(No Model.)

H. F. WAITE.

ELECTRIC DENTAL APPARATUS.

No. 566,103. Patented Aug. 18, 1896.

Fig. 1.

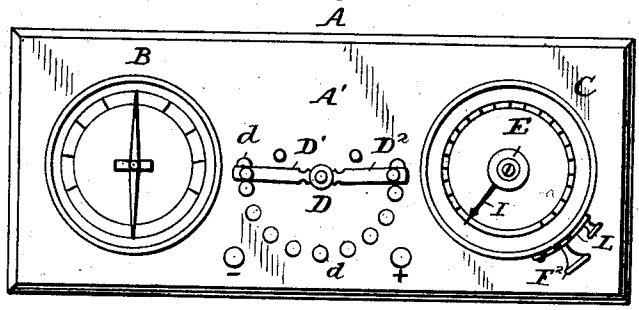


Fig. 2.

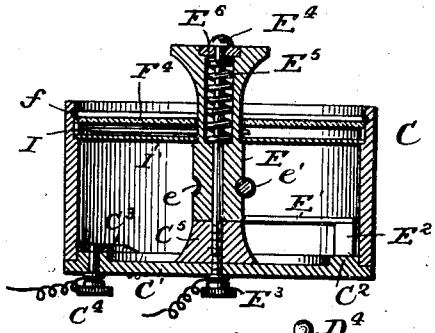
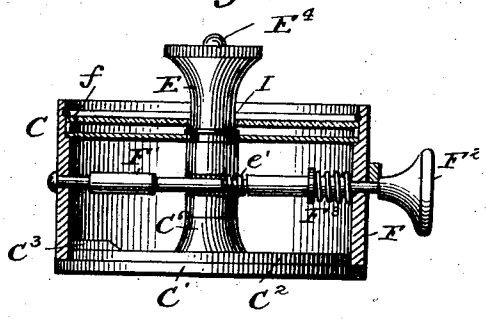


Fig. 3.



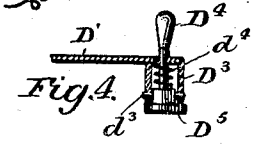


Fig. 4.

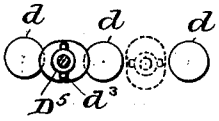
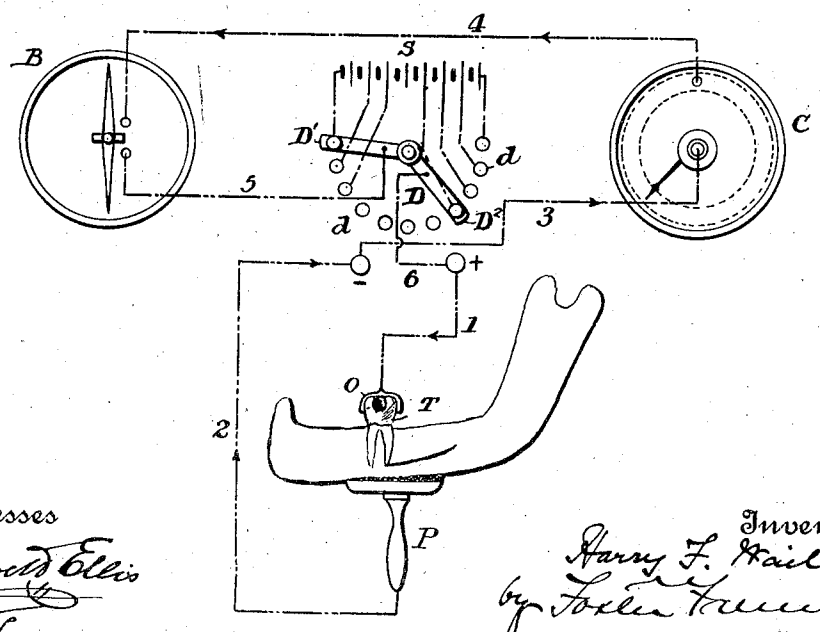


Fig. 5.

Fig. 6



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UNITED STATES PATENT OFFICE.

HARRY F. WAITE, OF NEW YORK, N. Y.

ELECTRIC DENTAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 566,103, dated August 18, 1896.

Application filed April 16, 1896. Serial No. 587,842. (No model.)

To all whom it may concern:

Be it known that I, HARRY FULLER WAITE, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Dental Apparatus, of which the following is a specification.

My invention relates to what is known as "dental cataphoric apparatus," and it has for its object to provide a simple, cheap, and effective construction and arrangement of parts whereby the dental cataphoric effects can be readily produced and delicately adjusted; and to these ends my invention consists in the various features substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings, Figure 1 is a plan view of a box or case, showing the general arrangement of the apparatus. Fig. 2 is a longitudinal vertical section of the rheostat. Fig. 3 is a transverse vertical section of the same. Fig. 4 is a section showing the construction of the switch. Fig. 5 is an enlarged plan view showing the operation of the switch, and Fig. 6 is a general diagrammatic view showing the mode of using the apparatus.

It is well known that the application of an electric current to the human body has, under certain conditions, what is generally described as a "catalytic" action producing a cataphoric effect, which tends to increase the absorption of fluids by the parts subjected to the action of the current, and this effect has been taken advantage of in dental operations for the purpose of rendering the teeth or gums insensible to pain. It is well known that when cocaine, for instance, is applied to the gum or parts surrounding a tooth it practically affects only the external portions of the parts, but it has been found that the application of electricity to the parts tends to cause them to absorb the cocaine and extend its efficiency. Thus, for instance, in filling a tooth, if cocaine is applied to the cavity, in ordinary practice it produces little or no effect, as it does not seem to penetrate the tooth sufficiently to produce the effects desired. If, however, when so applied a current of electricity is caused to pass through the tooth in the proper direction, such as is usual in producing the cataphoric effect, it has been found that the cocaine will extend throughout the mass of the tooth or be absorbed in such a way as to permit the usual dental operations on the most sensitive tooth without pain.

The object of my present invention is to provide a dental cataphoric apparatus which shall be well adapted for the purposes intended, and I will now proceed to describe the general characteristics of the apparatus.

For convenience it is preferable to make the apparatus portable, and A represents a suitable case or box adapted to contain the necessary batteries (not shown) and provided on its top A′ with a milliampere-meter B, a resistance device C, and a switch device D, they being arranged in such relation as to be readily observed and handled in the application of the electric current.

The milliampere-meter B need not be specifically described, as it is one of usual construction, and is used for the purpose of measuring the current with great accuracy.

The resistance device C requires to be of great sensibility and delicacy in order that the current going to the sensitive tooth can be carefully and delicately regulated, and some of my improvements relate more particularly to the construction and arrangement of the resistance device, and will be more particularly described.

The switch device D is also the subject of some improvements hereinafter described, and all these improvements combine to make a structure well adapted for the delicate manipulations of the electric current necessary in dental cataphoric apparatus.

The resistance device C embodies in its general construction a well-known rheostat, in which there is a base C′, of slate or similar non-conducting material, having a raised portion C^2, the surface of which is covered with a conducting material, such as graphite, and which conducting material is the real resistance material of the rheostat. In order to make a good connection with the graphite on the raised portion C^2, I place thereon a metal plate C^3, which is connected to the binding-post C^4. Mounted on the base C′, near its center, is a raised bearing C^5, on which is mounted the standard E, carrying an arm E′, having a brush or contact-finger E^2 bearing on

the surface of the raised portion C^2. This standard and arm (one or both) are of conducting material and are connected with the electric circuit in any suitable way, a binding-post E^3 being shown bearing on the end of a screw E^4, which passes through the standard into the raised bearing C^5. The upper portion of the standard is hollowed and contains a spring E^5, and there is a washer E^6 bearing on the spring, and by means of the screw E^4 it will be seen that the standard can be tightly and at the same time accurately adjusted on the raised bearing C^5 and be capable of being turned by the thumb and finger to cut in or out a greater or less portion of the graphite surface of the resistance. It happens, however, that when the current is flowing through the sensitive tooth it is desirable to make fine adjustments of the resistance in the circuit, and for this purpose the standard E is provided with a worm-wheel *e*, and arranged to engage with this is a worm *e'*, so that very delicate movements of the arm E' can be obtained. The worm *e'* may be suitably mounted with relation to the standard, and I have shown a case or cover F embracing the rheostat, in the walls of which is mounted a shaft F', carrying the worm *e'*. This shaft F' is provided with a thumb-nut F^2, extending outside the case F, and it is provided with reduced bearings, permitting it to slide longitudinally in the case. There is a spring F^3, surrounding the shaft F', which tends to force the worm *e'* into engagement with the worm-wheel *e*, and when so engaged on turning the thumb-nut F^2 the resistance-arm E' is moved in accordance therewith. Sometimes it is not necessary to provide such accurate adjustment, and I therefore arrange the shaft F' so that the worm and worm-wheel may be disengaged, and thus when the shaft is drawn outward, as shown in Fig. 3, the latch L, pivoted on the outer side of the case, will fall onto the reduced portion of the shaft and hold the shaft in position with the worm disengaged from the worm-wheel. When, however, the latch is lifted, the spring F^3 will automatically cause the worm *e'* to engage the worm-wheel *e*, and the resistance device can be operated by the thumb-nut F^2.

In order to show the relative position of the resistance-arm E', I attach to the standard E a pointer I, and arrange this over a graduated scale I', and the whole is preferably inclosed in the case F by a glass cover F^4, secured in position by a rubber gasket *f*. With this construction it will be seen that the resistance can be varied either by turning the standard directly to include more or less of the resistance material in the circuit, or when finer adjustments are required by turning the thumb-nut F^2, through the medium of the worm and worm-wheel, a very delicate adjustment of the resistance can be attained.

The switch D is arranged substantially as is common in connection with batteries for therapeutic effects, and is intended to include more or less of the cells or elements in the working circuit, and the terminals of the cells are connected to the contacts *d* on the top of the case, and there are switch-arms D' D^2, which may be adjusted in a well-known way to include more or less of the cells in circuit. It often happens that it is desirable to cut in or out more or less of the cells while the circuit is in operative condition, and if the circuit is broken during this operation it produces a shock which is not only disagreeable, but often injurious, and for this purpose it has been common to make the switch-arm of such form that before leaving one contact it will close another adjacent contact, and thus prevent an actual break in the circuit. While this accomplishes the result desired, it often happens that through accident or otherwise the switch-arm is left in such a position as to bear on two adjacent contacts, and then the cell or cells included between those contacts are short-circuited and their usefulness soon destroyed. One of the features of my present invention is to provide means for overcoming this objection, and I have shown the arms D' D^2 as being provided with a spring-actuated contact-piece. (Shown more particularly in detail in Fig. 4.) Thus the arm D' is extended in the form of a socket D^8, on which is mounted a stem D^4, carrying on its lower face a contact-piece D^5, having diameters of different lengths; that is to say, its longest diameter is such as to extend a little more than from one contact-piece to the other, while its shortest diameter is such as to extend a little less than the distance from one contact-piece to another, as clearly indicated in Fig. 5.

Around the stem D^4 is placed a spring d^4, and this is fastened to the stem and to the lever-arm in such a way as to turn the contact-piece so as to have its shortest diameter in line with the contacts *d*. Pins d^2 take into slots in the socket D^3 and limit the movements of the stem on its longitudinal axis. Thus when the lever D' or D^2, for instance, is to be moved one way or the other to include or exclude more or less of the cells the operator turns the stem D^4 so that the contact-piece D^5 is in the position indicated in full lines in Fig. 5 and moves the arm from one contact *d* to another without breaking the circuit, and then when the lever is over any desired contact-piece he lets go of the stem, when the spring d^4 will automatically turn the contact-piece D^5 into the position indicated in dotted lines, Fig. 5, and if perchance it should be left in any other than its proper position directly over one of the contacts *d* it will not complete the circuit between the two adjacent contacts, and all danger of short-circuiting the battery is avoided.

In Fig. 6 I have shown diagrammatically an arrangement of circuits, in which S is a series of batteries or cells connected to the contact-terminals *d*, and T represents a tooth being

treated. + and − are the terminals for the external circuit, and connected to the terminal + by a conductor 1 is an electrode O, in the form of a cap or other device, adapted to fit the top of the tooth T, while P represents an ordinary sponge electrode, which may be placed on the outside of the jaw, and is connected by a conductor 2 with the minus binding-post. This post is connected by a conductor 3 with the rheostat C, and this by a conductor 4 with the milliampere-meter B, and a conductor 5 leads from the latter to the switch-arm D′, bearing on one of the contact-terminals *d*, connected to the battery, while the switch-arm D^2 is shown as bearing on another contact-terminal *d* and is connected with the plus binding-post by a conductor 6. It will thus be seen that the circuit includes a certain number of battery-cells, a milliampere-meter, the resistance, and the tooth or portion of the body being operated upon, and it will also be evident that by observing the usual precautions and adjusting the parts the desired current can be caused to pass through the tooth, producing the catalytic effects, and this current can be delicately and accurately manipulated to suit the requirements of any particular case.

Having thus described the general principles and characteristics of my invention, it will be understood that the details may be varied by those skilled in the art to adapt it for the particular purposes for which it is desired to use it without departing from the spirit of my invention.

What I claim is—

1. A rheostat comprising a resistance medium, a movable standard for adjusting the arm, a worm-wheel on the standard, and a shaft having a worm to engage the standard, the shaft being provided with means for holding the worm out of engagement with the worm-wheel and including it in engagement when desired, substantially as described.

2. A rheostat comprising a base, a resistance material, an arm moving over the resistance material, a standard supporting the arm and having a worm-wheel, a case inclosing the resistance material, a shaft mounted in the case and having a worm to engage the worm-wheel, the spring tending to move the shaft into engagement, and a latch to hold the worm out of engagement, substantially as described.

3. A switch-arm provided with a stem carrying a contact device having variable diameters, a spring controlling the normal position of the contact device with relation to the arm, and means permitting a partial rotation of the contact device, substantially as described.

4. In a dental cataphoric apparatus, the combination of a series of battery cells and contacts, switch-arms arranged to include more or less of the cells in circuit, a galvanometer in the circuit, an adjustable rheostat also included in the circuit, an electrode adapted to fit a tooth, and an electrode arranged to bear on the jaw, the said electrodes being included in the circuit, substantially as described.

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

HARRY F. WAITE.

Witnesses:
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