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METAL BLACKENING COMPOSITION
AND METHOD

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This invention relates to metal blackening and especially to compositions and methods for use in blackening metals by dipping or plating processes.

Heretofore there have been some efforts made to provide blackened finishes on metals for some uses, but mostly such black finishes would not have sufficient adherence to the base metal as to be satisfactory. Furthermore, not all metals could be blackened. Thus previous compositions and methods for blackening metals have, insofar as I am aware, not been completely satisfactory for one or more reasons.

The general object of the present invention is to provide a novel metal blackening composition which is characterized by its ability to produce a desirable black finish upon metals with the finish being permanently bonded to the base metal.

Another object of the invention is to provide a basic composition which can be varied slightly to make it adaptable for use in blackening certain special metals by dipping or plating operations.

Another object of the invention is to provide a metal blackening composition for treating substantially any metal to give it a permanent black surface.

Yet another object of the invention is to provide a relatively inexpensive composition and method for use in blackening metals.

The foregoing and other objects and advantages of the invention will be made more apparent as the specification proceeds.

The present invention broadly relates to a new composition for use in blackening substantially any and all metals, such as brass, copper, nickel, stainless steel, aluminum, zinc or cadmium, or alloys of such metals, by a dipping or plating process, and this composition basically comprises relatively large amounts of nickel and ammonium chlorides and small amounts of Rochelle salt and zinc chloride.

Example I

One specific composition that has been particularly suitable for blackening stainless steel is one which includes the following materials in the quantities (dry weight) indicated:

About 4 oz. of ammonium chloride;
About 8 oz. of nickel chloride;
About 1 oz. of Rochelle salt;
About $\frac{3}{4}$ oz. of zinc chloride;
About 2 oz. of sodium chloride;
About $\frac{1}{4}$ oz. of ammonium molybdate; and
About 1 gal. of water.

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Of the materials listed, the ammonium molybdate seems to be vital to the composition for blackening cadmium by dipping, but a small amount of ammonium molybdate aids in securing the action desired in blackening other metals by an electroplating action. In general, the molybdate appears to speed up the blackening action and give a deep black color on the finished product.

It appears that a small amount of sodium chloride is present in the composition primarily as an electrical conductor but it also aids in obtaining the action desired.

Example II

Another illustration of my composition with the limits of variation in the quantities of materials (dry weight) used for blackening metals such as stainless steel, brass, copper, steel, aluminum and cadmium, or their alloys, would be as follows:

Nickel chloride.....	About 6 to 12 oz.
Ammonium chloride.....	About 3 to 6 oz.
Rochelle salt.....	About $\frac{3}{4}$ to 1 $\frac{1}{2}$ oz.
Zinc chloride.....	About $\frac{1}{2}$ to 1 oz.
Sodium chloride.....	About 1 to 3 oz.
Ammonium molybdate.....	About $\frac{1}{4}$ oz.
Water	1 gallon

The foregoing composition has given excellent results in providing a desirable blackening action on most metals and their alloys. The composition even is satisfactory for use in treating stainless steel. Variations in the compositions within the limits stated vary the speed of the action slightly but do not materially alter the action secured.

Zinc articles can be coated by use of my novel composition by either dipping the zinc articles in baskets or by an electroplating process, and cadmium articles can be similarly processed.

Of course, any desired quantity of solution could be made as long as the proportions stated are maintained.

When blackening steel, stainless steel, brass, copper, aluminum or nickel articles, or alloys of such metal, and also for cadmium plated or finished articles, it is very desirable that an electroplating process be used to obtain the desired black finish. Thus, in barrel plating, I might use between 6 and 9 volts with 75 amperes of electrical energy flowing through the plating solution. In still plating, only about 4 to 6 volts would be required with about the same amperage of current flow.

It will be appreciated that before articles are blackened by my improved process, these articles

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should be cleaned by dipping them in conventional cleaning solutions maintained at about 140° F. The articles next would be washed thoroughly in water before being blackened.

When blackening articles by electroplating in accordance with the invention, the articles are the cathodes and the anodes are made from stainless steel or, preferably, nickel.

The specific composition set forth in Example I has given particularly good results on metal articles made from the metals indicated, or with a finish surface of such metals. A very black, tightly bonded coat is obtained in only a few minutes by practice of the invention.

While two complete embodiments of the invention have been disclosed herein, it will be appreciated that modifications of these particular embodiments of the invention may be resorted to without departing from the scope of the invention as defined by the appended claims.

Having thus described my invention, what I claim is:

1. A composition for blackening metals of the class consisting of brass, copper, nickel, steel, aluminum, zinc, stainless steel, and cadmium by an electroplating process, which composition consists essentially of by dry weight, about 8 parts nickel chloride, about 4 parts of ammonium chloride, about 1 part of Rochelle salt, about $\frac{3}{4}$ part of zinc chloride, about 2 parts of sodium chloride, about $\frac{1}{4}$ part of ammonium molybdate, and water.

2. A composition for blackening cadmium by a

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dipping process, which composition consists essentially of by dry weight, about 8 parts nickel chloride, about 4 parts of ammonium chloride, about 1 part of Rochelle salt, about $\frac{3}{4}$ parts of zinc chloride, about 2 parts of sodium chloride and a small amount of ammonium molybdate, and water.

3. A composition for use in blackening metals, which composition consists essentially of by dry weight about 6 to 12 parts nickel chloride, about 3 to 6 parts ammonium chloride, about $\frac{3}{4}$ to $1\frac{1}{2}$ parts of Rochelle salt, about $\frac{1}{2}$ to 1 part zinc chloride, about 1 to 3 parts sodium chloride, a small quantity of ammonium molybdate, and water.

4. A process of blackening a metal surface from the class consisting of steel, brass, copper, aluminum, nickel and cadmium comprising immersing the metal surface in a water bath consisting essentially of per gallon of water about 8 oz. nickel chloride; about 4 oz. of ammonium chloride; about 1 oz. of Rochelle salt; about $\frac{3}{4}$ oz. of zinc chloride; about 2 oz. of sodium chloride; and about $\frac{1}{4}$ oz. of ammonium molybdate, and passing a low voltage electrical current therethrough with the metal as the cathode.

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