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# UNITED STATES PATENT OFFICE

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## TERNE ELECTROPLATING BATH

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No Drawing. Original application June 26, 1940, Serial No. 342,525, now Patent No. 2,370,986, dated March 6, 1945. Divided and this application March 2, 1945, Serial No. 580,729

1 Claim. (Cl. 204—43)

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The invention relates to terne electroplating baths and more particularly to additions to be made to such baths with the object and effect of obtaining a tin-lead or terne deposit of superior quality. This application is a division of my prior copending application Serial No. 342,525, filed June 26, 1940, now Patent No. 2,370,986, March 6, 1945.

I have discovered that nicotine, either alone or in association with Duponol "80," is a most effective addition agent affording marked improvement in the quality of electrolytically deposited coatings of the lead-tin alloy of terne-plate; and that a terne plating bath containing nicotine is serviceable in the plating of steel strip, sheet and wire. Such use of nicotine I believe to be wholly new.

Those familiar with the art realize that addition agents are necessary in plating various metals, to obtain fine-grained, heavy deposits, free from "trees" on the sharp edges or projections. The literature abounds with suggestions of the use of different addition agents in electroplating baths, agents such as gelatin, glue, peptone, beta-naphthol, cresol, sulfonated cresol, clove oil, gum arabic, tannic acid, dextrine, etc. Nicotine, however has never to my knowledge been suggested for use in a terne electroplating bath for obtaining a deposit of markedly improved quality.

I have found that the use of nicotine in a terne electroplating bath has a very great effect in eliminating coarseness and "treeing" of the deposit. This is particularly true in making heavier deposits of the order of one-half to two ounces to the square foot of surface area. I also have found it desirable to use nicotine in a terne electroplating bath in association with addition agents such as a protein-type colloid, and, particularly, in association with such a wetting agent as Duponol "80."

The following is an example of a terne bath in which nicotine proved its worth as a satisfactory addition agent:

| | Grams per liter |
|---|---|
| White lead | 112.5 |
| Stannous oxide | 11.35 |
| Boric acid | 186.8 |
| Hydrofluoric acid (30%) | 650 |
| Nicotine | 10 |
| Beta-naphthol | 2 |

The bath of the foregoing example may be operated at room temperature and at 25–150 amperes per square foot.

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In the example given, the tin and lead salts named may be replaced by other inorganic or organic tin and lead salts. The acidity of the bath may be varied over a rather wide range; the degree of concentration, both of the tin and lead salts and of the addition agents, may be varied over a rather wide range; and the bath temperature may be varied—all to meet the various requirements of character of deposit, cost of solution, and current density.

The bath is operable with either soluble anodes of lead and tin or insoluble anodes such as carbon, and gives dense, fine-grained deposits, suitable as coatings upon steel, or upon other conductors, metallic or non-metallic. Likewise, the deposit is adherent and covers well.

It is to be understood that I am not limiting myself in the use of the various ingredients to the concentrations given in the example. The material referred to herein as Duponol "80" is the sodium salt of the sulfate ester of a mixture of aliphatic alcohols in which the $C_8$ chain-length predominates.

Accordingly, I have discovered that nicotine is a very valuable addition agent in plating the lead-tin alloy of terne-plate from an electroplating bath to replace the protein-type colloids such as gelatin, glue or peptone, commonly used in electrolytic baths. The terne electroplating bath of the present invention containing nicotine has a long operating life, does not form any gummy precipitate, and does not form any sludge with the salts of the bath.

I claim:

A terne electroplating bath formed from the following components substantially in the ratios set out: white lead—112.5 g./l., stannous oxide—11.35 g./l., boric acid—186.8 g./l., hydrofluoric acid (30%)—650 g./l., nicotine—10 g./l., and beta-naphthol—2 g./l.

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### REFERENCES CITED

The following references are of record in the file of this patent:

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