

UNITED STATES PATENT OFFICE.

PAUL JOSEPH RUDOLPH DUJARDIN, OF PARIS, FRANCE.

ELECTRIC ACCUMULATOR.

SPECIFICATION forming part of Letters Patent No. 497,869, dated May 23, 1893.

Application filed March 15, 1892. Serial No. 425,020. (No specimens.) Patented in France March 15, 1886, No. 174,761; in Belgium November 29, 1886, No. 75,423; in Austria-Hungary December 10, 1886, No. 20,066 and No. 45,048; in England December 14, 1886, No. 16,408; in Italy December 24, 1886, No. 311, and in Spain January 29, 1887, No. 6,554.

To all whom it may concern:

Be it known that I, PAUL JOSEPH RUDOLPH DUJARDIN, of Paris, in the Republic of France, have invented new and useful Improvements in Electric Accumulators, of which the following is a specification.

This invention has been patented to me in the following countries: Belgium, dated November 29, 1886, No. 75,423; France, dated March 15, 1886, No. 174,761, two patents of addition to the same being respectively dated June 17 and September 21, 1886, No. 174,761; England, dated December 14, 1886, No. 16,408; Italy, dated December 24, 1886, No. 311; Austria-Hungary, dated December 10, 1886, No. 20,066 and No. 45,048, and Spain, dated January 29, 1887, No. 6,554.

The formation of oxides of lead on electric accumulating plates, by means of chemical electricity, has, up to the present presented very great difficulties in practice. This operation is considerably improved by adding a small quantity of alkaline nitrate to the water bath acidulated by sulphuric acid, which has been used up to the present. The same reaction can be produced by nitrate of potash, nitrate of soda or nitrate of ammonia. I generally use nitrate of soda on account of its cheapness. The proportion is about as follows:—water ten liters; sulphuric acid two liters; nitrate of soda five hundred grams. When the electric current passes into the bath, the alkaline nitrate is decomposed, the nitric acid attacks the positive plate and forms a small quantity of nitrate of lead. The nitrate of lead at once transforms itself into insoluble sulphate of lead which remains sticking to the polar plate. The sulphate of lead in its turn receiving a constant flux of oxygen proceeding from the decomposition of the acidulated water passes rapidly into the state of peroxide of lead. There are thus formed two superposed layers which are easily recognizable by their colors, the one being white on coming in contact with the lead, the other maroon or red-brown with peroxide of lead. If the proportion of alkaline nitrate is too strong the quantity of sulphate of lead produced is too great to be able to be peroxidized by the oxygen liberated from the acidulated water. In this case the layer becomes

of a whitish color; if, on the contrary the quantity of sulphate of lead produced is too small, the layer becomes of a dark hue. It is therefore easy to regulate the action and in a few hours a thickness of about half a millimeter of peroxide of lead is obtained. In order to verify the reaction described above, it suffices to set the two acidulated baths working with an electric current of equal power, the one bath containing alkaline nitrate only and the other prepared in accordance with the indications which I have already given. The first bath will not give any thickness of deposit however long the lead plates are immersed in the same; on the other hand the other bath will show a pretty thick formation after a few minutes and this can be augmented indefinitely at the will of the experimenter. It must be observed however that when nothing but nitric acid is added to the bath of formation, the peroxide of lead obtained is of a dusty nature and has a very feeble electric power. On the contrary the alkaline nitrate gives an adhering layer, hard and of great electric capacity. This difference is easily explained; in the case of a bath to which nitrate is added, the nitric acid is only liberated in proportion to the intensity of the electric current and only on the surface of the positive pole. In the case of a bath to which nitric acid is added, this acid at once attacks the positive and negative plates and there produces sulphate of lead in the state of dust even though the electric current is not established.

I claim as my invention—

The process herein described of forming accumulator plates, consisting in decomposing a proportion of alkaline nitrate by an electric current in an acidulated bath, whereby the reactions indicated are caused and producing on the plates an adhering layer of peroxide of lead, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

PAUL JOSEPH RUDOLPH DUJARDIN.

Witnesses:

ROBT. M. HOOPER,
J. CHATEL.