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 Clarence, N.Y.
 Continuation of application Ser. No.
 586,691, Oct. 14, 1966, now abandoned.

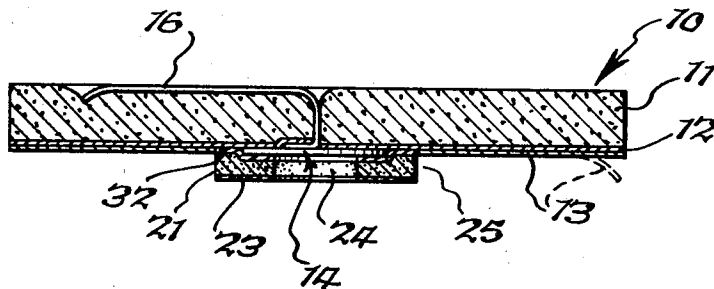
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[54] **DISPOSABLE ELECTRODE**
 4 Claims, 6 Drawing Figs.

[52] U.S. Cl. 128/2.06
 [51] Int. Cl. A61b 5/04
 [50] Field of Search 128/2.06,
 2.1, (Pickup Electrode Digest), 404, 411, 416,
 417, 418

ABSTRACT: A disposable electrode having a foamlike base with pressure-sensitive adhesive on one surface, an annular well projecting from the surface on which said pressure-sensitive adhesive is located, a conduit in communication with said well for conducting electrode jelly thereto with an electrode located between said annular well and said base, the electrode being secured to said base by a lead wire which extends through the base and is bent over flat on the rear thereof.



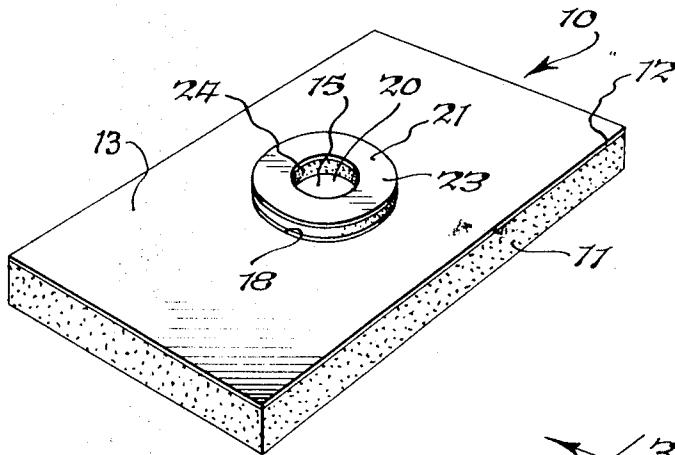


Fig. 1.

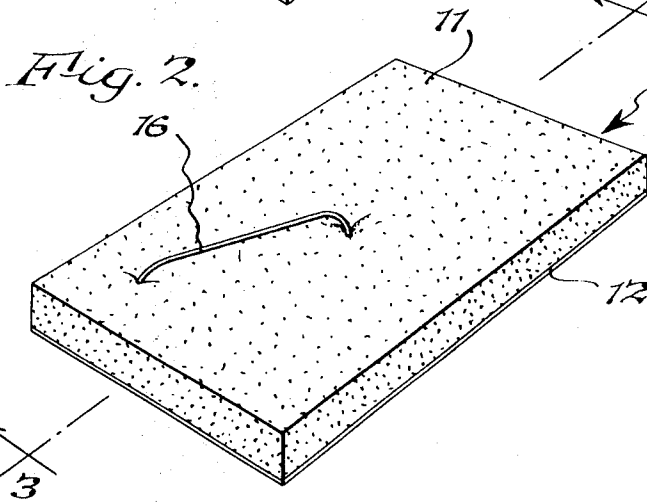


Fig. 2.

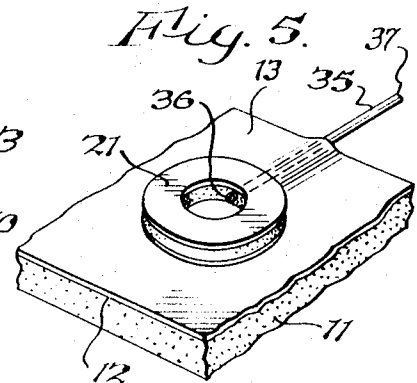


Fig. 5.

Fig. 6.

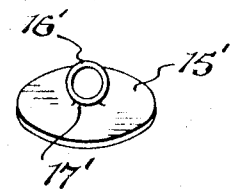


Fig. 3.

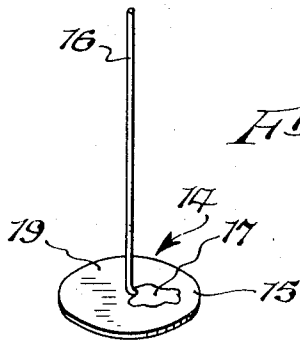
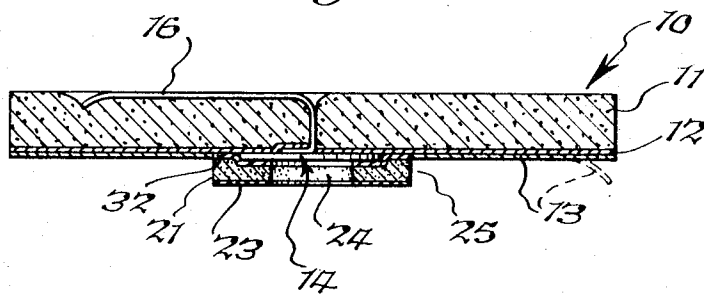


Fig. 4.

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DISPOSABLE ELECTRODE

This application is a continuation of application Ser. No. 586,691, filed Oct. 14, 1966, now abandoned.

The present invention relates to an electrocardiograph accessory and more particularly to a disposable electrode for an electrocardiograph machine.

By way of background, in order to obtain an electrocardiograph it is necessary to place electrodes in contact with the skin of a patient. In the past, permanent electrodes were utilized which were strapped in position. The strapping was a cumbersome and inconvenient task. In addition, the electrodes required frequent cleaning for sanitation and to insure good electrical contact. Disposable electrodes were relatively expensive and uncomfortable because of the stiffness of the backing material which carried the adhesive and the stiffness of the metallic electrode member which contacted the skin. Because of this stiffness a relatively strong adhesive was required to insure good contact which in turn caused hair to be pulled from the patient when the electrode was removed. Furthermore, past disposable electrodes could not confine the electrode jelly used in conjunction therewith to an area underneath the electrode and this resulted in leakage which could stain the patient's clothes. It is with a disposable electrode which overcomes the foregoing shortcomings of prior devices that the present invention is concerned.

It is accordingly the primary object of the present invention to provide a resilient, comfortable, easily-conforming, disposable electrocardiograph electrode which is sufficiently soft so that a patient can lie on it without discomfort and which does not pull the patient's hair when it is removed.

Another object of the present invention is to provide a disposable electrocardiograph electrode which includes a well for receiving electrode jelly which not only insures good electrical contact between the electrode and the patient's skin but also prevents the electrode jelly from squirting beyond the electrode when it is applied.

A further object of the present invention is to provide an improved electrocardiograph electrode which insures insulation between the electrocardiograph lead and the skin and which can be used with any standard clamp-type of electrocardiograph lead, thereby obviating the necessity for leads of a specialized configuration.

Still another object of the present invention is to provide an improved disposable electrocardiograph electrode which is highly reliable and which can be manufactured in an extremely simple manner. Other objects and attendant advantages of the present invention will readily be perceived hereafter.

The improved disposable electrocardiograph electrode of the present invention includes a base member which is both flexible and resilient and has a pressure sensitive adhesive on one side thereof. Because of its flexibility and resiliency it can adhere satisfactorily to rough, curved and uneven skin areas. An electrode member is provided consisting of a circular disc and a lead wire coupled thereto. The circular electrode is located on the surface which contains pressure sensitive adhesive and the electrical lead to the electrode extends through the base member and is bent over on the other side thereof. The adhesive of the base member, which engages one side of the electrode disc, prevents electrode jelly, which is subsequently applied to the electrode, from seeping through the base member. The lead is a normal ordinary wire through which any suitable lead wire from an electrocardiograph can be clamped. Special connectors are not required. Surrounding the disc-shaped electrode member is a raised annular member which is in firm adhering engagement with the pressure sensitive adhesive on the base member. The open central portion of the annular member provides a well for receiving electrode jelly and for tending to confine said jelly when the disposable electrode is applied to a patient. The present invention will be more fully understood when the following portions of the specification are read in conjunction with the accompanying drawing wherein:

FIG. 1 is a perspective view of the improved disposable electrode showing the front surface thereof, that is, the surface which is applied to a patient's skin;

FIG. 2 is a perspective view showing the rear surface of the improved disposable electrode and the lead wire bent thereon;

FIG. 3 is a cross-sectional view taken substantially along line 3-3 of FIG. 2;

FIG. 4 is a perspective view of the electrode means which are mounted on the disposable electrode;

FIG. 5 is a fragmentary view of an alternate embodiment of the present invention; and

FIG. 6 is a view of a still further modification of the present invention.

The improved disposable electrode 10 includes a base member 11 which is flexible and resilient causing it to conform easily to curved and uneven skin areas. A layer 12 of pressure sensitive adhesive comprises the front surface of base member 11 and this layer is covered by a protective paper covering 13 which is peeled from adhesive 12 when base member 11 is to be applied to the patient. Base member 11 with the adhesive layer 12 and the protective paper 13 thereon can be purchased commercially under the trademark RESTON of the 3M Company. Base member 11 is a polyurethane foam pad. However, foam rubber or any other suitable foamlike material can be used.

An electrode member 14 (FIG. 4) consisting of a disc-shaped electrode means 15 having a lead wire 16 soldered thereto at 17 is mounted on base member 11, after first cutting out a circular portion of backing 12 at 18 to expose the pressure-sensitive adhesive 12 in this area and thereafter pushing the free end of lead wire 16 through base member 11 until such time as rear surface 19 of disc 15 engages the pressure-sensitive adhesive which provides good sealing engagement with this rear surface to prevent electrode jelly which is applied to the front surface 20 of disc 15 from leaking through the aperture formed by the penetration of lead wire 16. Thereafter, lead wire 16, which was originally straight, as shown in FIG. 4, is bent over to the position shown in FIGS. 2 and 3 to serve the purpose of insuring that there is no separation between disc member 15 and base member 11, and also for providing a flat surface which facilitates handling and packaging of disposable electrode 10.

A raised annular member 21 which consists of a foamlike material, such as foam rubber, is mounted on the pressure-sensitive face of base member 11 in concentric relationship with disc 15, with a portion of annular member 21 overlying a peripheral portion of disc 15, as can be seen from FIG. 3. Annular member 21 has an outside diameter which is substantially equal to the diameter of cutout 18. Annular member 21 has a pressure-sensitive adhesive 22 of its own on the face thereof which contacts pressure-sensitive adhesive 12. This insures a good seal between annular member 21 and base member 11 and further serves to prevent leakage of electrode jelly between the two. In addition, the pressure-sensitive adhesive 22 on the inner portion of annular member 21 engages the outer peripheral edge portion of disc 15 to further prevent leakage (see FIG. 3). In addition, the overlap between annular member 21 and disc 15 insures that said disc 15 will retain its position base member 11, as shown in FIG. 3. Hard disc 15 will therefore remain spaced from the skin for comfort. A nonadhesive plastic backing layer 23 is secured to the face of annular member 21 remote from disc 15 to prevent disc face from sticking to the patient's skin, thereby permitting excess jelly from the central portion 24 to escape to the area 25 when the disposable electrode 10 is placed in adhering engagement with a person's skin. Central area 24 of annular member 21 provides a well for receiving electrode jelly to insure good electrical contact between the patient's skin and electrode disc 15.

The improved disposable electrode 10 of the present invention is used in the following manner: Any suitable type of electrode jelly is inserted into well 24. The well insures that a measured amount of electrode jelly is applied to the face 20 of electrode disc 15. Thereafter, backing layer 13 is stripped from pressure-sensitive adhesive 12 by peeling it therefrom, as shown in dotted lines in FIG. 3. The circular cutout 18 surrounding annular member 21 permits backing 13 to be peeled

from adhesive 12 without removing annular member 21. Thereafter, the front surface containing the pressure-sensitive adhesive 12 is pressed onto the skin area at which electrical contact is to be made. The annular member 21 will compress slightly and also sink into the resilient material of base member 11. This action produces comfortable contact, inasmuch as there is no pressing of a rigid member onto the skin. Any excess electrode jelly in well 24 will escape because of the fact that cover 23 does not adhere to the skin. This excess jelly will tend to accumulate in the area 25 surrounding annular member 21 but will not pass beyond the perimeter provided by base member 11, thereby obviating the tendency for staining of the patient's clothes or the like.

After the disposable electrode 10 has been placed in position in the foregoing manner, any suitable type of clamp on a electrocardiograph lead wire or pickup is clamped to lead wire 16 to complete the electrical contact. Specialized contactors need not be used. After the electrocardiograph has been taken, it is merely necessary to lift base member 11 from the skin, and it can be thrown away.

Disc member 19 may be fabricated from any conventional material known for use as an electrocardiograph electrode, such as silverchloride, german silver, or normal silver.

In FIG. 5 a modified form of the present invention is shown, which includes all of the structure of the embodiments of FIGS. 1-4. In addition, in this embodiment a hollow tube or conduit 35 is provided for conducting electrode jelly into well 24, as by use of a suitable syringe or injector which is inserted into the end 37 of the tube which extends beyond the edge of member 11. Tube 35 extends through a hole in the annular wall of member 21 into well 24. The central portion of tube 35 lies under protective paper 13, so that it will not interfere with the removal of said paper. By the use of this modification the electrode 10 can be placed in position before jelly is conducted into well 24 through tube 35. It is after it is in position that a suitable injector or syringe, not shown, is inserted into tube end 37 and the proper amount of jelly is injected into well 24. With this embodiment there is no waste of jelly. It will be appreciated that the conduit for conducting jelly to the well may occupy a different orientation than shown, for example, it may extend through the base member 11 into well 24.

In FIG. 6 a modified form of the electrode member construction is shown. This electrode member has a disc 15' which is identical to disc 15 shown in the preceding FIGS. However, instead of a straight lead wire shown in the preceding FIGS., a conductive wire ring 16' which is soldered to disc 15' at 17', is used. Wire ring is inserted through a suitable slot in base member 11, and the rear of disc 15' is caused to adhere to pressure sensitive adhesive 12, as described above relative to disc 15. The top portion of ring 16' is adjacent to the rear surface of base member 11 for attachment to the clamp of a suitable electrical lead of the electrocardiograph apparatus.

Because of the resiliency of the polyurethane foam comprising base member 11, good adhesive contact with a patient's skin is obtained, notwithstanding the curvature or irregularities thereof. Furthermore, because of the resiliency of base member 11, the pressure-sensitive adhesive will not provide so great a bond with the hair on the person's skin so as to cause a tearing action when the electrode is removed. Base member

11 is approximately three-eighths inch thick, and the remainder of the elements of structure are drawn in a scale proportional to this dimension. It will be appreciated that while a relatively thick foamlike base member has been illustrated, sheetlike base members of other materials, such as plastic or fabric, can be used to support a well and electrode if there is a willingness to sacrifice the comfort provided by a foamlike base member, and this structure is within the scope of certain claims. While base member 11 has been depicted as rectangular, it will be appreciated that it can assume any other suitable geometrical shape. Furthermore, while disc 15 has been shown as a solid disc, it can consist of a gridlike member to which lead wire 16 is attached, and this structure is included within the term disc.

It can thus be seen that the improved disposable electrocardiograph electrode of the present invention is manifestly capable of achieving the above enumerated objects, and while a preferred embodiment of the present invention has been disclosed, it will be understood that it is not limited thereto but may be otherwise embodied within the scope of the following claims.

I claim:

1. A disposable electrode comprising a flexible base member having a substantially flat front surface and a rear surface, a pressure sensitive adhesive on said front surface, electrode means having a front surface and a substantially flat rear surface mounted on said substantially flat front surface of said flexible base member, lead means connected to said electrode means, a well on said base member proximate said front surface of said base member and in communication with said front surface of said electrode means for receiving electrode jelly, said well being a single well formed by an annular member having a front surface and a rear surface, said annular member being located in encircling relationship to said electrode means with said rear surface of said annular member being adhesively secured to said front surface of said base member, said front surface of said annular member being raised beyond said front surface of said base member, conduit means forming a part of said disposable electrode in communication with said well for conducting electrode jelly to said well, said conduit means comprising a tube lying on said front surface of said base member, a first end portion on said conduit means lying between said front surface of said base member and said rear surface of said annular member and extending into said well, and a second end portion on said conduit means remote from said first end portion and being located proximate the edge of said base member for receiving electrode jelly to be conducted to said well.

2. A disposable electrode as set forth in claim 1 wherein said lead means comprises a lead wire which punctures said base member and extends through said flexible base member the entire distance from said front surface to said rear surface, said lead wire being bent over flat on said rear surface of said base member.

3. A disposable electrode as set forth in claim 2 wherein said electrode means are secured between said rear surface of said annular member and said front surface of said base member.

4. A disposable electrode as set forth in claim 3 wherein said base member comprises a foamlike material for providing cushioning engagement with said annular member.