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UNITED STATES PATENT OFFICE

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PROCESS OF FINISHING CADMIUM PLATED GOODS

No Drawing. Application filed March 14, 1930. Serial No. 435,968.

This application is a continuation in part of my application filed September 4, 1929, Serial No. 390,421, which in turn was a continuation in part of my application filed January 28, 1928, Serial No. 250,339.

The invention relates to a method of treating cadmium plated goods and particularly to a method of finishing the goods, to enhance their appearance and attractiveness

In the manufacture of cadmium plated goods, it is the practice at the present time to impart a finish to the goods by mechanical means which is costly and unsatisfactory in finishing goods of irregular shape or uneven surfaces; or by brightening agents forming a part of the plating bath which only produce a dull finish and do not bring out the true cadmium color, and it is the primary object of my invention to provide a method of treating the cadmium plated goods which will quickly and cheaply produce a bright, lustrous, smooth and lasting finish for such goods similar to that produced by tinning and nickel plating.

In the carrying out of my process, the goods to be treated are first electro-plated in the usual manner, employing any of the commonly used electrolytic plating baths for cadmium, such for instance as a sodium cyanide bath. After the goods have been plated, the improved and novel steps of my process are performed.

These steps consist essentially in withdrawing the plated goods from the electrolytic bath, and before any perceptible corrosion of the surface of the cadmium plate takes place, as will occur for instance if the electrolyte residue thereon is allowed to dry in the atmosphere, subjecting said plating surface of the goods to the momentary action of an extremely dilute oxidizing acid. The application of the dilute acid may be conveniently accomplished by lifting the plated goods from the electrolytic bath and at once dipping them into a bath of said acid in aqueous solution, and after a few seconds' time removing said goods from the dilute acid bath. The dilute acid bath may be termed a brightening bath. In order that the action of the dilute acid upon all parts of the surface of the goods may be as uniform as possible, the goods are preferably agitated during their brief period of immersion in the brightening bath. A freshly plated surface of cadmium will immediately brighten when dipped into this bath and the goods should be removed from said bath before the brightening effect has disappeared. After the withdrawal from the brightening bath, the goods are preferably rinsed in cold water to remove any acid residue therefrom and may then be considered finished. Thereafter the goods may be dried in any of the usual ways. The bright lustrous surface thus produced is that of the pure cadmium metal and is of such character that it will maintain its brightness for a long period of time in moist or dry atmosphere.

For the brightening bath, very satisfactory results are obtained by using an aqueous solution of commercial nitric acid diluted in the proportion of one ounce of nitric acid to a gallon of water. By commercial nitric acid is meant a 36° to 40° acid having a specific gravity of approximately 1.355. In a brightening bath of this description, the time duration for immersion of the plated goods should be in the order of from 5 to 15 seconds. The shorter time is sufficient when the brightening bath is fresh, with a gradual increase to the longer time as the bath becomes used.

Other oxidizing acids than nitric acid may be employed for the brightening bath: for instance, acetic, oxalic, or cyanic acid, etc., having regard to their respective avidities as compared with nitric acid, in making an equivalent solution thereof, and in giving a proportionate time of immersion of the plated goods therein for producing and retaining the bright surface finish desired. For commercial work, however, the most practical and suitable acid so far tried has been nitric acid in the approximate dilution stated.

While in describing my process I have pointed out the desirability of immediately dipping the plated goods into the brightening bath after removal from the electrolytic bath, this should be understood as having for its purpose the avoidance of any appreciable time for atmospheric corrosion or

chemical action to occur upon the freshly plated surface of the goods. Such deleterious action will take place if the freshly plated goods are allowed to dry before dipping into the brightening bath. In such a case, the corroded surface will require for its removal either a strength of acid or time of immersion therein as will completely destroy the ordinary thin plated layer of cadmium.

On the other hand, the action of the brightening bath on the goods may be delayed for a short period provided the freshly plated goods are protected from atmospheric corrosion or chemical action. For instance, the goods may be allowed to stand a short time in the electrolytic bath with the current off or preserved in cold water, provided that immediately upon withdrawal from such protective agencies the goods are given the brightening bath treatment as described. Furthermore, cadmium plated goods which have become dull or tarnished may be rebrightened by a fresh plating action of momentary duration and immediate treatment thereafter with the brightening bath.

In the practical application of my process for commercial work, it is desirable to prolong the acid character of the brightening bath for the dipping of successive pieces of work therein. Consequently if the electrolytic bath is appreciably basic or alkaline, the freshly plated goods withdrawn therefrom should preferably be immediately washed in cold water (i. e., doused in a cold water bath) to remove from the surface of the goods some of the electrolytic bath adhering thereto; and thereafter immediately and momentarily dipped in the brightening bath.

For best results, the washing of the freshly plated goods should not be proceeded with to the point of removing all traces of the electrolyte from the surface of the plate, but should be merely sufficient to mitigate a too strong alkalinity of said surface. Too long washing in cold water or even a short washing in hot water may completely destroy the conditions desirable at the surface of the plate for the most successful action of the brightening bath. Provided the surface of the freshly plated goods is maintained in proper condition, viz., with a trace of electrolyte residue present, still wet and not strongly alkaline, it will be found that the dilute acid bath for a time will actually improve with use in its brightening effect on the goods. Eventually, of course, after a long period of use, the brightening bath may become neutralized and require renewal.

The foregoing description of the preferable steps for obtaining successful results is, I believe, sufficient to enable those skilled in the cadmium plating art to make useful application of my process. Therefore I do not deem it necessary to advance any theoretical statements or construct any hypothesis concerning the chemical reactions or physical changes which possibly take place in the process. It has long been known that acids, particularly nitric acid, attack cadmium with great avidity; but I believe it to be a discovery, both startlingly new and of great utility in this art, that the attacking power of nitric acid on a thin freshly plated surface of cadmium can be controlled and limited in the manner described so as to exhibit the natural lustre of the metal as a durable and lasting finish.

What I claim is:

1. The method of giving a lustrous surface finish to cadmium plated goods which consists in the withdrawal of said plated goods from the electrolytic bath and, before any perceptible change takes place in the surface of the cadmium plate from its condition while in the electrolytic bath, subjecting said surface to the action of an extremely dilute aqueous solution of an oxidizing acid.

2. The method of giving a lustrous surface finish to cadmium plated goods which consists in the withdrawal of said plated goods from the electrolytic bath and subjecting the surface of said freshly plated goods while still wet to the action of an extremely dilute aqueous solution of an oxidizing acid.

3. The method of giving a lustrous surface finish to cadmium plated goods which consists in the withdrawal of said plated goods from the electrolytic bath and, before any perceptible change takes place in the surface of the cadmium plate from its condition while in the electrolytic bath, dousing said plated goods in cold water, and while the surface of said cadmium plate is still wet subjecting said surface to the action of an extremely dilute aqueous solution of an oxidizing acid.

4. The method of giving a lustrous surface finish to cadmium plated goods which consists in the withdrawal of said plated goods from the electrolytic bath and, before drying of the electrolyte residue adhering to said plating surface, dousing said plated goods in cold water, and while the surface of said cadmium plate is still wet subjecting said surface to the action of an extremely dilute aqueous solution of an oxidizing acid.

5. The method of giving a lustrous surface finish to cadmium plated goods which consists in the withdrawal of said plated goods from the electrolytic bath and, before any perceptible change takes place in the surface of the cadmium plate from its condition while in the electrolytic bath, subjecting said surface to the action of an extremely dilute aqueous solution of nitric acid.

6. The method of giving a lustrous surface finish to cadmium plated goods which consists in the withdrawal of said plated goods from the electrolytic bath and, before any perceptible change takes place in the sur-

face of the cadmium plate from its condition while in the electrolytic bath, subjecting said surface to the action of an extremely dilute aqueous solution of nitric acid, said acid solution being in the proportion of approximately one ounce of nitric acid to a gallon of water.

7. The method of giving a lustrous surface finish to cadmium plated goods which consists in the withdrawal of said plated goods from the electrolytic bath and, before any preceptible change takes place in the surface of the cadmium plate from its condition while in the electrolytic bath, dipping said plated goods in a brightening bath of dilute nitric acid, said brightening bath being in the proportion of approximately one ounce of nitric acid to a gallon of water and the duration of dipping in said brightening bath being about 5 to 15 seconds.

8. The method of giving a lustrous surface finish to cadmium plated goods which consists in the withdrawal of said plated goods from the electrolytic bath and immediately dousing said plated goods in cold water and, while the surface of the cadmium plate is still wet, dipping said goods in a brightening bath for about 5 to 15 seconds, said brightening bath consisting of a dilute solution of nitric acid in the proportion of approximately one ounce of nitric acid to a gallon of water.

9. The method of giving a lustrous surface finish to cadmium plated goods which consists in the withdrawal of said plated goods from the electrolytic bath and immediately dousing said plated goods in cold water and, while the surface of the cadmium plate is still wet, dipping said goods in a brightening bath for about 5 to 15 seconds, said brightening bath consisting of a dilute solution of nitric acid in the proportion of approximately one ounce of nitric acid to a gallon of water, and finally rinsing said goods in water to remove the residue of the brightening bath therefrom.

10. The method of giving a lustrous surface finish to cadmium plated goods which consists in the withdrawal of said plated goods from the electrolytic bath and subjecting the surface of said freshly plated goods while still wet to the action of an extremely dilute aqueous solution of nitric acid, said acid solution being in the proportion of approximately one ounce of nitric acid to one gallon of water.

11. The method of giving a lustrous finish to cadmium plated goods which consists in the withdrawal of said plated goods from the electrolytic bath, dipping said freshly plated goods, while still wet, in a brightening bath of dilute nitric acid, said brightening bath being in the proportion of approximately one ounce of nitric acid to a gallon of water and the duration of said dipping in the brightening bath being about 5 to 15 seconds.

In testimony whereof I have affixed my signature.

CARL L. GANSER.

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CERTIFICATE OF CORRECTION.

Patent No. 1,816,837. Granted August 4, 1931, to

CARL L. GANSER.

It is hereby certified that the middle initial of patentee's name in the above numbered patent was erroneously written and printed "A.", whereas said initial should have been written and printed L.; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of November, A. D. 1931.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)