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UNITED STATES PATENT OFFICE.

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COATED PRIMARY-CELL ELECTRODE.

No Drawing.

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To all whom it may concern:

Be it known that we, GEORGE W. HEISE and CLARENCE W. BROKATE, citizens of the United States, residing at Elmhurst and Danbury, respectively, in the counties of Queens and Ottawa and States of New York and Ohio, have invented certain new and useful Improvements in Coated Primary-Cell Electrodes, of which the following is a specification.

This invention relates to electric cells, and particularly to improvements in protective anode coatings adapted to inhibit chemical or electrolytic action on the anode during the period in which the cells are on open circuit.

Deterioration of the anode always tends to occur, as it is impossible in commercial practice to insure the absence of conditions inducing local action, deposition of insoluble compounds on the surface of the metal, or other deleterious effects. The corrosion and incrustation of the anode is particularly harmful in cells which are used in open circuit work, such as dry cells. It is well known that these cells are subject to damage or destruction, before service or during periods of non-use, by reaction of the electrolyte with the zinc. Our invention is primarily designed to inhibit undesired reactions in cells of this type, though it is not limited thereto.

With a view to avoiding the above-mentioned disadvantages, it has been proposed to coat the inner surface of zinc container electrodes with paraffin or oils. If paraffin is used, it is necessary to melt it in order to expose the metal surface to electrolytic action. This is inconvenient, and the coating is effective only during the pre-service life of the cell. Oils are only a partial protection, and give rise themselves to certain corrosion effects. Also, they tend to separate from the metal, making it necessary to provide means, such as a paper lining, to retain them in position.

We have discovered that improved results may be obtained by the application of a soap to the surface of the soluble electrode; in case dry cells of usual construction are in question, the soap is applied to the inner surface of the zinc cup. We prefer to use a soap which is substantially insoluble in the electrolyte solution, such as zinc oleate or

aluminum oleate. We may, however, use soaps comprising the high fatty acids other than oleic and a water-soluble soap may be employed in cases in which the electrolyte contains a heavy metal ion, as reaction takes place between the soap and the metal to form an insoluble layer on the electrode surface. Ordinary soft or hard soaps may be used, preferably in alkaline solution. The caustic alkali extract of sawdust, especially pine sawdust, or resin soap in prepared form, is a cheap and convenient material for coating the zinc.

The method of applying the soap is immaterial. By way of example, it may be said that when soaps insoluble in water are used, it is convenient to dissolve them in a volatile solvent, such as benzene, and to brush or spray the solution on the metal. The soap may also be precipitated upon the zinc or applied in any other suitable way, as, for instance, by mixing with paste and spreading the mixture in a thin layer on the electrode. Heat may be applied to dry the soap and secure a firmly adherent coating.

Cells provided with a coating of the kind described are effectively protected against corrosion on open circuit, and therefore have a prolonged shelf life. The soap coating on the anode, being substantially insoluble, has no chemical effect on the cell, nor does it add materially to the internal resistance. The voltage and amperage of freshly prepared cells provided with the coating is not appreciably less than that of freshly prepared cells without it. Owing to the diminution of corrosion, the former cells give effective service for a considerably longer period than the latter.

The protective coating described herein may be used with particular advantage in hermetically sealed dry cells, in which it is necessary to reduce so far as possible the generation of gases by corrosion of the zinc and other causes. The coating may, for example, be applied to the zinc electrodes of hermetically sealed cells of the type described and claimed in applications Serial No. 481,715 and 481,716, filed by George W. Heise on June 30, 1921. The invention is in no way limited to this use, however, but is of broad application as indicated by the scope of the appended claims.

We claim:—

1. An electrode provided with a coating comprising a soap.
2. An electrode provided with a coating comprising an aluminum soap.
3. In an electric cell, means for preventing corrosion of the anode while the cell is on open circuit, comprising a coating, containing a soap, upon the anode.
4. In a dry cell, a zinc container electrode, and a coating, comprising a soap, upon the interior surface of the zinc container.
5. In a dry cell, a zinc container electrode, and a coating of aluminum oleate upon the inner surface of the container.

In testimony whereof, we affix our signatures.

GEORGE W. HEISE.
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