Improvements in apparatus for short-wave therapy.

PATENT SPECIFICATION

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530,528

PROVISIONAL SPECIFICATION

Improvements in Apparatus for Short-wave Therapy

We, CYRIL HUBERT WALKER, of 19, Winchester Road, Urmston, Manchester, in the County of Lancaster, a subject of the King of Great Britain, and METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, of Number One, Kingsway, London, W.C.2, a British Company, do hereby declare the nature of this invention to be as follows:—

This invention relates to apparatus for short-wave therapy, that is to say apparatus wherein treatment of patients is effected by ultra high frequency capacity currents carried through leads from an oscillation generator, usually of the thermionic valve type, to applicator electrodes not in contact with the skin of the patient. such treatment is distinct from so called short-wave diathermy wherein the applicator electrodes are placed in contact with the skin with the object of providing a conduction current through the part of the patient's body being treated. For diathermy the wavelength has been of the order of 300 metres whilst for ultra short-wave therapy the wavelength is of the order of 5 metres. For such short-wave therapy the applicator electrodes are held in such a position that they do not and even cannot come into contact with the part of the body being treated. To this end they may be clamped in position on a suitable bracket or standard or they may be encased in insulating material such as glass shoes or covers which can be generally readily removed, or such applicator electrodes may be encased in bakelite, indiarubber and the like, from which ordinarily they cannot be readily removed, although removal of the electrodes from such insulating members is in some cases possible. Sometimes the applicator electrodes are flexible and encased in indiarubber so that the electrodes can be bent to the shape of the part of the body being treated, the insulating casing providing the requisite spacing of the electrodes from the skin: additional insulating pads can also be interposed to increase the spacing.

The present invention concerns applicator electrodes for the treatment of the teeth and gums. Heretofore for such treatment the electrodes, or at least one of them, have or has always been placed on the face outside the mouth. Sometimes the applicator electrodes have been of the flexible type, encased in indiarubber, or the electrodes have been located in glass shoes, and in either case they are generally held in position by means of a strap or system of straps. Such method of applying the treatment amounts to the general flooding of the teeth and jaws and other adjacent parts with the ultra high frequency capacity currents with loss of intensity at the affected part.

According to the present invention in contradistinction to such general flooding, localised treatment is given by the use of one or each of the applicator electrodes in the form of a relatively small metal plate or foil which is preferably rectangular and may be slightly curved, which electrode is encased in insulation such as a glass shoe, which may be of glass of high dielectric constant, which shoe is of only slightly larger outside dimensions than that of said electrode plate. The latter has connected to it a conducting lead, which is preferably flexible, passing through a glass or other insulating tube which is fused or otherwise secured to the shoe and which at the other end carries a terminal member to which can be attached one of the high frequency leads from the generating apparatus. Furthermore such insulating tube is suitably bent so that the encased electrode can be introduced into the mouth of the patient and applied in contact with the gum either on the inside or the outside thereof, that is to say between the tongue and the gum or between the gum and the cheek.

The invention further comprises a pair of such encased electrodes and a clamp for the tubes thereof permitting relative adjustment of the electrodes so that they may be appropriately applied to any part of the mouth. Normally there will be a set of several such electrodes with the insulating tubes bent in different ways and applied to different parts of the electrode casing, so that the treatment may be applied to any desired part of the mouth. It will be appreciated that the treatment

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may involve one such electrode in accordance with the invention inserted in the mouth, and another one outside the mouth applied against the cheek or elsewhere in the manner heretofore used.

The aforesaid clamp is necessarily of an insulating material, for instance ebonite or bakelite, and the screw member thereof is also non-metallic, conveniently comprising a fibre screw having an integral knurled head.

As may be seen from the Specification of prior Application No. 5662/39, it has been difficult in carrying out ultra short-wave therapy treatment to obtain a sufficiently close indication or assessment of the actual capacity current flowing into the patient or part thereof being treated, this being due to a number of variable factors: in general it may be said to be due to the fact that owing to the very high frequency of the current a lot of the energy output from the oscillation generator is lost as stray current. The subject matter of the earlier application just above mentioned provides one satisfactory solution of the aforeaid difficulty. A part of that subject matter involves the associating of a small current measuring device, preferably a flash lamp bulb, in a particular manner with a particular form of applicator electrode which is provided with an arrangement of guard electrode.

According to another feature of the present invention, a small high frequency current meter, preferably a small flash lamp bulb is associated with the connector member at the end of the high frequency supply lead coming from the oscillation generator which connector is adapted to be attached to the aforesaid terminal at the end of the insulating tube through which passes the conductor to the encased metal plate of the dental applicator. The latter terminal may comprise an insulating sleeve cemented to the end of the tube and having a screw thread adapted to receive a corresponding thread or nut member forming part of the connector which is at the end of the high frequency supply lead, the arrangement being such that when the connector is screwed into position on the applicator electrode terminal the filament of the flash lamp becomes connected in series with the supply lead and the lead passing from the applicator terminal to the applicator electrode proper. Whilst such an arrangement in the absence of any guard electrode cannot give an accurate indication of the actual current flowing through the gum or jaw of the patient it does enable any particular treatment dosage once determined to be repeated with sufficient accuracy. Furthermore the invention contemplates the employment of a set of flash lamp bulbs of different rating so that, as may be gauged from experience, different treatment currents may be applied to the gums, that is to say by adjusting the output of the oscillation generator and noting the brilliance of the selected flash lamps in use in the aforesaid connector.

In accordance with a still further feature of the invention still greater accuracy in the dosemeter above described may be obtained by providing the dental applicator electrode in accordance with the main feature of the invention, with a conducting sheath or layer which is preferably inside the glass tube and extends from near the electrode within the shoe, through the tube and through the encased terminal to the outer contact terminal of the flash lamp. The electrical conductor lead within the tube is suitably insulated from such interior metal coating.

In accordance with a still further feature of the invention which is adapted to be used more particularly when the oscillation generator is of the oscillating valve type, the supply leads extending between the output terminals of the oscillation generator and the applicator electrodes, instead of being two separate and distinct insulated wires as heretofore used, said two leads are held in fixed space relationship substantially thoughout their whole length so as to act after the manner of a feeder known in the art of radio transmission. Thus the two leads may consist of rubber covered flexes located in a fabric tube which is suitably stitched or glued so as to become flattened, or the wire flexes may be moulded in an indiarubber strip. The centres of the flexes may be spaced apart a fixed distance of, for example, one-half to three-quarters of an inch or more.

In order that the flash lamp dosemeter, which it will be appreciated will be only a few inches from the patient's face, shall not dazzle him, the lamp may be painted in parts or provided with a shield so that the operator giving the treatment can see the lamp whilst the patient does not suffer the effects of being dazzled thereby.

The aforesaid clamp for the pair of electrodes or even for a single electrode may have adjustably secured to it an insulating arm which may carry a handle to be grasped by the dentist, or alternatively said arm may be clamped to a suitable bracket or standard or other fixture so that when once the applicator electrodes have been adjusted in position on the patient they may be left in this position without the necessity for the elec-

trodes being continuously held by the operator during treatment.

Dated the 13th day of June, 1939.

A. S. CACHEMAILLE,
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Number One, Kingsway, London, W.C.2,
Agent for the Applicants.

COMPLETE SPECIFICATION

Improvements in Apparatus for Short-wave Therapy

We, CYRIL HUBERT WALKER, of 19, Winchester Road, Urmston, Manchester, in the County of Lancaster, a subject of the King of Great Britain, and METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, of Number One, Kingsway, London, W.C.2, a British Company, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to apparatus for short-wave therapy, that is to say apparatus wherein treatment of patients is effected by ultra high frequency capacity currents carried through leads from an oscillation generator, usually of the thermionic valve type, to applicator electrodes not in contact with the skin of the patient. Such treatment is distinct from so called short-wave diathermy wherein the applicator electrodes are placed in contact with the skin with the object of providing a conduction current through the part of the patient's body being treated. For diathermy the wavelength has been of the order of 300 metres whilst for ultra short-wave therapy the wavelength is of the order of 5 metres. For such shortwave therapy the applicator electrodes are held in such a position that they do not and even cannot come into contact with the part of the body being treated. To this end they may be clamped in position on a suitable bracket or standard or they may be encased in insulating material such as glass shoes or covers which can be generally readily removed, or such applicator electrodes may be encased in moulded insulating material, indiarubber and the like, from which ordinarily they cannot be readily removed, although removal of the electrodes from such insulating members is in some cases possible. Sometimes the applicator electrodes are flexible and encased in indiarubber so that the electrodes can be bent to the shape of the part of the body being treated, the insulating casing providing the requisite spacing of the electrodes from the skin additional insulating pads can also be interposed to increase the spacing.

The present invention concerns applicator electrodes for the treatment of the teeth and gums. Heretofore for such treatment the electrodes, or at least one of them, have or has always been placed on the face outside the mouth. Sometimes the applicator electrodes have been of the flexible type, encased in indiarubber, or the electrodes have been located in glass shoes, and in either case they are generally held in position by means of a strap or a system of straps. Such method of applying the treatment amounts to the general flooding of the teeth and jaws and other adjacent parts with the ultra high frequency capacity currents with consequent loss of intensity at the affected part.

An object of the present invention is to provide an electrode for high frequency therapy treatment which may conveniently be inserted in the mouth and whereby intensive treatment may be given to localised parts thereof, such as the inner or outer aspect of the teeth or gums.

According to the invention a short-wave therapy applicator electrode, especially for dental or mouth treatment, comprises a shoe portion in the form of an electrically conductive plate or foil closely encased in insulating material, which shoe is carried by an insulating shank of tubular or like form enclosing a conducting lead joined to the plate or foil, the shank being bent or cranked near its end or otherwise provided with a relatively short offset extension, to the end of which is fixed the shoe, the size and angular setting both of the offset extension and of the shoe itself being such that the shoe may be placed in operative contact on a part of the inner aspect of the teeth or gums whilst the main part of the shank passes between the teeth.

The invention further comprises a pair of such encased electrodes and a screw clamp for the tubes thereof permitting relative adjustment of the electrodes so that they may be appropriately applied to any part of the mouth. Normally there will be a set of several such electrodes with the insulating tubes and shoes bent in different ways so that the treatment may be applied to any desired part of the mouth. It will be appreciated that the treatment may involve one such electrode in accordance with the invention inserted in the mouth, and another one outside the

mouth applied against the cheek or elsewhere in the manner heretofore used.

The aforesaid clamp is necessarily of an insulating material, for instance ebonite or moulded resin, and the screw member thereof is also non-metallic, conveniently comprising a fibre screw having an integral knurled head.

As may be seen from the Specification of prior Application No. 5662/1939, it has been difficult in carrying out ultra short-wave therapy treatment to obtain a sufficiently close indication or assessment of the actual capacity current flowing into the patient or part thereof being treated, this being due to a number of variable factors: in general it may be said to be due to the fact that owing to the very high frequency of the current a lot of the energy output from the oscillation generator is lost as stray current. The subject matter of the earlier application just above mentioned provides one satisfactory solution of the aforesaid difficulty. A part of that subject matter involves the associating of a small current measuring device, preferably a flash lamp bulb, in a particular manner with a particular form of applicator electrode which is provided with an arrangement of guard electrode.

According to another feature of the present invention, a small high frequency current meter, preferably a small flash lamp bulb is associated with the connector member at the end of the high frequency supply lead coming from the oscillation generator which connector is adapted to be attached to the aforesaid terminal at the end of the insulating tube through which passes the conductor to the encased metal plate of the dental applicator. The latter terminal may comprise an insulating sleeve cemented to the end of the tube and having a screw thread adapted to receive a corresponding thread or nut member forming part of the connector which is at the end of the high frequency supply lead, the arrangement being such that when the connector is screwed into position on the applicator electrode terminal the filament of the flash lamp becomes connected in series with the supply lead and the lead passing from the applicator terminal to the applicator electrode proper. Whilst such an arrangement in the absence of any guard electrode cannot give an accurate indication of the actual current flowing through the gum or jaw of the patient it does enable any particular treatment dosage once determined to be repeated with sufficient accuracy and therefore may be termed a kind of dosemeter. Furthermore, the invention contemplates the employment of a set of flash lamp bulbs of different rating so that, as may be gauged from experience, different treatment currents may be applied to the gums by adjusting the output of the oscillation generator and noting the brilliance of the selected flash lamps in use in the aforesaid connector.

It will be appreciated from what is stated above that even when the high frequency therapy electrode is provided with a dosemeter as above described some of the energy passing through the meter is still dissipated in the form of stray currents.

In accordance with a further feature of the invention, the main object of which is to obtain greater accuracy of the dosemeter, the dental applicator electrode is provided with a guard electrode in the form of a conducting sheath or layer which is located close to but insulated from the dental electrode proper and the conducting lead connected thereto and extends from a point near the electrode within the insulating shoe for substantially the whole length of the said conducting lead. A convenient part, e.g. the near end, of the said conducting sheath or layer is adapted for connection to the high frequency generator or to the outer terminal of the indicator lamp, i.e. that terminal of the lamp which is to be directly connected to the high frequency generator, so that in operation the main part of the current from the high frequency generator passes through the lamp filament to the conducting lead and thence to the plate or foil constituting the dental electrode whilst another part passes through the conducting sheath or layer constituting the guard electrode. These two parts of the high frequency current are in a sense in parallel with respect to the supply. By means of such an arrangement the stray currents coming from the conducting lead and the plate or foil constituting the electrode may be reduced to a minimum and in fact stray currents may be substantially restricted to the guard electrode. The conducting sheath or layer may be of tubular section with the conducting lead passing coaxially therethrough. The conducting sheath or layer may be in contact with or spaced from the inner surface of the tubular insulating shank which forms the outer casing.

In accordance with a still further feature of the invention, which is adapted to be used more particularly when the oscillation generator is of the oscillating valve type, the supply leads extending between the output terminals of the oscillation generator and the applicator electrodes, instead of being two separate and distinct insulated wires as heretofore used, are held in fixed spaced relationship substantially thoughout their whole length so as

to act after the manner of a feeder known in the art of radio transmission. Thus the two leads may consist of rubber covered flexes located in a fabric tube which is suitably stitched or glued so as to become flattened, or the wire flexes may be mounded in an indiarubber strip. The centres of the flexes may be spaced apart a fixed distance of, for example, one half to three-quarters of an inch or more.

Preferred examples of the dental applicator electrodes according to the present invention will now be described with reference to the accompanying drawings which must be understood to be diagrammatic.

Figs. 1 to 6 illustrate a pair of applicator electrodes particularly suitable for treating the front teeth and gums.

Figs. 7 to 12 illustrate a pair of applicator electrodes particularly suitable for treating the teeth or gums at the bottom left position and top right position of the mouth.

Fig. 13 illustrates a pair of electrodes in combination with a clamping device for holding the electrodes in the desired position and in combination with means for giving an indication of the dosage.

Fig. 14 shows a sectional view of a dental applicator electrode provided with a guard electrode.

In all these figures corresponding parts are indicated by the same reference numerals.

Referring first of all to Figs. 1 to 6, Figs. 1, 2 and 3 represent respectively a side elevation, front elevation and worms-eye view of one electrode of the pair, namely the electrode for treating the inside of the teeth or gums, whilst Figs. 4, 5 and 6 represent corresponding views of the other electrode of the pair, namely the electrode for treating the outer parts of the teeth or gums.

In Figs. 1, 2 and 3 the inner electrode consists essentially of a small curved plate or foil 1 of electrically conductive material, preferably nickel, joined to a conducting lead 2 which may also be of nickel or copper flex. The plate or foil 1 is encased in a glass insulating shoe of slightly larger dimensions than the plate itself, and of such shape and size that it can easily be introduced into the mouth and applied to the part to be treated. Similarly the conducting lead 2 is encased in insulating material in the form of a glass tube 4 integral with the shoe 3. The tube 4 terminates at its upper end in a portion 5 which is bent away from the main axis of the tube. At its lower end the tube 4 has a portion 6 which is also bent away from the main axis of the tube in such a manner that the shoe 3 encasing the plate 1 is offset from the axis of the stem in two directions at right angles. As will be appreciated by those connected with the art of high frequency therapy, the shape of the tube and the manner in which the shoe is offset from the axis of the tube, as shown in the drawing, will facilitate the manipulation of the electrode and its application to the treated part.

Figs. 4, 5 and 6 show the outer electrode of the pair, the general construction of which is similar to the inner electrode shown in Figs. 1, 2 and 3, with the exception that the shank of the tube 4 is somewhat shorter for the outer electrode and that with respect to the main axis of the tube the shoe 3 is offset on the opposite side so that when, in operating on a localised part of the teeth or gums, the respective shoes are placed one at the inside and one at the outside of the part to be treated, the tubes 4 will be in the proper spaced relationship for entering the mouth and for conveniently making connection to the high frequency generator. The general arrangement of a pair of electrodes according to Figs. 1 to 6 in position for treatment may be seen from Fig. 13.

The pair of electrodes illustrated in Figs. 7 to 12 have the same essential parts as those already described above with respect to Figs. 1 to 6. There is, however, the difference that the electrodes of Figs. 7 to 12 are shaped so as to permit treatment of localised parts of the teeth and gums at the bottom left position and the top right position instead of at the front as is the case for the electrodes in Figs. 1 to 6. As compared with the latter construction it will be seen without further description that the electrodes according to Figs. 7 to 12 have longer tubes to enable them to reach the remoter parts of the teeth and gums and also that the shoes 3, besides being offset from the main axis of the tube, lie in a plane which is not substantially perpendicular to the said main axis but is inclined thereto at an appropriate angle for the purpose in view.

It will be understood that a complete set of electrodes for dental treatment will comprise in addition to the electrodes shown in Figs. 1 to 12, a further pair of electrodes for treating the bottom right and the top left positions of the mouth. These electrodes will have the same general configuration as the electrodes shown in Figs. 7 to 12 but with respect to the latter electrodes they will be enantiomorphous. For example, considering Fig. 7, the corresponding view of the electrode for treating the bottom right and top left positions will have the lower part of the tube 6 on the other side of the axis namely on the left instead of on the

right. The same applies to the inner electrode. With this exception the electrodes are identical and therefore no further description is necessary for the purpose of this specification.

In Fig. 13 a pair of electrodes are shown clamped in the relative positions which they would assume when treatment is being performed. The electrodes shown in this example are of the type shown in Figs. 1 to 6 but it will be understood that the electrodes shown in Figs. 7 to 12 may be used in a corresponding manner. Fig. 13 also shows a preferred form of dosemeter for indicating empirically the amount of high frequency energy which is being administered. At the end of each tube 4 is mounted a combined connector terminal and lamp-holder consisting principally of three parts 7, 8 and 9 which are of suitable insulating material. The parts 7 and 8 constitute a screwed clamp-type connector. The plug 7 is bored to receive the end of the glass tube 4 and also the extension of the nickel wire 2, which latter terminates in a metal stud 10 riveted to the end of part 7. The socket 8 carries a co-operating metal disc 11 so that when the two parts 7 and 8 are screwed together a good pressure contact is made between 10 and 11. The lamp-holder 9 has a central terminal 16 which extends through the lamp-holder 9 and the socket 8 in the form of a threaded bolt which is rigidly clamped to the lamp-holder 9 by nut 15 and spacing washer. The contact disc 11 is fixed at the end of bolt 16, thereby constraining socket 8 whilst allowing it to be rotated for making pressure contact between 10 and 11 without affecting lamp-holder 9. The outer terminal of the lamp-holder consists of the internal thread 13 to which connection is made by one of the leads 17 from the high frequency generator. It will be seen that in this arrangement the filament of the flash lamp 12 is in series between the lead 17 and the conducting lead 2 and hence the plate or foil 3. The brightness of the flash lamp bulb 12 will therefore give an indication, under a fixed set of conditions, of any fluctuations in the amount of high frequency energy passing from the plate or foil 1 to the part under treatment and therefore acts as a kind of dosemeter.

In the arrangement shown in Fig. 13 a second flash lamp bulb 24 is shown similarly connected in series between the other generator lead 18 and the corresponding conducting lead of the other electrode of the pair. With this arrangement each lamp bulb, besides giving an indication of the amount of high frequency energy flowing through the corresponding plate 1, also acts as a warning indicator in case one or other of the connections with the high frequency generator is accidentally broken. In such a case the particular filament will be completely extinguished. On the other hand when only one flash lamp bulb is used a fault in the connection of the other electrode to the high frequency generator would only be indicated by a reduction in the brightness of the flash lamp bulb and this might be confused with a fluctuation in the output from the oscillation generator. The arrangement as shown may, therefore, be used to show the doseage rate even when used by unskilled persons.

Fig. 13 also illustrates an example of an adjustable screw clamp for holding the pair of electrodes in the proper spaced relationship during treatment. The device consists of a clamping block 20 bored to receive the two parallel tubes 4 and centrally split through the plane of the bores to permit lateral assembly of the tubes. 23 is a set screw passing through both halves of split block 20 so that tubes 4 may be securely clamped in position. A handle or bracket 22 to enable the physician or patient to hold the assembled electrodes in position carries the clamping block 20 in the following manner. The handle 22 has a coned hole through which passes a correspondingly coned extension of block 20, said extension ending in a plain threaded portion adapted to receive clamping nut 21. Block 20 and the electrodes can be clamped in any angular position with respect to holder 22 owing to the wedge action which can be exerted between parts 20 and 22 by nut 21. All the parts 20 to 23 are of suitable insulating material.

Fig. 13 also illustrates a further feature of the invention. The pair of leads 17 and 18 to be connected to the high frequency generator are held in fixed parallel relationship substantially throughout their whole length by means of the insulating fabric 19. The leads 17, 18 are spaced at such a distance, for example half to three-quarters of an inch, as to act in the manner of a feeder, as is well known in the art of radio transmission.

Fig. 14 shows on a scale somewhat larger than the other figures an applicator electrode somewhat similar to that shown in Figs. 1—12 of the drawings, provided also with a guard electrode in the form of a conducting sheath or layer. As in the other figures of the accompanying drawing 1 indicates the electrode proper consisting of a metal plate or foil whilst 2 indicates the conducting lead through which the working current passes to the

body under treatment. 3 is the insulating glass shoe and 4 is the insulating tube fused thereto. The conducting sheath or layer 25 forming the guard electrode is located inside the insulating tube and coaxially surrounds the conducting lead 2, which is insulated therefrom by a sleeve 26 of suitable insulating material. Glass beads may also be used for this purpose. The said conducting sheath extends from a point very near the plate or foil 1 and for substantially the whole length of the insulating tube and conducting lead. It will be understood that when an indicator lamp is used, the connection of the dental electrode to the high frequency generator is effected through the filament of the lamp substantially as hereinbefore described. The connection of the near end, that is, the end nearest the operator, of the guard electrode to the generator or to the outer terminal of the indicator lamp may be effected in any convenient manner which affords the necessary insulation from the main current path through which high frequency energy is delivered to the patient. For example the near end of the said conducting sheath may be provided with a terminal to which connection may be made from the outer terminal of the indicator lamp. In operating the device the stray currents are mainly confined to the guard electrode and are reduced to a minimum in the case of the electrode proper. The indicator lamp therefore provides a more accurate indication of the actual amount of high frequency energy passing from the electrode to the body under treatment.

In order that the flash lamp dosemeter, which it will be appreciated will be only a few inches from the patient's face, shall not dazzle him, the lamp may be painted in parts or provided with a shield so that the operator giving the treatment can see the lamp whilst the patient does not suffer the effects of being dazzled thereby.

The aforesaid clamp for the pair of electrodes or even for a single electrode may have adjustably secured to it an insulating arm which may carry a handle to be grasped by the dentist, or alternatively said arm may be clamped to a suitable bracket or standard or other fixture so that when once the applicator electrodes have been adjusted in position on the patient they may be left in this position without the necessity for the electrodes being continuously held by the operator during treatment.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A short-wave therapy applicator electrode especially for dental or mouth treatment, comprising a shoe portion in the form of an electrically conductive plate or foil closely encased in insulating material, which shoe is carried by an insulating shank of tubular or like form enclosing a conducting lead joined to the plate or foil, the shank being bent or cranked near the end at which the shoe is carried, or otherwise provided with a relatively short offset extension to the end of which is fixed the shoe, the size and angular setting both of the offset extension and of the shoe itself being such that the shoe may be placed in operative contact on a part of the inner aspect of the teeth or gums whilst the main part of the shank passes between the teeth.

2. An electrode as claimed in claim 1 wherein the shank and the offset extension thereof form a simple L-shaped support for the shoe and the shoe is carried in unsymmetrical relation with the plane containing the said support and so that the general plane of the shoe is substantially at right angles to the plane of the said support.

3. An electrode as claimed in claim 1, wherein the offset extension of the shank is a two-limbed angle piece the limbs of which enclose an angle not less than a right angle whilst the plane containing it is inclined to the shank at an angle greater than a right angle, and the shoe is carried on the remoter limb of the angle piece in such a manner that with respect to the shank the said shoe lies on the remote side of the plane containing the angle piece.

4. An electrode as claimed in claim 1, 2 or 3, in combination with a high frequency current measuring device mounted on the insulating shank encasing the conducting lead and adapted to be electrically connected to said lead.

5. An electrode as claimed in claim 4, wherein an insulated holder for a flash lamp bulb is arranged on the insulating shank, the said holder having one terminal adapted to be connected to the conducting lead and another terminal adapted for connection to the high frequency supply.

6. An electrode as claimed in any one of claims 1 to 5, wherein a guard electrode in the form of a conducting sheath film or layer is provided within or on the insulating shank, the said conducting sheath or the like being insulated from the conducting lead and extending from a point near the plate or foil for substantially the whole length of the conducting lead.

7. A pair of electrodes according to any

one of the claims 1 to 6, capable of being positioned in spaced relationship with the active surfaces of the shoes substantially parallel and their main shanks substantially parallel, in combination with an insulating clamp adapted to hold said electrodes in said spaced relationship and to permit of adjustment of the distance between the shoes.

8. A pair of electrodes according to any one of claims 1 to 6, in combination with a pair of supply leads for connection to the oscillation generator, the said supply leads being connected to terminals on the respective conducting leads and being held apart in parallel and insulated relationship substantially throughout their length.

9. An applicator electrode, or a pair of electrodes, for high frequency therapy substantially as hereinbefore described with reference to the accompanying drawings.

Dated the 7th day of June, 1940.

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Chartered Patent Agent,
Number One, Kingsway, London, W.C.2,
Agent for the Applicants.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1941.

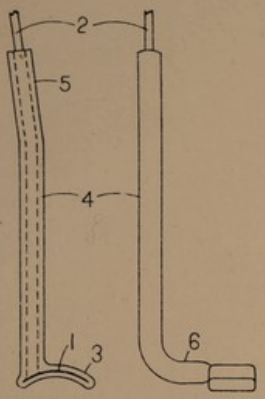

FIG.1.

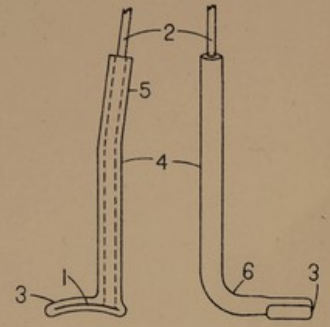

FIG.4. FIG.5.

FIG.2.

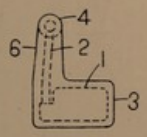

FIG.3.

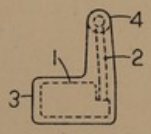

FIG.6.

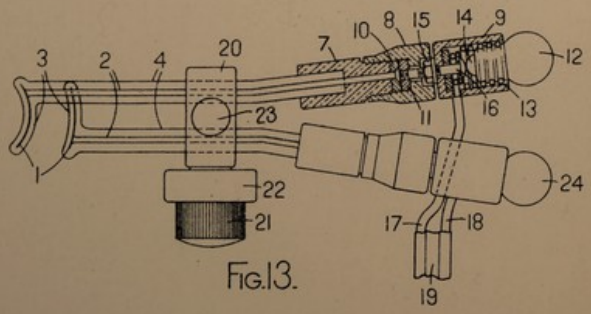

FIG.13.

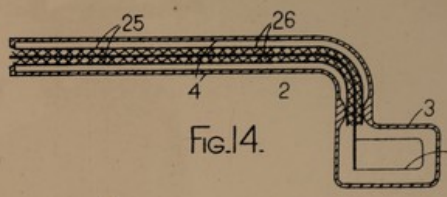

FIG.14.

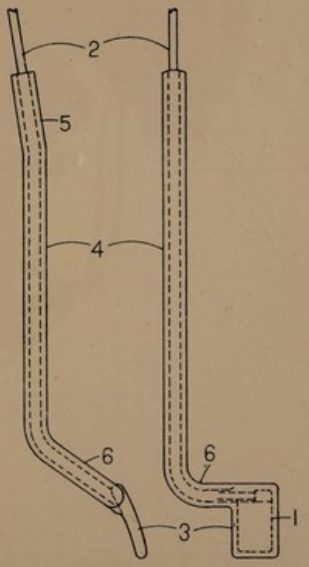

FIG.7. FIG.8.

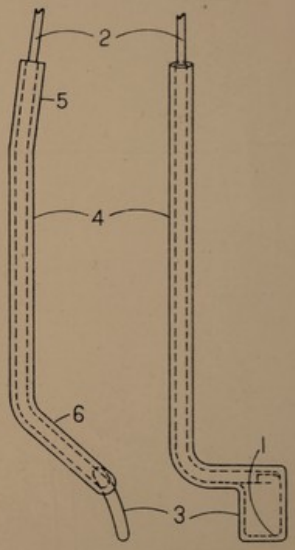

FIG.10. FIG.11.

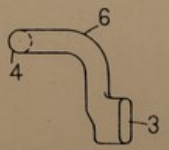

FIG.9.

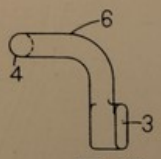

FIG.12.

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