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TREATMENT OF METAL ARTICLES

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This invention relates to the treatment of metal articles and it is particularly directed to the removal of scale from hardened steel articles such as gears and to further removing the deposit left from the scale removing operation.

The invention will be described in connection with the treatment of hardened steel gears though it is of course applicable to other gears and to other metal articles.

The invention is an improvement upon the processes of patent to Avery & Bamblett, No. 1,442,243, dated January 16, 1923, and patent to Graves No. 1,525,502, dated February 10, 1925. In practicing the processes set forth in those patents, a deposit, which may be an oil carbon deposit, is left on the metal article and heretofore the practice has been to remove this deposit by brushing with a fibre brush. Brushing necessarily requires hand work and is therefore relatively costly and the full operation of cleaning cannot be entirely automatic.

One of the objects of the present invention is to completely clean the gears or other articles by steps that require no handling of the gears.

Another object of the invention is to substitute for the final brushing operation of the gear cleaning art, a cleaning operation that will remove the deposit left by the scale removing operations.

As is well known, cleaning operations such as described in the above referred to patents, from the first washing step to the last washing step, may be carried on without any hand labor whatever except to place the metal articles on a continuous chain at one end and remove them at the other, the chain carrying the articles through the various baths from one end of the process to the other. The present invention also cleans the deposit from the gears by the use of certain cleaning steps adaptable to this same continuous line so that when the gears emerge from the last wash no brushing at all is necessary. This not only saves the cost of the brushes and the time of the operator but, by making the entire process automatic, greatly adds to the efficiency of the work.

Specifically, the invention may be described as follows: the scale left by the hardening operation is removed by first subjecting the gear to an electrolytic treatment in an alkali bath, to remove the oil, then washing in cold water to remove the solution and cool the gear, and then subjecting the gear to an electrolytic treatment in an acid bath, preferably a solution of approximately nine parts (by volume) of water and one part of acid, the acid content consisting of two parts of commercial muriatic acid (specific gravity 1.15) and one part of commercial sulphuric acid (66° Baumé). This completes the removal of the scale, and then the gear is washed in cold water. If the gear were then, as formerly, washed in the usual hot solution and then removed from the operating line, it would be found to be covered with an objectionable deposit which might be removed by brushing or some similar means. But by this invention the next step after the cold water wash is to subject the gear to an alkali cleaning bath similar to the first bath but for a shorter period of time, only long enough, say approximately ten minutes, to loosen the black deposit left from the acid pickle. This makes the deposit more flocculent and with less adhesion to the steel. Coming from this alkali bath the gear goes into a cold water bath and then is immersed in a suitable acid solution, preferably comprising muriatic and sulphuric acids, although either of these acids may be used alone in certain instances. The proportions of this solution may vary considerably but excellent results have been obtained when it is composed of commercial muriatic acid of from 25% to 40% and sulphuric acid of about 1%, the remainder being

water. The length of time in this bath is largely dependent upon the strength of the acid, say from five to six minutes. This acid bath completely removes the black deposit that was loosened by the alkali bath.

The gear is then washed in cold water and then subjected to a solution, preferably hot, of sal soda (about one pound of sal soda to about ten or fifteen gallons of water) to neutralize whatever acid may be left on the gear.

To recapitulate, the steps of the process as more fully described above, are as follows:

First, the gear is subjected to an electrolytic treatment in an alkali bath to remove the oil;

Second, the gear is washed in cold water to remove the solution and to cool the gear;

Third, the gear is subjected to an electrolytic treatment in an acid bath;

Fourth, the gear is washed in cold water;

Fifth, the gear is subjected to electrolytic treatment in an alkali bath as in step one, except that the time is shorter, being sufficient only to loosen the deposit;

Sixth, the gear is washed in cold water;

Seventh, the gear is immersed in an acid solution until the loosened deposit is removed;

Eighth, the gear is washed in cold water;

Ninth, the gear is subjected to a solution of sal soda to neutralize the acid that may be left.

Although the invention has been described rather specifically as to particular methods or processes that have been practiced under it, it will be understood that it is not thus limited in its application.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. The process of treating hardened metal articles which consists in subjecting the same to an alkali cleaning treatment and then to an electrolytic treatment in an acid bath for a time necessary only to remove the scale, then subjecting the articles to electrolytic treatment in an alkali bath and then to an acid dip to finally remove the deposit left from the scale removing processes.

2. The process of treating scaled hardened metal articles which consists in subjecting them to electrolytic action in an alkaline solution to remove foreign matters from the scale, then subjecting the articles to electrolytic action in an acid solution to remove the scale, then subjecting the articles to electrolytic action in an alkaline solution to loosen deposits remaining after removal of the scale, and then subjecting the articles to an acid wash without electrolysis to remove the deposits.

3. The process of treating scaled hardened metal articles which consists in subjecting them to electrolytic action in an alkaline solution to remove foreign matters from the scale, then subjecting the articles to electrolytic action in an acid solution to remove the scale, then subjecting the articles to electrolytic action in an alkaline solution to loosen deposits remaining after removal of the scale, and then subjecting the articles to a wash, without electrolysis, in an acid solution comprising muriatic and sulphuric acids, to remove the deposits.

In testimony whereof I affix my signature.

FREDERICK BAMBLETT.