UNITED STATES PATENT OFFICE.

HARRY C. HUBBELL, OF NEWARK, NEW JERSEY.

METHOD OF MAKING STORAGE-BATTERY ELECTRODES.

1,081,531. Specification of Letters Patent. Patented Dec. 16, 1913.

No Drawing. Application filed April 11, 1910. Serial No. 554,710.

To all whom it may concern:

Be it known that I, HARRY C. HUBBELL, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Methods of Making Storage-Battery Electrodes, of which the following is a specification.

My present invention relates to an improved method of making or producing a storage battery electrode, and the main object is to provide such an electrode of simple construction, but efficient and durable.

In carrying out my invention, the following steps are preferably employed: I first take a mixture of powdered metallic nickel or cobalt, or both, and from such powdered material is produced, in the manner hereinafter specified, filaments, threads or fibers, after which each of the said filaments or threads are electrolytically coated with metallic nickel or cobalt or both. In order to obtain the powdered metallic nickel or cobalt it has been discovered, that if a solution, such as the chlorid of nickel or cobalt be electrolyzed in a vessel holding at the bottom thereof considerable mercury and a suspended anode of nickel or cobalt, that the nickel or cobalt deposited on the mercury amalgamates therewith. Some of the mercury may be removed from the amalgam by pressure, but what is left is distilled off in a retort under proper regulation of temperature, leaving a block of nickel or cobalt, as the case may be, which is very friable, hence easily made into a powder in a suitable mill. The ordinary mortar and pestle may do for small quantities. If enough of this powdered metallic nickel or cobalt be intimately mixed with the hydroxid of nickel or cobalt, or both, it will make the mixture, even in the dry condition, a good electrical conductor. This mixture when wet is squirted through a small orifice and deposited in parallel rows on a metal tray, and when dried the tray holding these rows of material may be immersed in a nickel or cobalt plating solution and metallic nickel or cobalt be deposited on the exposed surfaces of the said filaments, fibers or threads.

It will, of course, be understood that the deposit of nickel or cobalt commences immediately upon the immersion of the plate in said plating solutions, and the threads, after being dried do not readily break up under this treatment, if properly handled. It will be readily perceived that there is a portion of this thread which rests against the tray or plate, that receives no coating of nickel or cobalt, thereby permitting the interior of each thread to be subjected to electrolytic action when such threads form active material of battery electrode. These threads, filaments or fibers are removed from the tray then compressed and formed into a matted cake, the said matted cake is then surrounded by a suitable conducting envelop or container.

It will be understood that, under electrolytic action the powdered metallic nickel and cobalt becomes as active as their respective hydroxids, this being due to their finely divided condition, but while it is preferable to use this material some other material may be utilized which will be inactive, such as carbon and graphite, and as I depend altogether upon the deposited metallic casing for proper conduction through the mass, such inactive conducting material would be objectionable after it has performed its office of making the thread a conductor, so that a casing of metallic nickel or cobalt may be deposited thereupon. Thus the powdered metals having served their purpose to make the thread, fiber or filament a conductor, so that a film of metallic cadmium or nickel may be plated thereon, they are subsequently turned into active material by electrolytic action. Furthermore, it will be obvious that, a thread composed entirely of powdered metallic nickel or cobalt, with a film or coating of nickel or cobalt deposited thereon may be utilized, but the mixture of the aforesaid powdered metals and their hydroxids is preferable.

It is desired to lay stress on my improved method of obtaining metallic powdered nickel or cobalt, and forcing a mixture of powdered metallic nickel or powdered metallic cobalt mixed with their respective hydroxids, or all four materials in one mixture; forming a thread therefrom and subsequently plating metallic nickel or cobalt on the exposed surfaces of each thread wherefrom the final product is made.

Having thus described my invention what I desire to claim and secure by Letters Patent is:—

1. The method of making a storage battery electrode, which consists in first forming a thread-like material from a mixture of powdered nickel or cobalt with their re-

spective hydroxids, then drying such thread like material, then depositing a metallic nickel or cobalt coating on portions thereof and finally forming a matted cake therefrom.

2. The method of making a storage battery electrode, which consists in first forming a thread-like material from a mixture of powdered metallic nickel or cobalt or both, then mixing intimately with hydroxid of nickel or cobalt, then drying such thread-like material, then depositing a metallic nickel or cobalt coating on the exposed surface of such thread-like material, then forming this thread-like material into a matted cake, and finally surrounding such cake by a suitable conducting envelop or container.

3. A storage battery electrode comprising, a matted cake of thread-like material, composed of a mixture of powdered nickel or cobalt with their respective hydroxids, having a coating of metallic nickel or cobalt on a portion of the surface of each thread, and said matted cake being surrounded by a suitable conducting envelop or container.

HARRY C. HUBBELL.

In presence of—
MAY M. PLYER,
JOS. H. BLACKWOOD.