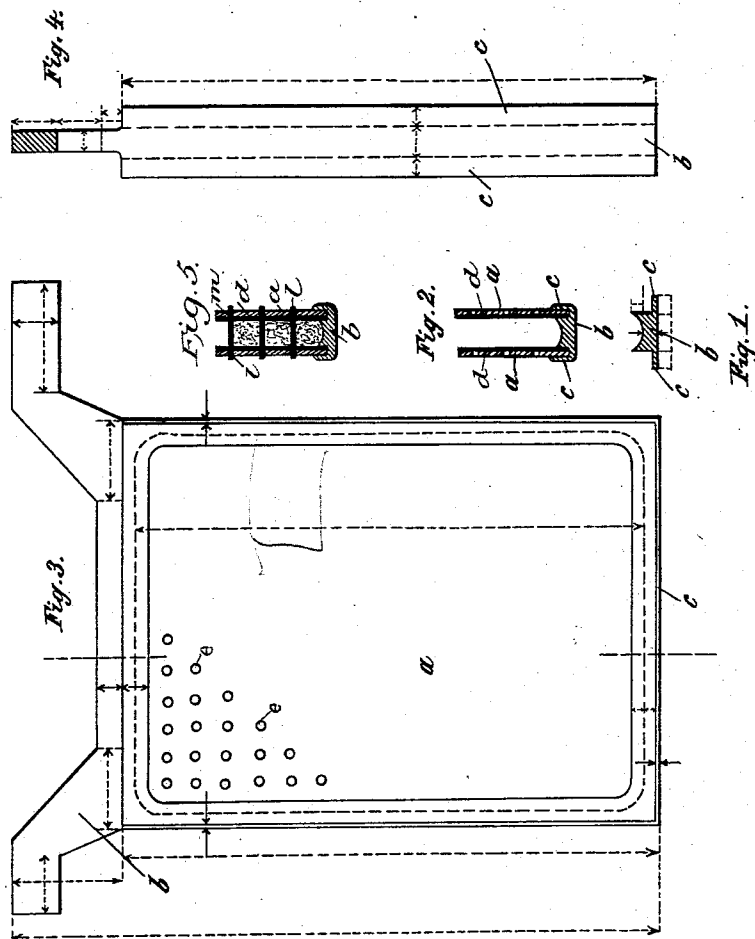


(No Model.)

C. H. WEISE.
PROCESS OF MANUFACTURING PLATES FOR SECONDARY
BATTERIES.

No. 570,619.

Patented Nov. 3, 1896.



Witnesses.

M. V. Bidgood
J. Green.

Inventor.

Carl Hugo Weise
By *[Signature]*
Att'y.

UNITED STATES PATENT OFFICE.

CARL HUGO WEISE, OF PÖSSNECK, GERMANY.

PROCESS OF MANUFACTURING PLATES FOR SECONDARY BATTERIES.

SPECIFICATION forming part of Letters Patent No. 570,619, dated November 3, 1896.

Application filed April 4, 1895. Serial No. 544,437. (No specimens.) Patented in France October 10, 1894, No. 241,977; in Hungary March 4, 1895, No. 2,814; in Belgium June 22, 1895, No. 116,220; in Switzerland June 24, 1895, No. 10,619; in Spain June 26, 1895, No. 17,645; in England June 27, 1895, No. 12,420; in Portugal July 10, 1895, No. 2,031, and in Italy October 2, 1895, No. 39,878/163.

To all whom it may concern:

Be it known that I, CARL HUGO WEISE, a subject of the Grand Duke of Saxe-Meiningen, residing at Pössneck, in the Grand Duchy of Saxe-Meiningen and German Empire, have invented certain new and useful Improvements in Processes for the Manufacture of Plates for Storage Batteries, (for which I have obtained Letters Patent in France, No. 241,977, dated October 10, 1894; in Hungary, No. 2,814, dated March 4, 1895; in England, No. 12,420, dated June 27, 1895; in Belgium, No. 116,220, dated June 22, 1895; in Italy, No. 39,878/163, dated October 2, 1895; in Spain, No. 17,645, dated June 26, 1895; in Portugal, No. 2,031, dated July 10, 1895, and in Switzerland, No. 10,619, dated June 24, 1895,) of which the following is a specification.

The object of the present invention is a process for the production of accumulator-plates which differs from the processes heretofore known in that the plates are produced directly by the introduction between compressing-plates of a pasty mass of some suitable lead compound, which, having been first subjected to the chemical action of an electrical current for the purpose of hardening the surface, are then subjected to a further hardening by the compressing-plates, which prevent an extension of the accumulator-plates in their further formation. The process is executed in a frame shown in the annexed drawings, which is closed by perforated compressing-plates.

In the drawings, Figure 1 is a detail view representing a cross-section of the frame. Fig. 2 is a detail sectional view representing the frame with the compressing-plates fastened by bending over the flaps or flanges. Fig. 3 represents one of the compressing-plates in front elevation. Fig. 4 is an edge elevation of the same. Fig. 5 is a detail sectional view representing part of a complete electrode.

The process is executed in the following manner: The lead or lead-alloy frame *b*, which is preferably formed with a concave inner face and oppositely-extending flaps or flanges, is covered with a thin lead-foil *d* or a sheet of an easily-perforated material and laid over in horizontal position, when a perforated com-

pressing-plate *a* is placed on top of the lead-foil inside flange *c* and fastened to the frame by bending over the flap or flange. Into the trough thus formed by turning the frame over with plate *a* down a pasty mass of lead salts *m*, preferably lead oxid, is now introduced and covered with a second lead-foil *d* and a second perforated compression-plate *a*, which is pressed down upon the pasty mass and secured in place by bending over the flange *c* on the opposite side of the frame for the purpose of completely inclosing the lead salts in the same. The completely-inclosed mass *m* is now perforated with cellulose threads *l*, which are introduced through the perforations *e* of the compressing-plates *a* in any suitable manner, such as the use of a needle, and form holes corresponding to the size of the thread in the lead-foil, the leaking out of the pasty mass being prevented by the presence of the threads. In this manner the inclosed mass is prevented from running together, at the same time making it possible to introduce the electrolytical fluid. These frames or boxes are now placed in a bath of diluted sulfuric acid, and an electric current passed through the same immediately. This operation causes an immediate hardening of the surface of the mass by reason of the chemical change of its surface, preventing the mass from dissolving in the electrolytical bath. The inner parts of the mass are then slowly formed under the further action of the current. The mass has a tendency to extend or expand during this forming action, which tendency is counteracted by the pressure or confining action of the plates *a* on the inclosed mass, the result of which is that the latter obtains an extraordinary hardness, by which their time of life is considerably increased. At the same time the formed plates, in consequence of their expansion, are pressed strongly against the lead frame, which serves at the same time as conductor for the current, creating thereby a good conductor. After finishing the process the plates are taken from the bath and dried in the air. The cellulose threads passing through the plates are chemically changed and weakened by the action of the acid, and when they are exposed to the

air they fall to pieces and are completely destroyed, leaving in this way channels passing through the plates, which in the practical use of the plates offer the essential advantage
5 while charging that the circulation of the gas bubbles arising takes place in these channels, which greatly assists the charging operation, as a much less quantity of bubbles will arise on the surface than heretofore customary,
10 thus producing an economy in the charging operation. At the same time a reduction of the interior resistance is effected by the increase of the effective surface, caused by the formation of channels.
15 The formation of positive and negative plates being accomplished at different operations, it is very essential that each electrode be removed as soon as it is formed, and a new electrode, not yet formed, be introduced in its
20 place. This is not the case in the processes used heretofore.

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

25 1. The herein-described method of forming accumulator-plates, which consists in confin-

ing a pasty mass of lead compound in an acid-proof frame or vessel having perforated sides, passing cellulose threads through the perforations of the frame, placing the same in an acid-bath, passing an electric current through the same, and finally exposing the formed hardened plate to the action of the air to destroy the chemically-changed cellulose, as and for the purpose set forth. 30

2. The herein-described process of forming accumulator-plates, which consists in lining a perforated frame or receptacle with lead-foil or equivalent material, placing and confining a pasty mass of lead compound therein, passing cellulose threads through the perforations, foil and mass, subjecting the same to the action of an electric current in an acid-bath, and finally exposing to the air to destroy the chemically-changed cellulose, as set forth. 35 40 45

In witness whereof I have hereunto set my hand in presence of two witnesses.

CARL HUGO WEISE.

Witnesses:

WILHELM SCHWICHTAL,
JOHN B. JACKSON.