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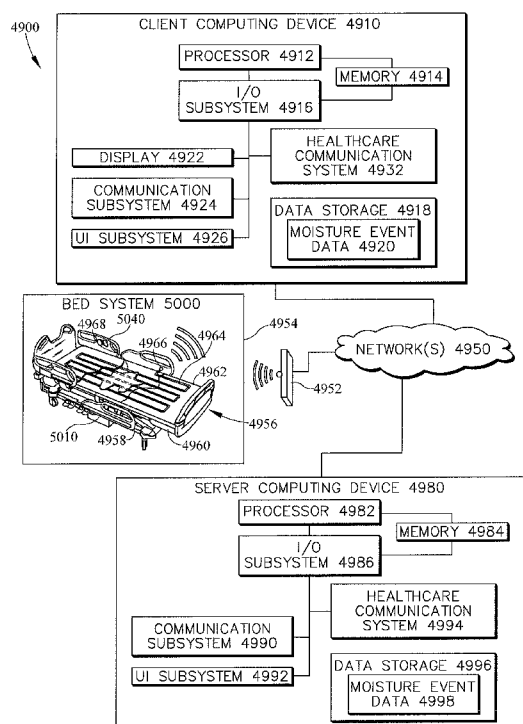
(54) Title: METHODS AND APPARATUSES FOR THE DETECTION OF INCONTINENCE OR OTHER MOISTURE, METH-
ODS OF FLUID ANALYSIS, AND MULTIFUNCTIONAL SENSOR SYSTEMS

FIG. 49

(57) Abstract: A moisture management apparatus (e.g., an occu-
pant support) includes one or more sensors to detect the presence
of moisture. The apparatus may include material having hydro-
phobic properties and material having hydrophilic properties.
Portions of the apparatus may be configured to direct moisture to
a reservoir in the apparatus. One or more of the sensors may be
located in the reservoir. The moisture management apparatus may
be coupled to a patient support apparatus. The moisture manage-
ment apparatus may communicate moisture alerts to a healthcare
communication system. The moisture management apparatus may
display moisture alerts on a user interface device.



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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

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(88) Date of publication of the international search report:

26 November 2015

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2014/024214

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G08B 21/20 (2014.01)

USPC - 340/540

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(8) - A61F 13/42; G08B 21/18, 21/20, 21/22 (2014.01)

USPC - 340/540, 572.1, 572.4, 572.5, 572.7, 572.8, 573.1, 573.5, 573.7

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

CPC: A61F 13/42; G08B 21/18, 21/20, 21/22 (2014.02)

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

Orbit, Google Patents, Google Scholar

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/0145526 A1 (FRIEDMAN et al) 10 October 2002 (10.10.2002) entire document	1-44, 50-59
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Y		45-49, 60
Y	US 2007/0159332 A1 (KOBASZ) 12 July 2007 (12.07.2007) entire document	45-49, 60
A	US 2002/0204245 A1 (BLAIR et al) 28 August 2008 (28.08.2008) entire document	1-60
A	US 2012/0119912 A1 (ORTEGA et al) 17 May 2012 (17.05.2012) entire document	1-60
A	US 2008/0262376 A1 (PRICE) 23 October 2008 (23.10.2008) abstract, figures 2-3, 7-8, paragraphs 38, 127.	1-60

☐ Further documents are listed in the continuation of Box C.

* 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

22 August 2014

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INTERNATIONAL SEARCH REPORT

international application No.

PCT/US2014/024214

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.: 177-178
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 extra 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.:
1-60

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.

Continuation of Box III.

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 1-60, drawn to providing one or more moisture responsive sensors in a surveillance zone; exciting the one or more sensors with an electromagnetic signal; monitoring for a response from the one or more sensors; comparing the response to an expected response; and issuing a first output based on the comparison.

Group II, claims 61-77, drawn to a deposition layer having an exposed side susceptible to moisture and a nonexposed side; a moisture responsive element separated from the deposition layer by a reservoir material.

Group III, claims 78-110, drawn to a sheet of material having a capillary/hydroaffinity property for encouraging moisture migration from a source to a destination.

Group IV, claims 111-122, drawn to a sheet of material which receives moisture; a camera for observing emission of radiation or lack thereof in response to the presence of moisture.

Group V, claims 123-127, drawn to a sensor pad comprising at least one RFID tag, the tag including processor adapted to process inputs obtained from multiple sensors having disparate sensing capabilities.

Group VI, claims 128-139, drawn to a switch having a first terminal, a second terminal, an electrically conductive bridge for establishing an electrical connection between the terminals; a fuse/separator having open and closed states to impede/enable the establishment of the electrical connection.

Group VII, claims 140-152, 160-164, drawn to a plurality of layers including an upper layer; a lower layer spaced apart from the upper layer by a middle layer; a sensor positioned in the lower layer.

Group VIII, claims 153-159, drawn to a layer of fabric material comprising an arrangement of fluid conducting pathways, each pathway to direct fluid to a fluid collecting region; a sensor positioned in the fluid collecting region.

Group IX, claims 165-185, drawn to moisture management apparatus to monitor an amount of patient generated moisture in an area supported by the patient support apparatus; electrical circuitry to receive a signal from a moisture management apparatus; a visual indicator supported by the housing to activate in response to receiving the signal by the electrical circuitry.

The inventions listed as Groups I-IX 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: providing one or more moisture responsive sensors in a surveillance zone; exciting the one or more sensors with an electromagnetic signal; monitoring for a response from the one or more sensors; comparing the response to an expected response; and issuing a first output based on the comparison as claimed therein is not present in the invention of Groups II-IX. The special technical feature of the Group II invention: a deposition layer having an exposed side susceptible to moisture and a nonexposed side; a moisture responsive element separated from the deposition layer by a reservoir material as claimed therein is not present in the invention of Groups I, III-IX. The special technical feature of the Group III invention: a sheet of material having a capillary/hydroaffinity property for encouraging moisture migration from a source to a destination as claimed therein is not present in the invention of Groups I, II, IV-IX. The special technical feature of the Group IV invention: a sheet of material which receives moisture; a camera for observing emission of radiation or lack thereof in response to the presence of moisture as claimed therein is not present in the invention of Groups I, II, III or V-IX. The special technical feature of the Group V invention: a sensor pad comprising at least one RFID tag, the tag including processor adapted to process inputs obtained from multiple sensors having disparate sensing capabilities as claimed therein is not present in the invention of Groups I-IV, VI-IX. The special technical feature of the Group VI invention: a switch having a first terminal, a second terminal, an electrically conductive bridge for establishing an electrical connection between the terminals; a fuse/separator having open and closed states to impede/enable the establishment of the electrical connection as claimed therein is not present in the invention of Groups I-V, VII-IX. The special technical feature of the Group VII invention: a plurality of layers including an upper layer; a lower layer spaced apart from the upper layer by a middle layer; a sensor positioned in the lower layer as claimed therein is not present in the invention of Groups I-VI, VIII-IX. The special technical feature of the Group VIII invention: a layer of fabric material comprising an arrangement of fluid conducting pathways, each pathway to direct fluid to a fluid collecting region; a sensor positioned in the fluid collecting region as claimed therein is not present in the invention of Groups I-VII, IX. The special technical feature of the Group IX invention: moisture management apparatus to monitor an amount of patient generated moisture in an area supported by the patient support apparatus; electrical circuitry to receive a signal from a moisture management apparatus; a visual indicator supported by the housing to activate in response to receiving the signal by the electrical circuitry as claimed therein is not present in the invention of Groups I-VIII.

Groups I, II, III, IV, V, VI, VII, VIII and IX lack unity of invention because even though the inventions of these groups require the technical feature of a moisture sensor; wirelessly indicating the presence of moisture to another device, this technical feature is not a special technical feature as it does not make a contribution over the prior art. Specifically, US 2008/0262376 A1 (PRICE) 23 October 2008 (23.10.2008) abstract, figures 2-3, 7-8, paragraphs 38, 127.

Since none of the special technical features of the Group I, II, III, IV, V, VI, VII, VIII or IX inventions are found in more than one of the inventions, unity of invention is lacking.