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ZINC AND CADMIUM PASSIVATING BATH

Donald M. Johnson, Cicero, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

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This invention relates to a method of inhibiting corrosion and brightening the surface of zinc and cadmium parts, and to a bath for use in such a method.

In the past numerous processes have been proposed for passivating or inhibiting the corrosion of parts either made from cadmium or zinc or plated with cadmium or zinc and suitable baths have been devised for use in such processes. However, these previously suggested methods used costly materials, primarily concentrated solutions of hexavalent chromium, and when a satisfactory result from a corrosion inhibition standpoint was achieved, an iridescent, drab or highly colored surface was produced. To produce a light colored, bright surface, an additional operation was necessary to bleach the coating. This resulted in a decrease in the degree of corrosion inhibition.

It is an object of the present invention to provide an inexpensive brightening and corrosion inhibiting method in one bath and a bath therefor which will produce zinc or cadmium coated parts having protective qualities consistent with the production of a finish which is bright and substantially colorless.

In accordance with one embodiment of the invention parts which have been electroplated with either cadmium or zinc are dipped for a short time in a bath comprising essentially a trivalent salt of chromium with a small percentage of nitrate in water.

In practicing the invention it has been found that zinc or cadmium parts, or parts which have been electroplated with either zinc or cadmium, may be given a lustrous substantially transparent surface which is relatively corrosion resistant if the parts are dipped in a water solution of trivalent chromium salt to which a nitrate has been added and held therein from 5 to 20 seconds while the bath is maintained at a temperature of from 50° to 130° F.

The bath comprises a water solution of 1 ounce of chrome alum ($K_2Cr_2(SO_4)_4 24H_2O$) for each gallon of water to which .5% nitric acid (HNO_3) by volume is added.

Though more expensive, the bath may consist of 1 ounce of chromic sulphate

$$(Cr_2(SO_4)_3 18H_2O)$$

in a gallon of water to which is added from .1% to .75% by volume of nitric acid (HNO_3).

The above described baths are particularly useful when incorporated in the final step of an electroplating process wherein parts are electroplated with either cadmium or zinc and after the last rinsing incident to the cadmium or zinc plating are dipped momentarily into the passivating bath. In these baths it is apparent that any trivalent salt of chromium when combined with a small amount of a nitrate and dissolved in water will produce a suitable finish. While admittedly this finish is not as corrosion resistant as those which involve the use of hexavalent chromium, the bath, however, produces a bright transparent finish which has relatively good corrosion resistant qualities and a pleasing appearance. To obtain a lustrous, transparent surface, only one bath is necessary, making it readily adaptable to automatic platers. Of course, the passivating bath need not be used in connection with a plating process and may be used as a passivating solution on cadmium or zinc parts which are formed from solid metals, or the passivating may be effected on zinc or cadmium coated or plated parts at any time subsequent to the plating of the parts.

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It should be noted, from a consideration of the two specific examples cited hereinbefore, that a water solution of trivalent chromium salts in the range of ½ to 1 ounce per gallon of water and to which nitric acid of 1.42 specific gravity has been added in an amount from .1% to .75% by volume of the solution provides a suitable passivating and brightening bath. Preferably, the nitric acid in such baths, as indicated in the first example, should comprise approximately .5% by volume of the bath.

It is to be understood that the above described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and all within the spirit and scope thereof.

What is claimed is:

1. The method of passivating zinc and cadmium surfaces of parts, which consists in dipping the parts in a water solution of chrome alum and nitric acid wherein approximately one ounce of chrome alum is used for each gallon of water and the nitric acid comprises approximately .5% by volume of the solution, holding the parts in said solution for from 5 to 20 seconds while maintaining the temperature of the solution at from 50° to 130° F.

2. A water solution for forming a protective coating on zinc or cadmium surfaces, consisting of an acidified solution of chrome alum and nitric acid in water, wherein the chrome alum

constitutes approximately 1 ounce for each gallon of water, and the nitric acid constitutes approximately .5% by volume of the bath.

3. A water solution for forming a protective coating on zinc or cadmium, consisting of chromic sulphate ($Cr_2(SO_4)_3 18H_2O$) and nitric acid in water, wherein one ounce of chromic sulphate is used for each gallon of water and .5% by volume of nitric acid is added to the solution.

4. A water solution for forming a protective coating on zinc or cadmium, consisting of from ½ to 1 ounce of chromic sulphate

$$(Cr_2(SO_4)_3 18H_2O)$$

in water to which there is added from .1% to .75% of nitric acid by volume.

5. The method of passivating zinc and cadmium surfaces of parts which consists in dipping the parts in a solution of a trivalent salt of chromium selected from the group consisting of chrome alum and chromic sulphate, and nitric acid in water, wherein the salt of chromium constitutes approximately one ounce for each gallon of water, and the nitric acid constitutes from .1% to .75% by volume of the solution, and holding the parts in the solution for from 5 to 20 seconds while maintaining the solution at from 50° F. to 130° F.

6. The method of passivating zinc and chromium surfaces of parts which consists in dipping the parts in a bath consisting of a water solution of chromic sulphate in nitric acid, wherein approximately one ounce of chromic sulphate is used for each gallon of water, and the nitric acid comprises from .1% to .75% by volume of the solution, holding the parts in said bath for from 5 to 20 seconds, and maintaining the bath temperature at from 50° F. to 130° F.

7. A solution for use as a passivation bath for zinc or cadmium surfaces consisting of a trivalent salt of chromium selected from the group consisting of chrome alum and chromic sulphate, and nitric acid in water wherein the salt of chromium constitutes approximately one ounce for each gallon of water and the nitric acid constitutes from .1% to .75% by volume of the bath.

DONALD M. JOHNSON.

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