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- (81) **Designated States** (unless otherwise indicated, for every
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AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
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HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
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EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
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(54) **Title:** A STRETCHABLE BIDIRECTIONAL CAPACITIVE PRESSURE SENSOR AND METHOD OF USE

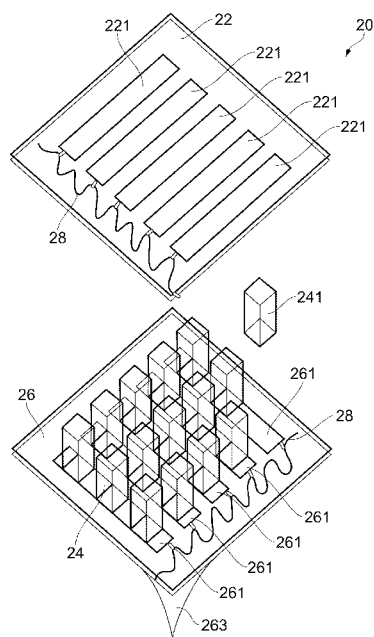


FIG. 1

(57) **Abstract:** A stretchable bidirectional capacitive pressure sensor (20) comprising: a first elastomeric sheet (22) made from a dielectric material, with a series of conductor lines (221) located on or in the first elastomeric sheet; a second elastomeric sheet (28) made from a dielectric material, with a series of conductor lines (261) located on or in the second elastomeric sheet; wherein the conductor lines of the first elastomeric sheet are substantially orthogonal to the conductor lines of the second elastomeric sheet; a microstructure comprising a plurality of elastomeric pillars (241) made from a dielectric material, disposed between the elastomeric sheets; wherein the microstructure is bonded to both the first and second elastomeric sheets so that the bidirectional sensor can register positive and negative pressure by the movement of the first and second elastomeric sheets. A further aspect of the invention discloses a method of collecting data related to fluid flow over an object by using a two-dimensional capacitive pressure sensor.



INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2020/050214

A. CLASSIFICATION OF SUBJECT MATTER
INV. G01L1/14 G01F1/00
ADD.
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)
G01L G01F

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 practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 2017/044617 A1 (UNIV CALIFORNIA [US]; UNIV DREXEL) 16 March 2017 (2017-03-16) abstract paragraphs [0042], [0117], [0159] figures 21B, 21C, 23C, 25 -----	1,4-6, 10-13 2,3
Y	US 2010/033196 A1 (HAYAKAWA TOMONORI [JP] ET AL) 11 February 2010 (2010-02-11) paragraph [0056] -----	2
Y	WO 2014/058806 A1 (STC UNM [US]; SIBBETT SCOTT [US]) 17 April 2014 (2014-04-17) figures 2, 3 -----	3
	-/--	

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
- "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 7 August 2020	Date of mailing of the international search report 19/08/2020
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Grewe, Clemens F.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2020/050214

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

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:

see additional 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 an 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.:

1-6, 10-13, 15-19

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-6, 10-13

Invention 1 according to claims 1-6 and 10-13 solves the problem of how to provide conductor lines with more stable electrical properties,

2. claims: 7, 8

Invention 2 according to claims 7 and 8 solves the problem of how to provide for electrodes with more stable electrical properties,

3. claims: 9, 14

Invention 3 according to claims 9 and 14 solves the problem of how to facilitate the sensor attachment to the object to be monitored,

4. claims: 15-19

Invention 4 according to claims 15-19 solves the problem of providing for a sensor which is capable of monitoring fluid flow over an object.

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2020/050214

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2019/014243 A1 (UNIV LELAND STANFORD JUNIOR [US]) 17 January 2019 (2019-01-17) abstract paragraph [0071] figures 6A, 6B	15-19
X	----- US 2015/114077 A1 (WHITE ROBERT D [US] ET AL) 30 April 2015 (2015-04-30) abstract paragraph [0036] page 3; figure 3 -----	15-19

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/GB2020/050214

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2017044617 A1	16-03-2017	US 2018243924 A1 WO 2017044617 A1	30-08-2018 16-03-2017

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US 2015114077 A1	30-04-2015	NONE	
