PROTECTIVE COATING AND PROCESS OF PRODUCING SAME

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This invention relates to a protective coating and the process of producing the same and more particularly to a protective coating of manganese and molybdenum for use in protecting metallic parts, such as iron, steel and brass, although not necessarily limited to these particular metallic parts.

This application is a continuation-in-part of my application Serial No. 230,688, filed June 8, 1951, for Protective Coating and Process of Producing Same, now abandoned.

An object of this invention is to produce a protective coating deposited electrolytically from a solution containing manganese sulphate and ammonium molybdate.

Another object of this invention is to provide a manganese molybdenum coating which is applied electrolytically to a steel part having first been treated with a flash of zinc.

Another object of this invention is the process of coating the article including the steps of providing a bath containing manganese sulphate, ammonium sulphate, ammonium sulphocyanate, and ammonium molybdate and electrolytically depositing manganese and molybdenum salts upon the articles.

Other objects and advantages reside in the combination of ingredients and the process of utilizing the same, as will become more apparent from the following description.

The process and ingredients used in producing this coating will now be described. The part to be coated, if a ferrous part, may first have a flash of zinc applied thereto electrolytically. The zinc flash may be very thin, in which case it may be applied by passing current through a suitable zinc solution, in which the part is submerged for only a couple of minutes.

A suitable solution or bath for use in depositing the manganese molybdenum plating may consist of—

Manganese sulphate, (MnSO₄·H₂O), 12—16 ozs. per gallon of water;
Ammonium sulphate, ((NH₄)₂SO₄), 9—12 ozs. per gallon of water;
Ammonium sulphocyanate, (NH₄CNS), 7.5—10 ozs. per gallon of water;
Ammonium molybdate, (NH₄)₂MoO₄·10H₂O, 3—5 ozs. per gallon of water;

This solution may be heated to a temperature of 140°F., and then electrolytically deposited upon the metal part to be plated, this part functioning as a cathode. This temperature is not critical. A stainless steel anode may be used. The article is used as a cathode. The current density and the voltage is not very critical. A current density of 5 to 17 amperes per square foot utilizing 3 to 5 volts direct current may be used for electro-

depositing the part to be plated. This coating is a binary oxide, which consists of MnO₂·MoO₃, deposited on the metal. The finish, given excellent results as far as corrosions are concerned. It will not readily peel. The resulting finish is a smooth lustrous black coating. The following is an example of a coating solution that has been used and produces excellent results:

Manganese sulphate, (MnSO₄·H₂O), 13 ozs. per gallon of water;
Ammonium sulphate, ((NH₄)₂SO₄), 10 ozs. per gallon of water;
Ammonium sulphocyanate, (NH₄CNS), 8 ozs. per gallon of water;
Ammonium molybdate, (NH₄)₂MoO₄·10H₂O, 5 ozs. per gallon of water.

By using a solution as set forth above, the coating may consist of approximately 26.9% manganese, 43.8% molybdenum and 29.2% oxide. These percentages are merely an example, in that the percentages vary, depending upon the concentration of the solution, the voltage used and the current flowing through the solution, as well as possibly other factors, such as the time of the deposition and the temperature of the solution.

The plating may also be done by the barrel plating process. In the barrel process, the articles to be coated are placed in an aerated barrel or perforated batch of non-conductive material. This perforated non-conductive barrel is put into the solution or bath. The container for the solution may function as the anode. Danglers are mounted in the perforated barrel and positioned among the articles to be coated. These danglers form the other electrode for conducting current to the articles functioning as cathodes.

Although the preferred embodiment of the process has been described, it will be understood that within the purview of this invention various changes may be made in the form, proportions and ingredients and the combination thereof, which generally stated consist in a method and a compound capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. The method of electroplating a protective coating upon ferrous parts including the steps of electroplating a flash coating of zinc on the part followed by electroplating upon the part functioning as cathode, a protective coating from a solution consisting essentially of 13 ounces of manganese sulphate, 10 ounces of ammonium sulphate, 8 ounces of ammonium sulphocyanate, and 5 ounces of ammonium molybdate, the above compounds being dissolved in water the amounts being in ozs./gal., the current density being in the range of 5 to 17 amperes per square foot.

2. An aqueous solution for use in electroplating a binary oxide coating of MnO₂·MoO₃, said solution consisting essentially of 13 ounces of manganese sulphate, 10 ounces of ammonium sulphate, 8 ounces of ammonium sulphocyanate, and 5 ounces of ammonium molybdate, the amounts being in ozs./gal.

3. The method of electroplating a protective coating upon ferrous parts including the steps of electroplating a flash coating of zinc on the part followed by the electroplating upon the parts functioning as cathodes having a current density within the range of 5 to 17 amperes per square foot a protective coating from a solution consisting of 12 to 16 ounces of manganese sulphate, 9
to 12 ounces of ammonium sulphate, 7½ to 10 ounces of ammonium sulphocyanate, and 3 to 5 ounces of ammonium molybdate, the above compounds being dissolved in water the amounts being in ozs./gal.

4. An aqueous solution for use in electroplating a binary oxide coating of MnO$_3$MoO$_2$ said solution consisting essentially of 12 to 16 ounces of manganese sulphate, 9 to 12 ounces of ammonium sulphate, 7.5 to 10 ounces of ammonium sulphocyanate, and 5 ounces of ammonium molybdate the amounts being in ozs./gal.

References Cited in the file of this patent

UNITED STATES PATENTS

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