(No Model.) 2 Sheets—Sheet 1.

E. GRAUERT.

ELECTRO THERAPEUTIC APPARATUS.

No. 456,219. Patented July 21, 1891.

Fig. 1.

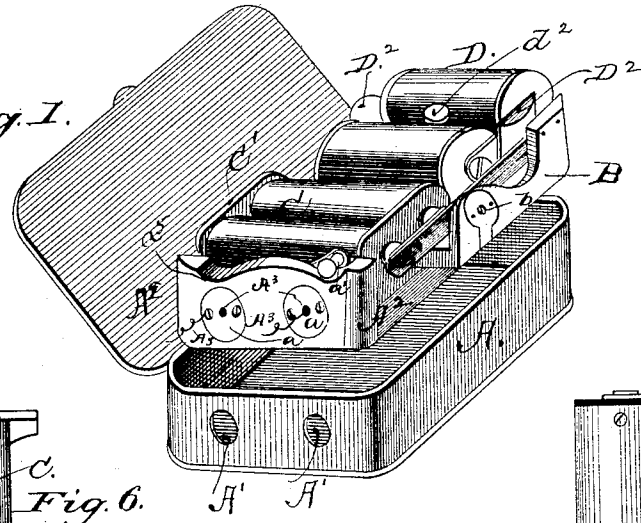


Fig. 6.

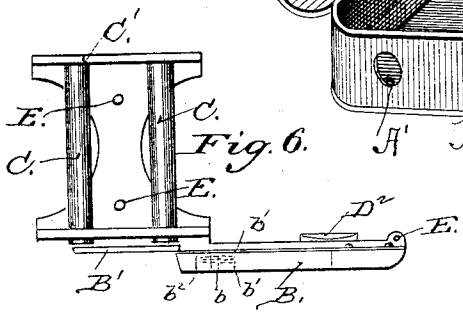


Fig. 3.

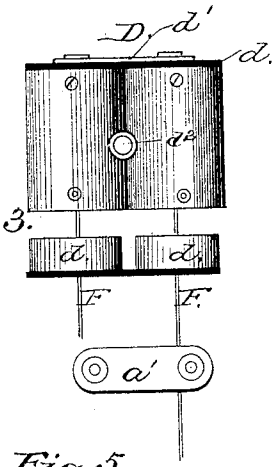


Fig. 4.

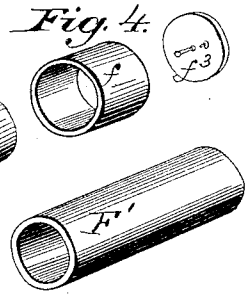


Fig. 2.

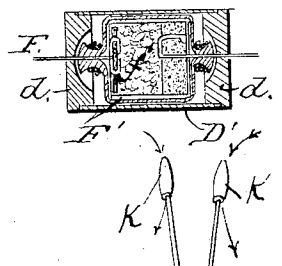


Fig. 5.

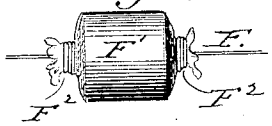


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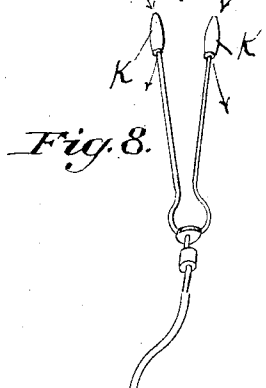
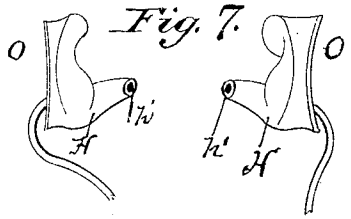


Fig. 7.



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(No Model.) 2 Sheets—Sheet 2.

E. GRAUERT.

ELECTRO THERAPEUTIC APPARATUS.

No. 456,219. Patented July 21, 1891.

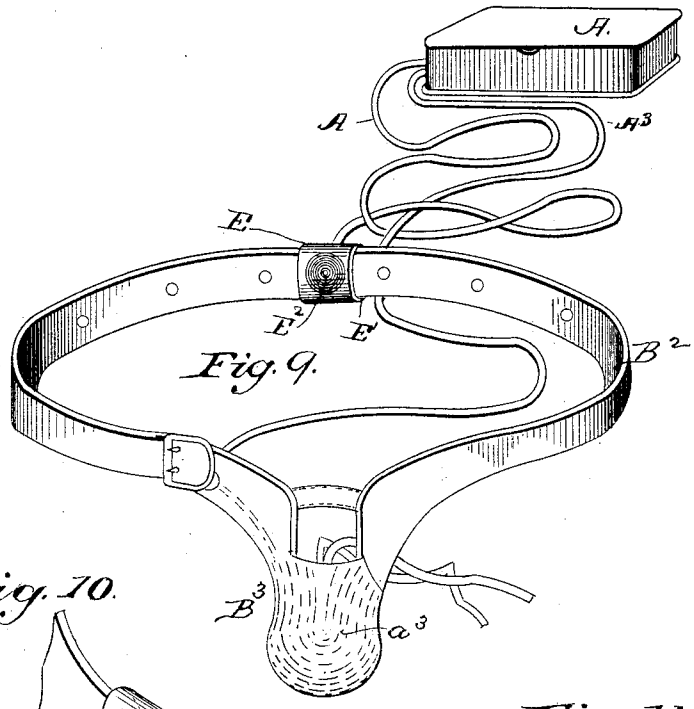


Fig. 9.

Fig. 10.

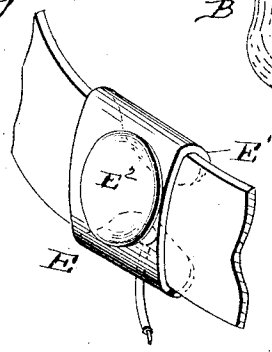


Fig. 11.

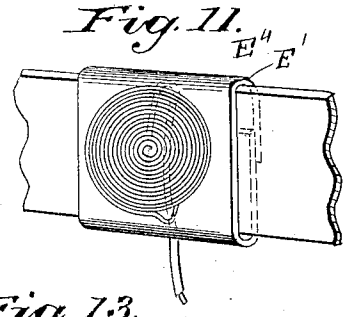


Fig. 12.

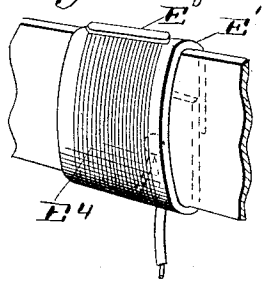
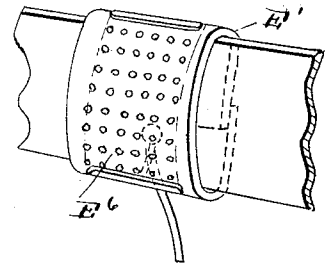


Fig. 13.



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UNITED STATES PATENT OFFICE.

EDGAR GRAUERT, OF NEW YORK, N. Y., ASSIGNOR TO EMIL GRAMM, OF SAME PLACE.

ELECTRO-THERAPEUTIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 456,219, dated July 21, 1891.

Application filed July 16, 1890. Serial No. 358,890. (No model.)

To all whom it may concern:

Be it known that I, EDGAR GRAUERT, a subject of the Emperor of Germany, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electro-Therapeutical Apparatus, of which the following is a specification.

My invention relates to an improved electro-therapeutic apparatus, and has for its object to provide a compact apparatus of the character described that shall remedy many of the defects of former apparatuses. Electro-therapeutic apparatuses now in general use consist of a cell or cells, magnet, and rheotome or interrupter. The cells, which are constructed to run for one hundred hours, often cease to act for short periods of time, and some exterior power is necessary to throw it into action again. If the stoppage should not be noticed, (and it cannot be when the patient is asleep,) the cell, when it does begin action, is short-circuited by reason of the interrupter not working, and a hundred-hour cell will become exhausted in eight hours or less. Besides this, during the unusual chemical action, gas is generated, which forces the exciting-fluid out of the cell and impairs the general appearance of the appliance.

My improvement is intended to remedy the evils above referred to and also others; and with this object in view my invention consists in the peculiar construction of various parts and their novel combination, such as shown in the accompanying drawings, and specially designated in the claims.

In the drawings, forming a part of this specification, Figure 1 is a perspective view of the pocket-battery. Fig. 2 is a vertical longitudinal section of one of the cells; Figs. 3, 4, and 5, detail views in perspective of parts of the cell. Fig. 6 is a top plan view of the frame carrying the battery. Fig. 7 shows an electrode adapted to be placed in the ear, and Fig. 8 one adapted to be applied to the nose. Fig. 9 is a perspective view of my improved therapeutic suspensory bandage. Figs. 10, 11, 12, and 13 are detail views in perspective of various styles of electrodes.

The battery of my apparatus is inclosed in a case A, the conductors passing out through the apertures A′.

B indicates a frame, of brass or other suitable material, which fits within the case and supports the various parts of the battery, which consists of the cells, electro-magnet, armature, rheotome, &c.

In the drawings, D indicates the cell, two of which are preferably employed.

In constructing my improved cell, which is of the dry-cell character, I use a glass cylinder f, on one end of which is placed an amalgam plate f^3, then the absorbent material f', and finally a compressed chloride-of-silver plate f^2. I use an amalgam plate because when zinc plates are simply coated with mercury it frequently drops off and does not prevent polarization. In a plate constructed of amalgam this is entirely avoided. The chloride of silver plate is compressed, because I have found that in casting these plates they crystallize upon coating and form pores or openings of varying sizes. By pressing the plates all the pores or crevices are reduced to a uniform size, and there is an equal absorption of fluid at every point of the plate. Conducting-wires F are connected to the plates f^2 and f^3 and extend outward, as shown. The glass cylinders and contents are placed within a rubber tube F′, of a length greater than the glass cylinder, and the projecting ends F^2 of the rubber tube are tied around the ends of the cylinder and wires, as shown, a suitable cement being used to form a tight joint. The rubber-incased cell is now placed in a cylinder D′, the ends of which are closed by the rubber heads d, the wires F passing through the same. When two or more cells are employed, they are connected by the contact-plates d', and a handle d^2 is arranged between the two to facilitate their removal from the frame. The metal frame B is secured to a rubber frame or base A^2. The cells are held between the spring contact-plates D^2, the forward one of said plates being connected to the metal frame B.

C indicates the electro-magnet, which is of the usual horseshoe or double-spool pattern.

B′ is the armature, which is connected with a thin metal spring, which is secured at one

end to the frame B. *b* is is a metal contact-point. The circuit is interrupted by the rheotome at point *b* in the ordinary manner. By this construction the current will pass from the cells to the spring contact-plate D^2, to the frame B, whence it passes into the spring of the armature, which normally rests against the point *b*. This conducts the current into the magnet, and the cores, attracting the armature, break the circuit, thereby producing an interrupted current. The conductors A^3 pass out through the plates *a*, secured in the rubber frame A^2, and then out through the apertures A′, formed in the case, to the electrodes, which are placed in the body. *a′* indicates the switch. This switch is provided with a handle *a′*, by means of which the rheotome may be thrown in or out of operation, as desired. The handle rests in a depression a^5 at either end of the rubber frame A^2.

My battery is particularly adapted for suspensory bandages, and in Fig. 9 I have shown it as applied. One electrode E is attached to the belt B^2, the other electrode being secured in the sack B^3. In this sack coiled wires a^3 form the electrode, said wires being woven in with the other fabrics. The electrode E, adapted to slide upon the belt, consists of a clamping-slide E′, to which the conductor is attached, and a contact-plate E^2, which rests against the body. The electrodes preferably used are those shown in Figs. 11 and 12. In Fig. 11 the electrode consists of a flat volute coil of wire, which renders it flexible, thereby avoiding undue pressure and friction on the body and permitting it to yield with the movements of the body. In Fig. 12 a felt slide is used, having the wires forming the electrode wound transversely around it, the slide being held in place by a clasp E^5. In Fig. 13 a perforated plate E^6 encircles the felt slide E^3. In general use the flexible or spirally-wound electrode is considered preferable.

In Fig. 7 electrodes for insertion in the ears are shown. They consist of a shell, one part O being secured in place within the ear, the tube H entering the ear-channel, and further provided with an air-passage *h*. In Fig. 8 the nasal-electrodes K are also shells having air-passages, so that the air can pass freely through them when inserted in the nose. These air-passages prevent rumbling when the electrodes are inserted in the ears and the feeling of suffocation when inserted in the nose, and as they are light shells they can be worn without inconvenience. The ear and nasal electrodes are intended to be used together, the nasal-electrodes forming one pole, the ear-electrodes the other pole. My cells are connected in parallel circuit, so that should one cease to work the other is sufficiently strong to keep the rheotome working.

Having thus described my invention, what I claim is—

1. In an electro-therapeutic apparatus, the combination, with the inclosing case, of a battery having as an element a compressed plate of chloride of silver, an electro-magnet, a rheotome, and conductors leading from the case and terminating in body-electrodes.

2. In an electro-therapeutic apparatus, the combination, with a portable case, of a battery provided with a compressed plate of chloride of silver, devices for producing an interrupted current, and conductors leading from the case and terminating in electrodes on a body-band, said electrodes consisting of sliding clamps whereby they may be automatically held in any desired position on the body-band.

3. In a pocket-battery, the cell consisting of the following elements: an amalgam plate, compressed chloride of silver, and an absorbent material filled with the exciting-fluid.

4. In a pocket-battery, a cell consisting of an amalgam plate, compressed chloride of silver and absorbent material filled with exciting-fluid, a glass cylinder, a rubber tube covering the glass cylinder, and a cylinder covering the rubber tube.

5. In an electro-therapeutic apparatus, the combination, with a battery, of the belt connected therewith, and a bandage or suspensory sack having the electrode-wires woven in the fabric of the same.

6. In an electro-therapeutic apparatus, the combination, with the battery, of ear-electrodes, each consisting of a shell provided with the parts O H and air-passages, as described, and nasal-electrodes also provided with air-passages, the two sets of electrodes being in one circuit, as and for the purpose set forth.

7. In an electro-therapeutic apparatus, the combination, with the battery, of the conductors and electrodes consisting of coiled wire secured to a slide on the belt, whereby said electrodes are made flexible, as and for the purpose set forth.

8. The combination, with the cells switched in parallel circuits, of the contact-springs, metal frame, spring-armature, insulated contact-point, and electro-magnet connected with the contact-point, all arranged to operate substantially as described.

In testimony whereof I have hereunto set my name in the presence of two witnesses.

EDGAR GRAUERT.

Witnesses:

CHAS. G. WILLING,

I. H. MACDONALD.