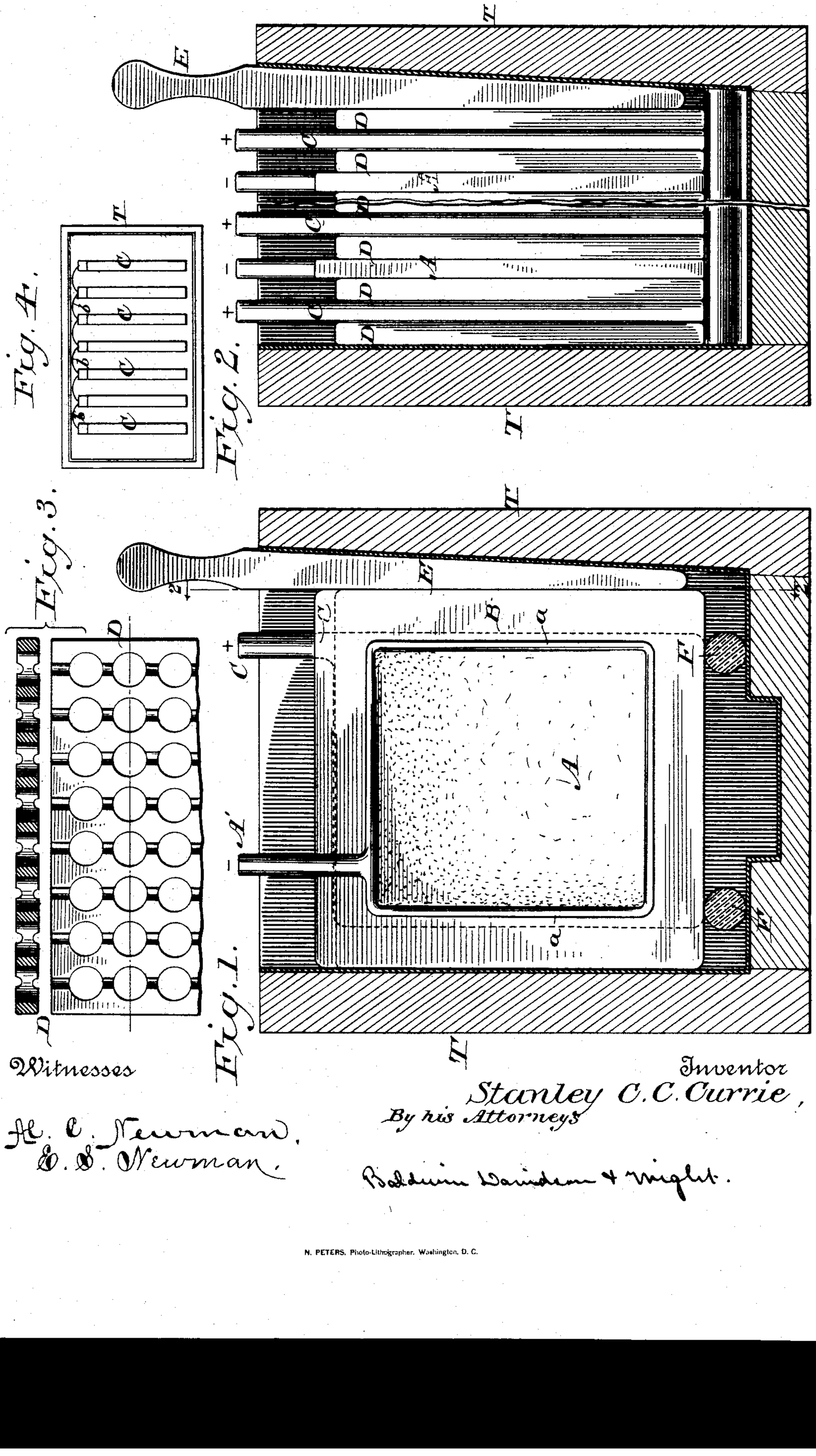
(No Model.)

S. C. C. CURRIE.

APPARATUS FOR FORMING SECONDARY BATTERY PLATES.

No. 411,787. Patented Oct. 1, 1889.



Witnesses

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR FORMING SECONDARY-BATTERY PLATES.

SPECIFICATION forming part of Letters Patent No. 411,787, dated October 1, 1889.

Application filed January 31, 1889. Serial No. 298,284. (No model.)

To all whom it may concern:

Be it known that I, STANLEY C. C. CURRIE, a subject of the Queen of Great Britain, now residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Charging or "Forming" Electrical Accumulator-Plates, of which the following is a specification.

The objects of my invention are to produce a cheap, simple, and efficient apparatus the parts of which can readily be assembled or dispersed, and in which the plates may be held during the process of "formation" rigidly against expansion, so as to produce hard compact plates of uniform density. These ends I attain by surrounding the active material, in the form of a plate or sheet, with a flange, bead, or rim adapted to be readily inserted in or removed from an inclosing-frame, in which it is held during the process of formation, the electric connections being attached to the frame in such manner that the plate can be removed or inserted without the necessity of connecting it up every time, as usually heretofore has been the case. A tag on the plate extends beyond and across the plate for the usual terminal connections. This compound plate is arranged in a suitable tank alternately with the ordinary positive plates of an accumulator, separated from the negative plates by an insulated sheet, board, or plate containing numerous transverse perforations, and also corrugated vertically to permit of free circulation of the electrolytic fluid and the escape of gases generated in the process of charging the plates. These plates are securely locked in the tank by suitable wedges or equivalent fastenings.

The subject-matter claimed is hereinafter specifically designated.

In the accompanying drawings, which represent so much of an apparatus embodying all my improvements as is necessary to illustrate my invention, Figure 1 represents a vertical longitudinal section through a cell or tank parallel with plates arranged therein, showing one of the plates to be "formed;" Fig. 2, a vertical transverse section therethrough on the line 2 2 of Fig. 1. Fig. 3 is a detail view of one of the grooved and perforated separating insulating-plates, showing both a face view and a section therethrough, and Fig. 4 a detail plan view showing the mode of connecting up the plates.

A cell or tank T, of suitable well-known construction, contains a proper electrolytic bath in which the plates are immersed, their lower edges resting upon insulating-rods F, as usual. The negative elements or plates A are made with a stiff bead, flange, or rim *a*, of the same metal as the plate itself, and are inclosed within rigid frames B, of suitable construction and material—lead, for instance—closely surrounding the edges of the plates. The casings or frames constitute contacts or electrodes for the terminals of the circuit, and thus avoid the necessity of constantly connecting them up every time a plate is changed, the advantage of which is obvious. This is done in the following manner: When the ordinary lead-lined tank is used, the frames are wedged against the lining so as to maintain the electrical contact. When, however, an insulated lining is used for the tank, the connections must be made across it by suitable conductors. One good way of doing this is shown in Fig. 4, which shows wires *b* connecting the frames in horizontal loops, which permit the plates to be slid vertically in and out of the frames, the tops of which may be made removable in well-known ways for that purpose. I term the beaded plate and inclosing-frame a "compound plate" in contradistinction to the plain or positive plate or element. The usual tags A′ project from the rim *a* through slots or apertures in the frame. These plates and frames are then inserted in the tank in alternation with the usual positive plates or elements C, but separated therefrom by plates D of suitable insulating material, preferably horizontally and transversely perforated and corrugated or grooved vertically, as shown in Fig. 3, to permit of the free circulation and proper action of the electrolytic fluids and of the escape of gas. The whole assemblage of plates is firmly secured by keys or wedges E, inserted between the sides and ends of the plates and the walls of the tank, or in other equivalent well-known

ways. The negative plates are formed or converted into the peroxide state by the passage of a current of electricity, as usual, and, being rigidly held at their edges by their frames and wedges, and to some extent at their sides by the insulating-plate, the expansion accompanying such formation expends its force within the body of the plate itself, resulting in the production of strong compact unwarped plates of uniform consistency.

The process of forming the plates herein described constitutes the subject-matter of another application filed by me January 30, 1889, No. 298,123, and is consequently not claimed herein.

Having thus fully described the construction and operation of my improved bath for forming accumulator-plates, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The combination, substantially as hereinbefore set forth, of the plate of active material, its inclosing-rim, the closely-fitting detachable inclosing-frame, and the electrical circuit-connections constituting it an electrode, whereby the plate may be removed or inserted without affecting the electrical contacts of the elements.

2. The combination, substantially as hereinbefore set forth, of a series of compound negative elements consisting of plates of active material, their rims, and inclosing-frames with interposed plain plates constituting the positive elements of the accumulator.

3. An accumulator separating-plate constructed, as described, of insulating material with transverse perforations and vertical longitudinal grooves to permit of free circulation of fluids and gases.

4. The combination, substantially as hereinbefore set forth, of the compound negative plates, the positive plates, and the interposed grooved and perforated insulating-plates.

5. The accumulator-plate-forming apparatus herein set forth, consisting of the combination of the cell or tank, the elements or plates, their insulating-plates, and the wedges for locking the removable parts in position.

In testimony whereof I have hereunto subscribed my name.

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Witnesses:
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