

(No Model.)

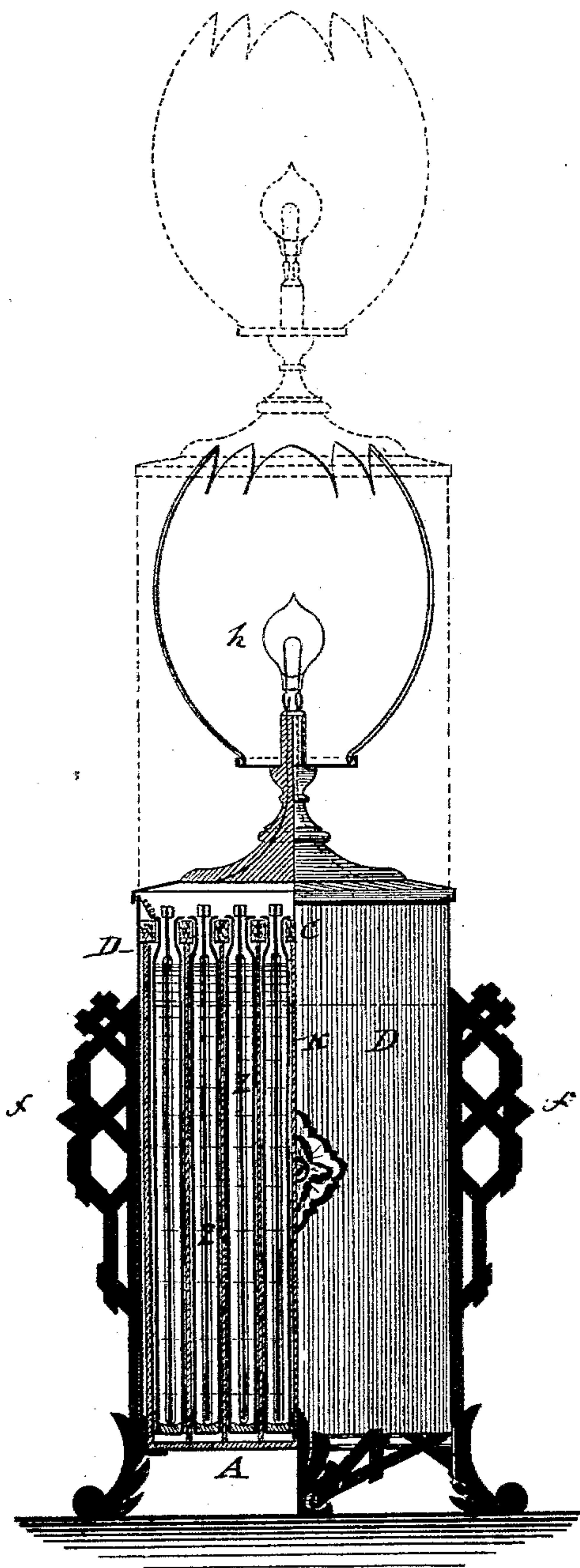
4 Sheets—Sheet 1.

K. POLLAK.
ELECTRIC BATTERY.

No. 359,690.

Patented Mar. 22, 1887.

Fig. 1.



WITNESSES.

For. H. Rosenbaum.
Carl Kump

INVENTOR

Karl Pollak

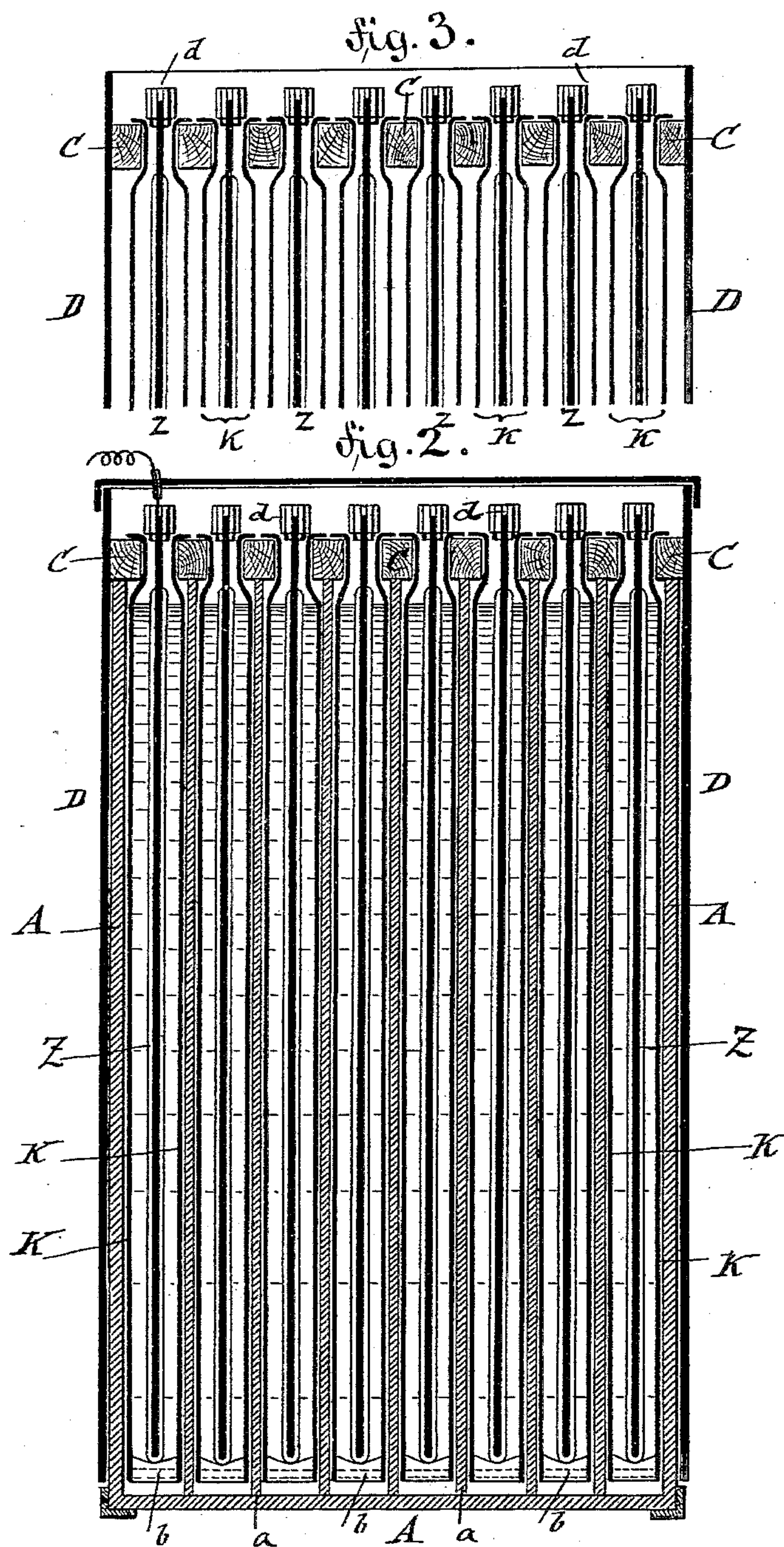
By *his* Attorneys

Loeppert & Raegeners

K. POLLAK.
ELECTRIC BATTERY.

No. 359,690.

Patented Mar. 22, 1887.



WITNESSES

For. H. Rosenbaum.
Carl Klapp

INVENTOR

Karl Pollak

By *his Attorneys*

Lochner & Raegner

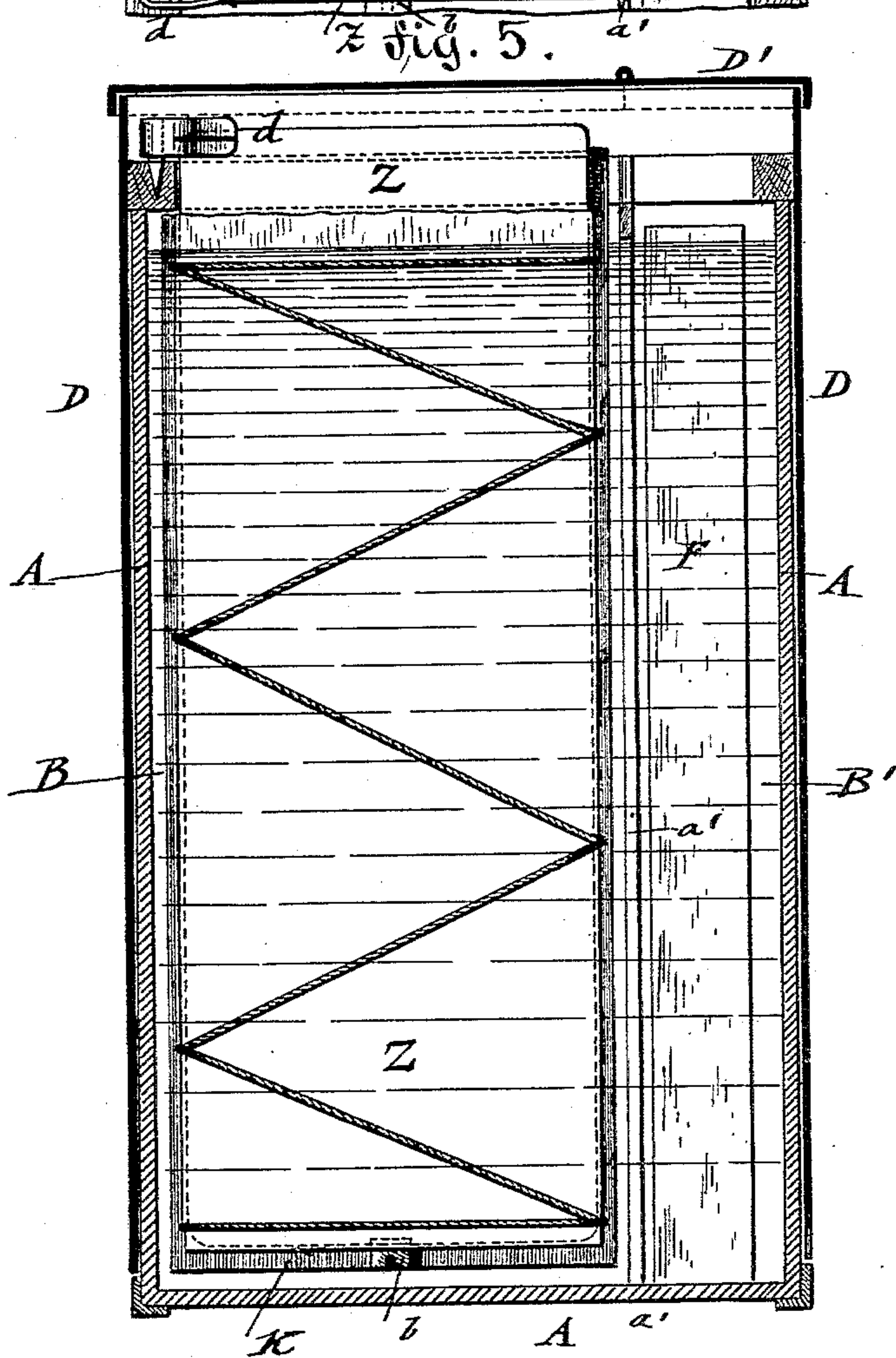
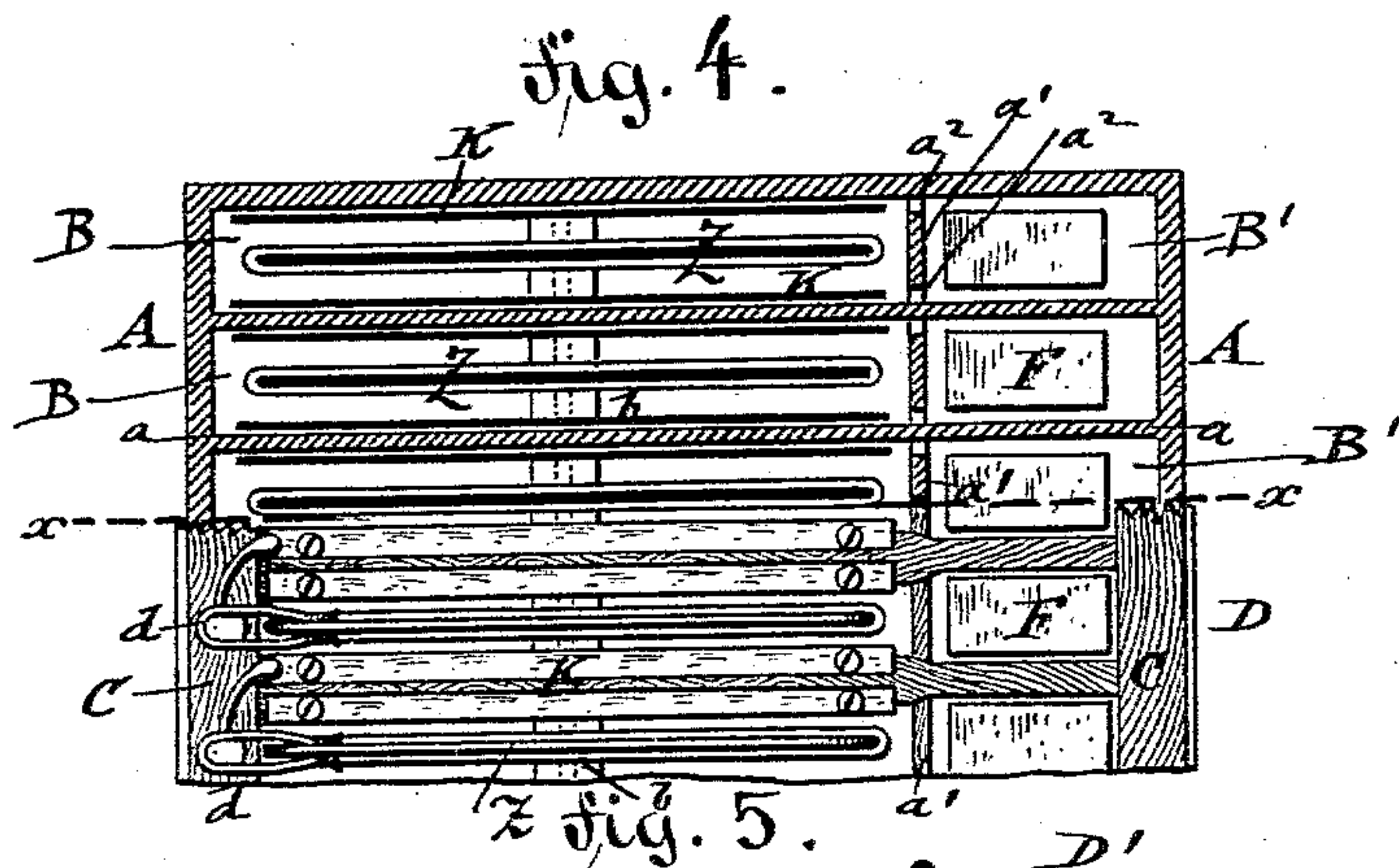
(No Model.)

4 Sheets—Sheet 3.

K. POLLAK.
ELECTRIC BATTERY.

No. 359,690.

Patented Mar. 22, 1887.



WITNESSES

For. H. Rosenbaum.
Carl Kuhn

INVENTOR

Karl Pollak

By *his Attorneys*
James H. Baegemer

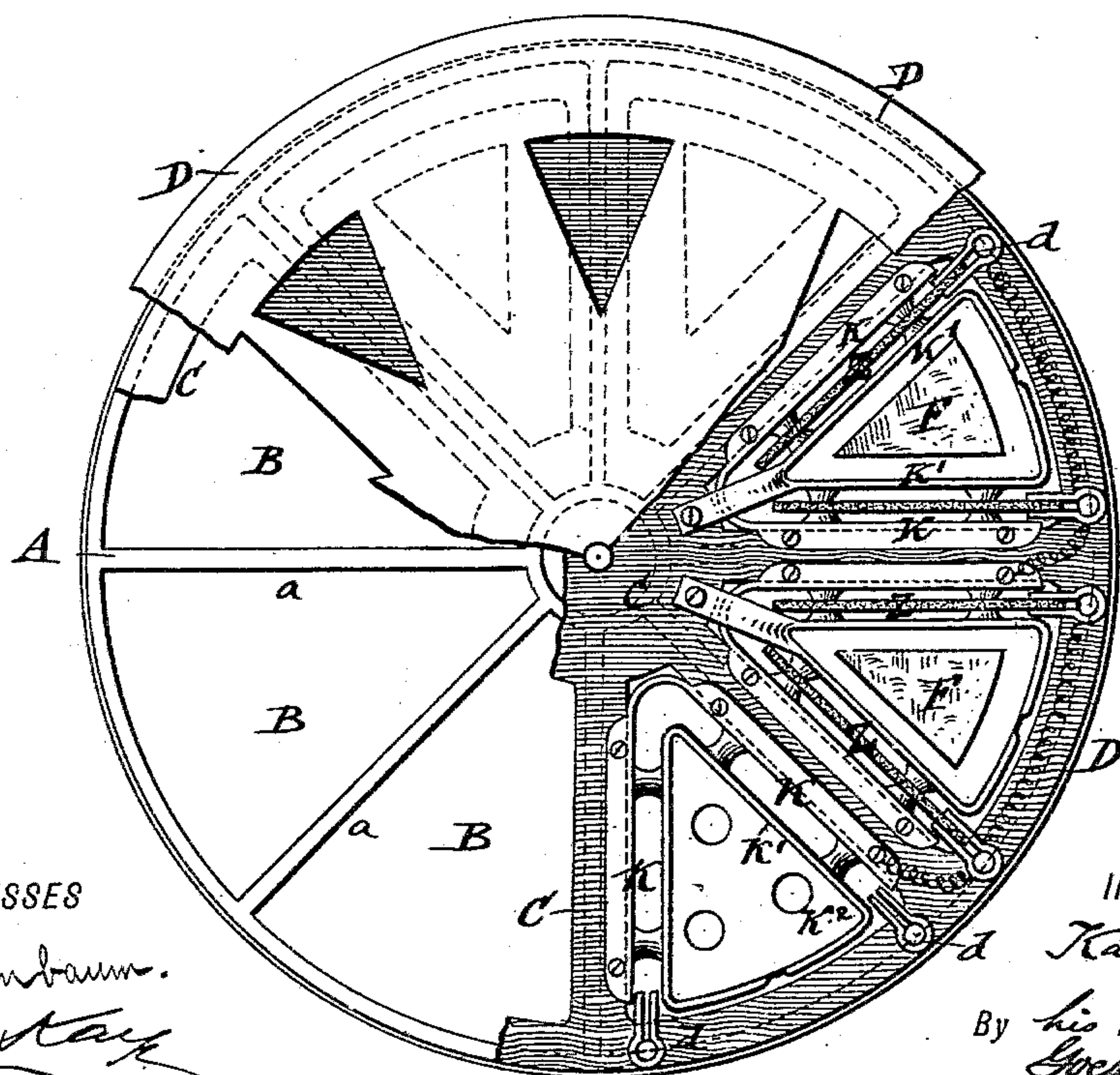
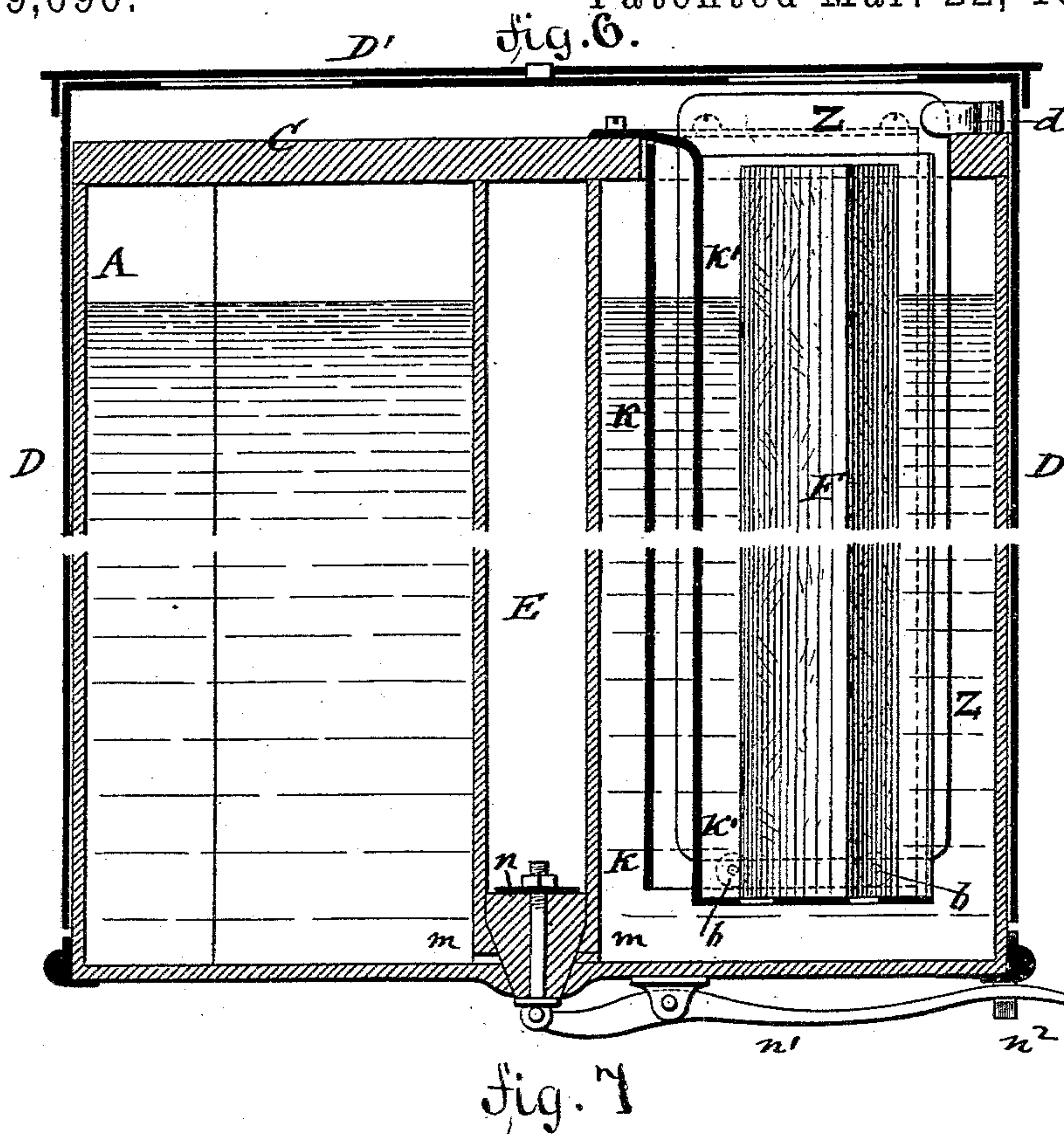
(No Model.)

4 Sheets—Sheet 4.

K. POLLAK.
ELECTRIC BATTERY.

No. 359,690.

Patented Mar. 22, 1887.



WITNESSES

Frederick Rosenbaum.
Paul Kay

INVENTOR

Karl Pollak
By *his Attorneys*
Greene & Ruggles

UNITED STATES PATENT OFFICE.

KARL POLLAK, OF BERLIN, GERMANY, ASSIGNOR TO DEUTSCHE EDISON GESELLSCHAFT FÜR ANGEWANDTE ELEKTRICITÄT, OF SAME PLACE.

ELECTRIC BATTERY.

SPECIFICATION forming part of Letters Patent No. 359,690, dated March 22, 1887.

Application filed August 6, 1885. Serial No. 173,684. (No model.)

To all whom it may concern:

Be it known that I, KARL POLLAK, a subject of the Emperor of Austria-Hungary, residing at the city of Berlin, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Electric Batteries, of which the following is a specification.

This invention relates to an improved electric battery which has the advantage that it can be arranged within a very small compass, produces a comparatively great and constant electromotive force, and that it can be easily filled and cheaply renewed.

The invention consists of an electric battery composed of a partitioned vessel, in the cells of which are suspended copper plates, and intermediately between the latter zinc plates covered by a prepared wrapper of tissue-paper. The zinc and copper plates are supported by a grating that is attached to a sliding casing which is fitted tightly around the vessel. The covering-wrapper of the zinc plate is soaked in a mixture of gelatine, glycerine, and water and treated with tannic acid, as will herein-
after be more fully described, and finally be pointed out in the claims.

In the accompanying drawings, Figure 1 represents a side elevation, partly in section, of an incandescent lamp for table use, in the body of which is arranged an electric battery of my improved construction. Fig. 2 is a vertical transverse section of the same; Fig. 3, a vertical transverse section of the movable part of the battery. Fig. 4 is a top view, partly in horizontal section; Fig. 5, a vertical longitudinal section on line xx , Fig. 4; and Figs. 6 and 7 are respectively a vertical central section and a top view, partly in horizontal section, of a modified form of my improved electric battery.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents the vessel within which my improved electric battery is arranged, and in which the exciting-liquid is placed. The vessel A is made, preferably, of square or oblong shape, but can also be made of round or polygonal shape. The vessel A is separated by a number of parallel partitions, a , into a number of chambers, which are again

divided by transverse partitions a' into two compartments, B B', of which the compartments B are considerably longer than the compartments B'. The transverse partitions a' are provided at both sides with narrow slits a'' , that extend from the upper to the lower end of the partitions a' , so that the compartments B and B' communicate with each other. In the longer compartments B B are arranged the copper and zinc elements of the battery, which are suspended from a grating, C, of wooden slats, that rests on the rim of the vessel A. The copper plates k are lapped at their upper ends over the slats of the grating and attached thereto by screws, as shown in Fig. 4. The slats of the grating C rest centrally on the partitions a of the vessel A. From each slat of the grating C extend two copper plates in downward direction and at opposite sides of each partition a into the compartment B. The lower ends of the copper plates k are connected by one or more transverse blocks, b b , of hard rubber or other suitable material, by which they are retained at a uniform distance from each other. The insulating-blocks b are attached to the plates by transverse copper rivets, by which at the same time the metallic connection of the copper plates is accomplished.

In the spaces formed between the copper plates k in the compartments B B are arranged the zinc plates Z, which also rest on the bottom blocks, b b , and are retained thereby in position at the lower ends. The zinc plates are supported at their upper ends by spring-clasps d , of sheet metal, as shown in Figs. 4 and 5, which are attached to a transverse end strip of the grating C. The grating C is attached to a metallic casing, D, which is tightly fitted to the casing A and adapted to slide over the same. The casing D has handles ff , by which it is raised or lowered. The casing D is closed at the top and provided with a hinged lid, D', as shown in Fig. 5, that extends over the compartments B', and that serves for inserting the material required for replenishing the electric battery from time to time.

The metallic connection of the different elements of the battery is such that the copper plates of the first element are connected by a

copper wire with the zinc plate of the next adjoining cell, as shown in Fig. 4, and the copper plates of the last element by a copper wire with the casing D, which latter serves for conducting the electric current.

The opposite pole of the battery is formed by the zinc plate of the first element, from which a wire passes through an insulated opening of the casing D, as shown in Fig. 2.

The vessel A is filled to nearly half its height with a solution of sulphate of copper, into which the elements are plunged by lowering the casing until the zinc and copper plates arrive at the bottom of the vessel A, as shown in Figs. 1 and 2.

For interrupting the action of the battery, the casing D is raised into the position shown in dotted lines in Fig. 1, in which position the casing D is retained by a spring-catch or other locking device, by which arrangement the battery is entirely at rest when not required for use. The tight fitting of the casing D around the vessel A serves for keeping the zinc plates in a moist condition even when the battery is not in use, which has the advantage that at the moment when the casing is lowered and the battery dipped in the exciting-solution a current of considerable force is generated.

Around the zinc plates Z is wrapped a layer of tissue-paper, which, either before or after its application to the plates, is soaked in a solution of two parts of gelatine, six parts of glycerine, and three parts of water. The wrapper of tissue-paper forms a kind of bag in which the zinc plate is hung. When the soaked wrapper of tissue-paper has become perfectly dry, which takes about two hours, the zinc plate and its wrapper are dipped in a solution of tannic acid of brownish color and of the consistency of a weak solution of gum-arabic. In this weak bath of tannic acid the plate is allowed to remain for about ten or twenty seconds, after which the plate is taken out and allowed to dry, so that the tannic acid can exert a tanning action on the paper wrapper. This is accomplished in about fifteen to twenty minutes, upon which the tanned wrapper can be washed off with water. After the surplus moisture has been allowed to drip off, the plates are again covered with a wrapper of common tissue-paper, which is secured by a thread wound around the covering-paper, as shown in Fig. 5. The covering layer of tissue-paper has the object of protecting the prepared wrapper of tissue-paper, and also of preventing, respectively, retarding the mixing of the sulphate-of-copper solution with the sulphate-of-zinc solution. The thus-prepared wrapper lasts until the zinc plate is entirely consumed, which is of considerable advantage, as thereby the zinc plate has to be covered only once during its life with a covering-wrapper. The sulphate of zinc formed by the action of the elements is diffused through the wrapper and collected as a saturated solution at the bottom of the cells, below the sulphate-

of-copper solution, where it crystallizes and assumes a greenish tint, owing to the sulphate of copper solution. The refilling of the battery is accomplished by inserting bars which are pressed into prismatic shape, and formed of sulphate of copper mixed with about five per cent. of tartaric acid, into the compartment B' by means of the hinged lid D' of the casing D.

The battery so far described was supposed to be of square or oblong shape. A battery of round or polygonal shape is shown in Figs. 6 and 7. In this case the elements are arranged radially to the center of the battery. The vessel A is provided with a central cylindrical or polygonal chamber or wall, E, which is open at the lower end, connected by small channels *m* at the lower end with the compartments B, that are formed by radial partitions *a a* around the well E. A conical rubber valve, *n*, is fitted to a tapering seat at the lower end of the well E, and connected to a fulcrumed lever, *n'*, that is retained by a spring-hook, *n''*, at the bottom of the vessel A, whereby the valve *n* closes tightly the lower end of the well. When the lever *n'* is released, the valve *n* is raised in the well E, so as to open the channels *m* without permitting the liquid to rise above the valve. By the channels *m* and valve *n* the spent solution can be readily drawn off at the bottom of the vessel A. The copper and zinc plates *k* and *Z* are suspended from the wooden grating C in the same manner as in Figs. 1 to 5. The grating C is attached to a metallic sleeve or casing, D, which is fitted around the vessel A.

In each compartment B are arranged two combined elements—namely, two zinc plates, *Z*, which are inclosed in a prepared wrapper, as the zinc plates hereinbefore described, and two copper plates, *K K'*. The outer copper plates, *K*, are attached to the grating, while the inner copper plates, *K'*, form the side of a hollow prism whose third side or base, *K''*, is divided at the center by a narrow slot, and whose bottom is provided with openings for the passage of the exciting-solution. The space inclosed by the copper prisms *K' K''* serves for inserting the bars *F*, composed of sulphate of copper and tartaric acid, which are employed for replenishing the elements. The sides *K'* of the prism *K' K''* are connected at their lower end with the copper plates *K* by copper rivets and rubber blocks *b b*, which support the zinc plates *Z*, that are retained at their upper ends by metal clasps *d*, in the same manner as in Figs. 1 to 5.

The two zinc plates of each compartment B are connected with each other by a metal strip, while the copper plates of each cell are metallically connected by the rivets. The different elements are connected in series, the copper plates of one element being connected to the zinc plates of the next element, and so on, the copper plates of the last element being connected to the casing D, while the zinc plate

of the first element is connected to a wire that is insulated from the cover of the casing D. The cover of the casing is made of two plates, which are provided with triangular openings 5 that correspond to the size of the prisms K' K², and that serve, when made to register with each other and the upper parts of the prisms, to insert the replenishing-bars F. By turning the upper plate of the cover the casing is 10 closed.

A battery of this construction possesses a comparatively great electro-motive force, owing to the close proximity of the copper and zinc plates to each other, by which the interior resistance of the elements is considerably 15 diminished and the effect of the same considerably increased, so that elements having zinc plates of sixteen centimeters in height and seven centimeters in width can be used for the 20 generation of electric light. Owing to the close proximity of the zinc and copper plates, the prepared tissue-wrapper has to be used in place of the clay, parchment, or bladder cells used heretofore, as these are too cumbrous to 25 permit the close approach of the plates. By the use of said cells the copper would be deposited in a very short time in metallic form, and thereby connect the electrodes with each other.

A battery of this construction is specially 30 adapted for use with portable electric lamps for domestic purposes, the battery being arranged in the base of the lamp. An incandescent lamp, *h*, is arranged on a standard of suitable insulating material on the casing of the 35 battery, the carbon filament of the lamp being connected by insulated wire with the zinc and copper poles of the battery.

When several incandescent lamps have to 40 be supplied, a battery of large size is required, which is preferably arranged below the table or at any suitable place from which the lamps may be conveniently supplied with the electric current. Care has to be taken, however, that 45 they are so placed that the raising or lowering of the casing can be easily accomplished.

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

1. In an electric battery, the combination of a partitioned vessel, copper plates suspended 50 in the cells of said vessel, and intermediate zinc plates covered by a wrapper of tanned tissue-paper, substantially as set forth.

2. The combination of a partitioned vessel, a grating resting on said vessel, copper plates 55 suspended from said grating, and intermediate zinc plates having a wrapper of prepared tissue-paper, substantially as set forth.

3. The combination of a partitioned vessel, a grating resting on said vessel, copper plates 60 suspended from said grating and connected at the lower ends by copper rivets and insulating-blocks, zinc plates supported from said grating and resting on said blocks intermediate 65 between the copper plates, said zinc plates being covered by a wrapper of prepared tissue-paper, substantially as set forth.

4. The combination of a vessel divided by partitions into a number of cells, a wooden grating resting on said vessel, copper plates 70 suspended from said grating, and zinc plates covered by a wrapper of tissue-paper and supported intermediate between the copper plates, and a sliding casing to which the zinc 75 and copper plates are attached, substantially as set forth.

5. In an electric battery, a zinc plate covered by a wrapper of tissue-paper soaked in gelatine, glycerine, and water and treated with tannic acid or other tanning substance, substantially 80 as set forth.

6. In an electric battery, replenishing-bars composed of sulphate of copper and tartaric acid, substantially as set forth.

In testimony whereof I have signed my name 85 to this specification in the presence of two subscribing witnesses.

KARL POLLAK.

Witnesses:

GERARD V. NAWROCKI,
B. ROI.