

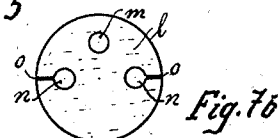
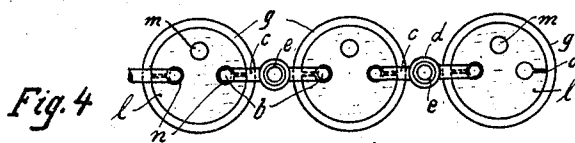
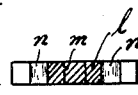
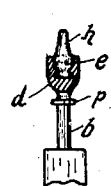
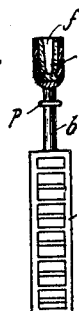
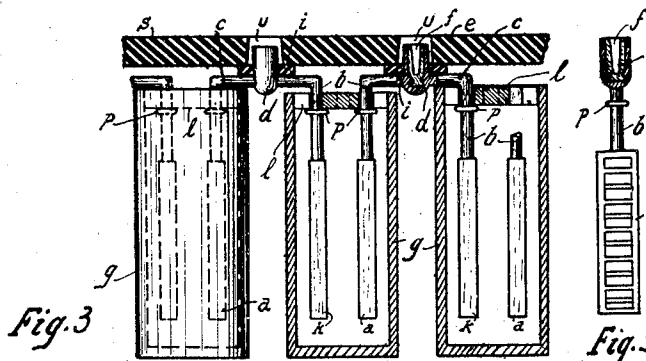
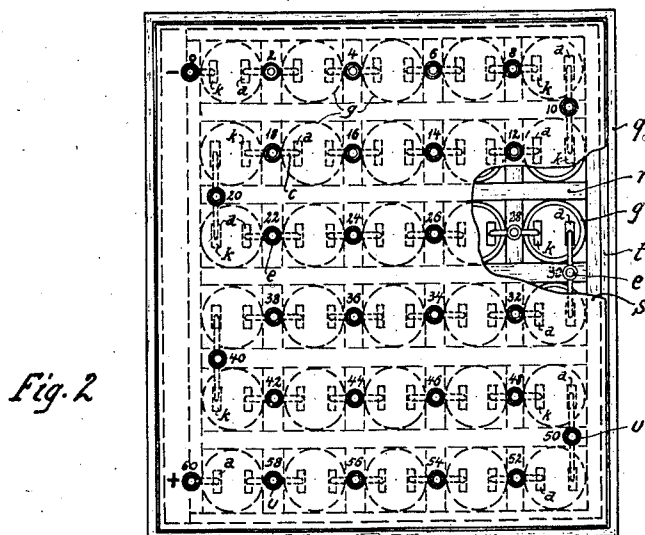
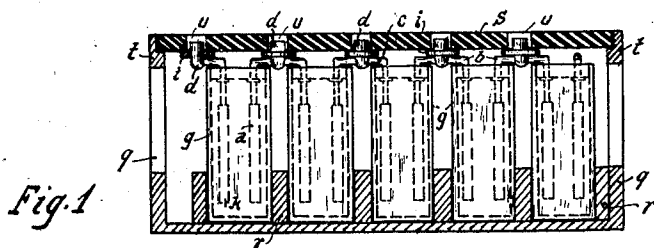
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ANODIC CURRENT ACCUMULATOR BATTERY

Filed April 7, 1926



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UNITED STATES PATENT OFFICE.

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ANODIC-CURRENT ACCUMULATOR BATTERY.

Application filed April 7, 1926, Serial No. 100,420, and in Germany October 16, 1925.

This invention relates to an anodic-current accumulator-battery specially designed for use in the radio-technics, and it relates more specially to a new arrangement of the elements for connection and for appropriation of current between the several cells to facilitate the care of the battery, to enable the battery to be tapped at various voltages and to reduce the cost of manufacture.

It is generally known to use as source for the anodic-current for radio-apparatus, besides the commonly used dry-batteries, current-accumulators in which the electrodes of the several cells are exchangeably suspended or mounted in an acidic liquid which can also be renewed, the reason herefore being the lower price of these sources of anodic-current. In accordance with the desired voltage a certain number of such cells are series-connected, e. g. the cathode and the anode of two adjacent cells are connected with one another by a bridge, whilst hitherto they have been connected either by soldering or by means of contact-screws. These commonly used connections present however the inconvenience that they get easily loose by the action of vibrations, that the soldering points oxidize easily and consequently lose their conducting-capability, and that the individual points at which the current is tapped are difficult to arrange for the several voltages. In the connection of known type the putting on and removing of the lids for the cell-vessels is also very difficult, as the means for connecting the electrodes have to be loosened or removed.

According to this invention all these inconveniences are avoided by connecting the cathode and the anode of two adjacent cells by an electrical-conducting bridge made in one piece with the cathode and anode so that no soldering nor connecting by screws is necessary. At the centre of the connecting-bridge a boss of circular or multi-cornered cross section is arranged in which a plug-contact of metal for the commonly used anode plug is fixed by casting, so that these collection points for the several voltages are also neither soldered nor fixed by screws. The smooth conducting rods of the electrodes permit further of inserting from above into each cell vessel a disk-shaped lid of soft elastic rubber which has holes or slots.

An anodic-current accumulator-battery according to the invention is shown, by way of example, in the accompanying drawing in which:—

Fig. 1 is a vertical cross section through the box of the battery.

Fig. 2 is a plan view of the battery.

Fig. 3 shows in elevation and on larger scale three adjacent single cells.

Fig. 4 is a plan view of Fig. 3.

Fig. 5 shows in front elevation an electrode with connecting bridge, the latter being shown in section.

Fig. 6 shows another form of construction of the plug contact cast into the connecting bridge.

Fig. 7^a is a cross section through the disk-shaped rubber-lid and

Fig. 7^b is a plan view of Fig. 7^a.

Every single cell of the anodic-current accumulator-battery consists, in well known manner, of a vessel *g* of circular or cornered cross section, and of the two electrodes, e. g. the cathode *k* and the anode *a*, which are suspended or placed into the vessel *g* filled with acid and adapted to be charged in the commonly used manner by means of an electric current. The electrodes *a* and *k* extend at the top ends as conducting-rods, every cathode *k* or every anode *a* of two adjacent cell-vessels *g* being connected by a conducting bridge *c* made in one piece with said cathode and anode. At the centre the connecting bridge *c* has a boss *d* of cylindrical or multi-cornered cross section in which a plug contact *e* is fixed by casting. The plug contact *e* may, as shown in Figs. 3 and 5, be sleeve-shaped and have a conical bore *f* designed to receive the conical pin of the anode-plug, or as shown in Fig. 6, it may consist of a conical pin *h* designed to receive the sleeve-shaped anode plug. In any case a strong mechanical contact is ensured between the boss *d* and the contact plug *e* by which an absolutely secure contact is ensured which can not be disconnected. The plug contact *e* serves to receive temporarily the plug which by an electric cable is connected with the radio apparatus. The length of the electrodes *a* and *k* or of the electrode rods *b* is selected so that the electrodes may either be suspended, by means of the bridge *c*, upon the upper edge of the cell vessels *g* so that the lower ends of the electrodes are

not in contact with the bottom of said vessel, or the electrodes are placed upon a separate support on the bottom of the cell vessel. The cell vessels *g* are closed at the top end by a disk-shaped lid *l*, which is of sufficient thickness and made of a soft, elastic rubber and has such a shape (circular or cornered) that it fits tightly into the open end of the vessel *g* and closes the same like a stopper.

The lid *l* has an air- and filling-hole *m* and two holes *n* through which the electrode rods *b* pass. In order that the electrode rods can be inserted into the holes *n* said holes have each a lateral slot *o* extending to the outer edge of the lid *l*. According to the position of the electrodes the two passage-holes *n* might be arranged either on a diameter of the disk or at an angle the one to the other. To insert the lid it is merely necessary to lift the corresponding pair of electrodes *a*, *k* and to force the lid by way of the slots *o* over the electrode rods until they engage with the holes *n*, whereupon the lid is pushed like a stopper into the cell vessel *g* until it bears on the collars *p* provided on the electrode rods *d*. The collars *p* limit therefore the downward movement of the lid.

Analogous to the mounting of the lid the removing of the same is carried out, a hook being preferably used for this purpose which is inserted into the charging hole *m* so that the lid can be lifted. The lid presents, besides the advantages of easy handling, the further advantage that it tightly closes the cell vessel and that it cannot rattle like an ordinary lid.

The several cells are mounted, in the usual manner, in a box-shaped frame *g*, open at the sides so that the vessels *g* can be observed. The frame is subdivided by short vertical longitudinal and transverse partitions upwardly extending from the bottom plate into a number of separate compartments. Into each compartment a cell *g* can be placed so that it is securely fixed in its position. A number of cells may be combined in one frame *u* in accordance with the desired maximum voltage of the radio apparatus.

In the drawings Figs. 1 and 2 show, for instance, a battery of 60 volts. As each single cell in the charged state possesses a voltage of 2 volts, the thirty series-connected cells, sum up to 60 volts. The plug contacts *c* constructed according to the invention and arranged one between every two elements permit of a selection of voltage increasing of two volts from 2, 4, 6, 8 . . . to 60 volts, and adapted to be increased at will by the provision of a greater number of cells.

It is only necessary to insert the anode plug into the corresponding contact plug *e* marked with the desired volt-number. The continuous volt-numbers 2 to 60 (if there are

more cells, increasing for each additional cell of 2 volts) are preferably arranged on a cover plate *s* cast from hard rubber or similar insulating material, and marked at the side of each plug contact *e* so that they can be easily read by anyone not skilled in the art. The insulating cover plate *s* is guided in the edge ledge *t* at the upper end of the box-shaped frame and mounted on the rubber lids *i* stripped over the bosses *d* of the connecting bridges *c*, said bosses *d* which carry the plug contacts *e* or the contact pins *h* engaging with the corresponding holes *u* in the cover plate *s*.

The thickness of the cover plate *s* is selected so that the plug-contacts *e* do not reach to the upper surface of the cover plate in order to prevent the establishment of short-circuits between the several cells, which might otherwise be produced if a metal object is placed onto the cover plate. The holes *u* in the cover plate may be cylindrical but they are preferably conical enlarged, in downward direction as shown in Fig. 3, in order that the plug-contacts *e* can be more easily inserted into the holes *u* if the insulating cover plate *s* is put on. As Fig. 3 shows further, the cell vessels *g*, in case suspended electrodes are used, are arranged in such a manner that between every two cells *g* of the same height a single lower cell may be placed (in Fig. 3 the middle one) so that the upper edge of the one vessel *g* is on a higher plane than the upper edge of the adjacent vessel. This arrangement is made in order that the connecting bridge *c* of the electrodes rests upon the edge of the one vessel so that a creeping over of the acid from one vessel to the other vessel is prevented. It is advisable to arrange, in a manner known per se, in each cell between the two electrodes *a* and *k* a separate perforated insulating wall of rubber or similar material in order that touching of the two electrodes is excluded.

The several cells may evidently be arranged in any desired succession and in any number, and the battery frame might be enclosed in a protecting box to facilitate transport.

I claim:—

1. An anodic-current accumulator-battery the several cells of which are united in any desired number in a case adapted to be closed and which permit of selecting the voltages from cell to cell comprising in combination with the anode and the cathode of two adjacent cells, a connecting bridge made in one piece with the same without soldering, screw-connection or riveting and having a plug-contact sleeve cast on it, a lid of the battery-case having holes for said plug-contacts and being of such thickness that said plug-contacts project only partly into said holes whereby a secure voltage-selecting by

means of a commonly used contact-plug is ensured and the plug-contacts are protected against contact with articles placed on the lid.

- 5 2. An anodic-current accumulator-battery as specified in claim 1, comprising in combination with the cells, the electrodes made in one piece with the connecting

bridge, a stopper-like rubber-disk for holding said electrodes in their cell and having 10 two circular holes each with a slot directed towards the edge of the disk said hole being designed to be pushed over the electrode-rods to hold the same from all sides.

In testimony whereof I affix my signature.
GUSTAV REINSTROM.