



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : <b>A61B 17/39</b></p>	<p><b>A1</b></p>	<p>(11) International Publication Number: <b>WO 97/45062</b></p> <p>(43) International Publication Date: 4 December 1997 (04.12.97)</p>
<p>(21) International Application Number: PCT/US96/14769</p> <p>(22) International Filing Date: 16 September 1996 (16.09.96)</p> <p>(30) Priority Data: 08/655,519 30 May 1996 (30.05.96) US</p> <p>(71) Applicant: MINNESOTA MINING AND MANUFACTURING COMPANY [US/US]; 3M Center, P.O. Box 33427, Saint Paul, MN 55133-3427 (US).</p> <p>(72) Inventors: OSTER, Craig, D.; P.O. Box 33427, Saint Paul, MN 55133-3427 (US). BRYAM, David, C.; P.O. Box 33427, Saint Paul, MN 55133-3427 (US).</p> <p>(74) Agents: HORNICKEL, John, H. et al.; Minnesota Mining and Manufacturing Company, Office of Intellectual Property Counsel, P.O. Box 33427, Saint Paul, MN 55133-3427 (US).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
<p>(54) Title: CLAMP FOR ELECTROSURGICAL DISPERSIVE ELECTRODE</p>		
<p>(57) Abstract</p>		
<p>A clamp (10) for a dispersive electrode is disclosed. The clamp comprises (a) a housing (14) having an exterior surface (15), an interior surface (25) being formed within the housing for receiving projecting tabs of the electrode, and a slot (20) in the housing disposed between the exterior surface and the interior surface; and (b) sliding means (22) for releasably engaging the tabs at the interior surface, comprising a locking rib on a slide and a locking catch on the interior surface of the housing.</p>		

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

## CLAMP FOR ELECTROSURGICAL DISPERSIVE ELECTRODE

### Field of Invention

5                                This invention relates to clamps for dispersive electrodes.

### Background of Invention

                                 Biomedical electrodes are used in a variety of applications and are configured to operate according to the size, type, and direction of current flowing into  
10                                or out of a body of a patient.

                                 Dispersive electrodes are used in electrosurgery. In modern surgical practice there are many times when electrosurgery is more preferable than the use of the traditional scalpel. In electrosurgery, cutting is performed by an intense electrical current passing through a cutting electrode. The surgeon directs this current to exactly  
15                                where cutting is required by wielding the cutting electrode, which because of its cylindrical shape and the way it is held in the hand is commonly called an "electrosurgical pencil". By activating controls which change the characteristics of the electrical current being sent to the pencil by an electrosurgical generator, the surgeon can use the pencil either to cut or to coagulate areas of bleeding. This makes  
20                                electrosurgery particularly convenient when surgery requiring extra control of blood loss is being performed. Because of concerns to minimize the transmissions of blood-borne illnesses between health care patients and health care providers, in both directions, electrosurgery is becoming increasingly important.

                                 In electrosurgery, as in all situations where electrical current is flowing,  
25                                a complete circuit must be provided to and from the current source. In this case, the current that enters the body at the pencil must leave it in another place and return to the generator. It will readily be appreciated that when current enough to deliberately cut is brought to the body of a patient in one place, great care must be taken that unintentional damage is not also done to the patient at the location where that current is  
30                                leaving the body. The task of collecting the return current safely is performed by a dispersive electrode.

A dispersive electrode performs this task by providing a large surface area through which the current can pass; the same current which was at cutting intensity when focused at the small surface area at the tip of the pencil is relatively harmless, with the goal of being painless to the patient, when spread out over the large surface area of the dispersive electrode.

Between the dispersive electrode and the electrosurgical generator, the typical manner to complete the circuit is to electrically connect the end of the dispersive electrode to a clamp connected to an electrical wire ending in a plug compatible with the electrosurgical generator.

Any tendency toward disconnection of the clamp from the dispersive electrode is critical to maintenance of the electrical circuit.

Some clamps are known to those skilled in the art. Two examples of clamps are represented by U.S. Pat. Nos. 4,061,408 (Bast et al.) and 4,952,177 (Drake et al.). Commercially available clamps related to such patents are available from 3M Health Care of Minnesota Mining and Manufacturing Company of St. Paul, MN.

Smaller size clamps, known as clips, are used for smaller biomedical electrodes used to receive electrical signals from a patient's body. Examples of such clips are represented by U.S. Pat. Nos. 4,555,155 (Drake et al.); 4,700,997 (Strand et al.); 4,842,558 (Strand et al.); 5,407,368 (Strand); and 5,454,739 (Strand).

While clamps and clips serve similar purposes to complete an electrical connection, the dispersive electrode used with a clamp differs from an electrocardiographic electrode used with a clip, in that the dispersive electrode can have two different electrically conductive surfaces for Contact Quality Monitoring ("CQM") circuitry that tests continued adequate electrical connection of the electrode with the clamp to avoid burning skin of the patient.

#### Summary of Invention

The present invention provides a clamp that has different features from that found in prior clamps or clips.

The clamp for an electrosurgical electrode (a) a housing having an exterior surface, an interior surface being formed within the housing for receiving

projecting tabs of the electrode, and a slot in the housing disposed between the exterior surface and the interior surface; and (b) sliding means for releasably engaging the tabs at the interior surface, comprising a locking rib on a slide and a locking catch on the interior surface of the housing.

5 A feature of the present invention is an ergonomic sliding action to positively contain tabs of an electrode within the clamp.

Embodiments of the invention follow the brief description of the drawings.

#### 10 Brief Description of Drawings

FIG. 1 is a top plan view of a clamp of the present invention.

FIG. 2 is a cross-sectional view of the clamp as seen on Section lines 2-2 in FIG. 1.

#### 15 Embodiments of Invention

Clamp 10 is connected to a cable 12 having a strain relief 13 engaging a clamp housing 14 having an exterior surface 15. The cable 12 is connected to the electrosurgical generator (not shown) which may require an electrical adaptor for proper electrical connection.

20 The housing 14 is divided into a first cover 16 and a second cover 18. The housing 14 is configured to have a tabs receiving slot 20 at a point on its exterior surface 15 of joinder between first cover 16 and second cover 18 to allow insertion of tabs of a dispersive electrode into the housing 14.

A slide 22 that moves toward slot 20 resides in upper slot 24 on the exterior surface 15 of first cover 16. The first cover 16 and the second cover 18 are secured by latches received in notches in the housing 14 on the exterior surface 15 not adjacent to the tabs receiving slot 20.

The slide 22 is composed of a ribbed surface 30, a contact rib 32, and a locking rib 34 opposing rib 32 on a portion of slide 22 proximal to slot 20.

30 On the interior surface 25 of housing 14, one of two receiving electrical contact strips 38 (the other strip being in parallel relation in the portion of

clamp 10 not sectioned) is shown in its restrained position. In this embodiment, strip 38 is generally U-shaped flat spring configured to receive a tab of the electrode.

Also on interior surface 25 of housing 14 are a sliding ramp 40 upon  
5 which slide 22 moves at approximately an angle of  $-15^\circ$ , and a locking catch 42 for releasably receiving locking rib 34 and retaining the position of slide 22 relative to housing 14 to lock strip 38 around a tab of the electrode inserted into slot 20.

Wires 44 from lead cable 12 and strain relief 13 pass through second  
cover 18 and are secured by soldering or other electrically conductive securing  
10 means to the respective separated electrical contact strips.

When tabs of the electrode are inserted into clamp 10 through slot  
20, tabs must be releasably engaged to maintain continuous electrical connection  
with the separated electrical contact strips within the housing. The means for  
releasably engaging the tabs are composed of slide 22, sliding ramp 40, and the  
15 combination of locking rib 34 and locking catch 42.

While embodiments of the invention have been disclosed, the claims  
of the invention follow.

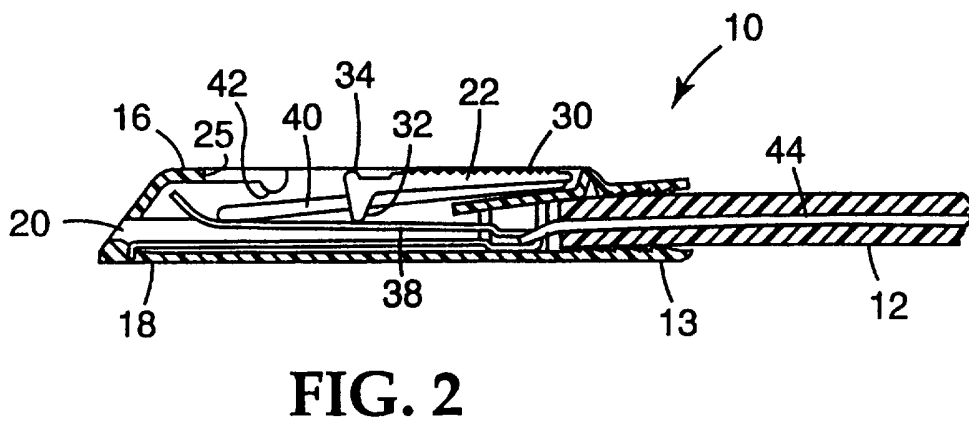
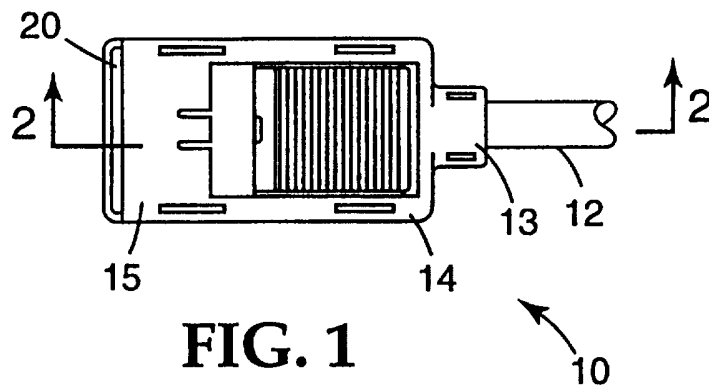
What is claimed is:

1. A clamp 10 for an electrosurgical electrode, comprising:
  - 5 (a) a housing 14 having an exterior surface 15, an interior surface 25 being formed within the housing for receiving projecting tabs of the electrode, and a slot 20 in the housing disposed between the exterior surface and the interior surface; and
  - 10 (b) sliding means 22 for releasably engaging the tabs at the interior surface, comprising a locking rib 34 on a slide and a locking catch 42 on the interior surface of the housing.
2. The clamp according to Claim 1, wherein the housing is divided into a first cover 16 and a second cover 18.
- 15 3. The clamp according to Claim 2, wherein the housing 14 is configured to have the slot 20 at a point on the exterior surface 15 of joinder between the first cover 16 and the second cover 18.
- 20 4. The clamp according to any of Claims 1-3, wherein the sliding means comprises a slide 22 that moves toward the slot 20 and resides in an upper slot 24 on the exterior surface of the first cover 16.
- 25 5. The clamp according to Claim 4, wherein the first cover 16 and the second cover 18 are secured by latches received in notches in the housing on the exterior surface not adjacent to the slot.
- 30 6. The clamp according to Claim 4, wherein the slide 22 comprises a ribbed surface 30 and a contact rib 32, and wherein the locking rib 34 opposes contact rib 32 on a portion of the slide 22 proximal to the slot 20.

7. The clamp according to any of Claims 1-6, further comprising two receiving electrical contact strips 38 on the interior surface of the housing.

5 8. The clamp according to Claim 6, further comprising a sliding ramp 40 upon which the slide moves at approximately an angle of  $-15^{\circ}$  and wherein the locking catch 42 releasably receives the locking rib 34 and retains the position of slide 22 relative to the housing 14.





# INTERNATIONAL SEARCH REPORT

International . . . cation No  
PCT/US 96/14769

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 A61B17/39

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 94 07 774 U (MINNESOTA MINING COMPANY) 18 August 1994 see the whole document -----	1,6,7

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

15 September 1997

Date of mailing of the international search report

30.09.97

Name and mailing address of the ISA  
 European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+ 31-70) 340-2040, T'x. 31 651 epo nl,  
 Fax (+ 31-70) 340-3016

Authorized officer

Papone, F

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 96/14769

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 9407774 U	18-08-94	CN 1124931 A	19-06-96
		EP 0701461 A	20-03-96
		JP 8510663 T	12-11-96
		WO 9427491 A	08-12-94
		US 5366489 A	22-11-94
		US 5496363 A	05-03-96
-----			