No. 725,731. PATENTED APR. 21, 1903.

S. H. LINN.

CATAPHORIC ELECTRODE.

APPLICATION FILED AUG. 9, 1901.

NO MODEL.

Fig. 1.

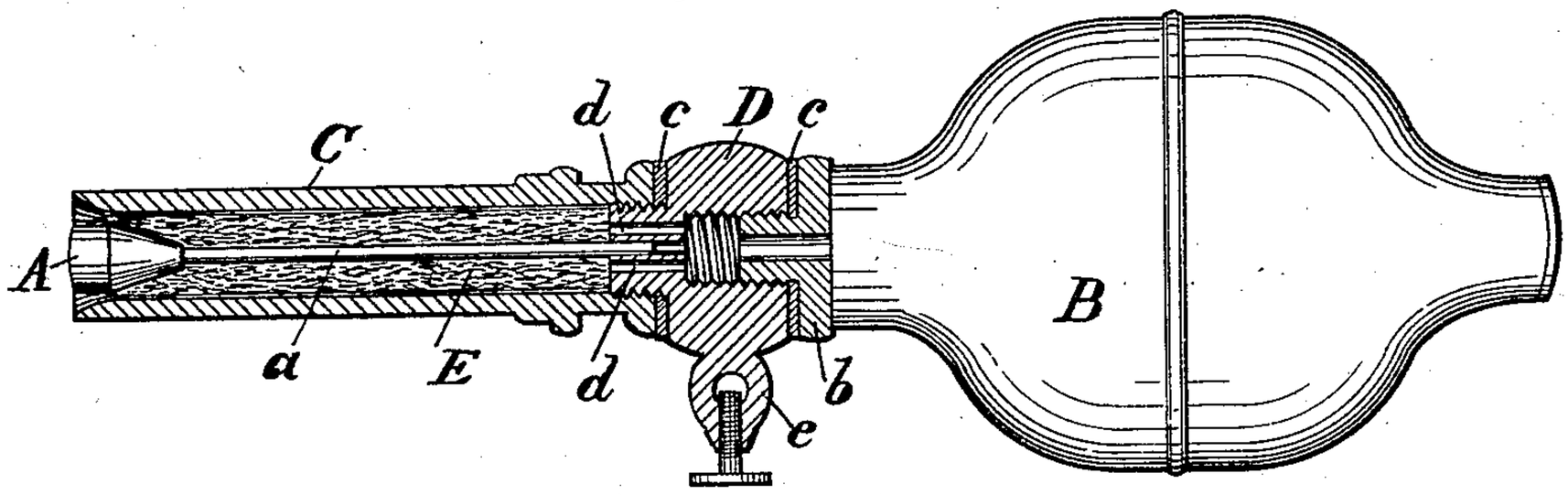


Fig. 2.

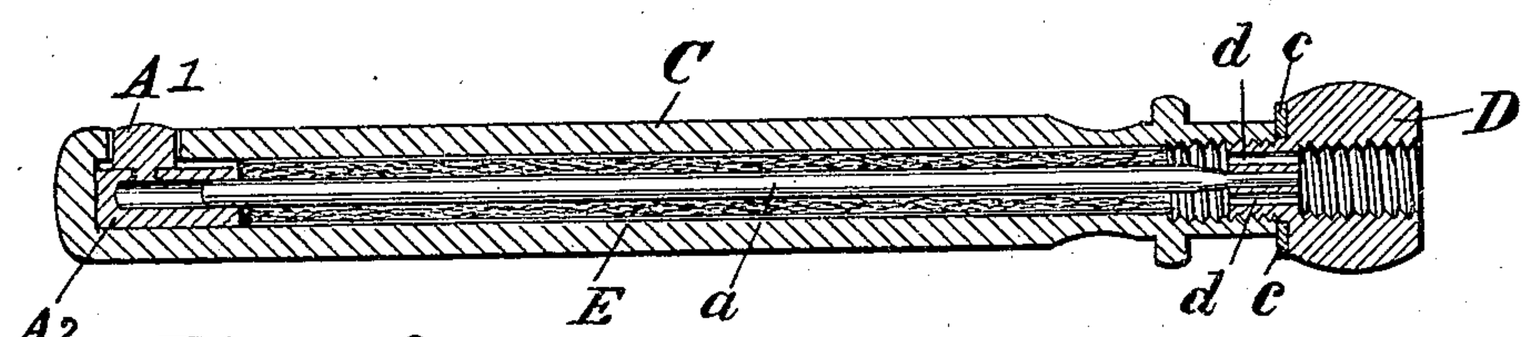


Fig. 3.

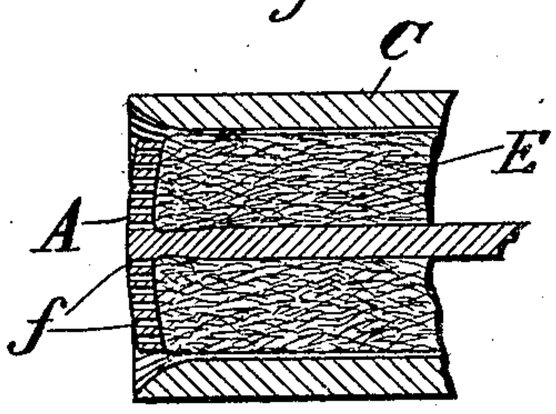


Fig. 4.

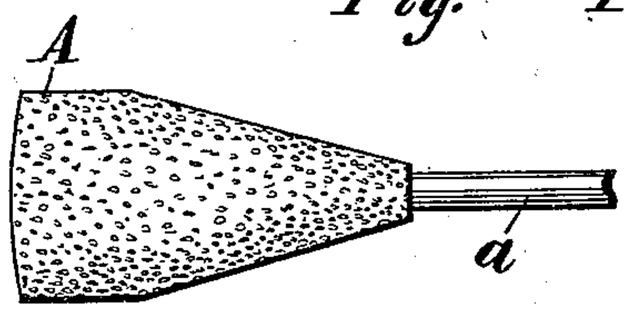


Fig. 5.

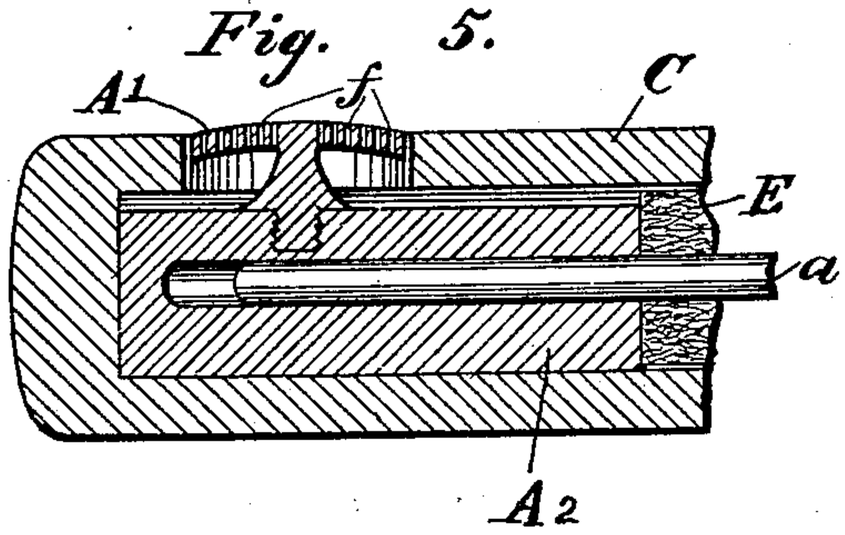
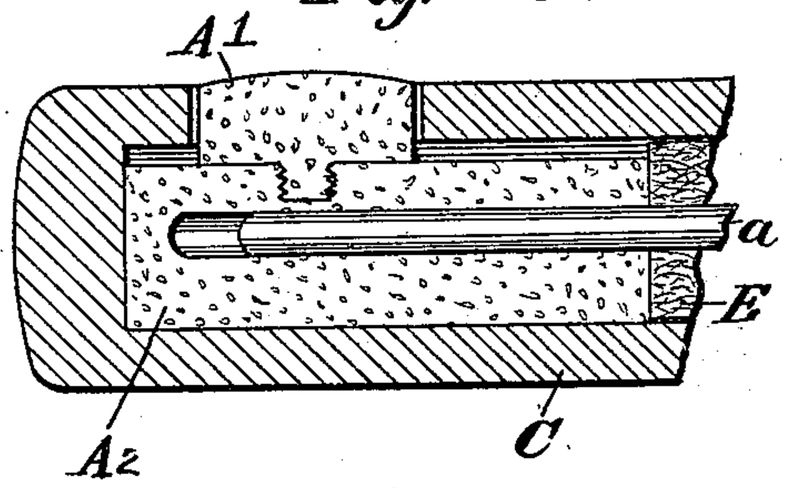


Fig. 6.



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CATAPHORIC ELECTRODE.

SPECIFICATION forming part of Letters Patent No. 725,731, dated April 21, 1903.

Application filed August 9, 1901. Serial No. 71,445. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL H. LINN, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a new and Improved Cataphoric Electrode, of which the following is a specification.

Treatment by cataphoresis has been found to afford relief and cure for many diseases that are difficult to treat by other methods. Electrodes as heretofore produced for such treatment have presented serious difficulties on account of the usually-employed methods of and means for supplying the electrolyte to the surfaces of the tissues to be treated.

The object of my invention is to overcome these difficulties by producing a cataphoric electrode which shall be capable of use with an electric current of low potential with means for maintaining a constant regulable supply of the electrolyte to the tissues to be treated and that, too, in a very thin film in order to secure the most efficient cataphoric action.

The accompanying drawings, illustrating my invention, are as follows: Figure 1 is a longitudinal section through the center of one style of my electrode in which the air-bulb B, of substantially the usual construction, is shown attached and in full side view. Fig. 2 shows a longitudinal section of a different style of my electrode, while Figs. 3 and 4 show in similar section portions only of different styles of electrodes which may be used in connection with the style of sheath shown in Fig. 1, while Figs. 5 and 6 also show in similar sections portions only of modified forms of electrodes adapted to use with the style of sheath seen in Fig. 2.

Similar letters refer to similar parts throughout the several views.

Referring to the drawings, my electrode consists of a terminal piece or anode A, preferably of aluminium, which may be of substantially the form shown in Fig. 1, to which there is secured an aluminium stem *a*, rigidly secured at its right-hand end, as indicated, in a ball-shaped metal coupling D. This coupling D is threaded at its left-hand end, as seen, to receive the sheath C, of hard rubber or other suitable insulating material, between which and the ball-shaped coupling D there is seen a washer *c*, preferably of soft rubber, the purpose of which is to secure a tight joint between such parts. This coupling D carries a binding-post *e* of the usual construction and is bored and threaded internally from the right-hand side, as indicated, to receive the stem *b*, preferably of rubber or insulating material, permanently secured to the air-bulb B in the usual manner. This air-bulb B carries the usual check-valve at its right-hand end. A second washer *c* is seen between the connecting-stem *b* and the metallic coupling D, the purpose of which is to secure a tight joint between such parts.

In using my electrode the metallic rod or stem *a* is wound with any suitable absorbent material E, such as asbestos cord, adapted to hold therein by absorption the electrolyte. Then the parts are put together in the relative positions indicated in Fig. 1. The air-bulb is then removed, and the electrolyte to a sufficient quantity may be supplied through the small holes *d* (seen in the coupling D) by means of the usual glass dropper, after which the air-bulb B is again screwed on in position, as seen in Fig. 1. By connecting the positive terminal of a suitable source of electricity with the binding-post *e* and bringing the other terminal thereof into contact with the body of the patient to be treated and at the proper point and using the electrode in such a way that the aluminium anode A is in contact with the tissues to be treated and compressing the air-bulb B the electrolyte held by absorption in the wrapping E is forced out around the anode A in such a way as to form a thin film of such electrolyte between the anode A and the surface of the tissues to be treated, which during the process of cataphoresis becomes the cathode.

The air-bulb B serves not only as an insulating-handle for using the electrode, but it affords a means whereby a constant supply of the electrolyte may be maintained upon the tissues to be treated, because by the compression of the air-bulb the pressure thus created upon the wrapping E forces the electrolyte held in absorption therein out through the hole in the left-hand end of the sheath C and around the anode A in such a way that when the left-hand end of the sheath C is

slightly pressed over the surface of the tissues to be treated there is formed a thin film of the electrolyte between the tissues and the anode A. The rapidity with which the tissues may be supplied with the electrolyte is varied, of course, by varying the pressure exerted upon the bulb B.

Referring to Fig. 2, there is shown herein a style of my instrument, more especially adapted to internal treatment, in which the sheath C is closed at the end, but has an opening on one side thereof and near the end. The anode A′ in this instance has a stem threaded into the aluminium block A^2, and as such anode A′ and block A^2 are not readily removable from the sheath C the stem *a* is made readily removable from the aluminium block A^2, as indicated, by being fitted loosely in a hole therein. This block A^2 is flattened or cut away on the top, as seen in Fig. 2, so as to afford an unobstructed egress for the electrolyte around on all sides of the anode A′, where it passes through the hole therefor in the side of the sheath C.

In the use of the style of electrode seen in Fig. 2 the sheath is inserted within the organ so as to reach the tissues to be treated and the electrode so positioned that the anode A shall come directly in contact with such tissues.

In place of the solid anode A (seen in Fig. 1) such anode may be of a thin disk-like form and have perforations therein, as indicated in Fig. 3, or when desired such anode A, as seen in Fig. 4, may consist of light and porous spongy material, preferably, though not necessarily, a metal, such as sponge platinum. In a similar way also the anode A′ for use with the style of sheath seen in Fig. 2 may have the portion thereof coming in contact with the tissues reduced to a thin disk-like conformation and be provided with holes therethrough, as seen in Fig. 5, or, as indicated in Fig. 6, such anode may have practically the conformation indicated in Fig. 2, but be built up of spongy material, such as already above described. With the style of anodes indicated in Figs. 3 and 5 the small holes through the disk-like portion thereof coming in contact with the tissues afford increased opportunity for the egress of the electrolyte in reaching the entire surface of the tissues to be treated. When the anode A′ is made of spongy material, as indicated in Figs. 4 and 6, the porous nature of such anode admits of the egress of the electrolyte therethrough in a very satisfactory way to produce the thinnest possible film over the entire surface of the tissues to be treated.

I have found that the use of this style of electrode, in connection with a means for maintaining the supply of the electrolytes in a thin film to the tissues to be treated, affords a very satisfactory and efficient means for the successful cataphoric treatment of many diseases.

Some of the important advantages of this style of electrode are as follows: The supply of the electrolyte to the tissues to be treated may be maintained at any desired rate, and such supply when maintained in a thin film I have found to afford very satisfactory results on account of the rapidity of the electrolytic action which results from supplying such a thin film to the tissues and with the metallic anode so little removed from the tissues to be treated on account of which a current of very low potential may be used to maintain cataphoresis. Another important advantage is found in the fact that there is no clogging of the electrode. Such an electrode also affords ready opportunity for cleansing and sterilizing when desired after each use thereof. There are no inaccessible parts or parts liable to clog or get out of order.

What I claim is—

1. In a cataphoric electrode, an anode of spongy or absorbent material and means for forcing an electrolyte therethrough under pressure and against the tissues to be treated.

2. In a cataphoric electrode, an anode of spongy or absorbent material, means for forcing an electrolyte therethrough under pressure against the tissues to be treated, and means for varying such pressure as desired.

3. In a cataphoric electrode, an insulating-sheath, an anode of conducting material arranged to be exposed through an opening in such sheath, a packing of absorbent material within such sheath arranged to retain an electrolyte therein in a liquid form by absorption, and means for ejecting the electrolyte from such absorbent material against the tissues to be treated and in a thin film between such tissues and such anode.

4. In a cataphoric electrode, an insulating-sheath, an anode of conducting material arranged to be exposed through an opening in such sheath, a packing of absorbent material within such sheath arranged to retain an electrolyte therein in a liquid form by absorption, and means for ejecting the electrolyte from such absorbent material under pressure against the tissues to be treated and in a thin film between such tissues and such anode.

5. In a cataphoric electrode, an insulating-sheath, an anode of conducting material arranged to be exposed through an opening in such sheath, a packing of absorbent material within such sheath arranged to retain an electrolyte therein in liquid form by absorption, means for ejecting the electrolyte from such absorbent material under pressure against the tissues to be treated and in a thin film between such tissues and such anode, and means for varying such pressure.

6. In a cataphoric electrode, an insulating-sheath, an anode of conducting material arranged to be exposed through an opening in such sheath, a packing of absorbent material within such sheath arranged to retain an electrolyte therein in a liquid form by absorption,

an air-bulb, and connections between such air-bulb and such absorbent material whereby the compression of the bulb ejects the electrolyte from such absorbent material against the tissues to be treated.

7. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, a receptacle containing absorbent material arranged to retain in suspension an electrolyte in a liquid form, and means for supplying such electrolyte from such receptacle to the tissues to be treated and in a thin film between such tissues and such anode.

8. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, a receptacle containing absorbent material arranged to retain in suspension an electrolyte in liquid form, and means for supplying such electrolyte from such receptacle under pressure to the tissues to be treated and in a thin film between such tissues and such anode.

9. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, a receptacle containing absorbent material arranged to retain in suspension an electrolyte in a liquid form, means for supplying such electrolyte from such receptacle under pressure to the tissues to be treated and in a thin film between such tissues and such anode and means for regulating such pressure.

10. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, a receptacle containing absorbent material arranged to retain in suspension an electrolyte in a liquid form, an air-bulb and connections between such air-bulb and such receptacle whereby the compression of the bulb ejects the electrolyte from such absorbent material against the tissues to be treated.

11. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, means for retaining an electrolyte in a liquid form in suspension in a body of absorbent material, and means for forcing the electrolyte from such absorbent material against the tissues to be treated in a thin film between such tissues and such anode.

12. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, means for retaining an electrolyte in a liquid form in suspension in a body of absorbent material, and means for forcing the electrolyte from such absorbent material under pressure against the tissues to be treated in a thin film between such tissues and such anode.

13. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, means for retaining an electrolyte in a liquid form in suspension in a body of absorbent material, means for forcing the electrolyte from such absorbent material under pressure against the tissues to be treated in a thin film between such tissues and such anode, and means for regulating such pressure.

14. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, means for retaining an electrolyte in a liquid form in suspension in a body of absorbent material, an air-bulb and connections between such air-bulb and such absorbent material whereby the compression of the bulb ejects the electrolyte from such absorbent material against the tissues to be treated.

15. In a cataphoric electrode, an anode of conducting material, an insulating-sheath surrounding the same having a hole therein through which such anode may contact with the tissues to be treated, the edges of such sheath around such anode arranged to retain the electrolyte in contact with the tissues only through such opening in such sheath and between such tissues and such anode.

16. In a cataphoric electrode, an insulating-sheath having a hole therethrough, an anode of conducting material arranged to contact with the tissues through such hole in such sheath, means for supplying an electrolyte to the tissues to be treated, such anode and such sheath coöperating with such means for supplying the electrolyte to retain such electrolyte in contact with the tissues to be treated in a thin film between the tissues to be treated and such anode and only over a space covered by the opening in such sheath for such anode.

17. In a cataphoric electrode, an insulating-sheath, an anode of conducting material arranged to be exposed through an opening in such sheath, a packing of absorbent material within such sheath arranged to retain an electrolyte therein in a liquid form by absorption, and means for ejecting the electrolyte from such absorbent material against the tissues to be treated.

18. In a cataphoric electrode, an insulating-sheath, an anode of conducting material arranged to be exposed through an opening in such sheath, a packing of absorbent material within such sheath arranged to retain an electrolyte therein in liquid form by absorption, means for ejecting the electrolyte from such absorbent material under pressure against the tissues to be treated and means for varying such pressure.

19. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, a receptacle containing absorbent material arranged to retain in sus-

pension an electrolyte in a liquid form, and means for supplying such electrolyte from such receptacle to the tissues to be treated.

20. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, a receptacle containing absorbent material arranged to retain in suspension an electrolyte in liquid form, and means for supplying such electrolyte from such receptacle under pressure to the tissues to be treated.

21. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, a receptacle containing absorbent material arranged to retain in suspension an electrolyte in a liquid form, means for supplying such electrolyte from such receptacle under pressure to the tissues to be treated, and means for regulating such pressure.

22. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, means for retaining an electrolyte in a liquid form in suspension in a body of absorbent material, and means for forcing the electrolyte from such absorbent material against the tissues to be treated.

23. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, means for retaining an electrolyte in a liquid form in suspension in a body of absorbent material, and means for forcing the electrolyte from such absorbent material under pressure against the tissues to be treated.

24. In a cataphoric electrode, an anode of conducting material, means for supporting such anode so that it may contact with the tissues to be treated, means for retaining an electrolyte in a liquid form in suspension in a body of absorbent material, means for forcing the electrolyte from such absorbent material under pressure against the tissues to be treated, and means for regulating such pressure.

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