UNITED STATES PATENT OFFICE.

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EDGED TOOL.

1,383,176. Specification of Letters Patent. Patented June 28, 1921.

No Drawing. Application filed October 23, 1919. Serial No. 332,796.

To all whom it may concern:

Be it known that we, (1) MARVIN J. UDY and (2) FRANK C. NICHOLSON, citizens of the United States, residing at Kokomo, in the county of Howard and State of Indiana, have invented certain new and useful Improvements in Edged Tools, of which the following is a specification.

The present invention relates to implements and instruments of all descriptions containing one or more cutting edges.

We have discovered that the cutting edges of tools, knives, scissors or other implements can be effectively protected against rusting by coating them with a metal which is electro-positive to the metal of which the article is made. We refer in particular to the coating of articles made of steel with cadmium. We have found that although the edge of a coated article has been sharpened and the coating removed from it, the exposed steel edge is protected by the cadmium coating adjoining it.

For instance, in the case of a razor, it is first given a complete coat of cadmium. It is then honed and by this honing the cadmium is removed from the edge and a narrow strip backward of the edge which also bears on the hone. Thus the razor when in condition for use has a bare steel edge identical, in respect to all physical properties, with the edge it would have if it had not been treated. Our experiments have shown that this bare edge does not rust and that the coating need not be continuous to afford protection. We attribute this fact, as above suggested, to the electro-positive properties of cadmium in its relation to steel.

The coat is applied by electro-deposition and preferably by electro-deposition and subsequent heat treatment, as described in my copending applications Ser. No. 304,020, filed June 13, 1919 and Ser. No. 332,795, filed Oct. 23, 1919.

The treatment of the edged articles to be protected may be as follows:

1. Preparation of plating solution.

A solution containing about 25 grams of cadmium per liter of solution, we have found, is most convenient for the purpose. Enough of a salt of cadmium such as the sulfate or chlorid to yield 25 grams of metallic cadmium is weighed and dissolved in as small amount of water as possible. If metallic cadmium is used, it may be dissolved in hydrochloric acid to form a neutral solution or it may be dissolved in nitric acid and evaporated to dryness with hydrochloric acid to remove the nitric acid. After the cadmium is dissolved and is in a neutral or nearly neutral solution, a solution of sodium or potassium hydroxid is slowly added until the cadmium is precipitated and the solution is red to phenolphthalein. Sodium or potassium cyanid is now slowly added until the precipitated cadmium oxid is all dissolved, an excess of cyanid being avoided. The solution is then diluted to one liter. The solution as thus prepared constitutes the bath used for electroplating the article. Other strengths of solution may of course be used, but a solution of 25 grams cadmium per liter we find preferable for use. The anode is metallic cadmium. A current density of 7 amperes to 50 amperes per square foot of cathode area can be used. About 7 amperes per square foot are preferred. Lower and higher current densities have been used and in fact the current density does not seem to affect the deposit.

2. Cleaning of article.

Before plating, the article is cleaned of all rust and dirt by polishing with a very fine grade of emery cloth. If necessary, it may also be cleaned by dipping in dilute sulfuric acid or other chemical solutions and finally in water.

3. Electroplating.

After the article is cleaned it is immediately electroplated in the usual manner.

4. After the article has received its coating, it is washed in water and placed in an oven and heated to about 150° C. to 200° C. The maximum in an ordinary oven is about 200° C. The duration of the heating is not very material, but ordinarily it should be several hours. The temperature should be such that there is only a slight coating of cadmium oxid formed on the surface of the article. Excessive oxidation must be avoided. By burying the article in calcium hydroxid, the temperature may be raised to about 250° C. without excessive oxidation.

The degree of oxidation of course is governed by the temperature employed and the atmosphere in which the heating takes place.

The heat treatment has the purpose to alloy the cadmium with the metal of which the article is composed and also to harden the coating. It also serves the purpose of removing an excess of the coating metal by burning it to oxid. After the heat treatment the coating is very resistant to wear.

5. After the heat treatment the article is polished in any usual or preferred manner. If necessary another or other coatings may be given to the article.

While the heat treatment is particularly advantageous and results in a superior product, a coat of protecting metal applied by the process of electro-plating alone affords considerable protection.

We claim:

1. The process of protecting an edged steel article against rusting, which consists in coating the article with cadmium and then subjecting the coated article to heat to alloy the cadmium thereto.

2. The purpose of protecting an edged steel article against rusting, which consists in electro-plating the article with cadmium and then subjecting the coated article to heat to alloy the cadmium thereto.

3. The process of protecting an edged steel article against rusting, which consists in electro-plating the article with a metal which is electro-positive to the metal of which the article is made and subjecting the coated article to heat under conditions preventing excessive oxidation of the coating metal.

4. The process of protecting an edged steel article against rusting, which consists in electro-plating the article with cadmium and subjecting the coated article to heat under conditions preventing excessive oxidation of the cadmium coating.

5. An edged steel article having a coating of cadmium alloyed thereto.

6. A steel tool depending for its function upon a fine cutting edge having a coating of cadmium alloyed thereto.

7. A razor blade having a coating of cadmium alloyed thereto.

In testimony whereof we affix our signatures.

MARVIN J. UDY.
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