

UNITED STATES PATENT OFFICE.

ELMER A. SPERRY, OF CLEVELAND, OHIO.

PLATE OR ELEMENT FOR STORAGE BATTERIES.

SPECIFICATION forming part of Letters Patent No. 660,228, dated October 23, 1900.

Application filed March 26, 1900. Serial No. 19,197. (No specimens.)

To all whom it may concern:

Be it known that I, ELMER A. SPERRY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Plates or Elements for Storage Batteries, of which the following is a specification.

My invention is an improvement in the plates or elements of secondary or storage batteries; and said invention consists in a plate or element composed of a sustaining sheet or body of lead or other similar and equivalent material to which, as to one or both sides, is applied or in any suitable manner attached a mass consisting of a mechanical mixture of lead particles, oxids of lead, and an alkali-metal salt moistened with a solution of a hydroxid of the alkali metals.

The following is the method of making a secondary-battery plate or element according to my invention: I first take the oxid or mixture of oxids of lead and intimately mix therewith the salt constituents consisting of sulfate or a mixture of the sulfate and phosphate of one or more of the alkali bases, potassium or ammonium preferred. This mixture is then moistened with distilled water and is mixed with finely-divided metallic lead—such, for example, as precipitated lead, which after precipitation should be kept in a suitable vessel under water until used. The mixture of the lead, the oxid or oxids, and the alkali-metal salt or salts is diluted until it reaches the consistency of thick dough, and while being vigorously stirred there is added a solution of hydroxid of an alkali metal—such, for instance, as liquid ammonia diluted to from three-fifths to one-fourth with distilled water. When the mass has been thus thinned down to a condition which permits it to be readily spread over a conducting plate or grid, it will be found to have the property of setting peculiar to cement. It is then applied in any convenient manner to the plate or grid and is by preference caused to adhere thereto as a closely-coherent mass compacted by pressure in a mold. The mold consists of a heavy separable steel frame adapted to contain a retaining grid or support. When the plate or grid, with an attached mass of the composition, is placed in the mold, it is immedi-

ately subjected to heavy pressure in a suitable press, after which it is removed from the mold and set on edge to dry. I have found that the open air or the sun's heat is the best means of drying. I have also found that the heavy toggle-press is more suitable than the hydraulic press for this work on account of the more rapid action and the quickness with which the maximum pressures are reached, while with a press of sufficient capacity the final pressures are equal to those obtained in the hydraulic press. When dry, the plates, by the action of an electric current in a suitable bath, are "formed," after which they are grouped and charged in the well-known manner to bring the alternate plates or groups to opposite polarities and render them ready for use.

In making up the compound above described the proportions of metallic lead and lead oxid may be greatly varied, the proportion of salt employed being generally determined by the relative amount of the oxid present, and not usually more than a few per cent. I have found, for example, that very serviceable plates may be produced by the use of from eighty to eighty-five per cent. of finely-divided lead, from fifteen to twenty per cent. of the oxid of lead, and an admixture of a salt, such as sulfate of ammonium, amounting to about one twenty-fifth of the whole mass.

By following the above directions plates will be produced which after being formed will be found to possess a density much superior to those heretofore used and which have the further merit of containing a minimum of foreign material, there being practically nothing present which does not contribute directly to increasing their capacity as battery elements.

I have found as a result of the use of the alkali salts above described that while they are of themselves inert they appear to have a very important and twofold function, first, by dissolving out during the process of forming, thereby facilitating the penetration of the electrolyte and the electrical disintegration of the metallic substance of the element, and, second, in causing the active material while being electrolytically produced to set or harden rather than to soften, as is the case with all plates formed by the Planté process.

It will readily be understood that while the details of the invention and process have been described with more or less minuteness yet the invention should not be limited to the exact methods and details described. For example, I have found that if the mixture is dried and then reduced to a finely-divided condition it may be applied to the supporting plates or grids and the proper cohesion and adhesion secured by pressure. A very dense and serviceable plate may thus be formed.

I do not claim herein the process of manufacturing plates or elements of storage batteries herein described, having made this the subject of another application filed April 13, 1900, Serial No. 12,699.

Having now described my invention, what I claim is—

1. The material herein described for the plates or elements of storage batteries consisting of a set mass, composed of an intimate

mixture of an alkali-metal salt, lead oxid, and finely-divided lead, moistened with a solution of a hydroxid of the alkali metals.

2. A storage-battery element consisting of a supporting grid or plate having a coating attached thereto, said coating primarily composed of finely-divided metallic lead, lead oxid and an alkali-metal salt, moistened with a solution of a hydroxid of the alkali metals, substantially as set forth.

3. As an article of manufacture, an element for batteries consisting of a supporting grid or plate upon and into which is pressed active material consisting of a set mass composed of an intimate mixture of alkali-metal salt, lead oxid and finely-divided lead, moistened with a solution of a hydroxid of the alkali metals.

ELMER L. SPERRY.

Witnesses:

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