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BY A. P. C.

L. J. JUMAU
LEAD ELECTRIC ACCUMULATORS
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Fig. 1

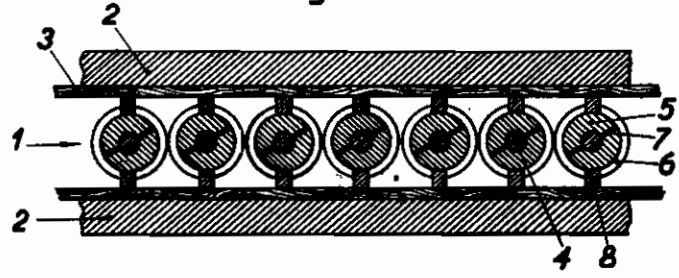


Fig. 2

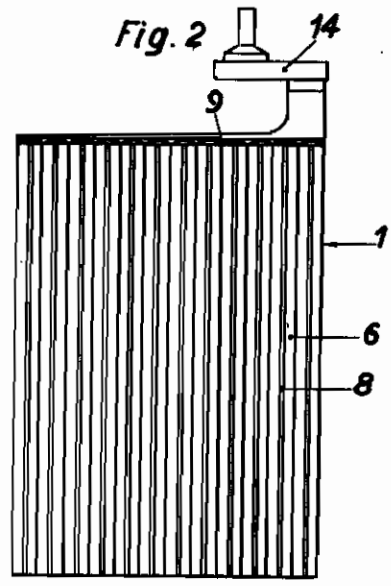


Fig. 3

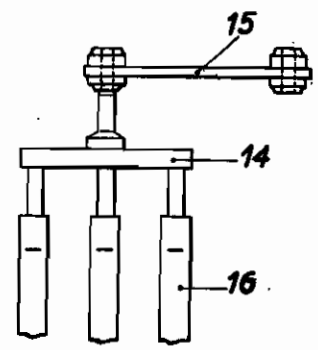


Fig. 4

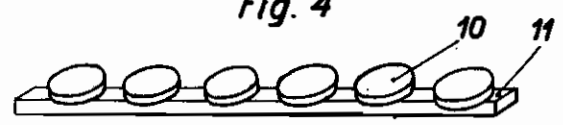
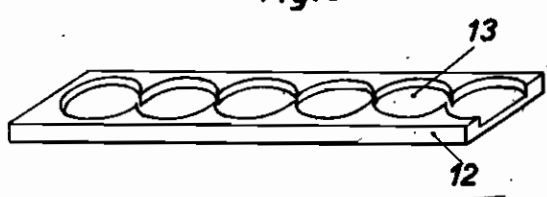


Fig. 5



Inventor
Lucien J. Juma
Raymond C. Robe
Attorney

ALIEN PROPERTY CUSTODIAN

LEAD ELECTRIC ACCUMULATORS

Lucien Jules Jumau, Paris, France; vested in the
Alien Property Custodian

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The present invention relates to improvements in the construction of electric accumulators. Accumulator plates are known under the name "Ironclad" or "Panzerplatte" which are provided with fine slots and in which the active material is lodged. In the axis of each tube is disposed a conductor of antimonial lead, the conductors of all the tubes of a plate being connected together at the upper and lower ends by two horizontal bars also of antimonial lead.

The present invention has for an object to reduce to a considerable extent the weight of accumulators of the above type while extending their life. A first improvement applied to the construction of the plates of such accumulators consists in replacing the ebonite tubes of the positive plates by tubes of any section, circular, elliptical, polygonal, etc., of porous material such as rubber of porous structure and preferably micro-porous rubber.

By virtue of this substitution any falling off of active material is completely avoided, which falling off was merely retarded in plates formed of split ebonite tubes. The life of the plates is thus considerably increased since it is only limited by the much greater life of the tubes of microporous material. A secondary advantage of this construction is the reduction of the distance between the base of the plates and the bottom of the container and consequently reduction in the space occupied since there is no need to provide for the lodging of deposits on the bottom of the container.

The new construction provides as another particularly advantageous consequence the following feature relative to the positive plate; since the active material does not fall, the central conductor is always surrounded by active material and is never in direct contact with the electrolyte. It serves practically only as a conductor and the electrolytic action takes place only over a very slight thickness. Hence, the possibility of replacing this conductor hitherto made of antimonial lead by a conductor in lead covered light metal, said light metal being aluminium or aluminium alloy.

The present invention has for its object an electric accumulator of the armoured type characterised by the simultaneous use of tubes containing the active positive material in porous material such as microporous rubber and conductors located in the axis of the said porous tubes of lead covered aluminium or a lead covered aluminium alloy. The construction of the positive conductor unit of the element in accordance with the

invention is very simple. This unit comprises, in addition to the central conductors, a horizontal bar connecting their upper ends, the whole being of lead-covered aluminium or of a lead-covered aluminium alloy with a thicker layer of lead on the horizontal upper bar. The central conductors may be provided with small lugs to hold them exactly in the axis of the tubes of micro-porous rubber.

There results a considerable diminution in the weight and an increase in the conductivity which produces a specific increase of power and energy. Moreover, the introduction of antimony into the electrolyte is avoided, this antimony in plates having conductors of antimonial lead electrolyzing from the positive on to the negative, creating on the latter energetic local actions which diminish the output and impede proper conservation of the charge.

It should be noted moreover, that the conductor in lead-covered aluminium which is converted into peroxide only over very slight thickness is indeformable. This advantage, joined to the increased conductivity, permits of dispensing actually with the metal bar of antimonial lead connecting the lower part of the conductors of the tubes. It is sufficient either to make use of tubes closed at the lower end or to close the lower end of each tube with a small unattackable plug, or by an ebonite bar carrying plugs opposite each tube. The ebonite bar can also be provided with perforations into which extend the ends of the tubes, adhesion being obtained, for example, through the medium of rubber solution.

This modification provides considerable reduction in the weight of the plates. The positive "ironclad" plates thus modified may be mounted in known manner opposite negative plates comprising a conducting grid in lead covered aluminium provided as usual with active material.

In order to reduce still further the weight of the elements and of the batteries, the junctions connecting the heads of the plates as also the connections connecting the elements together are formed of lead covered aluminium, or of a lead covered aluminium alloy, the joint being effected by applying lead either between the heads of the plates and the junctions or between the stocks of the latter and the heads of the connections.

The accompanying drawings make clearer the above description.

Fig. 1 is a view in section of a positive electrode mounted between two negative electrodes.

Fig. 2 is a view of a positive plate with a junction bar connecting the heads of the plates,

5
10
15
20
25
30
35
40
45
50
55

Fig. 3 is a view of a group of negative plates with a coupling bar forming the connection between elements.

Fig. 4 is a detail of a bar with plugs for closing the tubes of a positive plate.

Fig. 5 is a detail of a bar provided with perforations adapted to receive the lower ends of the tubes of a positive plate.

In Fig. 1, 1 denotes the positive plate, 2 the negative plate and 3 a separator; the positive plate 1 is composed of a series of tubes 5 of microporous ebonite for example containing the active material 5 and in the axes of which are located conductors of lead covered aluminium 4. Each conductor 4 is held in the axis of the corresponding tubes by lugs 7; each of the tubes has two reinforcing ribs 6.

Fig. 2 is a view of the positive plate in accordance with the invention. This plate is constituted by a certain number of porous juxtaposed tubes which may be caused to adhere to one an-

other by any known means (vulcanization, gluing, etc.). These tubes are closed at their lower ends; the central conductors of lead covered aluminium or of lead covered aluminium alloy are connected together by a horizontal bar 8 of the same metal, and the junctions of the heads of the plates of same polarity are constituted by bars 14 of the same lead covered metal or alloy. In similar manner the connections between elements are constituted by members 15 (Fig. 3) of lead covered aluminium or aluminium alloy, and finally the grids 16 of the negative plates (Fig. 3) are also of the same lead covered metal or alloy.

In lieu of being closed at their lower ends the tube 5 might be open but sealed by insulating and unattackable plugs 10 carried by an ebonite bar 11 or they may be open and closed by an ebonite plate 12 provided with recesses 13 in which the ends of the tubes can fit and be sealed.

LUCIEN JULES JUMAU.