(No Model.)

M. DE CONTADES.

SECONDARY BATTERY.

No. 590,930. Patented Sept. 28, 1897.

Fig. 1.

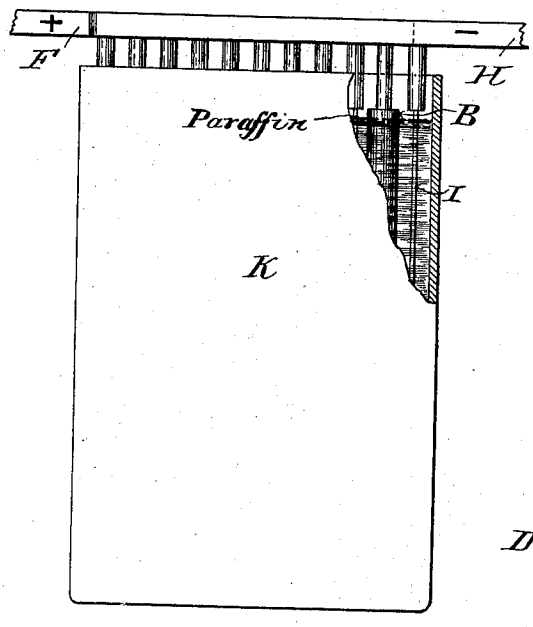


Fig. 3.

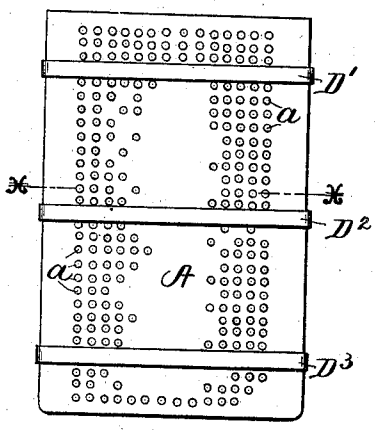


Fig. 4.



Fig. 2.

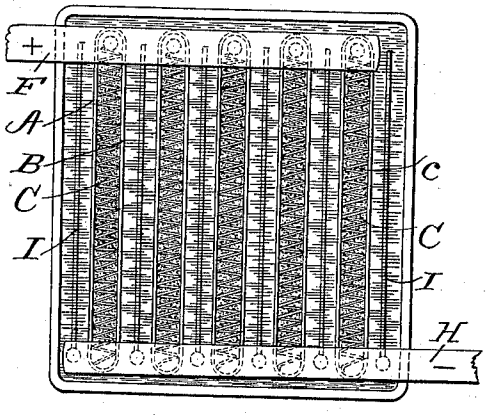
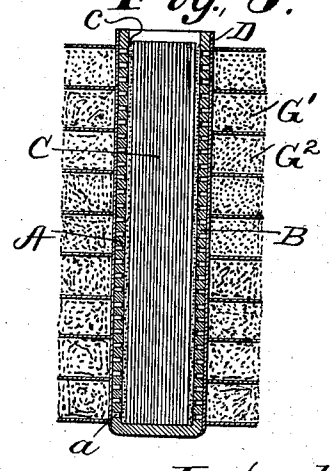


Fig. 5.



Witnesses.
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by Edward Mauro.
his attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

MÉRY DE CONTADES, OF PARIS, FRANCE.

SECONDARY BATTERY.

SPECIFICATION forming part of Letters Patent No. 590,930, dated September 28, 1897.

Application filed February 9, 1897. Serial No. 622,641. (No model.) Patented in France August 11, 1896, No. 258,825.

To all whom it may concern:

Be it known that I, MÉRY DE CONTADES, of Paris, in the Republic of France, have invented a new and useful Improvement in Secondary Batteries, which is fully set forth in the following specification, and which has been patented in France, No. 258,825, dated August 11, 1896.

This invention has for its objects to impart to the elements of a secondary battery increased suppleness and elasticity, to obviate the necessity of great care in handling the battery, to give strength to the plates, and to increase the durability of the battery. The improved constructions whereby these objects are attained are illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of a battery constructed in accordance with the invention. Fig. 2 is a plan view thereof. Fig. 3 is an elevation of the casing or envelop of one of the elements. Fig. 4 is a horizontal section on line *x x*, Fig. 3; and Fig. 5 is a vertical section of the envelop when provided with a single holding-band.

The accumulator is composed of a number of positive electrodes C of inoxidizable metal in thin sheets (about one millimeter in thickness) folded back and forth, as shown in Figs. 2 and 4, each inclosed in a casing formed of the two parts A B, preferably constructed as hereinafter described, and filled in about the electrode C with active material *c*.

F represents the conducting-strip which electrically connects the positive elements, and H the corresponding strip connecting the negative plates I. The latter may be of the usual construction. The elements are, as usual, immersed in the acidulated battery liquid contained in vessel K, which may be of wood or other inoxidizable material. A heavy coating of paraffin is preferably spread over the surface of the liquid to prevent evaporation and the escape of vapors.

The casings A B of the positive electrodes are about two centimeters in thickness and are of such size that the angles of the folds of the electrodes C simply touch the interior walls. They may be of rubber or any other suitable well-known material. The form of the electrodes gives them great suppleness and freedom of movement, enabling them to become deformed without detriment, thus avoiding the danger of breaking the inclosing casing. The negative electrodes I may consist, as already stated, of ordinary plates, or they may be formed, as are the positive electrodes, of folded sheets contained each in an inclosing and protecting casing, as shown in Figs. 3 and 4. The two walls A B, which form the porous envelop or casing, may be perforated or provided with holes *a*, which do not quite pass through the walls, but stop within a few millimeters of one surface. The walls A and B are so fashioned at their meeting edges as to form expansible joints, permitting the spreading or expansion of the casing to accommodate it to changes produced in the form of the inclosed electrode during the charging and use of the battery. These joints are shown in Fig. 4, as formed by tenons and mortises, but other equivalent constructions can be employed instead. By this arrangement increase in porosity of the active material is obtained and the charge and discharge are effected with facility and without alteration of the plates. At the same time the capacity of the element is considerably increased.

The casing A B may be surrounded with narrow belts or holding-bands $D' D^2 D^3$, preferably elastic, such as rubber, or of expansible and ductile metal, such as lead or tin. This allows the battery action to take place without rupturing the vessel and serves to maintain the active substance against the plate. There may be used a single band D, of lead or any other suitable conducting material, extending the full height of the vessel, as shown in Fig. 5, thus constituting an additional protective envelop or armor. In such case the perforated armor may be united with the casing A B and be arranged in such a way as to form cells $G' G^2$, which when filled with active material constitute the negative electrode, the positive electrode C being inclosed, as before, in the vessel A B.

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

1. In a secondary battery, a non-conducting porous envelop or casing inclosing an electrode and composed of two sheets, connected at their meeting edges by expansible joints,

permitting the casing to adjust itself to changes in shape of the electrode, said casing being provided with a holding band or bands of expansible material, substantially as described.

2. The combination with a battery-plate, of an inclosing casing of non-conducting material having expansible joints, and a holding-band or armor of expansible conducting material surrounding and united to said casing, and provided exteriorly with cells filled with active material, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

MÉRY DE CONTADES.

Witnesses:
EDWARD P. MACLEAN,
EDWARD BEUGUIOT.