron alloys or from alloys having a relatively high chromium content, which consists in pickling such articles in a nitric acid pickle, the concentration of which is from

about 50% to about 70%, and in carrying on the pickling at a temperature of from about 180° F. to about 240° F.

In testimony whereof, I have hereunto subscribed my name this 21st day of November, 1927.

LOUIS L. SATLER.