No. 763,183. PATENTED JUNE 21, 1904.

C. F. W. HORN.

ULTRA-VIOLET RAY ELECTRODE.

APPLICATION FILED APR. 25, 1904.

NO MODEL.

Fig. 1

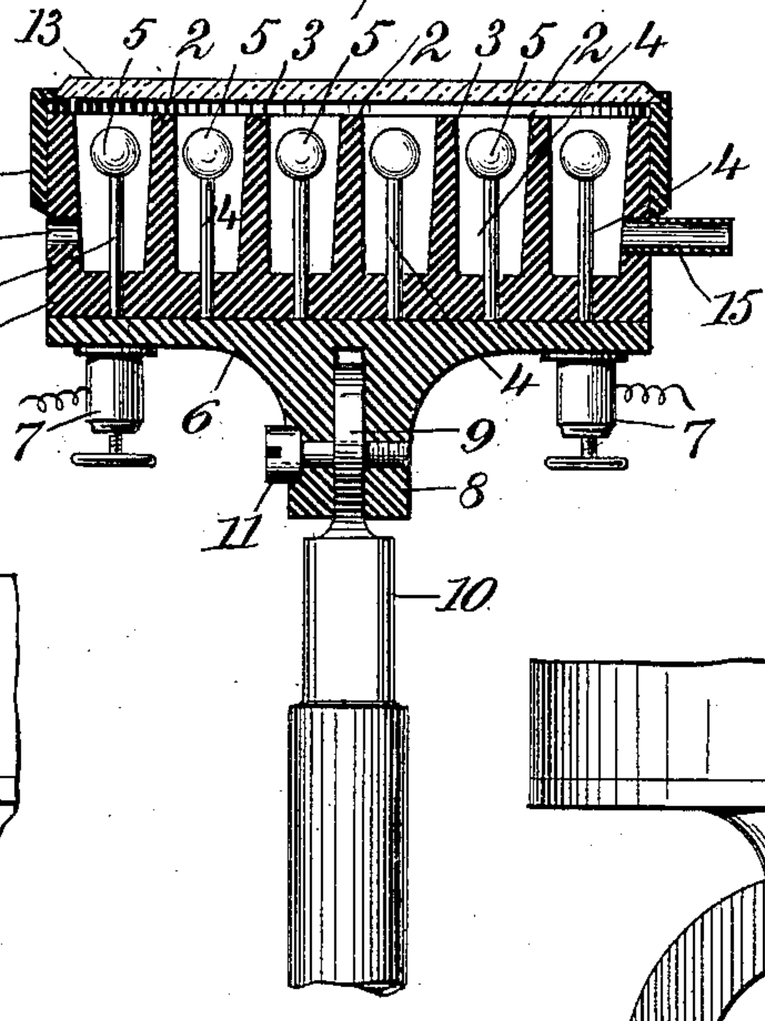


Fig. 4

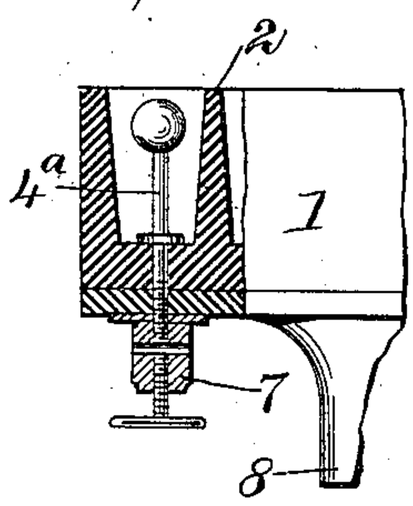


Fig. 5

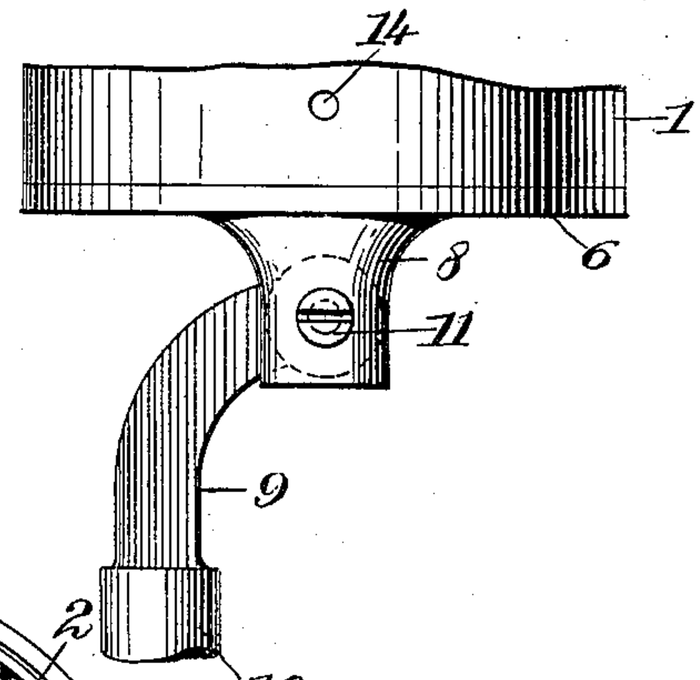


Fig. 6

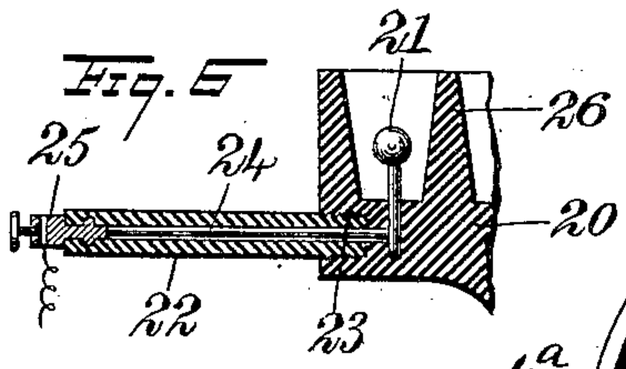


Fig. 2

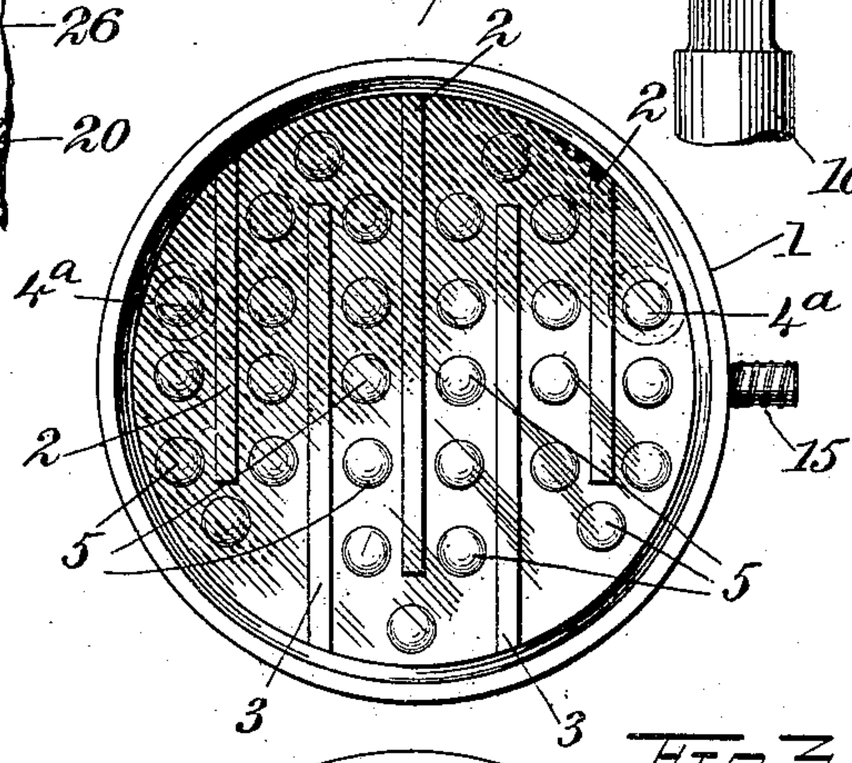
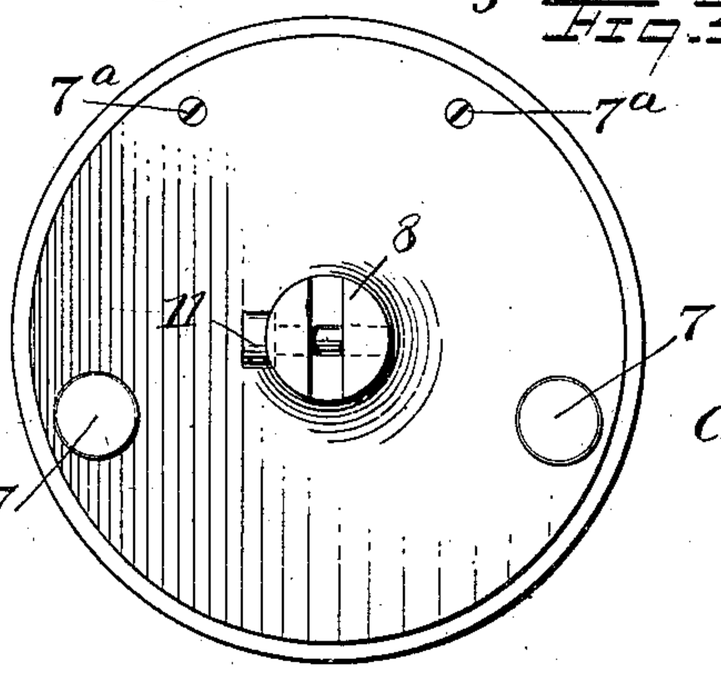


Fig. 3



WITNESSES:

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No. 763,183. Patented June 21, 1904.

UNITED STATES PATENT OFFICE.

CHARLES F. W. HORN, OF NEW YORK, N. Y.

ULTRA-VIOLET-RAY ELECTRODE.

SPECIFICATION forming part of Letters Patent No. 763,183, dated June 21, 1904.

Application filed April 25, 1904. Serial No. 204,696. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. W. HORN, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Ultra-Violet-Ray Electrode, of which the following is a full, clear, and exact description.

This invention relates to electrodes for the production of ultra-violet rays; and the principal object of the invention is the provision of an electrode by means of which ultra-violet rays may be produced in large quantities and which may be conveniently employed in the application of the ultra-violet rays to the cure of disease.

As is well known to persons skilled in the art to which the invention relates, the ultra-violet rays of the spectrum have been successfully employed in recent years in the treatment of a number of diseases, skin diseases in particular having been treated with marked success in this manner. The electrodes ordinarily employed in the production of the ultra-violet rays are bulbs of glass in which vacua of varying degree have been produced. These electrodes are effective in the production of the ultra-violet rays by the discharge of high-potential charges of static electricity within the bulbs; but as glass is almost wholly impervious to ultra-violet rays the rays so produced within the bulbs are scarcely transmitted through the glass thereof at all, and the therapeutic effects producible by means of ultra-violet rays are therefore not obtained by the use of such electrodes. Other devices by means of which ultra-violet rays may be produced are the ordinary poles of a static electric machine or the poles of an induction coil of sufficient strength to produce a spark or brush of considerable length. Neither of these devices, however, is well adapted for the application of the ultra-violet rays to therapeutic uses, as neither can be conveniently manipulated, nor can a sufficient quantity of the ultra-violet rays be readily obtained therefrom. To overcome the defects of the various devices heretofore employed in the production of ultra-violet rays for therapeutic uses, I have invented the improved electrode hereinafter fully described and having the novel features thereof particularly pointed out in the appended claims, it being understood that changes in the minor details of construction may be made in the structure described without departing from the spirit of the invention or sacrificing the advantages thereof.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a transverse sectional view through the electrode proper, the adjustable handle being shown in elevation. Fig. 2 is a plan view of the electrode. Fig. 3 is a bottom plan view of the electrode with the handle detached. Fig. 4 is a detail view, chiefly in section, showing the connection of one of the binding-posts with one of the terminal studs or pins of the series in the electrode. Fig. 5 is a detail view in elevation, showing the preferred form of connection between the adjustable handle and the electrode; and Fig. 6 is a detail sectional view showing the construction of a slightly-different form of the invention.

Referring to the drawings by the reference characters marked thereon, 1 designates a box or cup, preferably of circular contour, as shown, and constructed of any suitable insulating material—such, for example, as vulcanite, gutta-percha, or indurated fiber. The cup 1 is preferably provided in the interior with a plurality of parallel partitions, each of which is attached at one end to the wall of the cup, but has the other end thereof spaced from the wall of the cup, as shown. These partitions are preferably arranged in two sets, the partitions in one set being designated 2 and those in the other set being designated 3. The partitions 2 of one set are preferably three in number and extend from one side of the cup or box 1, while the partitions 3 are preferably two in number and extend from the opposite side of the cup 1. As clearly shown in Fig. 2, the two sets of partitions are arranged so that a partition of one set intervenes between any two partitions of the other set, and the whole number of partitions define a tortuous

or sinuous path from one side of the cup 1 to the other.

Within the box or cup 1 and following the tortuous path defined by the partitions 2 and 3 I arrange a series of studs 4 of some suitable conducting material, preferably aluminium. These studs 4 are preferably provided at their tops with spherical heads 5 and are secured in the bottom of the cup or box in any suitable manner. The studs 4 are spaced apart at short intervals, as clearly shown in Figs. 1 and 2, and at each end of the series the terminal stud 4^a has the stem thereof extended through the base or bottom of the cup and threaded to form a means of attaching a binding-post, as will be hereinafter more fully explained. The studs 4 between the terminal studs 4^a have the stems thereof terminating flush with the under surface of the base of the cup 1, and in order to protect the ends of the studs from contact with any conducting substance I secure upon the bottom of the cup a plate 6 of any suitable insulating material, such as vulcanite, gutta-percha, or the like. The plate 6 is pierced by suitable openings for the passage of the threaded ends of the terminal studs 4^a of the series, and the binding-posts 7 are internally threaded to receive the projecting threaded ends of the said terminal studs. The binding-posts 7 serve, therefore, as a means for securing the plate 6 upon the bottom of the cup or box 1, and the plate 6 may be further secured by the use of any suitable cement between it and the cup and small screws 7^a, as shown in Fig. 3.

To make the electrode convenient to manipulate, it is necessary to provide an adjustable handle, and to this end the plate 6 is preferably formed with a central stud 8, which is longitudinally slotted to receive the threaded shank 9 of a handle 10. The shank 9 is preferably curved, as shown in Fig. 5, and it is secured in position in the slot of the stud 8 by a transverse clamping-screw 11, which permits the handle to be adjusted in position when the screw is loosened and which clamps the two portions of the stud 8 upon the shank of the handle when the screw is tightened.

It is desirable to employ in connection with the electrode as above described a cap which will cover the box or cup 1 and prevent contact of the studs 4 with any external body, but will not prevent the escape of the ultra-violet rays from the cup. A cap which serves this double purpose is illustrated in the accompanying drawings and comprises a band 12, which fits closely around the cup and has frictional engagement with the outer surface thereof, and a plate 13 of quartz crystal, which is secured in the band in any preferred manner. The plate of quartz is employed in preference to a plate of glass, because quartz is transparent to the ultra-violet rays and glass, as already explained, is opaque thereto in very large measure. When the cap is employed upon the cup of the electrode, the heat generated therein by the production of the ultra-violet rays will be confined and may be sufficient to interfere with the satisfactory use of the electrode unless some means be provided to dissipate it. To provide for the removal of the heat generated within the cup, an outlet-opening 14 is formed in the wall of the cup at one side, and approximately opposite thereto a tube or nipple 15 is secured to provide means for attaching a rubber tube through which carbonic-acid gas or air may be forced through the chamber within the cup. The amount of air or carbonic-acid gas forced through the chamber of the cup will of course depend upon the amount of heat developed in the use of the invention, and if the electrode is used for a short period only the forcing of any current through the chamber will be unnecessary.

In using the electrode above described I connect the binding-posts 7 with the terminals of a Ruhmkorff coil of suitable size or with the terminals of a static electric machine, and when the coil or static machine is set in operation a discharge of electricity is caused to pass from one of the terminal studs within the cup or box 1 through the entire series of studs arranged in the tortuous path defined by the partitions within the cup or box, giving rise to the formation of a large number of small brushes between the several studs. Each of these brushes is accompanied by a number of ultra-violet rays, and from all of the brushes so produced a much larger quantity of ultra-violet rays is produced than by any of the devices hitherto employed for the production of ultra-violet rays for therapeutic uses. Moreover, as all of the ultra-violet rays are produced within the small space inclosed within the cup or box 1 the application of the rays at any point is greatly facilitated, as the operator is enabled to localize the application very exactly.

In Fig. 6 I have illustrated a form of the invention particularly adapted for use with electric discharges of extremely high potential, which might with the form of the invention above described tend to form arcs bridging the space between the binding-posts or to form arcs across from one of the studs in one row to the corresponding stud in the adjacent row. In Fig. 6 the casing or box, which is designated 20, is formed in much the same way that it is in the form of the invention first described; but the base thereof is considerably thicker and the supplemental plate 6 is dispensed with. In this form of the invention studs 21 are set in openings in the base, which do not extend entirely through, and the terminal studs are connected with the wires bearing the electric charges from the poles of the coil by means of plugs 22, of gutta-percha or the like, screwed into threaded sockets 23 in

the sides of the box or casing and having a central core 24 of some suitable conducting material, such as aluminium. The core 24 of each plug extends beyond the end of the plug, so that when the plug is screwed into the socket provided therefor in the box or casing 20 the end of the core will abut against the embedded end of the terminal stud. At the end of the metallic core 24 a binding-post 25 is formed, to which the wire bearing the charges of electricity is connected in the usual manner. In this form of the invention the studs are made much shorter than in the form first described, and consequently the distance through which a spark would have to pass in leaping over one of the partitions 26 in the box or casing is much greater than in the first form of the invention described.

While I have illustrated the invention as embodied in an electrode having the series of studs forming the conductors arranged in a single tortuous path within the inclosing cup or box which forms the casing of the electrode, it is to be understood that other arrangements of the studs may be made and similar results obtained. I do not, therefore, limit myself to this specific arrangement to the exclusion of all others.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A device of the character specified, comprising a plurality of insulated conductors grouped in close order, and means for compelling an electric discharge to pass through all of said conductors consecutively.

2. A device of the character specified, comprising a plurality of insulated conductors grouped tolerably close together, and means for compelling an electric discharge to pass consecutively through all of said conductors in a sinuous or tortuous path.

3. The combination in a device of the character specified, of a casing having therein a plurality of partitions extending partially across the chamber of the casing, and a series of insulated conductors arranged within the casing between the partitions thereof.

4. The combination in a device of the character specified, of a casing of suitable material having a plurality of parallel partitions therein extending partially across the chamber of the casing and defining a tortuous path, and a series of insulated conductors arranged in the tortuous path within the chamber of the casing.

5. The combination in a device of the character specified, of a casing of insulating material, a plurality of studs of conducting material grouped within said casing, and means provided within the casing for causing an electric discharge to pass through all of said studs consecutively.

6. The combination in a device of the character specified, of a casing of insulating material, a plurality of studs of conducting material set within said casing, two of said studs having prolongations at the exterior of the casing to form terminals for connection with an electric circuit, and means within the casing for causing an electric discharge to pass consecutively through all of said studs.

7. The combination in a device of the character specified, of a casing of insulating material, a plurality of conductors grouped within the casing and insulated from each other, means for causing an electric discharge to pass through all of said conductors consecutively, and a cap or covering for said casing, comprising a plate of quartz over the top of the casing.

8. The combination in a device of the character specified, of a casing, a plurality of conductors grouped within the casing and insulated from each other, two of said conductors being extended to the exterior of the casing for connection with an electric circuit, means within the casing for causing an electric discharge to pass consecutively through all of said conductors, and an adjustable handle secured to said casing.

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

CHARLES F. W. HORN.

Witnesses:
JOHN H. BRAUTH,
MICHAEL ERLWEIN.