

Feb. 6, 1962

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3,019,787

APPARATUS FOR ELECTROLYTIC DENTAL DESENSITIZATION

Filed Oct. 5, 1960

Fig. 1.

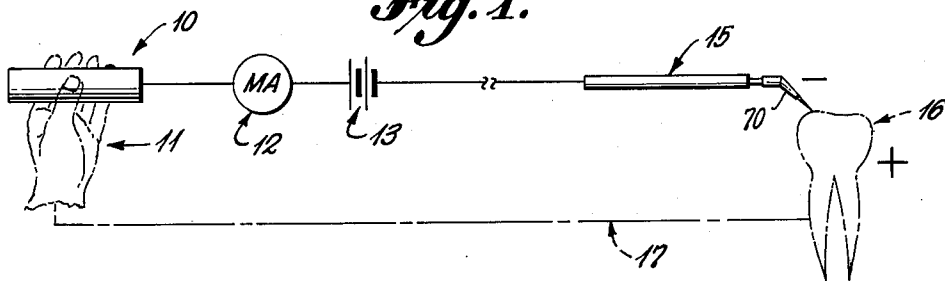


Fig. 2.

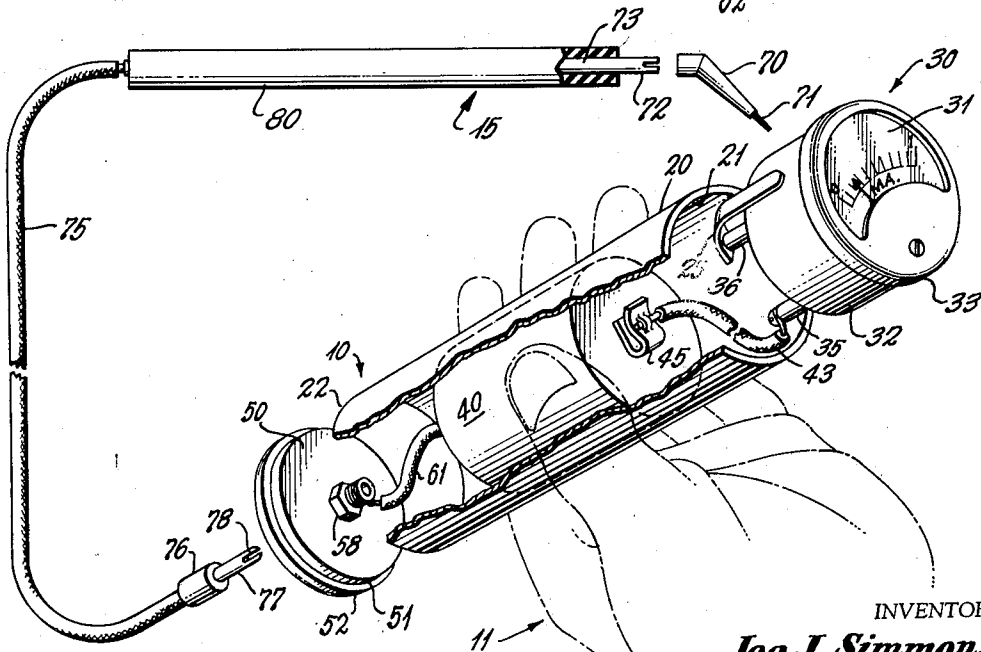
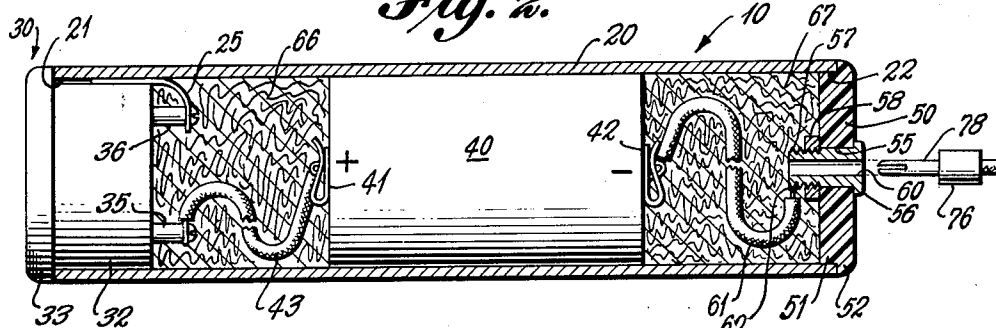


Fig. 3.

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1

3,019,787

APPARATUS FOR ELECTROLYTIC DENTAL
DESENSITIZATION

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Filed Oct. 5, 1960, Ser. No. 60,668

2 Claims. (Cl. 128—172.1)

The present invention relates to apparatus for electrolytic dental desensitization and more particularly to desensitization as is carried out with fluoride solutions.

It has been known for some time in the dental art that treatment of teeth by the application of fluoride compounds thereto according to all clinical evidence definitely indicates decay inhibiting powers and in addition, causes some desensitization of the treated teeth.

By applying a substance such as sodium fluoride electrolytically so as to produce ionization, the effectiveness and penetration or chemical combination with the tooth substances is substantially enhanced. The exact process by which the fluoride ions combine chemically with tooth substances is not as yet completely understood, but the results using this newer method have proved to be quite outstanding, and in so far as can be determined, no apparent pulpal irritation is produced.

Compared with other standard methods of tooth desensitization, the results obtained with electrolytic fluoride ionization are vastly superior.

In order to produce the electrolytic desensitization as is obtained in the present invention, it is necessary to provide an electrical current through the fluoride substance which serves as an electrolyte in and about the tooth to be treated. This is accomplished by establishing an electrical circuit through the patient, the circuit, of course, including a suitable tool for applying the fluoride solution to a particular desired area.

It is the necessity of providing the complete circuit through the patient which gives rise to certain problems in the art. The primary consideration from a practical standpoint is to provide an apparatus which permits a maximum degree of comfort and pain relief in so far as the patient is concerned. A definite psychological problem is here involved since if the patient is aware that he is actually holding an electrode and that a current of electricity is passing through him, these factors suggest possible pain to the patient and would certainly result in discomfort. On the other hand, if the patient is not aware of the fact that he is actually holding an electrode or that an electrical current is passing through him, he is much more apt to relax and experience no fear or pain during the desensitization procedure.

It is accordingly an important feature of the present invention to provide an apparatus which permits the patient to hold an electrode in his hand comfortably without actually being aware of the fact that he is in fact holding an electrode. In this connection, it is important to note that in the prior art, the patient is provided with some sort of electrical conductor which he holds in his hand and it obviously is intended to serve as an electrode. Accordingly, it has been necessary in the prior art to provide two lead wires from a suitable current source, one of the wires passing to the electrode held by the patient, and the other wire leading to the brush with which the fluoride solution is applied.

An additional problem encountered in the prior art is the fact that the apparatus required for use in such procedures is quite bulky and must be placed upon a separate table. This is disadvantageous since it is highly desirable for the dentist to be able to observe the meter which indicates the amount of current passing through the solution in order for the dentist to determine the duration of time for the application of the fluoride solution. In addition, it is necessary to find the most sensi-

2

tive area of the tooth which is indicated by a definite increase in the current flow as will be indicated by the meter. By observing the meter, the dentist receives an indication of desensitization of such an area by a continued drop in flow of current. When the apparatus including the meter is disposed on a separate table, it is not readily available for visual inspection by the dentist while he is treating a particular area of the teeth.

The disadvantages encountered in the prior art are overcome in the present invention by providing a unique arrangement wherein a portable hand-held self-contained electrode is provided, the electrode not only including the source of electrical energy, but also being provided with an indicating means in the form of a meter at one end portion thereof. With this arrangement, a dentist need only inform the patient that he should hold the device such that the meter thereof will be visible to the dentist, this, of course, facilitating proper treatment by the dentist since the meter is readily visible, and at the same time, the patient is completely unaware of the fact that he is holding an electrode in his hand which enables the circuit to be completed through the body of the patient.

With the self-contained unit of the present invention, a very compact arrangement is provided, and no additional equipment need be provided exteriorly of the electrode casing itself. The size of the apparatus is such that it permits the meter means to be held close to the patient's head thereby permitting it to be held in a very convenient location for observation by the dentist. The structural arrangement of the present invention is extremely simple and permits economical and fast production thereof so as to provide a relatively inexpensive unit, particularly as compared to the rather complex arrangements employed in the prior art. The structure is also formed of a plurality of readily available components such that no particularly unusual structural details are employed throughout the entire construction.

In addition to the aforementioned advantages obtained by the electrolytic application of fluoride solutions, all evidence up to the present time also indicates that this process results in sterilization and decay inhibition. The experiments with reference to these latter effects have not as yet been fully completed, but at the present time such beneficial results are clearly indicated.

An object of the present invention is to provide a new and novel apparatus for electrolytic dental desensitization, sterilization and decay inhibition of teeth which comprises a completely self-contained portable unit.

Another object of the present invention is to provide an apparatus for electrolytic dental desensitization including a hand-held electrode which is so designed as to prevent the patient from realizing he is holding an electrode.

A further object of the invention is the provision of an apparatus for electrolytic dental desensitization including indicating means to assist the dentist in determining the proper time of application of the desensitizing solution, the proper areas for treatment, and an indication of the effectiveness of the treatment as the treatment progresses.

Still another object of the invention is to provide an apparatus for electrolytic dental desensitization which is quite simple, compact and inexpensive in construction, and yet which is quite efficient and reliable in operation.

Other objects and many attendant advantages of the present invention will become more apparent when considered in connection with the specification and accompanying drawings, wherein:

FIG. 1 is a schematic view illustrating the overall arrangement by which ionization of the fluoride solution is obtained;

FIG. 2 is a longitudinal sectional view taken through

the portable self-contained electrode unit of the present invention; and

FIG. 3 is an exploded perspective view partly broken away illustrating the complete apparatus for carrying out the desensitization process.

Referring now to the drawing wherein like reference characters designate corresponding parts throughout the several views, FIG. 1 illustrates the overall arrangement schematically wherein the portable self-contained hand-held electrode unit is indicated generally by reference numeral 10, the unit having a substantially cylindrical outer configuration so as to be readily and comfortably grasped within the hand of a patient which is indicated in phantom line by reference numeral 11. An indicating means 12 which may comprise a milliammeter for indicating the current passing through the electrode is indicated at 12, the meter being electrically connected to the casing of the electrode 10.

The meter 12 is connected to the positive terminal of a battery 13 whereby it will be clear that the outer casing of electrode 10 is also connected through the meter with the positive terminal of battery 13.

The battery 13 is in turn connected with an electrode 15 formed of a metallic electrically conductive material, electrode 15 being a metal brush handle. The battery 13 is in turn connected with an electrode 15 formed of a metallic electrically conductive material, electrode 15 being a metal brush handle over which a metal sleeve containing a sable brush tip is placed.

The tooth of the patient which is to be treated is indicated in phantom lines as indicated by reference numeral 16, and the fluoride solution is applied by the electrode 15 to the surface of the tooth. The broken line 17 indicates schematically the completion of the circuit from the tooth of the patient to the hand of the patient, and subsequently back to electrode 10.

It is apparent that an electrical circuit is completed through the body of the patient and the electrodes 10 and 15 to thereby produce a complete electrical circuit which enables the fluoride solution to be ionized adjacent the surface of the treated tooth.

Referring now to FIGS. 2 and 3 of the drawing, the electrode 10 comprises a cylindrical member 20 formed of an electrically conductive material, and preferably comprises a light-weight metallic housing formed of aluminum and the like. Body means 20 includes a first open end portion 21 and a second open end portion 22.

An indicating means indicated generally by reference numeral 30 may comprise a milliammeter having a face 31 including a dial thereon for indicating the magnitude of the current flowing through the meter. This meter is of conventional construction and includes a main cylindrical body portion 32 which fits snugly within the cylindrical open end portion 21 of body means 20. An enlarged annular portion 33 is formed at the outer portion of the meter and is adapted to abut against the end surface of body means 20, it being noted that when in the assembled position as shown in FIG. 2, the outer periphery of the enlarged portion 33 is substantially flush with the outer periphery of the body means 20.

The meter 30 is suitably fixedly mounted in the open end 21 of body means 20 as for example being a press fit or by adhesively securing the meter in place, or by securing the meter in position by means of adhesive tape. It is apparent that any conventional means may be employed for securing the meter in operative position as seen in FIG. 2.

The rear face of meter 30 is provided with a first terminal 35 and a second terminal 36, these terminals being conventionally designated as positive and negative terminals respectively. A contact indicated generally by reference numeral 25 is secured to the negative terminal 36 of the meter by any suitable means as by a screw or the like, the contact being of resilient construction and extending outwardly and over the cylindrical body portion 32 of the indicating means. When the meter is

inserted in operative position as shown, the spring contact 25 is wedged between the cylindrical portion 32 of the meter and the adjacent inner surface of the electrode 20 to thereby provide a good electrical connection between the electrode body means 20 and the terminal 36 of the meter.

A source of electrical energy in the form of a battery 40 is of a substantially cylindrical configuration and is supported within a central portion of hollow body means 20, the battery being of a suitable value such as 9 volts which is required for carrying out the electrolytic dental desensitization process.

A first spring clip 41 is provided at one end of the battery and serves as the positive terminal of the battery while a second spring clip 42 is disposed at the opposite end of the battery and serves as a negative terminal. The positive terminal 41 of the battery is connected by an electrical lead wire 43 to the terminal 35 of the meter, and in this manner the positive terminal of the battery is also connected through the meter and contact 25 to the body means 20 whereby the body means 20 forms one electrode of the system.

An end closure member 50 is provided for closing the opposite open end of the body means 20, and closure member 50 is formed of a suitable electrically non-conductive material such as plastic or the like. It will be noted that end closure member 50 includes an inner portion 51 of reduced diameter which fits snugly within the open end 22 of the body means, and also includes an enlarged portion 52 which abuts up against the end edge of the body means. End closure member 52 may also be secured in position in any suitable manner such as by applying a suitable adhesive substance or adhesive tape as by being press-fitted in place.

A central opening 55 is provided through end closure 50 and a socket or connector member 56 includes an elongated portion which is mounted within opening 55 in the closure member and has an inner threaded portion 57. A nut 58 is mounted on the inner threaded portion 57 of the socket member for locking the socket member in position on the end closure member 50. A central opening 60 is provided through the socket member 56, this opening 60 being adapted to receive another suitable connector member as hereinafter described.

An electrical lead 61 has one end thereof connected with the spring clip 42 forming the negative terminal of the battery while the opposite end 62 of the lead 61 is electrically connected to the connector member 56 as by soldering or the like.

Battery 40 is wedged and held in place within the hollow body means 20 by a body of compacted wax paper or other suitable insulating material 66 disposed between the positive end of battery 40 and the meter 32, while a second body of compacted wax paper 67 is disposed between the negative end of the battery and the end closure member 50. In this manner, the spaces between opposite ends of the battery and the meter 22 as well as the end closure member 50 are well insulated, and the battery is positively retained in its central position within the body means 20.

As seen in FIG. 3, the electrode 15 comprises a conventional sable brush employed in electrolytic dental desensitization, the brush including an outer end portion 70 having sable bristles 71 extending therefrom, this outer end portion being connectable with a resilient attaching end portion formed at the end of an elongated rod or tube 73, rod 73 being formed of a suitable electrically conductive material. It is evident that when the end portion 70 is mounted in operative position on the outer end of rod 73, a complete brush mechanism is provided, the opposite end of rod 73 being connected by means of an electrical lead 75 to a plug portion 76 including an outwardly extending outer end 77 which is provided with a slot or slots 78 such as to provide a certain degree of resilience to the plug, in order to pro-

5

vide a tight fit between the plug and the socket or connector member 56 when the portion 77 of the plug is inserted within the opening 60 of the socket member.

It will also be noted that the rod portion 73 of the metallic applicator brush is provided with a sleeve-like covering 80 formed of rubber or other suitable electrically non-conductive material such that this electrode may be held in a dentist's hand and at the same time the dentist's hand will be insulated from the electrode.

In use, the patient holds the self-contained unit in such a position that the dentist can readily view the face of the meter while treating the teeth. The bristles 71 of the electrode means 15 are dipped into a fluoride solution such as 1 percent sodium fluoride and the tooth area is painted by contacting only the bristles with the tooth surface. In a typical example, the meter should read from about .2 to about .7 milliamp. If the meter reads less than about .3 milliamp, the duration of application is approximately 60 to 90 seconds, while if the ammeter reads above .3 milliamp, the duration of application is approximately 30 to 60 seconds.

It should be understood that the current flow and duration of application of current is governed by the strength of the solution and such variations will be readily appreciated by those skilled in the art.

It is evident that the assembly of the unit according to the present invention is a very simple matter, and accordingly, the entire apparatus may be sold as a kit which may be assembled by the dentist since no special or complex procedures are involved in completely assembling the unit.

It is apparent from the foregoing that there is provided a new and novel apparatus for dental desensitization wherein a completely self-contained portable unit is provided. The electrode is of such a construction as to be held in the hand of a patient, and the arrangement is such that the patient is completely unaware of the fact that he is holding an electrode to complete an electrical circuit through his body. The compact unit serves the additional important function of enabling the meter fact to be held in such a position that it is readily visible to the dentist while carrying out the electrolytic desensitization. The overall structural arrangement is quite simple, extremely compact, and also inexpensive in construction, and yet the device is at the same time very efficient and reliable in operation.

As this invention may be embodied in several forms

6

without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

I claim:

1. Apparatus for electrolytic desensitization and inhibition of decay comprising a hollow body means defining an electrode formed of an electrically conductive material and being of such dimension as to be readily and comfortably grasped within a patient's hand, a source of electrical energy supported within said hollow body means, indicating means supported at one end portion of said body means for readily visibly indicating the amount of current flow passing through the electrode such that a dentist can constantly monitor the amount of current flowing, an applicator means formed of electrically conductive material and including an elongated relatively narrow solution retaining operating end portion defining a second electrode for applying a solution to a specific area of the patient's tooth and being adapted to be manually manipulated, said applicator means including insulating means for insulating the applicator means from a dentist's hand, and means electrically connecting said hollow body means, said source of electrical energy and said applicator means including an elongated insulated flexible electrical lead connected between said hollow body means and said applicator means for permitting ready manipulation of said second electrode.

2. Apparatus as defined in claim 1, wherein said electrical connecting means includes a socket means mounted at the opposite end portion of said body means, a plug electrically connected with said second electrode, said plug being adapted to fit within said socket to provide an electrical connection therewith.

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