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JOSEPH SCHULEIN, OF ROCKFORD, ILLINOIS

COLORED COATING AND PROCESS FOR PRODUCING THE SAME

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My invention relates to the art of producing colored coatings upon zinc or zinc coated surfaces by electrolytic means.

One object of this invention is to provide colored coatings for zinc or zinc plated surfaces which will be more pleasing to the eye than the metallic color.

Another object is to provide colored coatings for zinc or zinc coated surfaces which may be easily and evenly applied to the surface.

Still another object is to provide colored metallic coatings for zinc or zinc coated surfaces in which the color will be permanent and relatively unaffected by light or atmospheric action and which will not crack, chip or peel while being handled or while in use.

I have also aimed to provide colored metallic coatings for zinc or zinc coated surfaces which will have high resistance to corrosion and increase the life of the metal.

A further object of my invention is to provide colored metallic coatings for zinc or zinc coated surfaces which will serve to hold paints to the surface of the metal.

My invention consists generally in a process for the treatment of zinc or zinc coated surfaces whereby a colored coating is formed upon the surface. I have found that when zinc or zinc coated articles are made either or both electrodes in a bath substantially similar to that used for chromium plating while an alternating current is caused to pass, a colored coating soon appears at the surface of the metal. If zinc articles to be treated are used as both electrodes, coating will occur on each article. On the other hand, if an insoluble electrode such as platinum is used as either electrode and a zinc article used as the other electrode, only the zinc will be coated in the manner contemplated. The theory of this formation is not known. Spectroscopic analysis shows the presence of chromium in the coating but this is throught to be only such amounts as are imprisoned or occluded. However, polychrome colors may be obtained upon galvanized iron by varying the solutions and current densities. This is aided by a short immersion in dilute sulphuric acid solution before treatment. The coating material appears to be very highly opaque since very thin films are sufficient to completely hide the natural color of the metal. This coating clings tenaciously to the surface, may not easily be removed by rubbing, will not crack except as the metal itself cracks, will not peel or chip, and the coatings may be polished to give a bright glossy finish without apparent detrimental effect.

For example, two pieces of metal which are to be treated are cleaned in the common electrolytic cleaner and then immersed in the bath, each being made a terminal of the circuit in the bath. Though a large variety of solutions may be used I have found the following to be well suited to my process: 250 grams CrO_3, 3 grams $Cr_2(SO_4)_3$, 1000 cubic c. H_2O. While the process is operative at both high and low frequencies, 60 cycles seems to produce the best results. Increasing the frequency adds only slightly to the rate of formation while decreasing the frequency therefrom rapidly decreases the rate of formation. The voltage drop through the cell amounts to about 4 volts. The optimum temperature appears to be about 80° centigrade though this seems but slightly better than atmospheric temperatures. Excessively high temperatures (approaching the boiling point) decrease the rate of formation. A current density of about 1 ampere per square inch has been used very effectively when about 3 minutes are required to produce an opaque coating.

I have also observed that a uniform coating is obtained under circumstances adverse to a plating process where, for example, the electrode was placed behind a shield having a small opening in which case an apparently uniform coating resulted.

One of the features of the invention is the use of alternating current. In all other processes with which I am familiar where electrolytic coatings are produced upon metals, direct current is essential. In my process alternating current is required and, while not definitely known, it is thought not to be an electro-deposition process in the common sense of the term. A result wholly new is

obtained for the production of colored coatings.

I am aware that numerous changes may be made in my process without departing from the spirit and scope of my invention and I do not desire to limit the claims otherwise than as required by the prior art.

I claim:

1. A process for producing colored coatings upon the surface of zinc comprising passing of alternating electric current through solutions containing chromium using the zinc to be treated as one electrode and an insoluble metal as the second.

2. A process for producing colored coatings upon the surface of zinc comprising passing of alternating electric current through solutions containing chromium using the zinc to be treated for both electrodes.

3. A process for producing colored coatings upon the surface of zinc comprising passing alternating electric current through a solution having substantially the properties of the following—250 grams CrO_3, 3 grams $Cr_2(SO_4)_3$, 1000 cubic c. H_2O, using the zinc to be treated as electrodes.

4. As an article of manufacture, zinc surfaces having colored, metallic, electrolytic coatings formed by passing alternating electric current through solutions containing chromium using the metal to be treated for both electrodes.

5. A process for producing colored coating upon the surface of zinc comprising passing alternating electric current of frequency greater than 25 through a solution containing chromium and a sulphate ion, using the metal to be treated as one electrode and an insoluble metal as the second.

6. A process for producing colored coating upon the surface of zinc comprising passing alternating electric current of frequency in the region of 60 through a solution containing chromium using the zinc to be treated as one electrode and the insoluble metal as the second.

7. A process for producing colored coating upon the surface of zinc comprising passing alternating electric current of a frequency greater than 25 through a solution containing chromium and a sulphate ion, using the zinc to be treated for both electrodes.

8. A process for producing colored coating upon the surface of zinc comprising passing alternating electric current of frequency in the region of 60 through a solution containing chromium and a sulphate ion, using the zinc to be treated for both electrodes.

9. A process for producing colored coating upon the surface of zinc comprising passing alternating electric current of frequency greater than 25 through a solution having substantially the properties of the following: 250 grams CrO_2, 3 grams $Cr_2(SO_4)_3$, 1000 cubic c. H_2O, using the zinc to be treated as electrodes.

10. As an article of manufacture, zinc surfaces having a colored metallic electrolytic zinc coating.

11. A process for producing colored coatings upon the surface of zinc comprising passing alternate electric current through solutions containing chromium and sulfate using the zinc to be treated as at least one electrode.

In witness of the foregoing I affix my signature.

JOSEPH SCHULEIN.