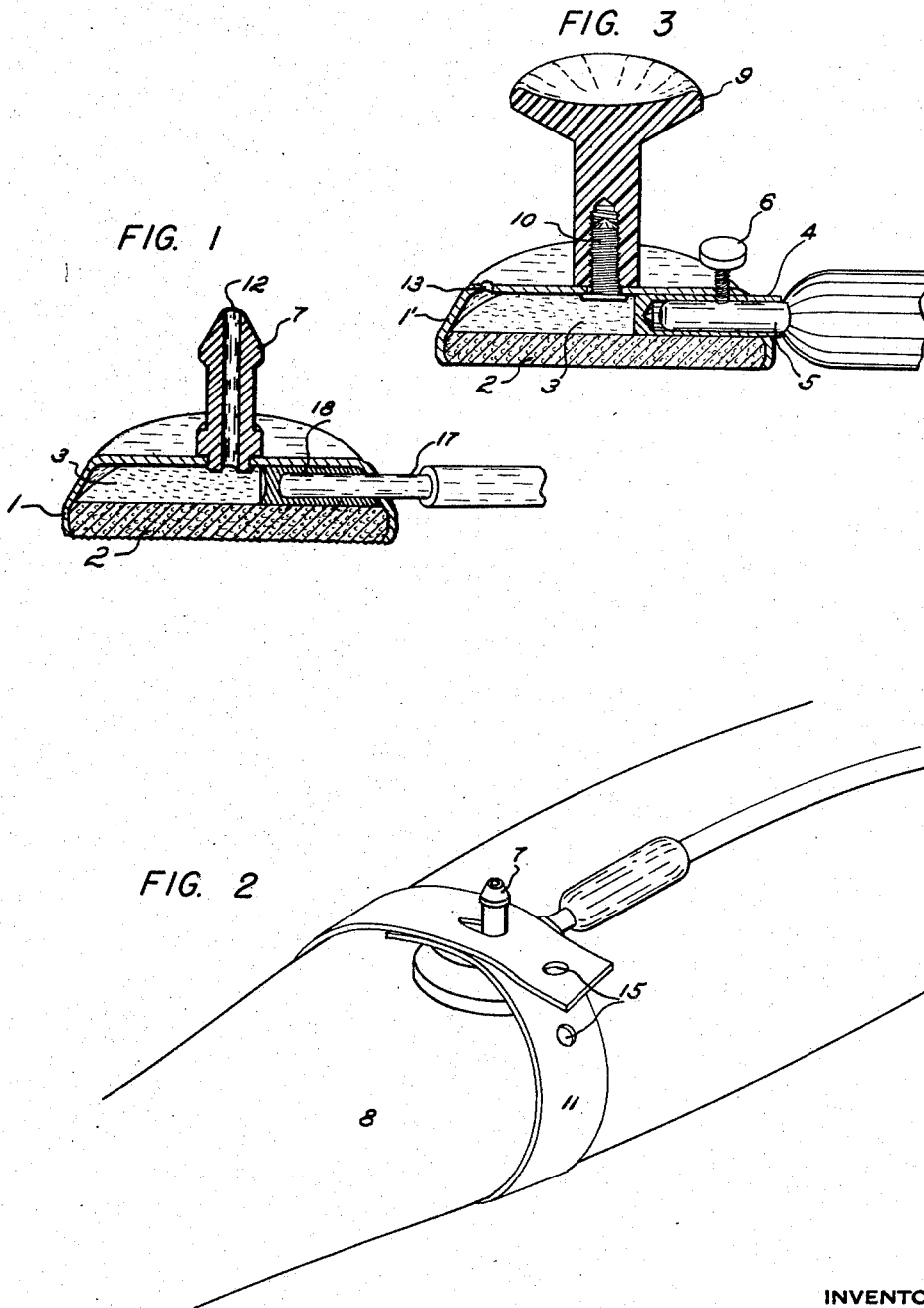


July 21, 1959

R. A. LLOYD
ELECTROCARDIOGRAPH ELECTRODE

2,895,479

Filed Sept. 13, 1957



INVENTOR
ROGER A. LLOYD
BY *John E. Diehl*
Attorney

1

2,895,479

ELECTROCARDIOGRAPH ELECTRODE

Roger A. Lloyd, Middleton, Wis.

Application September 13, 1957, Serial No. 683,912

5 Claims. (Cl. 128—417)

This invention relates to a new electrode comprising a portion of an electrocardiograph or other instrument comprising one or more electrodes which establish contact with the epidermis and more particularly it relates to such an electrode comprising a sintered porous metallic disc.

Heretofore it has not been unusual for electrocardiograph electrodes to give inaccurate and inconsistent readings due to changes in the conductance of the electrode. Such inaccuracy and inconsistency of results obtained with prior electrocardiograph electrodes has been caused in part by the depletion of the conductive material or solution and in part by the conductive material or solution not providing good contact between electrode and patient. Also in many prior electrocardiograph electrodes, conductive salts and salt solutions have been prepared as pastes or liquid solutions and have been applied to an area of the patient's skin on which the electrode was to be placed. Application of such conductive salts as pastes or as liquid salt solutions has not been conducive to restricted area testing because the pastes and liquid salt solutions could not be limited to the area in which the electrode contacted the patient. Pastes and liquid salt solutions also have dried out before completion of tests and by such drying out have caused lowering of conductance and inaccuracy in the final report.

Another disadvantage of prior electrocardiograph electrodes has been the poor means of attachment between electrode and cable which in turn has caused the electrode to give inaccurate test results and has also caused the electrode to be detached from the cable and damaged or lost during transfer of the electrocardiograph from one part of a hospital or clinic to another.

In addition to being part of an electrocardiograph, my electrode may be part of any other instrument which comprises one or more electrodes which are used to establish electrical contact with a polygraph (lie detector) or electrotherapeutic apparatus.

It is therefore an object of my invention to provide an electrocardiograph electrode which has uniform conductance and retains continuous uniform conductance over long periods of sustained use.

Another object is to provide an electrocardiograph electrode which gives consistent and accurate testing results.

Another object is to provide an electrocardiograph electrode which contains a reserve supply of conductive solution which does not dry out and which does not need to be replenished over long period of use such as, for example, during use in major heart and brain surgery.

Another object is to provide an electrocardiograph electrode which gives good contact between electrode and patient and also provides a test area which is limited to the electrode contact for restricted area testing.

Another object is to provide an electrocardiograph electrode which does not require a conductive paste or other accessory and thereby require extra expense and a clean-up operation.

2

Another object is to provide an electrocardiograph electrode which is permanently attached to the cable of the electrocardiograph and which therefore can not be lost or misplaced during transfer of the electrocardiograph.

Another object is to provide an electrocardiograph electrode which is unbreakable, streamlined and permanent.

Another object is to provide an electrode for an electrocardiograph which requires no separate action of application of the electrolyte to the testing surface of the patient's body and which does not cause undue mental distress to the patient nor staining of the clothing.

Another object is to provide an electrode for an electrocardiograph with which accurate results can be obtained by relatively inexperienced operators.

Other objects will become apparent from the drawings and from the following detailed description in which it is intended to illustrate the applicability of the invention without thereby limiting it to a scope less than that of all equivalents which will be apparent to one skilled in the art. In the drawings like reference numerals refer to like parts and;

Figure 1 is a sectional elevation of the electrocardiograph electrode;

Figure 2 is a perspective view of the embodiment of Figure 1;

Figure 3 is a sectional elevation of another embodiment of my invention.

Referring now more particularly to the drawings, reference numeral 1 is the main body of my electrode; the lower portion of said body 1 encloses a sintered or porous metal disc 2 which constitutes the base of said electrode. Housing 1 or 1' is conductively attached to disc 2 as by soldering or swaging and provides reservoir 3 immediately above said disc. Immediately above disc 2, housing 1 or 1' is provided with a hole to receive a cable jack adapter 4 or conductor such as wire 17 (Figure 1) respectively. Cable jack 5 may be soldered into the cable jack adapter 4; however a thumbscrew 6 may be used as an alternative as shown. Conductor 17 is irremovably attached to housing 1 by suitable means such as solder 18. Attached to and perpendicular to the upper surface of the body 1 of my electrode is a stem 7 or holder 9; depending on the particular embodiment, said stem or holder may be attached to the body 1 by solder or by screw means 10 or by other suitable means such as swaging, staking or riveting.

The reservoir 3 of my electrode is filled by means of a hypodermic syringe, or other suitable means, at the filling hole 12 or 13, depending on the model. In the embodiment of Figures 1 and 2 the filling hole 12 is located on the axis of stem of the electrode and in the embodiment of Figure 3 the filling hole 13 extends through the upper portion of the body 1' of the electrode. The filling hole 12 of the embodiment of Figures 1 and 2 must be located on the axis of stem 7 of the electrode because this specific embodiment is used to make tests by placing the electrode on the limb of the patient. The electrode is attached to the limb 8 of a patient by a rubber or plastic strap 11, said strap 11 containing holes 15 in each end. The stem 7 of my electrode is placed through one of the holes 15 in one end of the said strap 11 and the other end of said strap 11 is extended around said limb 8 until said extended end of said strap extends over stem 7; stem 7 is then placed in the hole 15 which best provides a tight contact for my electrode against the limb 8 of the patient. The reservoir 3 may be filled while the device is in use and attached to a patient. It may be filled with tap water, or if preferred various other water soluble electrolytes, skin irritants to lower skin resistance, penetrating agents, detergents, surface active agents or the like may be added to the water to lower its resistance and improve its skin contact. The water or

3

aqueous solution diffuses through the sintered conductive disc 2 until it reaches the surface of the patient's skin located immediately beneath the sintered conductive disc 2. When the water solution contacts the skin of the patient it creates a good moist conductive contact between the skin of the patient and the electrode and accurate and consistent test results are obtained over long periods of testing.

The body 1 of my new and unique electrocardiograph electrode may be constructed of stainless steel, aluminum 10 bronze or any other metal which lends itself to the construction of such an article. The sintered conductive disc 2, however, is constructed of a highly conductive material and while other materials are operable, the preferred material is a highly conductive metal such as 15 silver, platinum, stainless steel, bronze or copper.

If desired, the lower surfaces of disc 2 may be rough as shown in Figure 1. Such roughness makes it easy to mildly irritate the patient's skin by lightly rubbing or rotating the electrode when putting it in place; this has been found to have the desirable effect of markedly increasing conductance.

While certain modifications and embodiments of the invention have been described, it is of course to be understood that there are a great number of variations which 25 will suggest themselves to anyone familiar with the subject matter thereof and it is distinctly understood that

4

this invention should not be limited except by such limitations as are clearly imposed in the appended claims.

I claim:

1. A device of the type described comprising a disc of 5 sintered conductive material, said disc being impregnated with a liquid electrolyte, a metal housing in conductive relation to said disc, said housing providing a reservoir above said disc for said electrolyte, and electrical conductor means attached to said housing.
2. The device of claim 1 further characterized by said 10 disc being of stainless steel.
3. The device of claim 1 further characterized by said electrolyte being tap water.
4. The device of claim 1 further characterized by said 15 housing being provided with a single upwardly extending tube having a bore which provides means for introducing said electrolyte into said reservoir and provides means for attaching the device to a patient.
5. The device of claim 1 provided with electrically 20 conductive means irremovably attached to said housing.

References Cited in the file of this patent

UNITED STATES PATENTS

25	1,667,817	Moishiki	May 1, 1928
	2,621,657	Leech	Dec. 16, 1952
	2,782,786	Krasno	Feb. 26, 1957