UNITED STATES PATENT OFFICE.

EDWARD FRANK KERN, OF KNOXVILLE, TENNESSEE, ASSIGNOR OF ONE-HALF TO PERCY S. BROWN, OF NEW YORK, N. Y.

ELECTROLYTE AND METHOD OF DEPOSITING ZINC.

999,568. Specification of Letters Patent. Patented Aug. 1, 1911.

No Drawing. Application filed December 18, 1909. Serial No. 533,875. (Specimens.)

To all whom it may concern:

Be it known that I, EDWARD F. KERN, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented certain new and useful Improvements in Electrolytes and Methods of Depositing Zinc, of which the following is a specification.

This invention has reference to an improved process for the electrodeposition of zinc and to a new electrolyte for use in the practice of the said process.

Heretofore in the electrodeposition of zinc it has been necessary to employ current having a high electromotive force in order to obtain satisfactory results. Now I have discovered that a dense coherent and adherent deposit of zinc may be obtained by the electrolysis of a bath containing a chlorid of zinc and a chlorid of another metal, as aluminum or sodium, preferably combined in the form of a double chlorid of zinc and the other metal, and that particularly good results are obtained by the electrolysis of a bath containing a double chlorid of zinc and aluminum and an alkaline chlorid, preferably sodium chlorid. I have also discovered that the addition of an organic material hereinafter termed "organic addition agent" such, for example, as grape sugar, to my improved bath improves the operation of my process and particularly improves the appearance of the deposits. I have also discovered that zinc can be satisfactorily deposited from my improved electrolyte by the use of current of high amperage and low electromotive force, thereby overcoming the disadvantage of prior zinc electrolytes which require a current of very high electromotive force for their satisfactory use.

The following examples will serve to illustrate the preferred ingredients and proportions employed in producing electrolytes embodying my invention:

Example No. 1: water 100 parts, zinc chlorid ($ZnCl_2$) 10 parts, aluminum chlorid ($Al_2CI_6.12H_2C$) 6 parts, grape sugar 4 parts.

Example No. 2: zinc chlorid ($ZnCl_2$) 10 parts, aluminum chlorid ($Al_2Cl_6.12H_2O$) 4 parts, sodium chlorid (NaCl) 3 parts, grape sugar 4 parts.

In the use of an electrolyte corresponding to Example No. 1 satisfactory results were obtained with a current having an amperage of 25 amps. sq. ft. the E. M. F. being from .80 to .81 volts, and the temperature of the electrolyte being from 45° to 55° C. In the use of an electrolyte corresponding to Example No. 2, satisfactory results were obtained by the use of a current of .67 to .70 volts, the amperage being the same as in the case of Example No. 1 and the temperature of the electrolyte being as before, from 45° to 55° C.

In the electrolysis of my improved bath I preferably employ an anode of zinc or an anode consisting of an alloy, the greater part of which is zinc.

While I have stated the proportions of the material which I prefer to employ, it is to be understood that these proportions may be widely varied and equivalents employed, and that commercially satisfactory results may be obtained by omitting certain of the constituents of the bath, notably the sodium chlorid and the grape sugar, as hereinbefore indicated.

Having described my invention, I claim:—

1. A process of electrodepositing zinc which consists in electrolyzing a solution containing chlorid of zinc, chlorid of aluminum and another metallic chlorid.

2. A process of electrodepositing zinc, which consists in electrolyzing a solution containing chlorid of zinc, another metal chlorid and an alkaline chlorid.

3. A process of electrodepositing zinc, which consists in electrolyzing a solution containing chlorid of zinc, chlorid of aluminum and chlorid of sodium.

4. A process of electrodepositing zinc, which consists in electrolyzing a solution containing chlorid of zinc, chlorid of aluminum, another metallic chlorid, and grape sugar.

5. A process of electrodepositing zinc, which consists in electrolyzing a solution containing chlorid of zinc, another metallic chlorid, an organic addition agent, and an alkaline chlorid.

6. A process of electrodepositing zinc, which consists in electrolyzing a solution containing chlorid of zinc, another metallic chlorid, grape sugar and an alkaline chlorid.

7. An electrolyte comprising chlorid of zinc, chlorid of aluminum and another metallic chlorid.

8. An electrolyte comprising chlorid of zinc, another metal chlorid and an alkaline chlorid.

9. An electrolyte comprising chlorid of zinc chlorid of aluminum and chlorid of sodium.

10. An electrolyte comprising chlorid of zinc, chlorid of aluminum, another metallic chlorid and grape sugar.

11. An electrolyte comprising chlorid of zinc, another metallic chlorid, an organic addition agent and an alkaline chlorid.

12. An electrolyte comprising chlorid of zinc, another metallic chlorid, grape sugar and an alkaline chlorid.

13. A process of electrodepositing zinc, which consists in electrolyzing a solution containing a double chlorid of zinc and another metal.

14. A process of electrodepositing zinc, which consists in electrolyzing a solution containing a double chlorid of zinc and aluminum.

15. A process of electrodepositing zinc, which consists in electrolyzing a solution containing a double chlorid of zinc and another metal, and an organic addition agent.

16. A process of electrodepositing zinc, which consists in electrolyzing a solution containing a double chlorid of zinc and another metal, an organic addition agent, and an alkaline chlorid.

17. An electrolyte comprising a double chlorid of zinc and another metal.

18. An electrolyte comprising a double chlorid of zinc and another metal, and an organic addition agent.

19. An electrolyte comprising a double chlorid of zinc and aluminum.

20. An electrolyte comprising a double chlorid of zinc and another metal, and an organic addition agent.

21. An electrolyte comprising a double chlorid of zinc and another metal, an organic addition agent, and an alkaline chlorid.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD FRANK KERN.

Witnesses:

ADELE M. ERB,

FREDERIC W. ERB.