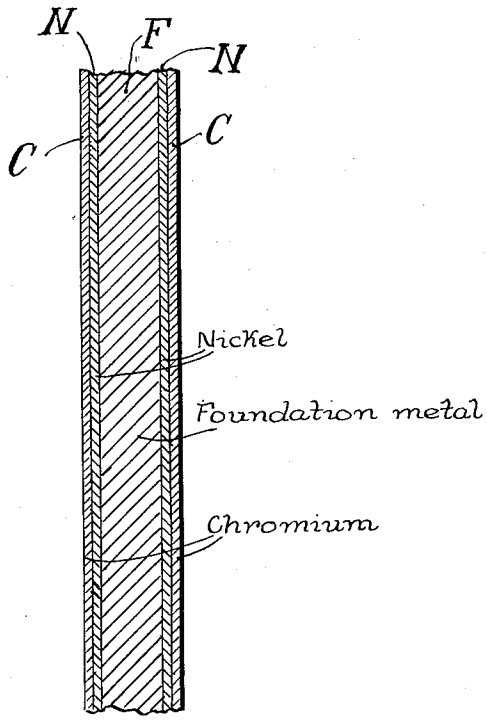
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METALLIC COATING AND PROCESS OF PRODUCING THE SAME

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METALLIC COATING AND PROCESS OF PRODUCING THE SAME

Application filed January 13, 1926. Serial No. 81,099.

This invention relates to metallic coatings which are protective, resistant, decorative, reflecting, and to processes of producing the same, and aims to provide improvements therein.

Fink (one of the present applicants) and associates, have heretofore produced resistant and protective coatings composed in whole or in part of chromium, and have devised several kinds of such coatings and several processes of producing the same. Decorative (including reflecting) coatings and processes of producing the same have also been devised. The present invention is the result of the continuation of their investigations in this direction, having for object to obtain a protective and resistant coating, a decorative coating, and a decorative and protective coating combining excellent qualities with an economical and readily performed procedure for obtaining such coatings. The present invention accordingly provides a coating having excellent protective and resistant properties (that is, resistance to corrosion, acids, wear), and/or excellent decorative and reflecting properties, and improved processes of producing such coatings carried out in readily performed operations and resulting in an economical production of such coatings.

The annexed drawing shows a form of embodiment of an article (sheet of metal) having thereon the decorative, protective and resistant coating, the drawing being explanatory and the thickness of the plates being exaggerated.

According to the present invention, a foundation metal, as for example iron, steel, etc., designated by the letter F on the accompanying drawing, is coated with nickel in any suitable manner, preferably by electrodeposition, and if, as is usually the case, the nickel plate is brittle and not firmly adherent, the coating or plate is treated in suitable manner, as by heating, to make the nickel ductile and adherent.

The heating of the nickel-plated article is preferably carried out in a neutral or reducing atmosphere, so as to minimize the oxidation, and the heating is preferably carried to a red heat, in order to bring about an adhesion or alloying between the nickel plate and the foundation metal, and also to produce a healing of defects (usually designated "pin holes") in the said plate.

The nickel plate N may be made of any desired thickness, but a thickness of about ½ mill (.0005 inch) is ordinarily used.

If the nickel plate is of the quality which is adherent and without defects, heating might be omitted, but it is generally advisable to heat treat the nickel plate, as indicated above.

After the foundation metal F has been provided with the ductile and adherent coat or plate N of nickel, a plate C of chromium is plated on the nickel. Ordinarily, the chromium plate is .0003 to .0005 inch thick.

Oxidation of the nickel surface, which may be produced by heating or otherwise, is removed prior to the deposit of the chromium. This de-oxidation is conveniently carried out in the chromium electroplating bath itself. Release or evolution of hydrogen is arranged to take place at the cathode, and when using chromic acid solutions such an evolution of hydrogen is made to take place therein. This evolution of hydrogen in electrolyzing with the chromic acid solutions is found to satisfactorily de-oxidize the nickel surface, and to result in the deposit of an adherent coat of chromium on the nickel, the quality of which chromium plate may be determined by the conditions of the plating. A bright or lustrous chromium plate may be produced by following the process set forth in the Fink application filed September 19, 1925, Serial No. 57,290.

By depositing such a bright chromium plate, bright metal surfaces which are protected from and resistant to various corrosive conditions and agents, and acids, and very resistant to wear, are obtained without unusual manufacturing expedients, such as grinding, polishing, etc. There is no necessary preparation of the article between the nickel plating bath, and the chromium plating bath, except the usual and readily performed operation of heat treatment.

It has been found that these resistant coats of nickel and chromium give very nearly the

same resistance to corrosive agents, acids, etc. as chromium coats from which the "pinhole" defects have been eliminated.

The invention has the advantage that the nickel adheres more readily to and alloys more readily with ferro metals than chromium, that is, when the nickel has been produced or treated in a manner to eliminate the brittleness of ordinary electrodeposits of nickel plate. It has the further advantage that nickel oxidizes less extensively and readily at higher temperatures than chromium, and the further advantage that the oxide of nickel may be removed by hydrogen in electrolytic baths, whereas chromium oxide is not so affected.

Cobalt may be substituted for nickel and is included in the scope of the claims as the equivalent of nickel.

By preparing the nickel plate, as by polishing, before depositing the chromium and by electrodepositing the chromium according to conditions of current density, temperature, etc., set forth in the application of Colin G. Fink, Serial No. 57,290, filed September 19th, 1925, a mirror-like, image reflecting surface may be obtained. By heat-treating the nickel plate, polishing and depositing thereon a chromium plate of the quality which is image-reflecting when deposited on a polished surface, mirrors and reflectors having a high reflecting value and especially suitable for outdoor use, are obtained. As a decorative surface, the resemblance of the present coatings is close to silver.

The process may be carried out by other modes of procedure than that herein specifically described, and the coatings may have other forms of embodiments than that specifically illustrated and described.

What is claimed is:

1. An article having a protective and resistant coating thereon, said coating comprising a heat-treated plate of nickel on the foundation metal of the article, and a plate of chromium on said plate of nickel.

2. An article having a protective and resistant coating thereon, said coating being bright, comprising a heat-treated plate of nickel on the foundation-metal of the article, and a plate of chromium on said plate of nickel.

3. A method of producing protective and resistant coatings on metal articles, comprising electrodepositing nickel on said article, heat-treating said nickel coat, removing oxidation of said nickel which may have resulted from heat treatment, and electrodepositing a plate of chromium on said nickel plate.

4. A method of producing protective and resistant coatings on metal articles, comprising electrodepositing nickel on said articles, heat-treating said nickel coat, and electrodepositing chromium on said nickel plate with evolution of hydrogen at the cathode to effect reduction of oxid present on said nickel surface.

5. A method of producing protective and resistant coatings on metal articles, comprising electrodepositing nickel on said articles, heat-treating said nickel coat, and electrodepositing chromium on said nickel plate from a chromic acid bath with evolution of hydrogen at the cathode to effect reduction of oxid present on said nickel surface.

In witness whereof, we have hereunto signed our names.

COLIN G. FINK.
LI CHI PAN.