R. H. WAPPLER.

THERAPEUTICAL ELECTRODE.

APPLICATION FILED MAR. 16, 1915.

1,146,292. Patented July 13, 1915.

Fig. 1.

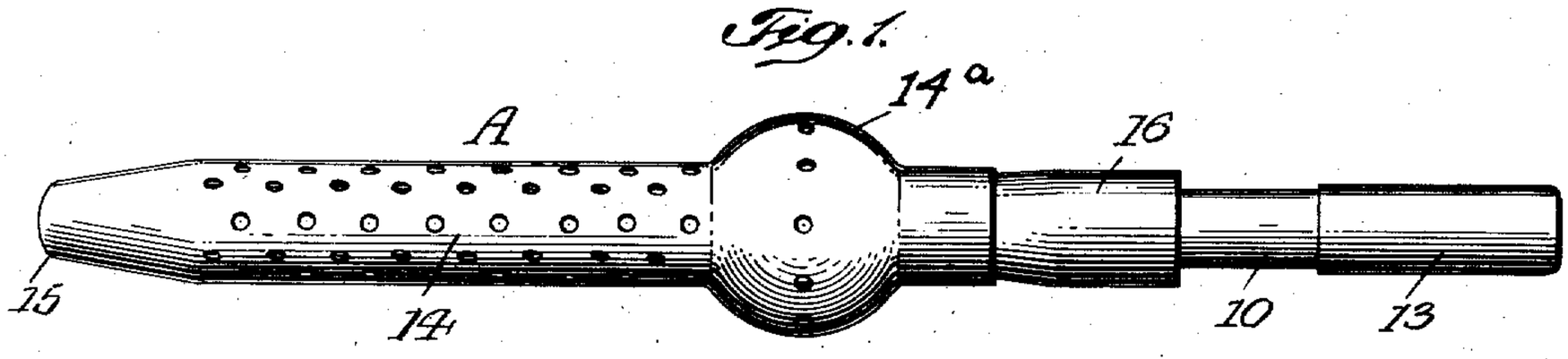


Fig. 2.

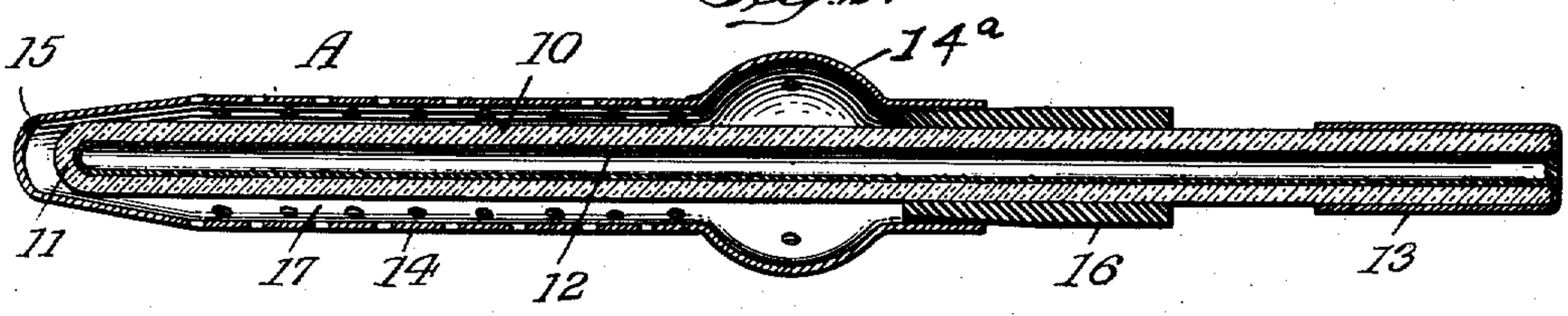


Fig. 3.

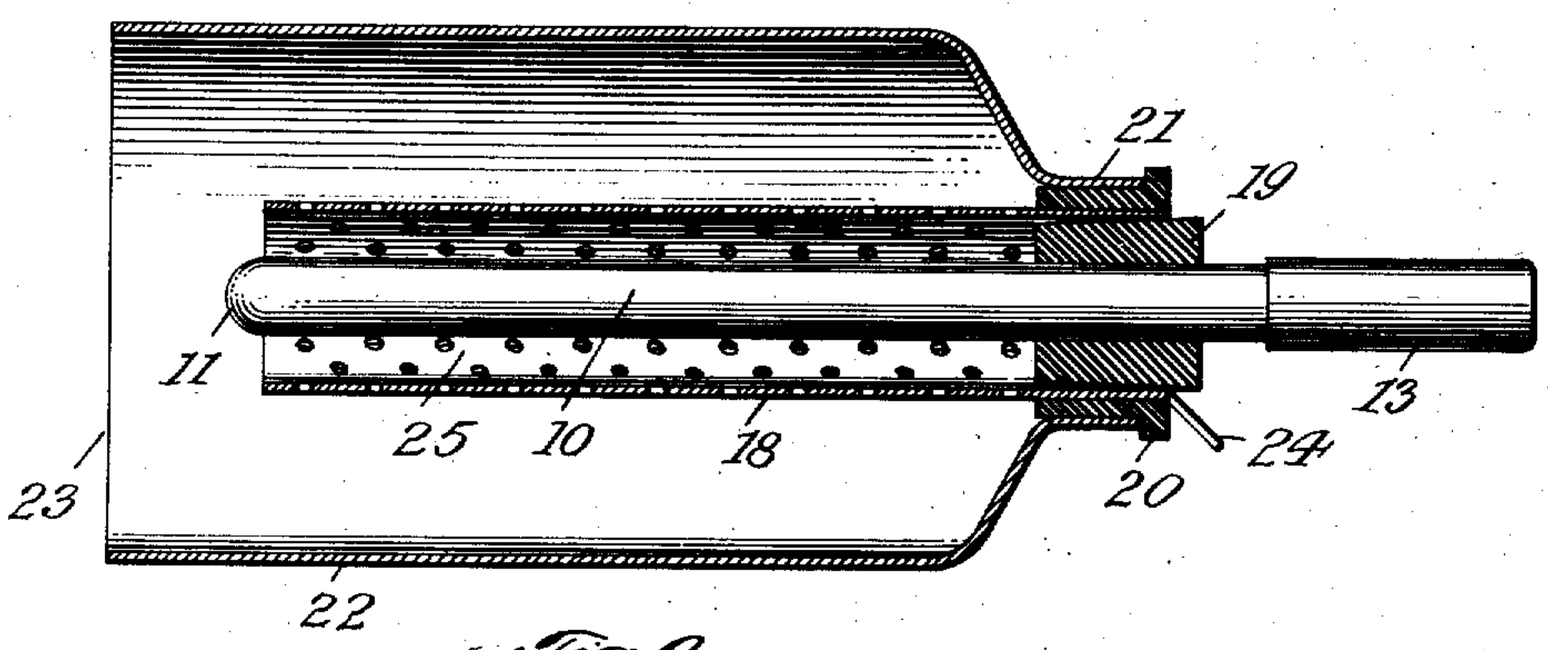


Fig. 4.

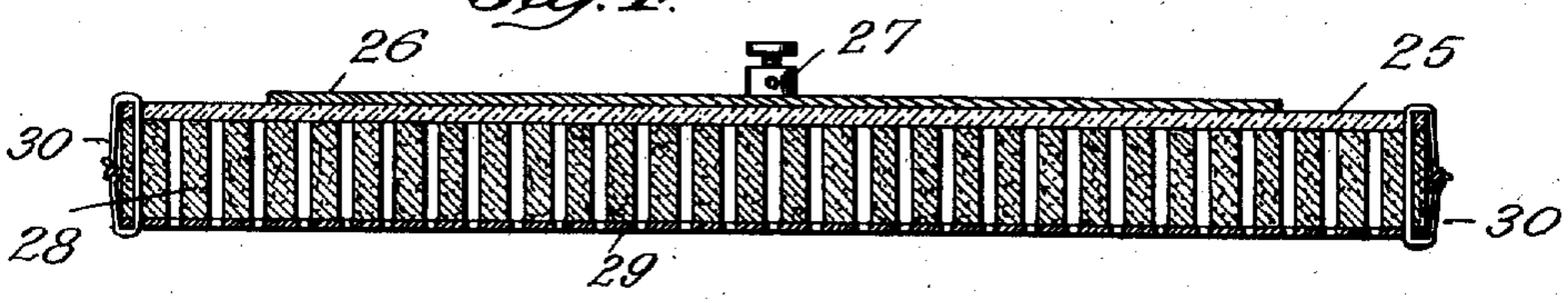
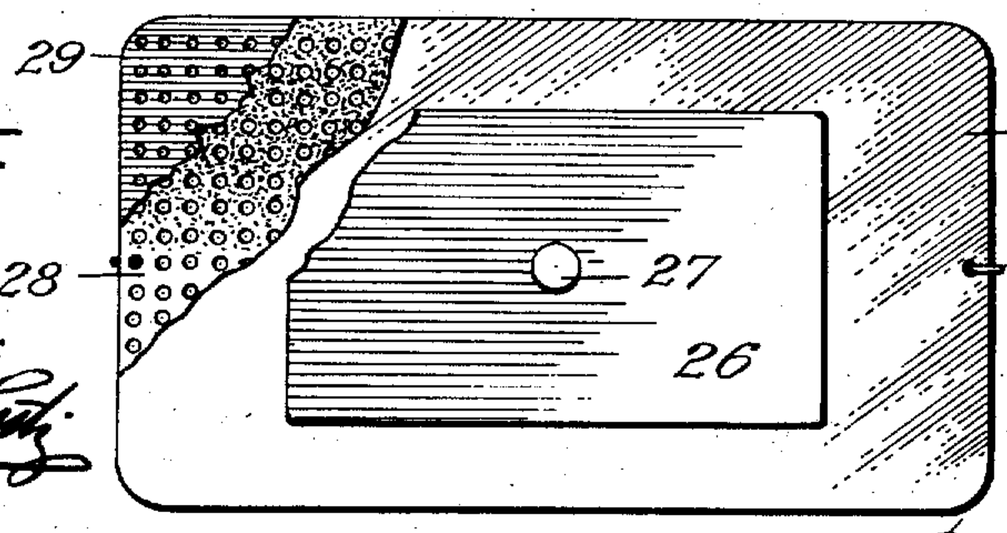


Fig. 5.



WITNESS:

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THERAPEUTICAL ELECTRODE.

1,146,292. Specification of Letters Patent. Patented July 13, 1915.

Application filed March 16, 1915. Serial No. 14,823.

To all whom it may concern:

Be it known that I, REINHOLD H. WAPPLER, a citizen of the United States, and a resident of New York city, county and State of New York, have invented new and useful Improvements in Therapeutical Electrodes, of which the following is a specification.

This invention relates to a novel electrode more particularly designed to be used for applying high-frequency electric current and its accompanying phenomena to the human body for therapeutical purposes. Electrodes heretofore generally employed for this purpose were of the vacuum type and were liable to break while being or after having been introduced into the human body, such occasional breaks causing considerable injury to the tissues surrounding said tube owing to the fact that these tissues were sucked by vacuum against the sharp edges of the broken glass. Thus not only great pain was caused to the patient but the removal of the glass chips was a difficult and likewise a painful procedure. I have found that in many instances the desired therapeutical effect is not at all produced by the applied high-frequency current *per se*, but by the action of nitrous oxid, ozonous and kindred gases formed by said current in proximity to the electrode and while such gases are *in statu nascendi*, and that such therapeutic gases are readily formed by means of non-vacuous electrodes of the character described and claimed in the annexed specification.

In the accompanying drawing, Figure 1 is a side view of an electrode embodying my invention; Fig. 2 a longitudinal section thereof; Fig. 3 a similar section of a modified form of my electrode; Fig. 4 a longitudinal section through a further modification thereof, and Fig. 5 a plan view partly broken away of Fig. 4.

My improved electrode A comprises essentially a tubular body 10 of comparatively thick glass or another dielectric medium, so as not to be liable to break under strain, said tube 10 being preferably closed at one end as at 11. Tube 10 is provided with an inner conductive coating 12 of say tinfoil which coating is conductively connected at the open tube-end to a metal cap 13 tightly fitted on said tube. The latter is loosely surrounded by a perforated metallic sheath conductor 14, of convenient form and having a coniform rounded end 15. Conductor 14 is held in a position properly spaced from tube 10, by means of a hollow plug 16 firmly secured to said tube. Near its rear end, conductor 14 is provided with a bulge 14ª that limits the depth to which the electrode may be inserted into the human body.

In use the electrode A is introduced into the cavity of the patient to be treated, whereupon the desired high-frequency current is applied to cap 13, while the return of the current from conductor 14 is effected through the human body and a suitable electrode exteriorly applied to said body at a convenient place. Owing to the passage of the high frequency current from coating 12 through the dielectric body 10 and the air space or chamber 17 formed between said body and the perforated conductor 14, the air contained in said space becomes highly ionized whereby nitrous oxid, ozonous and kindred gases are formed that pass outwardly through the perforations of the conductor 14 to produce the desired therapeutical effect upon the morbid organs to be healed.

In case the afflicted parts of the patient's body are exteriorly accessible, electrodes as shown in Figs. 3 to 5 may be employed. In Fig. 3 the dielectric body 10 is surrounded by a spaced perforated conductor 18 which is open at both ends, said conductor being held in position by a hollow plug 19, tightly fitted on tube 10. Conductor 18 is in turn provided with a flanged ring 20 to which the neck 21 of a glass bell or a similar casing 22 is attached.

In use the bell 22 is placed with its open mouth 23 upon the afflicted part of the patient's body and the high-frequency current conductors are connected to cap 13 and to an outwardly projecting lip 24 of conductor 18. In this way the gases generated within chamber 25 pass through the openings of conductor 18 into the interior of bell 22 so as to come in direct contact with the patient's body. It is obvious that the casing 22 may be of any size whatsoever as may be found convenient for improving the pathological condition of the patient.

In Fig. 5 finally, the tubular electrode A shown in Fig. 1 is so to say laid out in a plane so as to be adapted to come into direct

contact with a comparatively large surface area of the patient's body for treating purposes. To the upper side of a flat dielectric body 25 is cemented or otherwise secured a metallic coating 26 provided with a binding post 27. Below plate 25 is arranged a perforated spacer 28 made of felt or similar porous material and a likewise perforated metallic conductor 29, the parts 25, 28, 29 being shown to be held together by strings or other fastening means 30.

It will be seen that by the construction described, novel, reliable and effective means are provided for treating various abnormal and morbid conditions of the human body.

I claim:—

1. A therapeutical electrode adapted for the insertion into the human body, comprising a tubular dielectric member, a conductive coating applied to the inner surface thereof, and a perforated tubular conductor having a closed rounded forward end, said conductor surrounding said member and being spaced therefrom.

2. A therapeutical electrode adapted for the insertion into the human body, comprising a tubular dielectric member having an open end and a closed end, a conductive coating applied to the inner surface of said member, a conductive cap fitted over the open end of said member and conductively connected to said coating, a perforated tubular conductor surrounding the member portion adjacent the closed end and spaced from said member, and means for securing said conductor in position.

3. A therapeutical electrode adapted for the insertion into the human body, comprising a tubular dielectric member, a conductive coating applied to the inner surface of said member, a conductive cap fitted upon one end of said member and conductively connected to said coating, a perforated tubular conductor having a closed forward end surrounding the dielectric member adjacent its other end and spaced from said member, and means for securing said conductor in position.

4. A therapeutical electrode adapted for the insertion into the human body, comprising a tubular dielectric member, a conductive coating applied to the inner surface thereof, a perforated tubular conductor having a closed rounded forward end and fitted over said member and spaced therefrom to form an air-ionizing space therebetween, and means on said conductor for limiting the depth to which said electrode may be introduced into the human body.

5. A therapeutical electrode adapted for the insertion into the human body, comprising a tubular dielectric member, a conductive coating applied to the inner surface thereof, a perforated tubular conductor having a closed rounded forward end and fitted over said member and spaced therefrom to form an air-ionizing space therebetween, a hollow plug fitted upon said member and holding the conductor in position, and a bulge formed near the rear end of the conductor for limiting the depth to which said electrode may be introduced into the human body.

REINHOLD H. WAPPLER.