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(54) Title: ELECTRODE CONNECTOR WITH MOTION ARTIFACT DAMPENER

(57) Abstract: A biomedical connector includes a housing defining an interior space and an opening dimensioned to receive an electrode at least partially into the interior space. A lever is movably attached to the housing and biased toward an engagement position for contacting the electrode when the electrode is received in the opening in the housing to retain the biomedical connector to the electrode. A dampener is disposed in the interior space of the housing and configured to engage the electrode when the electrode is received in the opening in the housing. The dampener is configured to limit movement of the biomedical connector relative to the electrode to reduce motion artifact in a biomedical signal received by the biomedical connector.

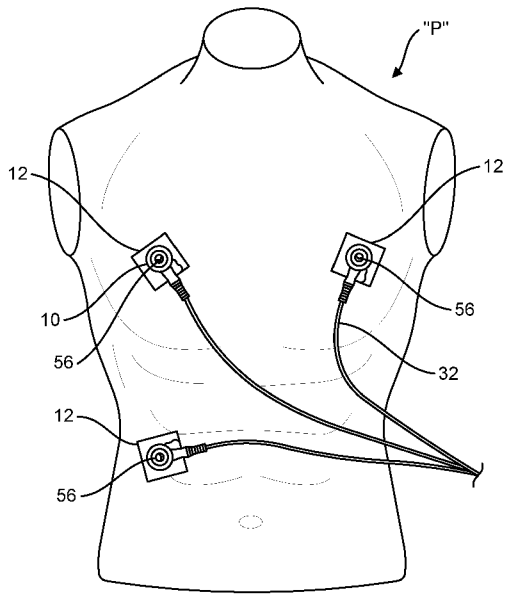

FIG. 1

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[Continued on next page]

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— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC: ***A61B 5/28*** (2024.01); ***A61B 5/273*** (2024.01)

CPC: ***A61B 5/28; A61B 5/273;*** *A61B 2562/227; A61B 2562/222*

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)

See Search History Document

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

See Search History Document

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

See Search History Document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	US 11,253,159 B2 (SHUSTERMAN) 22 February 2022 (22.02.2022)	
X	entire document	19-23
Y	entire document	1-6, 8, 10-15, 29-35
	US 2022/0117502 A1 (KPR U.S. LLC) 21 April 2022 (21.04.2022)	
X	entire document	24-27
	US 9,693,701 B2 (COVIDIEN LP) 04 July 2017 (04.07.2017)	
Y	entire document	1-6, 8, 10-15
	EP 3765542 B1 (DOW GLOBAL TECHNOLOGIES LLC) 16 March 2022 (16.03.2022)	
Y	entire document	29-35
	US 7,957,785 B2 (NISHIMURA) 07 June 2011 (07.06.2011)	
A	entire document	1-35
	US 2021/0369203 A1 (WELCH ALLYN INC.) 02 December 2021 (02.12.2021)	
A	entire document	1-35

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent 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	Date of mailing of the international search report
09 September 2024 (09.09.2024)	**10 October 2024 (10.10.2024)**

Name and mailing address of the ISA/US	Authorized officer
Mail Stop PCT, Attn: ISA/US **Commissioner for Patents** **P.O. Box 1450, Alexandria, VA 22313-1450**	**MATOS** **TAINA**
Facsimile No. **571-273-8300**	Telephone No. **571-272-4300**

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2024/025530

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

1. ☑ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☑ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2024/025530

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-18 is drawn to a biomedical connector comprising a lever movably attached to a housing and biased toward an engagement position for contacting an electrode.

Group II, claims 19-23, is drawn to a biomedical connector comprising a foam dampener disposed in the interior space of a housing and configured to engage an electrode.

Group III, claims 24-28, is drawn to a method of reprocessing a biomedical connector.

Group IV, claims 29-35, is drawn to a biomedical connector with foam disposed in an interior space of a housing, the foam having a rate of recovery of about 10 seconds to about 35 seconds for 100% recovery after deformation.

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention: a lever movably attached to the housing and biased toward an engagement position for contacting the electrode when the electrode is received in the opening in the housing to retain the biomedical connector to the electrode is not present in the inventions of Groups II-IV. The special technical feature of the Group II invention: a foam dampener disposed in the interior space of the housing and configured to engage the electrode when the electrode is received in the opening in the housing, the foam dampener being configured to limit movement of the biomedical connector relative to the electrode to reduce motion artifact in a biomedical signal received by the biomedical connector is not present in the inventions of Groups I, III, or IV. The special technical feature of the Group III invention: a method of reprocessing a biomedical connector comprising: deconstructing a housing of the biomedical connector to gain access to an interior space of the housing after the biomedical connector has been placed in use; removing a dampener from the interior space of the housing; replacing the removed dampener with a cleaned and sterilized dampener; and reconstructing the housing such that the biomedical connector is in a condition for reuse is not present in the inventions of Groups I, II, or IV. The special technical feature of the Group IV invention: foam disposed in the interior space of the housing, the foam having a rate of recovery of about 10 seconds to about 35 seconds for 100% recovery after deformation is not present in the inventions of Groups I-III.

Groups I-IV lack unity of invention because even though the inventions of these groups require the technical feature of a biomedical connector with a housing, this technical feature is not a special technical feature as it does not make a contribution over the prior art.

Specifically, US 9,693,701 B2 to Covidien LP (hereinafter "Covidien") teaches a biomedical connector (Abstract; connectors for ECG electrodes, Col. 4, Lns. 10-25) comprising a lever (lever 336, Figs. 7 and 8) movably attached to a housing (lever 336 attached to lower member 324 of housing 322, Figs. 7 and 8) and biased toward an engagement position for contacting an electrode (lever 336 biased to first position with biasing member 338, Col. 6, Lns. 14-34; Figs. 7 and 8; lever 336 presses stud 124 of electrode 100, Col. 6, Lns. 20-27; Figs. 3 and 7; lever 336 in first position extends across the bore 334 of the contact plate 332 to secure at least a portion of the electrode 100, Col. 10, Claim 12; Figs. 7, 8 and 11) when the electrode is received in an opening in the housing to retain the biomedical connector to the electrode (electrode 100 received in opening 325, Figs. 7 and 11).

Since none of the special technical features of the Groups I-IV inventions are found in more than one of the inventions, unity of invention is lacking.