

UNITED STATES PATENT OFFICE.

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REMOVAL OF OXIDS FROM FERROUS METAL.

No Drawing.

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To all whom it may concern:

Be it known that we, RUDYARD PORTER and JOSHUA C. WHETZEL, citizens of the United States, and residents of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in the Removal of Oxids from Ferrous Metal, of which the following is a specification.

This invention relates to the treating of ferrous metal to remove the oxid or scale and while not limited thereto relates more particularly to a method of treating ferrous metal articles having an oxid or scale thereon which is particularly resistant to acid and, therefore, is not readily removable by the ordinary or well-known acid pickling without the use of excessively strong acid solutions and long time immersions which results in badly etched or acid eaten surfaces on the articles.

The object of the present invention is to first so treat the articles containing the acid resisting oxid or scale as to break down the acid resisting qualities of the oxid prior to their immersion in the acid pickling bath, thus eliminating the use of excessively strong acid solutions and materially reducing the time of immersion in the acid bath, thereby obtaining a considerable saving in acid and producing a superior quality of oxid or scale free articles, the faces of which are not etched by the acid.

Our invention is particularly adaptable to removing the oxid or scale formed on stainless steel, especially the oxid resulting from annealing stainless steel, since such oxid is especially resistant to acid removal.

In carrying out our invention the metal containing the oxid is first immersed in a strong alkaline solution, a solution of a caustic alkali such as sodium hydroxid (NaOH) is preferable. The strength of the solution may vary but we have found that a 30 per cent solution of sodium hydroxid is very efficient when heated to a temperature of approximately 235 degrees Fahrenheit. The action of this alkaline solution is such as to break down the resistance of the oxid or scale to acid so that it is readily removable by acid pickling.

In the treatment of stainless steel we have found that immersion of the oxid or scale coated article in the above solution for ap-

proximately one hour is sufficient to break down the resistance of the oxid to the acid. The same results may be accomplished however with a weaker or cooler solution with longer time of immersion. In other words, the time of immersion varies in proportion to the strength and temperature of the solution.

It has also been found that with oxids less resistant than those found on stainless steel, such long time immersions are not required, in fact some effect on the oxid of plain steel may be noted after a few minutes immersion.

After the article has been treated by sufficient immersion in the above described alkaline solution, it is then immersed in an acid pickling bath to completely remove the oxid or scale, and due to the fact that the resistance of the oxid to the acid has been broken down by the prior alkaline solution, a comparatively short immersion in a comparatively weak acid solution is all that is necessary to remove the oxid.

Heretofore in the acid pickling of stainless steel to remove the oxid or scale, relatively strong acid solutions have been necessary with long immersions, which resulted in badly etched surfaces, while with the present method the surfaces of the pickled articles are substantially free from etching.

In carrying out our method, we have obtained clean surfaces with various strengths of muriatic and nitric acids, from 5 to 15 per cent, by varying the temperature and time of immersion, using the higher strength acid at the lower temperature of approximately 100 degrees Fahrenheit and lower strength acid at the higher temperature of approximately 170 degrees Fahrenheit.

It will be understood that the percentages and temperatures given herein are only given for purposes of illustration and not as limitations, and also while the method has been particularly described in connection with the treatment of stainless steel, it is not limited to the treatment of such steel, but may be used in the treatment of any or all ferrous metals.

We claim—

1. A method of removing oxid from ferrous metal articles which includes as a step the immersion of the articles in an alkaline solution.

2. A method of removing oxid from fer-

rous metal articles which includes as a step the immersion of the articles in a strong caustic alkaline solution.

3. A method of removing oxid from ferrous metal articles which includes as a step the immersion of the articles in a strong caustic soda solution.

4. A method of removing oxid from ferrous metal articles which includes as a step the immersion of the articles in an alkaline solution prior to acid pickling.

5. A method of removing oxid from ferrous metal articles consisting in first immersing the articles in an alkaline solution to break down the resistance of the oxid to acid, and then immersing the article so treated in an acid pickling bath to remove the oxid.

6. A method of removing oxid from ferrous metal articles consisting in first immersing the articles in a caustic alkaline solution to break down the resistance of the oxid to acid, and then immersing the article so treated in an acid pickling bath to remove the oxid.

7. A method of removing oxid from ferrous metal articles consisting in first immersing the articles in a hot alkaline solution to break down the resistance of the oxid to acid, and immersing the articles so treated in a hot acid pickling bath to remove the oxid.

8. A method of removing oxid from ferrous metal articles which consists in first immersing the articles in a hot bath consisting of approximately a 30 per cent solution of a caustic alkali to break down the resistance

of the oxid to acid, and then immersing the articles so treated in a hot acid pickling bath consisting of a solution of approximately from 5 to 15 per cent of one of the usual pickling acids such as muriatic or nitric acid.

9. A method of removing oxid from ferrous metal articles which consists in first immersing the articles in a caustic alkaline solution to break down the resistance of the oxid to acid, the time of said immersion being varied according to the strength and heat of said solution, since either the heating or strengthening of the solution or both together will quicken its action on the oxid, and then immersing the articles so treated in an acid pickling bath to remove the oxid.

10. A method of removing oxid from ferrous metal articles which consists in first immersing the articles in a caustic alkaline solution to break down the resistance of the oxid to acid, the time of said immersion being varied according to the strength and heat of said solution, since either the heating or strengthening of the solution or both together will quicken its action on the oxid, and then immersing the articles so treated in a hot acid pickling bath to remove the oxid, the time of immersion in the acid pickling bath being varied according to its temperature and strength, since either the heating or strengthening of the acid bath or both together will quicken its action on the oxid.

In testimony whereof we have hereunto set our hands.

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