H. STRECKER.

PROCESS OF PRODUCING POSITIVE PLATES FOR BATTERIES.

(Application filed May 12, 1899.)

Fig. 1.

Fig. 2.

Witnesses

Inventor

For

The remaining text is a protected invention document, containing details of the process and diagrams to illustrate the method.
HANS STRECKER, OF COLOGNE, GERMANY.

PROCESS OF PRODUCING POSITIVE PLATES FOR BATTERIES.

SPECIFICATION forming part of Letters Patent No. 651,089, dated June 5, 1900.

Application filed May 12, 1899. Serial No. 716,605. (No specimen.)

To all whom it may concern:

Be it known that I, HANS STRECKER, a subject of the King of Prussia, Emperor of Germany, residing at Cologne-on-the-Rhine, Germany, have invented a new and useful Improvement in Processes of Producing Positive Mass-Plates, of which the following is a specification.

The main object of the present invention is to reduce the weight and to prevent warping of hard-mass positive plates—mass-plates, or frame-plates filled with or containing hard mass, in contradistinction to lattice-plates or frame containings a soft mass. (See "Hilfsbuch der Elektrotechnik," Grawinkel & K. Strecker, 5th Edition, pages 366 and 367.) In order to attain this object, the plates are specially constructed, as shown in the accompanying drawings, which form part of the present specification, and in which—

Figure 1 is an elevation of a plate embodying my invention, and Fig. 2 is a horizontal section on the line x x of Fig. 1.

The interior part of the plate, which is never so much used as the edges, the latter being almost exclusively in supplying the current, is removed entirely, the plates being provided at this part with a circular, oval, square, or other shaped orifice lined or edged with a hard lead-frame or rim. The side of this rim, which is turned toward or contacts with the mass, is provided with a groove adapted to grip the mass and retain the same properly in position, the said ring or rim being retained in its position by the mass itself. This ring or frame of hard lead is advantageously made in two parts, which are not quite close together, so as to allow for the expansion of the mass.

In the drawings, a represents the mass, b the exterior frame, and c c' the divided interior frame. The arrangement of this central frame or ring disposes of a part of the mass, which practically only forms dead-weight and which gives rise in the main to the warping of the plates previously mentioned. As a secondary result of this arrangement more space is attained for the sulfuric acid and a better circulation effected. A special process is necessary in order to arrange the ring in position. This process must render it possible in filling to lay on the effective mass in as dry a condition as possible and without a subsequent drying process to form the plate as rapidly as possible, since the method generally employed of filling the frame with wet mass and subsequently drying the same in a furnace—for instance, Boese's process—cause the effective mass to contract and become loose, so that a ring arranged in this manner would fall out of the plate and the mass itself would crumble owing to the fragility of the plate before the same becomes hardened in the sulfuric acid. This process will be described hereinafter; but it should be mentioned here that in order to attain the desired result the employment of litharge is particularly advantageous. Hitherto the employment of litharge alone for positive plates has been objected to because it produced too dense and hard plates, which did not show sufficient capacity owing to their slight porosity and which were apt to warp during the formation. Red lead exclusively was used for the positive plates, and for the negative plates a mixture of red lead and litharge. The production of mass-plates is based on the action of the sulfuric acid on red lead or litharge even in those processes in connection with which it is alleged that the addition of a binding medium of organic nature and the formation of organic lead salts causes the hardening. The reaction which takes place between red lead or litharge and sulfuric acid causes the reacting mixture to expand in volume, so that if the mass is in a frame when the reaction takes place it will jam and become hard, or, in other words, the formation of sulfate of lead affects the hardening. This method of manufacturing has two considerable disadvantages, both of which are easily obviated by means of the present process with litharge. In the first place when red lead is employed there is the disadvantage that the red lead of commerce shows various chemical formulas (generally Pb₃O₄ and Pb₂O₃). This difference in the formula causes an unequal formation of lead sulfate in the hardening process, and consequently inequality in the hardness and capacity of the plates. The difference in the
reaction of various red leads with sulfuric acid will be apparent from the following formulae:

$$\text{Pb}_2\text{O}_4 + 3\text{H}_2\text{SO}_4 = \text{Pb}_2\text{O}_3 + 3\text{PbSO}_4 + 3\text{H}_2\text{O}$$

and

$$\text{Pb}_2\text{O}_3 + 3\text{H}_2\text{SO}_4 = \text{Pb}_2\text{O}_4 + 3\text{PbSO}_4 + 3\text{H}_2\text{O}.$$