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METHOD AND SOLUTION FOR TREATING METAL SURFACES

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This invention is a method of so treating metals that the surfaces thereof will be capable of taking a high polish.

One of the objects of the invention is to provide a method for treating metals, such as iron, steel, zinc and alloys of zinc, chromium and aluminum, or either of them, so as to leave a clean exposed area which will be capable of taking a high polish. A further object is to provide cleansed metal areas with surfaces which under the microscope fail to show evidence of breaks or cracks, and having the normal appearance of unpolished chromium, and which like chromium are capable of taking a high and durable polish. A further object is to provide a surface of the character mentioned which is free of oxides and other forms of corrosion, and which will provide a perfect bond for paint, enamel, lacquer, and metal plating. A further object is to so treat metal surfaces as to effectively degasify the metal in such manner that more perfect electro-plating is possible than by the methods now in common use.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In practice, the metal to be treated is dipped into or otherwise subjected to the action of a mixture containing copper salt, a nitrate and an organic acid. After said treatment the surfaces of the metal are washed in clear water, or if desired it may be removed by any ordinary cleaning bath now in common use, after which it will be ready for plating or buffing as the case may be.

In practice, it is preferred to use a mixture of copper sulphate or chlorides or nitrates of copper, and nitrates such as sodium nitrates and potassium nitrate. The organic acid preferred is oxalic acid. The mixture is usually prepared in concentrated form designed to be diluted before being applied to the metal. In making the mixture it is preferable to grind each ingredient separately and then to mix them, although this sequence is not absolutely necessary, it being sufficient that the mixture in its final state is reduced to a powder. To use the mixture it is dissolved in water to provide a bath into which the metal is immersed.

Good results have been obtained by a mixture of approximately the following proportions by weight:—

50% to 60% copper sulphate
30% to 35% sodium nitrate
5% to 10% oxalic acid crystals.

The above mixture is mixed with water in the approximate proportions by weight of 5% powder and 95% water. It has been found that the ingredients will dissolve quicker in warm water than in cold water, but where warm water is employed it is preferable to use about one-half of the volume of water to dissolve the powdered mixture and then to add the balance of the water cold. The bath in its final form is used cold.

The foregoing proportions are given solely for illustrative purposes and without intent to limit the invention thereto, and it is therefore contemplated that said proportions may be varied to suit different conditions, without departing from the spirit of the invention.

Just what action takes place during the treatment is not clearly understood, but the result is that the surfaces of the metal which have come into contact with the solution are cleansed of all surface corrosion and are left with non-corrosive clean surfaces which have somewhat the appearance of chromium before it is polished. Under the microscope the treated surface appears to exhibit to some extent, the nature of a continuous coating, but whether or not it is a coating has not yet been positively determined, although under tests it may be easily mistaken for chromium because of its similarity in appearance. It also possesses a definite degasifying characteristic in connection with the electro-plating of metal in that it appears to completely dissipate the minute gas deposits in the surface of the metal treated, so that upon immersion into an electro-plating bath, the resistance to the adherence of the plate, due to the presence of gas pockets in the ordinary practice is completely avoided, and more uniform plating of the exposed surfaces is accomplished.

Upon removal of the chemical solution from the surface of the metal, the treated surface presents a bright and clean appearance resembling that of chromium before polishing. Under the microscope it shows an apparently perfectly continuous coating-like surface extending over the entire treated area without any breaks, presenting a surface capable of withstanding buffing polishing without breaking down. Its character is not easily determinable, and in fact is not sufficiently distinguishable under chemical analysis and other tests to precisely determine whether it is in the form of a coating, or is in fact a surface of the metal which has been treated. In any event, the exposed cleansed area should not be confused as a coating in the sense of a painted or plated surface.

The treated surface as above stated has the appearance of chromium, and has the charac-

teristic of taking a high polish. It also provides a surface which may be readily electro-plated and which will form a perfect bond with the plate. In this connection, for instance, it is well known that when a steel surface is cleaned by an acid bath prior to electro-plating, oxides immediately form on the surface, which prevent a perfect bond between the plate and the metal surface. A piece of metal treated by the process hereinabove described is not open to any of these objections. This is because of the degasifying action and also because the original surface oxides and corrosions have been removed and the surface has been rendered chemically clean. Therefore, after said surface has been plated with other metals, the peeling off of the plating as is a common experience under recognized plating processes does not occur, the bond between the coating and the treated surface becoming absolutely permanent. By reason of the production of the surface herein described, it is also possible to plate nickel and chromium directly on said surface without interposing an intermediate plating of copper as is now customary, so that a very considerable saving in time is accomplished in connection with electro-plating functions and a much more durable coating is obtained.

Having thus explained the nature of the invention and described an operative manner of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the forms of its use, what is claimed is:—

1. The method of treating metal surfaces comprising subjecting the surface to the action of a solution containing oxalic acid, a copper salt and an inorganic nitrate.

2. The method of treating metal surfaces comprising subjecting the surface to the action of a solution containing oxalic acid, a copper salt and an inorganic nitrate until a loose coating is formed thereon, and then removing said coating.

3. The method of treating metal surfaces comprising subjecting the surface to the action of a solution containing oxalic acid, a copper salt and an inorganic nitrate for a period of approximately two minutes, and then removing the coating produced by said mixture.

4. A solution for imparting a polish-taking characteristic to metal surfaces comprising a mixture of oxalic acid, a copper salt and an inorganic nitrate.

5. A solution for imparting a polish-taking characteristic to metal surfaces comprising oxalic acid, copper sulphate and an inorganic nitrate.

6. A solution for imparting a polish-taking characteristic to metal surfaces comprising oxalic acid, a copper salt and sodium nitrate.

7. A solution for imparting a polish-taking characteristic to metal surfaces comprising oxalic acid, copper sulphate and sodium nitrate.

8. In a material for treating metals so as to render them susceptible of taking a high polish comprising a water soluble mixture of not exceeding approximately 60% copper sulphate, not exceeding approximately 35% sodium nitrate and not exceeding 10% oxalic acid crystals.

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