SILVER ALLOY FOR SILVER IODIDE BATTERIES


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3 Claims. (Cl. 75—173)

This invention relates to silver alloys and refers more particularly to an improved silver alloy especially adapted for use in primary galvanic cells having solid silver iodide as electrolyte.

Recently there has been developed a primary galvanic cell substantially devoid of water in which silver iodide is employed in the solid state as electrolyte. Cells of this type are extremely thin and to make them as thin as possible, the silver iodide is provided by forming a tarnish film on silver. In this case the silver forms one electrode of the cell. It may be supported by a thin sheet of stainless steel, usually of the austenitic type. In practice, the stainless steel is clad with fine silver, and the clad sheet is subjected to the action of iodine vapor to form a thin layer of silver iodide on the silver surface. It has been found in practice that the silver iodide layer formed by this technique does not adhere equally well to silver alloys of all compositions.

It is the principal object of this invention to provide a silver alloy on which an adherent layer of silver iodide may be formed.

The invention by means of which this object is achieved comprises a silver-base alloy consisting of 0.05% to 0.15% copper, 0.01% to 0.15% silicon, the remainder silver and incidental impurities, which impurities amount in the aggregate to not more than 0.05% by weight of the alloy. Preferably, no one impurity should exceed 0.001% by weight of the alloy.

Among the impurities commonly present in the fine silver of commerce are aluminum, iron, chromium, lead, boron and magnesium. Of these elements, magnesium apparently is the most detrimental from the standpoint of adherence of silver iodide and should not exceed 0.01% of the alloy of the invention.

As a specific example, an alloy containing 0.001% aluminum, 0.05% copper, 0.01% iron, 0.001% magnesium, 0.01% silicon, 0.01% chromium, 0.01% lead, 0.001% boron, the remainder silver, formed an adherent coating of silver iodide when subjected to iodine vapor. An equally good adherent coating of silver iodide was produced on an alloy containing 0.01% aluminum, 0.1% copper, 0.001% iron, 0.001% magnesium, 0.001% manganese, 0.1% silicon, 0.001% chromium, the remainder silver when it was subjected to iodine vapor.

Illustrating the criticality of the composition of the alloy of the invention, poor adherence of a silver iodide tarnish layer was obtained when an alloy having the following composition was subjected to iodine vapor: 0.001% aluminum, 0.1% copper, 0.01% iron, 0.1% magnesium, 0.001% manganese, 0.1% silicon, 0.001% chromium, 0.01% lead, 0.001% boron, the remainder silver.

The necessity for having silicon present in the alloy of the invention in the proportions indicated above is evidenced by the fact that an alloy composition similar to the second one above listed, but containing only 0.01% silicon, produced a poorly adherent silver iodide layer upon subjection to iodine vapor.

From the foregoing it will be evident that the alloy of the invention containing controlled proportions of impurities has superior properties for use in the production of primary cells of the type described.

What is claimed is:

1. A silver-base alloy consisting of 0.05% to 0.15% copper, 0.01% to 0.15% silicon, the remainder silver and incidental impurities, said impurities amounting in the aggregate to not more than 0.05% by weight of such alloy.

2. A silver-base alloy adapted to form on its surfaces an adherent layer of silver iodide upon exposure to iodine vapor, which alloy consists of 0.015% to 0.15% copper, 0.01% to 0.15% silicon, the remainder silver and incidental impurities, said impurities amounting in the aggregate to not more than 0.05% by weight of such alloy and individually not exceeding 0.001% by weight of such alloy.

3. An electrode for a galvanic cell having a silver iodide electrolyte, said electrode being composed of 0.05% to 0.15% copper, 0.01% to 0.15% silicon, the remainder silver and incidental impurities, said impurities amounting in the aggregate to not more than 0.05% by weight of such alloy, said electrode being adapted to form an adherent coating of silver iodide thereon in the presence of iodine vapor.

References Cited in the file of this patent
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,932,569

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Joseph J. Buchinski et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 34, claim 2, for "0.015%" read -- 0.05% --.

Signed and sealed this 11th day of October 1960.

(SEAL)

Attest:

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