

- [54] CLAMP FOR A PASSIVE ELECTRODE

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- [22] Filed: Feb. 21, 1974

- [21] Appl. No.: 444,314

Related U.S. Application Data

- [62] Division of Ser. No. 310,175, Nov. 28, 1972, Pat. No. 3,817,253.

- [52] U.S. Cl..... 339/97 R, 339/108 TP, 339/255 P,
339/261

- [51] Int. Cl. H01r 11/20

- [58] **Field of Search** 339/97-99,
339/108, 223, 255, 260, 261, 95; 128/418;
324/72.5, 149

- [56]
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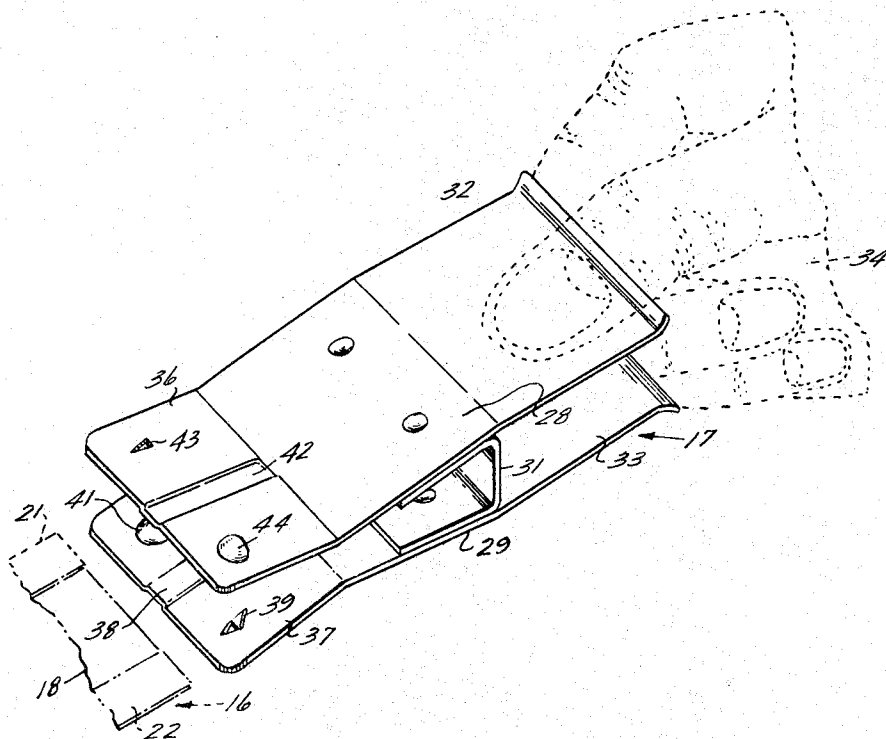
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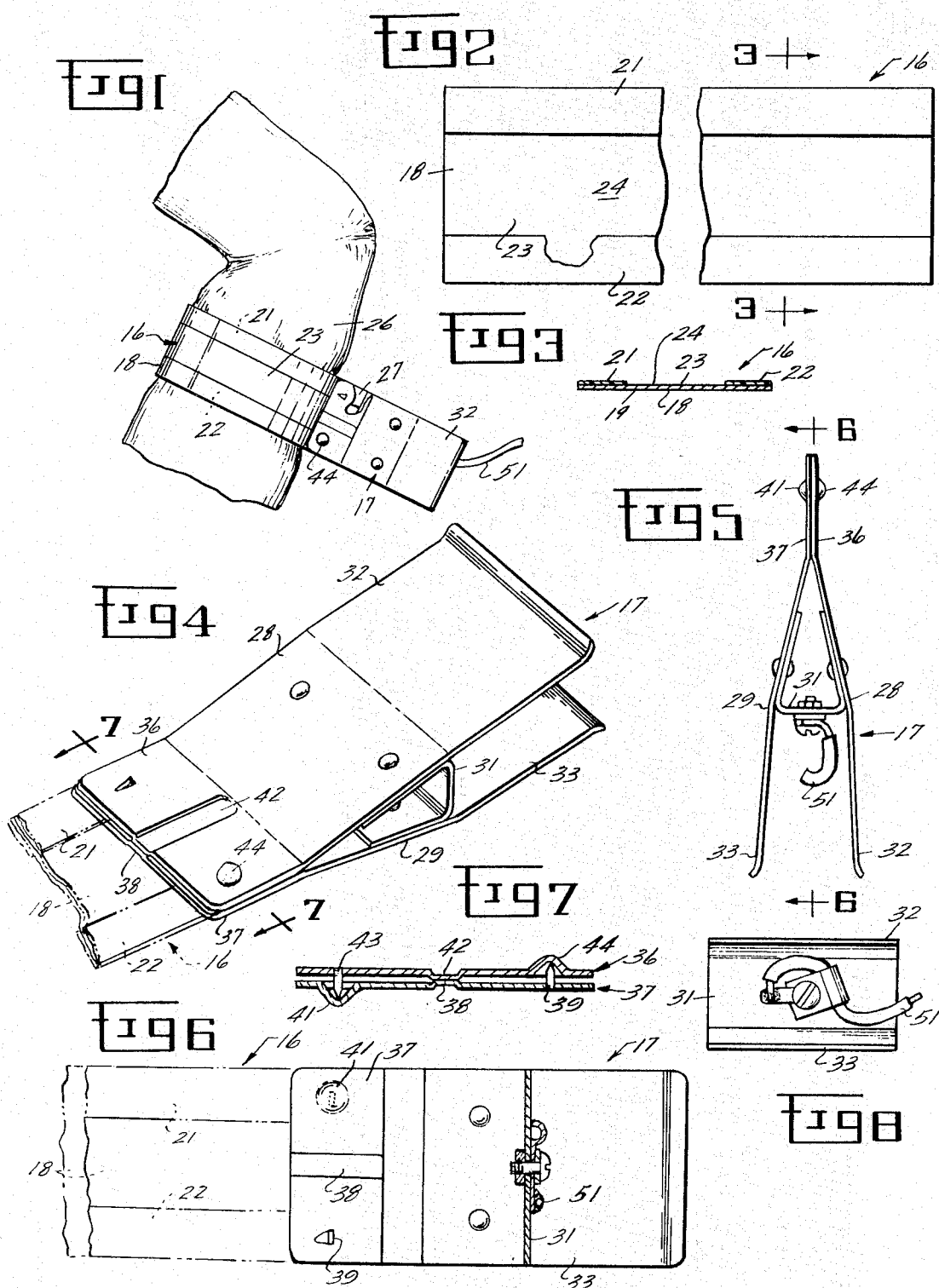
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- [57]
- ABSTRACT**

A clamp for a passive electrode strip and clamp combination. The clamp includes clamping arms which are urged together. The electrode includes an elongated metal foil body and reinforcing strips attached to a face of the body. Portions of the clamping arms engage an exposed portion of the strip carrying face in electrical contact relation therewith. Prongs on the clamping arms perforate the electrode strip to hold the clamp on the electrode strip.

- ## 2 Claims, 9 Drawing Figures

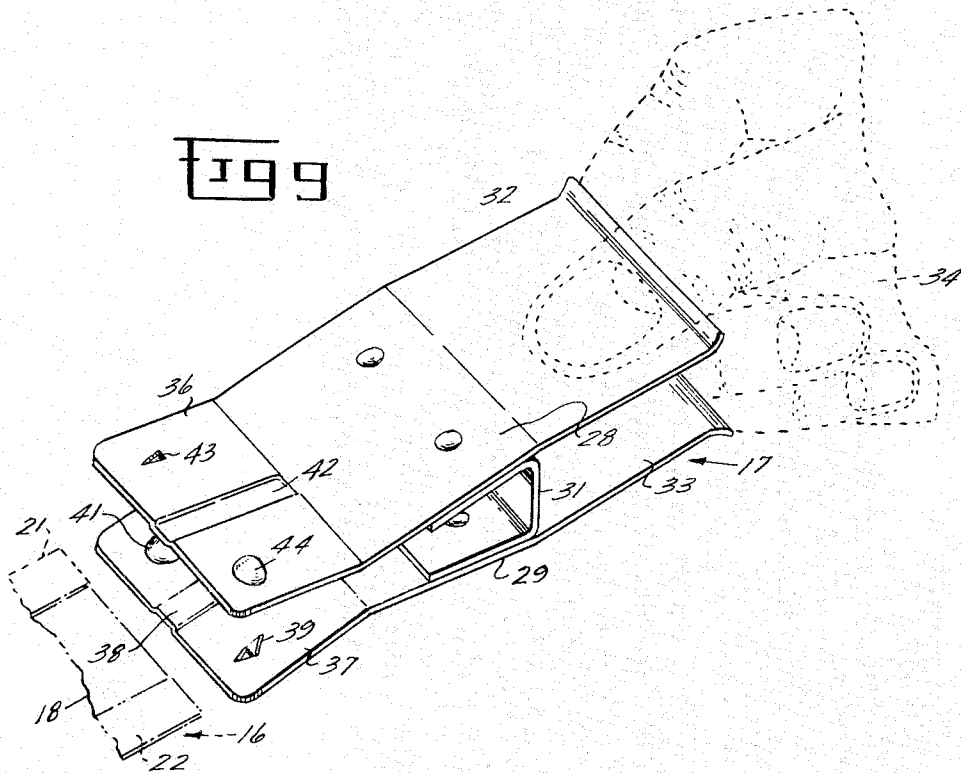




PATENTED FEB 25 1975

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CLAMP FOR A PASSIVE ELECTRODE

This is a division of my co-pending application Ser. No. 310,175 filed Nov. 28, 1972, now U.S. Pat. No. 3,817,253.

This invention relates to passive electrodes for electrosurgery or the like and clamps therefor.

An object of this invention is to provide an improved passive electrode strip having an elongated sheet metal foil body and spaced reinforcing strips of paper or plastic resin or the like adhesively attached thereto to reinforce the metal foil body.

A further object of this invention is to provide a clamp for use with such passive electrode strip which includes portions which firmly grip the electrode strip at the reinforcing strips to hold the clamp on the passive electrode strip and an electric contact portion which grips the passive electrode strip between the reinforcing strips.

Briefly, this invention provides a passive electrode strip and clamp arrangement in which the passive electrode includes an elongated body of sheet metal foil such as aluminum foil. Spaced reinforcing strips of paper or synthetic resin or the like are adhesively attached to one face of the foil body to provide support for the foil body with part of the face being exposed adjacent the reinforcing strips. The other face of the foil body is exposed. The passive electrode strip is wrapped about a limb or the like of a patient with the other face of the foil body in engagement with the limb and doubled ends of the electrode strip extending from the limb to receive the clamp. The clamp includes spring pressed clamping arms which include prongs that puncture the electrode strip at the reinforcing strips to anchor the clamp on the electrode strip. Portions of the clamping arms engage the foil body where exposed adjacent the reinforcing strips to form a good electrical contact therewith.

The above and other objects and features of the invention will be apparent to those skilled in the art to which this invention pertains from the following detailed description and the drawings, in which:

FIG. 1 is a perspective view of a passive electrode strip and a clamp attached thereto, the strip being shown in position on an arm of a patient;

FIG. 2 is a fragmentary plan view of the electrode strip removed from the limb and clamp, a portion of a reinforcing strip thereof being broken away;

FIG. 3 is a view in section taken on the line 3—3 in FIG. 2;

FIG. 4 is a perspective view of the clamp, end portions of the electrode strip being shown in association therewith in double-dot-dash lines;

FIG. 5 is a view in side elevation of the clamp;

FIG. 6 is a view in section of the clamp taken on the line 6—6 in FIG. 5, with the passive electrode strip being shown in double-dot-dash lines in association therewith;

FIG. 7 is a view in section taken on the line 7—7 in FIG. 4;

FIG. 8 is a view in rear elevation of the clamp; and

FIG. 9 is a perspective view of the clamp in open position, a fragmentary portion of the passive electrode being shown in double-dot-dash lines and a fragmentary portion of an operator's hand being shown in dashed lines in association therewith.

In the following detailed description and the drawings, like reference characters indicate like parts.

In FIG. 1 is shown a passive electrode and clamp assembly constructed in accordance with an embodiment of this invention, which includes an elongated passive electrode strip 16 and a clamp 17. As shown in FIGS. 2 and 3, the passive electrode strip includes an elongated body 18 of metal foil such as aluminum foil. As shown in FIG. 3, one face 19 of the body 18 is exposed. Elongated reinforcing strips 21 and 22 are adhesively attached to an opposite face 23 of the body 18 and extend lengthwise thereof. The reinforcing strips 21 and 22 are formed of paper or of a plastic resin film such as that known as "Mylar" or the like and are attached along lengthwise edges of the body 18 with a space 24 being formed between the reinforcing strips at which a portion of the opposite face 23 is exposed.

The passive electrode strip 16 can be wrapped around an arm 26 (FIG. 1) of a patient or around some other part of a body of a patient with the exposed face 19 (FIG. 3) of the body 18 of the strip engaging the patient's skin. The clamp 17 can be mounted on end portions 27 (FIG. 1) of the passive electrode strip 16.

The clamp 17 (FIGS. 4, 5, 6, and 7) includes two generally plate-like, electrically conducting metal members 28 and 29 which are connected by a U-shaped spring metal member 31, which is attached to central portions of the generally plate-like members 28 and 29. The end portions 32 and 33 of the members 28 and 29, respectively, can be engaged by a hand 34, as shown in FIG. 9, to swing opposite end portions 36 and 37 of the members 28 and 29 apart.

The end portion 37 is generally flat but includes a central portion 38 (FIGS. 6 and 8), which is displaced inwardly from the plane of the end portion 37, an inwardly directed prong 39 on one side of the central portion 38, and an outwardly bowed socket portion 41 on the other side of the central portion 38. The end portion 36 similarly is generally flat but includes a central portion 42 which is displaced inwardly from the plane of the end portion 36, an inwardly directed prong 43 on one side of the central portion 42, and an outwardly bowed socket portion 44 on the other side of the central portion 42. When the end portions 32 and 33 are released by the hand 34 (FIG. 9), the end portions 36 and 37 are urged together by the spring member 31. The central portions 38 and 42 are adapted to engage flatwise against the body of the passive electrode strip at the space 24 between the reinforcing strips 21 and 22. The prongs 39 and 43 are so spaced as to extend through the reinforcing strips 22 and 21, respectively. The prong 39 is sufficiently long to extend through two layers of the reinforcing strip 22 and two layers of the body 18 of the electrode strip where the layers overlap and also to extend into the socket 44, as shown in FIG. 7. The prong 43 is similarly sufficiently long to extend through two layers of the reinforcing strip 21 and two layers of the body 18 and into the socket 41. The central portions 38 and 42 are received on opposite sides of the body 18 at the space 24 where two layers of the body 18 overlap, and the central portions 38 and 42 engage the body 18 firmly to form a good electrical connection therewith. The central portions 38 and 42 are sufficiently displaced from the planes of the end portions 37 and 36, respectively, that the reinforcing strips 21 and 22 do not substantially resist closing movement of the end portions 36 and 37.

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The sockets 41 and 44 are sufficiently deep that the prongs do not engage or interfere with walls of the sockets 41 and 44, and the central portions 38 and 42 can firmly engage the body 18 of the electrode strip 16. However, the end portions 36 and 37 surrounding the sockets engage the reinforcing strips adjacent thereto backing up the doubled end portions of the electrode strip as the prongs are pushed therethrough.

A lead 51 (FIGS. 5 and 8) is attached to the spring member 31. The lead 51 can be attached to appropriate apparatus (not shown) to which the passive electrode is to be connected. The prongs 39 and 43 perforate the reinforcing strips 22 and 21, respectively, so that the clamp 17 cannot be dislodged from the passive electrode strip without tearing of the reinforcing strips 21 and 22. The reinforcing strips 21 and 22 can be sufficiently strong and tear resistant to prevent inadvertent tearing thereof.

The passive electrode strip and clamp structure illustrated in the drawings and described above are subject to structural modification without departing from the spirit and scope of the appended claims.

Having described my invention, what I claim as new and desire to secure by letters patent, is:

4

1. A clamp for a passive electrode which comprises a pair of clamping arms, means for urging end portions of said arms together, spaced electrode holding prongs on sections of said arms and adapted to perforate reinforcing strips of a passive electrode to hold the clamp on the passive electrode, a socket opposed to each prong in the end portion opposed thereto for receiving the prong, and contact sections on the arms spaced between the prong carrying sections, sections of the clamping arms surrounding the sockets being further spaced from the sections of the clamping arms surrounding opposed prongs than the contact sections are spaced when the clamping arms are closed on the passive electrode, whereby the contact sections are adapted to grip a metal foil section of the electrode between the reinforcing strips to make an electrical connection therewith.

2. A clamp as in claim 1 wherein the clamping arms are linked by a spring member having opposite end portions attached to the clamping arms which urges the end portions together and opposite end portions of the clamping arms project from the spring member to form gripping portions.

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