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(71) Applicant: **COLOPLAST A/S** [DK/DK]; Holtedam 1, 3050 Humlebaek (DK).

(72) Inventors: **HANSEN, Jais Ask**; Egelundsvej 7, 3630 Jaegerspris (DK). **LARSEN, Lars Erup**; Soendergaards Alle 45 st.th., 2760 Maaloev (DK). **HVID, Niels**; Birkebo 3B, 2950 Vedbaek (DK). **SVANEGAARD, Mads Hindhede**; Peder Hesselsvej 38, 2880 Bagsvaerd (DK). **KNÖDLER, Stephanie**; Slaaenhoej 16, 2990 Nivaa (DK).

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(54) Title: WOUND DRESSING COMPRISING A MONITOR INTERFACE

(57) Abstract: A wound dressing and a monitor device is disclosed, the wound dressing comprising a top layer; a first adhesive layer with a proximal surface configured for attachment of the wound dressing to the skin surface of a user; an absorbent core layer; an electrode assembly comprising a plurality of electrodes arranged on a distal side of the absorbent core layer; and a monitor interface configured for connecting the wound dressing to a monitor device, the monitor interface comprising a plurality of terminals configured to form electrical connections with respective terminals of the monitor device, wherein the wound dressing comprises a flexible element, the flexible element being bendable and/or twistable between a first flexible element end and a second flexible element end, and wherein the monitor interface comprises a coupling part positioned at the first flexible element end.

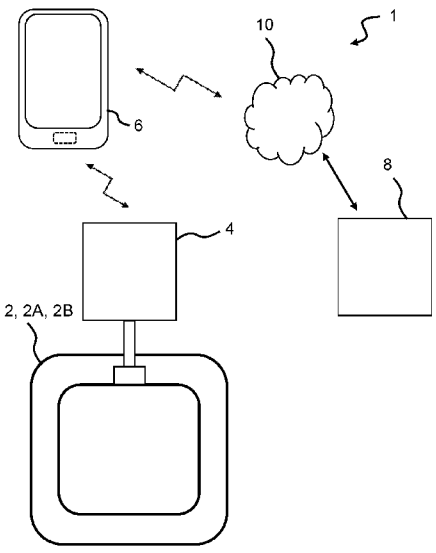


Fig. 1

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Wound dressing comprising a monitor interface

The present disclosure relates to wound dressings and in particular to wound dressings with a monitor interface and sensing capability to facilitate monitoring of the wound/wound dressing during use of the wound dressing. Methods of manufacturing a wound dressing and methods for monitoring a wound dressing are also disclosed together with wound dressing system, and devices of the wound dressing system. The wound dressing system comprises a wound dressing and a monitor device. In particular, the present disclosure relates to a wound dressing comprising a monitor interface for enabling or facilitating monitoring the operation state or condition of the wound dressing.

Brief Description of the Drawing

The accompanying drawings are included to provide a further understanding of embodiments and are incorporated into and a part of this specification. The drawings illustrate embodiments and together with the description serve to explain principles of embodiments. Other embodiments and many of the intended advantages of embodiments will be readily appreciated as they become better understood by reference to the following detailed description. The elements of the drawings are not necessarily to scale relative to each other. Like reference numerals designate corresponding similar parts.

Fig. 1 illustrates an exemplary wound dressing system,

Fig. 2 illustrates an exemplary monitor device of the wound dressing system,

Fig. 3 is a proximal view of a first adhesive layer of a wound dressing,

Fig. 4 is a schematic cross-section of an exemplary wound dressing,

Fig. 5 is a proximal view of an exemplary electrode assembly,

Fig. 6 is more detailed proximal view of a part of exemplary electrode assembly of Fig. 5,

Fig. 7 is a schematic cross-section of an exemplary wound dressing,

Fig. 8 is a proximal view of an exemplary first support layer,

Fig. 9 is a proximal view of an exemplary first masking layer,

Fig. 10 is a proximal view of an exemplary second support layer,

Fig. 11 is a proximal view of an exemplary second masking layer,

Fig. 12 is a distal view of an exemplary second support layer,

Fig. 13 is a proximal view of an exemplary second masking layer,

Fig. 14 is a distal view of an exemplary first support layer,

Fig. 15 is a schematic cross-section of a part of a wound dressing,

Fig. 16 is a distal view of an exemplary wound dressing,

Fig. 17 is a schematic cross-section of a part of a wound dressing,

Fig. 18 is a distal view of an exemplary wound dressing,

Fig. 19 is a schematic cross-section of a part of a wound dressing,

Fig. 20 is a distal view of an exemplary wound dressing, and

Fig. 21 is a perspective view of a wound dressing and a monitor device.

Detailed Description

Various exemplary embodiments and details are described hereinafter, with reference to the figures when relevant. It should be noted that the figures may or may not be drawn to scale and that elements of similar structures or functions are represented by like reference numerals throughout the figures. It should also be noted that the figures are only intended to facilitate the description of the embodiments. They are not intended as an exhaustive description of the invention or as a limitation on the scope of the invention. In addition, an illustrated embodiment needs not have all the aspects or advantages shown. An aspect or an advantage described in conjunction with a particular embodiment is not necessarily limited to that embodiment and can be practiced in any other embodiments even if not so illustrated, or if not so explicitly described.

In the following, whenever referring to proximal side or surface of a layer, an element, a device or part of a device, the referral is to the skin-facing side or surface, when a user wears the wound dressing. Likewise, whenever referring to the distal side or surface of a layer, an element, a device or part of a device, the referral is to the side or surface facing away from the skin, when a user wears the wound dressing. In other words, the proximal side or surface is the side or surface closest to the user, when the wound dressing is fitted on a user and the distal side is the opposite side or surface – the side or surface furthest away from the user in use.

The axial direction is defined as the direction away from the skin surface of the user, when a user wears the wound dressing. Thus, the axial direction is generally perpendicular to the skin or abdominal surface of the user.

The radial direction is defined as perpendicular to the axial direction. In some sentences, the words “inner” and “outer” may be used. These qualifiers should generally be perceived with respect to the radial direction, such that a reference to an “outer” element means that the element is farther away from a centre portion of the wound dressing than an element referenced as “inner”. In addition, “innermost” should be interpreted as the portion of a component forming a centre of the component and/or being adjacent to the centre of the

component. In analogy, "outermost" should be interpreted as a portion of a component forming an outer edge or outer contour of a component and/or being adjacent to that outer edge or outer contour.

The use of the word "substantially" as a qualifier to certain features or effects in this disclosure is intended to simply mean that any deviations are within tolerances that would normally be expected by the skilled person in the relevant field.

The use of the word "generally" as a qualifier to certain features or effects in this disclosure is intended to simply mean – for a structural feature: that a majority or major portion of such feature exhibits the characteristic in question, and – for a functional feature or an effect: that a majority of outcomes involving the characteristic provide the effect, but that exceptionally outcomes do no provide the effect.

The present disclosure relates to a wound dressing system and devices thereof, such as a wound dressing, a monitor device, and optionally one or more accessory devices. Further, methods related to an accessory device of the wound dressing system and accessory devices thereof are disclosed. An accessory device (also referred to as an external device) may be a mobile phone or other handheld device. An accessory device may be a personal electronic device, e.g. a wearable, such as a watch or other wrist-worn electronic device. An accessory device may be a docking station. The docking station may be configured to electrically and/or mechanically couple the monitor device to the docking station. The docking station may be configured for charging the monitor device and/or configured for transferring data between the monitor device and the docking station. The wound dressing system may comprise a server device. The server device may be operated and/or controlled by the wound dressing system manufacturer and/or a service centre.

A wound dressing system comprising a wound dressing and/or a monitor device is disclosed, wherein the monitor device is a monitor device as described herein.

The present disclosure provides a wound dressing system and devices thereof, such as a wound dressing, a monitor device, and optionally one or more accessory devices which either alone or together facilitate reliable monitoring of the wound dressing and operating state thereof. Accordingly, the wound dressing system and devices thereof enable providing information to the user about the operating state of the wound dressing, and in

turn optionally enable providing an indication to the user or a caretaker of the remaining time frame for replacing the wound dressing without experiencing leakage and/or to provide optimum wound healing conditions. Further, the wound dressing system and devices thereof either alone or together facilitate reliable determination of the nature, severity and rapidness of exudate or other liquids wetting the absorbent core layer of the wound dressing. Depending on the degree of wetting and/or nature of the pattern of wetting propagation in the absorbent core layer, the wound dressing system and devices thereof enable determination and provision of an indication to the user/caretaker of the internal state of the wound dressing.

A wound dressing is disclosed, the wound dressing comprising a top layer, a first adhesive layer with a proximal surface configured for attachment of the wound dressing to the skin surface of a user; an absorbent core layer; and an electrode assembly comprising a plurality of electrodes optionally arranged on a distal side of the absorbent core layer. The top layer is optionally on a distal side of the electrode assembly. The wound dressing may comprise a monitor interface.

It is an advantage of the present disclosure that an optimum or improved use of a wound dressing is enabled and facilitated. In particular, the present disclosure facilitates that a wound dressing is not changed too early (leading to increased costs and/or material waste) nor too late (leading to adhesive failure, leakage and/or unsatisfactory wound healing conditions). Accordingly, the user or a health care professional is able to monitor and plan the use of the wound dressing. A relatively simple wound dressing, i.e. optionally without more complex electrical circuits, is provided, in turn providing a relatively cheap and disposable wound dressing.

Further, determination of moisture or wetting pattern types and classification of operating states of the wound dressing is useful in helping to reduce the risk of a user experiencing leakage from a wound dressing and/or in helping reduce the risk of unsatisfactory wound healing conditions. The present disclosure provides a simple, efficient, and easy-to-use wound dressing system with a high degree of comfort for a user.

The wound dressing comprises a first adhesive layer having a proximal surface configured for attachment of the wound dressing to the skin surface of a user. The first adhesive layer may comprise or be made of a first composition. The first composition may comprise silicone. The first adhesive layer may comprise a support layer with an adhesive material

made of a first composition molded onto or otherwise attached to the support layer. The first composition may be a thermoset, curable adhesive material. An example of such adhesive material may be a silicone based adhesive material. The first composition may be a two-component system. Preferably, the first composition contains no solvent. Preferred first compositions include polyurethane, acrylic, silicone or polyethylene or polypropylene oxide based cross-linking types, e.g. as described in WO 2005/032401. The first composition may be a hotmelt type, which initially is heated to flow and subsequently cooled to gel or crosslink. Instead of curing upon cooling, the first composition may in some embodiments cure upon application of thermal energy.

The support layer of the first adhesive layer may be any suitable layer being water impermeable but vapour permeable. A suitable support layer may be a polyurethane film.

The first adhesive layer may have perforations or through-going openings arranged within an absorbing region, e.g. for allowing exudate from the wound to pass or flow through the perforations of the first adhesive layer to be absorbed by absorbent core layer arranged on the distal side of the first adhesive layer.

The perforations of the first adhesive layer may be made by punching, cutting or by applying high frequency mechanical vibrations, for example as disclosed in WO 2010/061228. The perforations may be arranged in a regular or random array, typically separated by 0.5 mm to 10 mm. The number of holes per cm^2 may be between 1 and 100, such as between 1 and 50 or even between 2 and 20. The perforations of the first adhesive layer may have a diameter in the range from 0.5 mm to 10 mm, such as in the range from 1 mm to 8 mm. In one or more exemplary wound dressings, the perforations of the first adhesive layer have a diameter in the range from 1 mm to 5 mm, e.g. from 1.5 mm to 5 mm, and even in the range from 2 mm to 4 mm.

The wound dressing comprises an absorbent core layer also denoted an absorbent pad. The absorbent core layer may be a uniform material or it may be a composite, for example in the form of a layered construction comprising layers of different texture and properties. The absorbent core layer may comprise foam, cellulose, super absorbent particles and/or fibres. The absorbent core layer may comprise a layer of foam facing the wound.

The absorbent core layer may comprise a polyurethane foam. The absorbent core layer may comprise a super absorbing layer.

The absorbent core layer and/or the first adhesive layer may contain active ingredients, such as ibuprofen, paracetamol, silver compounds or other medically active ingredients configured to reduce pain and/or to improve the healing of a wound. In one or more exemplary wound dressings, the absorbent core layer comprises a silver compound with antimicrobial properties.

The wound dressing comprises a top layer also denoted a backing layer. The top layer may be any suitable layer being water impermeable but vapour permeable. A suitable top layer may be a polyurethane film. The top layer is a protective layer protecting the absorbent core layer and other parts of the wound dressing from external strains and stress when the user wears the wound dressing. The electrodes, e.g. some or all the electrodes, may be arranged between the first adhesive layer and the top layer. The top layer may have a thickness in the range from 0.01 mm to 1.0 mm, e.g. in the range from 0.02 mm to 0.2 mm, such as 0.04 mm.

The top layer may comprise a top layer opening configured to allow for connection between the plurality of electrodes of the electrode assembly and terminals of a monitor device coupled to the wound dressing. For example, the top layer opening may allow for a first part of the electrode assembly to extend through the top layer to form a part of the monitor interface of the wound dressing.

The wound dressing may comprise a release liner, such as a one-piece, two-piece or a three-piece release liner. The release liner is a protective layer that protects adhesive layer(s) during transport and storage and is peeled off by the user prior to applying the wound dressing on the skin.

The electrode assembly comprises a plurality of sensor points or sensor zones distributed along a distal surface or distal side of the absorbent core layer. During use of the wound dressing, exudate from the wound may wet the distal surface of the absorbent core layer and in turn short-circuit an electrode pair of respective sensor points. Thus, wetting of a sensor point can be detected by determining the resistance and/or other electronic characteristic, such as capacitance, between two electrodes (sensing parts) of the sensor point.

The plurality of electrodes optionally comprises a first set of first electrodes and optionally a second set of second electrodes, wherein a sensing part of a first electrode and a

sensing part of the second electrode may form a sensor point. The electrodes are electrically conductive and may comprise one or more of metallic (e.g. silver, copper, gold, titanium, aluminium, stainless steel), ceramic (e.g. ITO), polymeric (e.g. PEDOT, PANI, PPy), and carbonaceous (e.g. carbon black, carbon nanotube, carbon fibre, graphene, graphite) materials. An electrode comprises a connection part, e.g. to form a terminal of the monitor interface or for connecting the respective electrode to other components and/or to interface terminals/terminal elements. An electrode may comprise one or more conductor parts and/or one or more sensing parts.

A set of electrodes, such as the first set of electrodes and/or the second set of electrodes, may comprise one or a plurality of electrodes. In one or more exemplary electrode assemblies, a set of electrodes, such as the first set of electrodes and/or the second set of electrodes, may comprise one, two, three, four, five, or more electrodes. In one or more exemplary electrode assemblies, a first electrode of the first set of first electrodes forms a part of a first sensor point and a second sensor point of the plurality of sensor points. In one or more exemplary electrode assemblies, a first electrode of the first set of first electrodes forms a part of at least two sensor points, such as at least three sensor points. In one or more exemplary electrode assemblies, each of at least two first electrodes of the first set of first electrodes forms a part of at least two sensor points, such as at least three sensor points.

The first set of first electrodes may comprise one, two, three, or more electrodes. In one or more exemplary electrode assemblies, the first set of first electrodes comprises at least three electrodes, such as at least five electrodes.

In one or more exemplary electrode assemblies, a second electrode of the second set of second electrodes forms a part of a first sensor point and a third sensor point of the plurality of sensor points. In one or more exemplary electrode assemblies, a second electrode of the second set of second electrodes forms a part of at least two sensor points, such as at least three sensor points. In one or more exemplary electrode assemblies, each of at least two second electrodes of the second set of second electrodes forms a part of at least two sensor points, such as at least three sensor points.

The second set of second electrodes may comprise one, two, three, or more electrodes. In one or more exemplary electrode assemblies, the second set of second electrodes comprises at least three second electrodes, such as at least five electrodes.

In one or more exemplary electrode assemblies, first electrode(s) of the first set of electrodes comprises three or more sensing parts, such as three, four, five or more sensing parts. In one or more exemplary electrode assemblies, a first primary electrode and a first secondary electrode of the first set of electrodes each comprises three or more sensing parts, such as three, four, five or more sensing parts. In one or more exemplary electrode assemblies, a first tertiary electrode of the first set of electrodes comprises three or more sensing parts, such as three, four, five or more sensing parts. In one or more exemplary electrode assemblies, a first quaternary electrode of the first set of electrodes comprises three or more sensing parts, such as three, four, five or more sensing parts. In one or more exemplary electrode assemblies, a first quinary electrode of the first set of electrodes comprises three or more sensing parts, such as three, four, five or more sensing parts.

In one or more exemplary electrode assemblies, second electrode(s) of the second set of electrodes comprises three or more sensing parts, such as three, four, five or more sensing parts. In one or more exemplary electrode assemblies, a second primary electrode and a second secondary electrode of the second set of electrodes each comprises three or more sensing parts, such as three, four, five or more sensing parts. In one or more exemplary electrode assemblies, a second tertiary electrode of the second set of electrodes comprises three or more sensing parts, such as three, four, five or more sensing parts. In one or more exemplary electrode assemblies, a second quaternary electrode of the second set of electrodes comprises three or more sensing parts, such as three, four, five or more sensing parts. In one or more exemplary electrode assemblies, a second quinary electrode of the second set of electrodes comprises three or more sensing parts, such as three, four, five or more sensing parts.

Sensing part(s) may be ring-shaped, annular-shaped, or loop-shaped.

A first set of first electrodes with N1 first electrodes E_1_1, E_1_2, ..., E_1_N1 and a second set of second electrodes with N2 second electrodes E_2_1, E_2_2, ..., E_2_N2 allow for an electrode assembly with N1 times N2 sensor points. In one or more exemplary wound dressings, the number N1 of first electrodes in the first set of first electrodes is in the range from 1 to 30, such as in the range from 3 to 25, or in the range from 4 to 20. The number N1 of first electrodes in the first set of first electrodes may be larger than 4, such as larger than 5 or even larger than 6. In one or more exemplary wound dressings, the number N2 of second electrodes in the second set of second

electrodes is in the range from 1 to 30, such as in the range from 3 to 25, or in the range from 4 to 20. The number N2 of second electrodes in the second set of second electrodes may be larger than 4, such as larger than 5 or even larger than 6.

The electrode assembly comprises a plurality of sensor points optionally distributed along a distal surface of the absorbent core layer. In one or more exemplary electrode assemblies, the plurality of sensor points comprises at least nine sensor points. The plurality of sensor points may be arranged in a matrix configuration. The plurality of sensor points may comprise at least 20 sensor points, such as 25, 30, 36, 40, 49 or more sensor points. In one or more exemplary electrode assemblies, the number of sensor points may be in the range from 20 to 50. Two electrodes of the electrode assembly, e.g. a first electrode of the first set of electrodes and a second electrode of the second set of electrodes (or respective sensing points thereof), may form a sensor point. A first electrode E_1_1 and a second electrode E_2_1 may form a (first) sensor point SP_1_1 (first electrode pair). The first electrode E_1_1 and a second electrode E_2_2 may form a (second) sensor point SP_1_2 (second electrode pair). The first electrode E_1_1 and a second electrode E_2_3 may form a (third) sensor point SP_1_3 (third electrode pair). A first electrode E_1_2 and the second electrode E_2_1 may form a (fourth) sensor point SP_2_1 (fourth electrode pair). The first electrode E_1_2 and the second electrode E_2_2 may form a (fifth) sensor point SP_2_2 (fifth electrode pair). The first electrode E_1_2 and the second electrode E_2_3 may form a (sixth) sensor point SP_2_3 (sixth electrode pair). A first electrode E_1_3 and the second electrode E_2_1 may form a (seventh) sensor point SP_3_1 (seventh electrode pair). The first electrode E_1_3 and the second electrode E_2_2 may form a (eighth) sensor point SP_3_2 (eighth electrode pair). The first electrode E_1_3 and the second electrode E_2_3 may form a (ninth) sensor point SP_3_3 (ninth electrode pair).

A distance, such as a center-to-center distance, between two neighbouring sensor points may be in the range from 2 mm to 50 mm, such as about 25 mm, or about 30 mm. In one or more exemplary electrode assemblies, a distance, such as a center-to-center distance, between two neighbouring sensor points is in the range from 3 mm to 20 mm, such as in the range from 4 mm to 15 mm, e.g. about 5 mm, 6 mm, 7 mm, 8 mm, 9 mm, or 10 mm.

The electrode assembly may comprise one or more support layers including a first support layer. The first support layer may have a plurality of sensor point openings, e.g. for allowing exudate to pass through the first support layer. A sensor point opening of the first

support layer may form a part of one or more sensor points of the electrode assembly. In one or more exemplary electrode assemblies, sensing part(s) of a first electrode surrounds sensor point opening(s) of the first support layer.

The first set of electrodes may be printed or arranged on the first support layer. In one or more exemplary electrode assemblies, the first set of electrodes are printed on a proximal surface of the first support layer. The first set of electrodes may be printed on a distal surface of the first support layer.

The second set of electrodes may be printed or arranged on the first support layer. In one or more exemplary electrode assemblies, the second set of electrodes are printed on a proximal surface of the first support layer. The second set of electrodes may be printed on a distal surface of the first support layer. The second set of electrodes may be printed or arranged on a support layer surface different than the support layer surface on which the first set of electrodes is printed or arranged. Arranging the first set of electrodes and the second set of electrodes on different support layer surfaces allows for provision of a larger number of sensor points using a smaller number of electrodes.

The electrode assembly may comprise a second support layer. The second set of electrodes may be printed or arranged on the second support layer. In one or more exemplary electrode assemblies, the second set of electrodes are printed on a proximal surface of the second support layer. The second set of electrodes may be printed on a distal surface of the second support layer.

The second support layer may have a plurality of sensor point openings, e.g. for allowing exudate to pass through the second support layer. A sensor point opening of the second support layer may form a part of one or more sensor points of the electrode assembly. In one or more exemplary electrode assemblies, sensing part(s) of a second electrode surrounds sensor point opening(s) of the first support layer and/or sensor point opening(s) of the second support layer.

A support layer, such as the first support layer and/or the second support layer, may comprise polymeric (e.g. polyurethane, PTFE, PVDF) and/or ceramic (e.g. alumina, silica) materials. In one or more exemplary wound dressings, the first support layer and/or the second support layer is/are made of thermoplastic polyurethane (TPU). The support layer

material may be made of or comprise one or more of polyester, a thermoplastic elastomer (TPE), polyamide, polyimide, Ethylene-vinyl acetate (EVA), polyurea, and silicones. Exemplary thermoplastic elastomers of the first support layer and/or the second support layer are styrenic block copolymers (TPS, TPE-s), thermoplastic polyolefin elastomers (TPO, TPE-o), thermoplastic Vulcanizates (TPV, TPE-v), thermoplastic polyurethanes (TPU), thermoplastic copolyester (TPC, TPE-E), and thermoplastic polyamides (TPA, TPE-A).

The electrode assembly may comprise a spacing layer between the first support layer and the second support layer. A spacing layer between the first support layer and the second support layer may reduce the risk of false positives when detecting and/or determining moisture/liquid patterns or distributions. The spacing layer may have a plurality of sensor point openings, e.g. for allowing exudate to pass through the spacing layer. The spacing layer may be made of an absorbent material. The spacing layer may have a thickness in the range from 1 µm to 1 mm, such as about 10 µm or 100 µm.

The electrode assembly may have a first part and a second part.

The first part may comprise at least some of or all the connection parts of the plurality of electrodes. The first part of the electrode assembly may extend through the top layer opening. In one or more exemplary wound dressings, at least some of the connection parts of the plurality of electrodes are arranged on a proximal surface of the electrode assembly. The first part of the electrode assembly may extend outside the absorbent core layer when seen in a radial direction. Accordingly, the connection parts of the plurality of electrodes may be arranged outside the absorbent core layer when seen in a radial direction. The first part may be elongated, e.g. having a length of at least 2 cm, such as at least 5 cm, e.g. in the range from 5 cm to 30 cm. An elongated first part may facilitate attachment and detachment of the monitor device and/or reduce the wear discomfort by allowing positioning of the monitor device away from the wound.

The electrode assembly may comprise a reinforcement element. The reinforcement element may form at least part of the first part of the electrode assembly. The reinforcement element optionally comprises a plurality of conductive paths respectively connected to connection parts of the plurality of electrodes. The conductive paths of the reinforcement element may form terminals of the monitor interface. The reinforcement element may be a flex circuit.

The second part may be arranged between the absorbent core layer and the top layer, i.e. the second part may be arranged to overlap with the absorbent core layer when seen in an axial direction. Thus, the second part of the electrode assembly may comprise the plurality of sensor points distributed along a distal surface of the absorbent core layer.

The electrode assembly/wound dressing may comprise one or more masking layers including a first masking layer isolating electrode parts of the plurality of electrodes. The first masking layer may isolate electrode parts of first electrodes of the first set of first electrodes.

The first masking layer may be printed on the first support layer and optionally cover one or more parts of electrodes printed or arranged on the first support layer. In one or more exemplary electrode assemblies, the first masking layer is printed on the proximal side of the first support layer and covering one or more parts of first electrodes and/or second electrodes. In one or more exemplary electrode assemblies, the first masking layer is printed on the distal side of the first support layer and covering one or more parts of first electrodes and/or second electrodes.

The first masking layer may be printed on the second support layer and optionally cover one or more parts of electrodes printed or arranged on the second support layer. In one or more exemplary electrode assemblies, the first masking layer is printed on the proximal side of the second support layer and covering one or more parts of second electrodes. In one or more exemplary electrode assemblies, the first masking layer is printed on the distal side of the second support layer and covering one or more parts of second electrodes.

The first masking layer may be divided in a plurality of first masking layer parts. The first masking layer may be arranged between the absorbent core layer and at least parts of the first electrodes to electrically isolate the parts of the first electrodes from the absorbent core layer. The first masking layer may be arranged between the absorbent core layer and at least parts of the second electrodes to electrically isolate the parts of the second electrodes from the absorbent core layer.

The first masking layer may comprise one or more, such as a plurality of, sensor point openings. A sensor point opening of the first masking layer optionally overlaps at least one electrode of the electrode assembly when seen in the axial direction, e.g. to form a

sensor point. For example, a sensor point opening of the first masking layer may overlap a (sensing) part of a first electrode of the first set of electrodes and a (sensing) part of a second electrode of the second set of electrodes.

The electrode assembly may comprise a second masking layer isolating electrode parts of the plurality of electrodes.

The second masking layer may be printed on the first support layer and optionally cover one or more parts of electrodes printed or arranged on the first support layer. In one or more exemplary electrode assemblies, the second masking layer is printed on the distal side of the first support layer and covering one or more parts of second electrodes.

The second masking layer may be printed on the second support layer and optionally cover one or more parts of electrodes printed or arranged on the second support layer. In one or more exemplary electrode assemblies, the second masking layer is printed or arranged on the proximal side of the second support layer and covering one or more parts of second electrodes. In one or more exemplary electrode assemblies, the second masking layer is printed or arranged on the distal side of the second support layer and covering one or more parts of second electrodes.

The second masking layer may be divided in a plurality of second masking layer parts. The second masking layer may be arranged between the absorbent core layer and at least parts of the second electrodes to electrically isolate the parts of the second electrodes from the absorbent core layer. The second masking layer may be arranged between the first support layer and at least parts of the second electrodes to electrically isolate the parts of the second electrodes from the first support layer. The second masking layer may be arranged between the spacing layer and at least parts of the second electrodes to electrically isolate the parts of the second electrodes from the spacing layer.

The second masking layer may comprise one or more, such as a plurality of, sensor point openings. A sensor point opening of the second masking layer optionally overlaps at least one electrode of the electrode assembly when seen in the axial direction, e.g. to form a sensor point. For example, a sensor point opening of the second masking layer may overlap a (sensing) part of a first electrode of the first set of electrodes and/or a (sensing) part of a second electrode of the second set of electrodes.

A masking layer, e.g. the first masking layer and/or the second masking layer, may comprise one or more, such as a plurality of, terminal openings. A terminal opening may overlap with one or more connection parts of electrodes. In one or more exemplary wound dressings, each terminal opening overlaps with a single connection part of an electrode. A masking layer, e.g. the first masking layer and/or the second masking layer, may comprise polymeric (e.g. polyurethane, PTFE, PVDF) and/or ceramic (e.g. alumina, silica) materials. In one or more exemplary wound dressings, the first masking layer and/or the second masking layer is/are made of or comprises thermoplastic polyurethane (TPU). In one or more exemplary wound dressings, the first masking layer and/or the second masking layer is made of or comprises polyester. The masking element material may be made of or comprise one or more of polyester, a thermoplastic elastomer (TPE), polyamide, polyimide, Ethylene-vinyl acetate (EVA), polyurea, and silicones.

Exemplary thermoplastic elastomers of the first masking layer and/or the second masking layer are styrenic block copolymers (TPS, TPE-s), thermoplastic polyolefin elastomers (TPO, TPE-o), thermoplastic Vulcanizates (TPV, TPE-v), thermoplastic polyurethanes (TPU), thermoplastic copolyester (TPC, TPE-E), and thermoplastic polyamides (TPA, TPE-A).

The wound dressing comprises a monitor interface. The monitor interface may be configured for electrically and/or mechanically connecting the wound dressing (electrode assembly) to the monitor device. The monitor interface may be configured for wirelessly connecting the wound dressing to the monitor device. Thus, the monitor interface of the wound dressing is configured to electrically and/or mechanically couple the wound dressing and the monitor device.

The monitor interface of the wound dressing may comprise, e.g. as part of a first connector of the monitor interface, a coupling part for forming or configured for forming a mechanical connection, such as a releasable coupling between the monitor device and the wound dressing. The coupling part may be configured to engage with a coupling part of the monitor device for releasably coupling the monitor device to the wound dressing.

The coupling part may be attached, such as glued, welded, press-fitted, or soldered, to the electrode assembly. In one or more exemplary wound dressings, the coupling part extends through the top layer opening, i.e. a part of the coupling part may extend on the proximal side of the top layer and a part of the coupling part may extend on the distal side

of the top layer. The coupling part may be attached such as glued, welded, press-fitted, or soldered, to the top layer.

In one or more exemplary wound dressings, the first part of the electrode assembly extends into the coupling part, i.e. the coupling part may accommodate at least a part of the first part of the electrode assembly.

The monitor interface of the wound dressing may comprise, e.g. as part of a first connector of the monitor interface, a plurality of terminals, such as two, three, four, five, six, seven, eight or more terminals, for forming or configured to form electrical connections with respective terminals of the monitor device. The monitor interface may comprise a ground terminal element forming a ground terminal. The monitor interface may comprise a first terminal element forming a first terminal, a second terminal element forming a second terminal and optionally a third terminal element forming a third terminal. The monitor interface may comprise a fourth terminal element forming a fourth terminal and/or a fifth terminal element forming a fifth terminal. The monitor interface optionally comprises a sixth terminal element forming a sixth terminal. The terminal elements of the monitor interface may contact respective electrodes (connection parts) of the wound dressing/electrode assembly. In one or more exemplary wound dressings, a first intermediate element may be arranged between the terminal elements and the first adhesive layer. The first intermediate element may cover or overlap terminal element(s) of the wound dressing when seen in the axial direction. Thus, the first adhesive layer may be protected or experience more evenly distributed mechanical stress from the terminal elements of the wound dressing, in turn reducing the risk of terminal elements penetrating or otherwise damaging the first adhesive layer. The first intermediate element may protect or mechanically and/or electrically shield the first adhesive layer from the terminal elements of the wound dressing.

A terminal element, such as the ground terminal element, the first terminal element, the second terminal element, the third terminal element, the fourth terminal element, the fifth terminal element and/or the sixth terminal element, may comprise a distal end and a proximal end. A terminal element, such as the ground terminal element, the first terminal element, the second terminal element, the third terminal element, the fourth terminal element, the fifth terminal element and/or the sixth terminal element, may comprise a distal part (with a distal end), a centre part, and/or a proximal part (with a proximal end). The centre part may be between the distal part and the proximal part. The proximal end/proximal part of a terminal element may contact a connection part of an electrode. A

terminal element, such as the ground terminal element, the first terminal element, the second terminal element, the third terminal element, the fourth terminal element, the fifth terminal element and/or the sixth terminal element, may be gold plated copper.

In one or more exemplary wound dressings, connection parts of electrodes of the electrode assembly form respective terminals of the monitor interface.

The wound dressing may comprise a flexible element, the flexible element being bendable and/or twistable between a first flexible element end and a second flexible element end. The coupling part of the monitor interface may be positioned at the first flexible element end. For example, the monitor interface may comprise the flexible element. A first part of the top layer and/or a first part of the electrode assembly may at least partly form the first flexible element. The coupling part is configured for forming a mechanical connection, such as a releasable coupling, between the monitor device and the wound dressing. The flexible element may have a length larger than 1 cm, such as larger than 2 cm, larger than 3 or even larger than 5 cm. The flexible element may at least partly extend on the distal side of the top layer.

Providing the coupling part of the wound dressing at an end of a flexible element may provide the advantage that the monitor device, after being coupled to the wound dressing, may be positioned in an advantageous position, such as in a designated position. Thus, the monitor device may be more freely positioned after being coupled to the wound dressing. Furthermore, the flexible element may facilitate for easier coupling the monitor device and the wound dressing since the coupling part may be turned, twisted and/or repositioned upon coupling of the monitor device to the wound dressing. Providing for an easier coupling of the monitor device to the wound dressing, may be of particular importance for a user, since the wound dressing may be situated on the body in a position complicating coupling of the monitor device. For example, the wound dressing may be partly hidden, such that the user needs to use a mirror in order to see what he/she is doing in coupling the monitor device to the wound dressing. Also, the wound dressing may be positioned to restrict the possibility for the user to use both hands. It is therefore a further advantage of the present disclosure, that it may facilitate the coupling of the monitor device to the wound dressing using both hands.

The coupling part of the monitor interface is optionally configured to engage with the monitor device by a linear motion in an engagement direction of the monitor device

relative to the wound dressing. The monitor device coupling part may be configured to engage with the wound dressing, such as with the coupling part of the wound dressing, by a linear motion in the engagement direction of the monitor device relative to the wound dressing. For example, the monitor device, such as the monitor device coupling part, and the wound dressing, such as the coupling part of the wound dressing, may be transferred from being decoupled to being coupled by a linear motion, such as a single linear motion, in the engagement direction of the monitor device relative to the wound dressing.

The engagement direction may be substantially parallel, e.g. within ± 10 degrees, to a longitudinal direction of the flexible element at the first flexible element end.

The coupling part may be configured to disengage with the monitor device by a linear motion in a disengagement direction of the monitor device relative to the wound dressing. The monitor device coupling part may be configured to disengage with the wound dressing, such as with the coupling part of the wound dressing, by a linear motion in the disengagement direction of the monitor device relative to the wound dressing. For example, the monitor device, such as the monitor device coupling part, and the wound dressing, such as the coupling part of the wound dressing, may be transferred from being coupled to being decoupled by a linear motion, such as a single linear motion, in the disengagement direction of the monitor device relative to the wound dressing. The disengagement direction may be opposite the engagement direction. Alternatively, the disengagement direction may be perpendicular to the engagement direction.

The first adhesive layer may be substantially planar, e.g. prior to being applied to a user's skin. The first adhesive layer may extend in a wound dressing plane. The flexible element may have a longitudinal direction, such as from the second flexible element end to the first flexible element bend. The longitudinal direction of the flexible element may be dependent on position between the first flexible element end and the second flexible element end. The engagement direction and/or the disengagement direction may be substantially parallel to the longitudinal direction of the flexible element at the first flexible element end.

In one or more exemplary wound dressings, the wound dressing comprises a locking mechanism configured to lock the monitor device in a coupled position with the wound dressing. Alternatively, or additionally, the monitor device may comprise a locking mechanism. The locking mechanism(s) may be configured to lock the monitor device in a coupled position with the wound dressing. For example, the locking mechanism(s) may

provide that the monitor device is maintained in the coupled position with the wound dressing. The locking mechanism(s) may be configured to automatically lock the monitor device in the coupled position with the wound dressing. The locking mechanism may be biased, e.g. spring-biased, towards locking of the locking mechanism. For example, the locking mechanism(s) may be biased, e.g. spring biased, towards locking of the locking mechanism(s). For example, the locking mechanism may comprise biasing means, e.g. a spring, that biases the locking mechanism towards a locked position. The locking mechanism(s) may be configured to unlock the monitor device from the coupled position with the wound dressing upon user interaction. Alternatively, or additionally, the locking mechanism(s) may be configured to lock the monitor device in the coupled position with the wound dressing upon user interaction.

The locking mechanism may comprise a locking element optionally configured to unlock and/or lock the locking mechanism upon user interaction with the locking element. The locking element may also be denoted an unlocking element. The locking element(s) may form part of the locking mechanism(s). The locking element(s) may be configured to unlock and/or lock the locking mechanism(s), e.g. upon user interaction with the locking element(s). For example, the locking element(s) may comprise button(s) for user interaction. For example, the locking element(s) may be engaged to lock the locking mechanism and/or the locking element(s) may be engaged to unlock the locking mechanism. User interaction with the locking element(s) may comprise deflection of one or more buttons or sliding of a slider etc.

The locking element may comprise a first button being deflectable in a first direction. The first direction may be substantially perpendicular to the engagement direction, e.g. form an angle in the range from 80 to 100 degrees. The locking element optionally comprises a first button and a second button, the first button being deflectable in a first direction and the second button being deflectable in a second direction. The first direction may be substantially opposite the second direction. In one or more exemplary wound dressings, the first direction and the second direction are substantially perpendicular to the engagement direction, e.g. form an angle in the range from 80 to 100 degrees.

The locking element of the wound dressing may comprise a slider being slidable in a first slider direction, and wherein the slider is spring loaded and biased towards a second slider direction. The first slider direction is optionally opposite the second slider direction.

In one or more exemplary wound dressings, the first slider direction and the second slider direction are substantially parallel to the engagement direction.

The wound dressing, such as the monitor interface, such as the coupling part, may comprise a locking section. Alternatively, or additionally, the monitor device may comprise a locking section. The locking section(s) may be configured to cooperate with a respective locking mechanism. For example a locking section of the wound dressing may be configured to cooperate with a locking mechanism of the monitor device, and/or a locking section of the monitor device may be configured to cooperate with a locking mechanism of the wound dressing.

The locking section(s) may comprise a hole extending through a coupling part, such as the coupling part of the wound dressing and/or the monitor device coupling part of the monitor device. Alternatively, or additionally, the locking section(s) may comprise a protrusion protruding from a surface of the coupling part and/or monitor device coupling part. Alternatively, or additionally, the locking section may comprise an indent in an edge of the coupling part and/or monitor device coupling part. Alternatively, or additionally, the locking section may comprise a recess in a surface of the coupling part and/or monitor device coupling part.

The wound dressing may comprise a first attachment element and a second attachment element. The first attachment and the second attachment element may be attached to each other. The first attachment element is optionally positioned at the first flexible element end and the second attachment element optionally extends on the distal side of the top layer. The first attachment element may be configured to attach to the second attachment element. The first attachment element may in the form of a clamp configured to clamp to the second attachment element. The first attachment element and the second attachment element may form a hook-and-loop coupling. The hook-and-loop coupling may be Velcro. The first attachment element and the second attachment element may form a magnetic coupling. The first attachment element may be a button element. The second attachment element may be a button element.

The coupling part(s), such as the monitor device coupling part and/or the coupling part of the wound dressing, may form a USB type plug or port. For example, the coupling part(s) may conform with a USB standard.

The monitor device comprises a processor and one or more interfaces, such as a first interface and/or a second interface. The monitor device may comprise a memory for storing wound data and/or parameter data based on the wound data.

The first interface is connected to the processor and the memory. The first interface is configured for collecting wound data from the wound dressing coupled to the first interface. The wound data, also denoted WD, comprises wound data from sensor points of the wound dressing, e.g. first wound data WD_1 from a first sensor point, e.g. a first electrode pair, of the wound dressing, second wound data WD_2 from a second sensor point, e.g. a second electrode pair, of the wound dressing, and optionally third wound data WD_3 from a third sensor point, e.g. a third electrode pair, of the wound dressing. In one or more exemplary monitor devices, the wound data comprises wound data for each sensor point of the wound dressing. For example, for a wound dressing with N sensor points, the wound data WD may comprise WD_1, WD_2, ..., WD_N. The number N of sensor points of the wound dressing may be at least 9, such as at least 20 or even larger than 50.

The processor is configured to apply a processing scheme. To apply a processing scheme comprises to obtain parameter data based on the wound data, e.g. the first wound data WD_1, the second wound data WD_2, and the third wound data WD_3; and to determine an operating state of the wound dressing based on the parameter data. The parameter data may comprise one or more of first parameter data, also denoted P_1, based on the first wound data WD_1, second parameter data, also denoted P_2, based on the second wound data WD_2, and third parameter data, also denoted P_3, based on the third wound data WD_3.

The operating state of the wound dressing is optionally indicative of a degree of wetting of the absorbent core layer of the wound dressing. The operating state is optionally indicative of a degree of wetting of the distal surface of the absorbent core layer. The operating state may be indicative of a wetting pattern or wetting distribution on the distal surface or distal side of the absorbent core layer.

The monitor device is optionally configured to, in accordance with a determination that the operating state is a first operating state, transmit a first monitor signal comprising monitor data indicative of the first operating state of the wound dressing via the second interface. The first operating state of the wound dressing may correspond to a situation wherein the

absorbent core layer is wetted to a first degree on the distal surface of the absorbent core layer and/or wherein a first wetting pattern is detected on the distal surface of the absorbent core layer.

The monitor device is optionally configured to, in accordance with a determination that the operating state is a second operating state, transmit a second monitor signal comprising monitor data indicative of the second operating state of the wound dressing via the second interface. The second operating state of the wound dressing may correspond to a situation wherein the absorbent core layer is wetted to a second degree (different from the first degree) on the distal surface of the absorbent core layer and/or wherein a second wetting pattern is detected on the distal surface of the absorbent core layer.

In one or more exemplary monitor devices, to determine an operating state of the wound dressing is based on a first criteria set based on first parameter data and/or second parameter data of the parameter data, wherein the operating state is determined to be the first operating state if the first criteria set is satisfied. The first criteria set optionally comprises a first primary criterion based on the first parameter data, and a first secondary criterion based on the second parameter data.

In one or more exemplary monitor devices, to determine an operating state of the wound dressing is based on a first threshold set comprising one or more first threshold values.

In one or more exemplary monitor devices, to determine an operating state of the wound dressing is based on a second criteria set based on first parameter data and second parameter data of the parameter data, wherein the operating state is determined to be the second operating state if the second criteria set is satisfied. The second criteria set optionally comprises a second primary criterion based on the first parameter data, and a second secondary criterion based on the second parameter data. Applying first and second criteria set based on first parameter data and second parameter data allows for a distinction between different degrees and/or patterns of wetting.

In one or more exemplary monitor devices, to determine an operating state of the wound dressing is based on a second threshold set comprising one or more second threshold values.

In one or more exemplary monitor devices, to determine an operating state of the wound dressing is based on a default criteria set based on the parameter data, wherein the operating state is determined to be the default operating state if the default criteria set is satisfied, and optionally in accordance with a determination that the operating state is the default operating state, transmit a default monitor signal comprising monitor data indicative of the default operating state of the wound dressing. The default operating state may correspond to no wetting or a low degree of wetting of the (distal surface or side of) absorbent core layer.

In one or more exemplary monitor devices, to determine an operating state of the wound dressing is based on a third criteria set based on third parameter data of the parameter data, wherein the operating state is determined to be the third operating state if the third criteria set is satisfied. The third operating state of the wound dressing may correspond to a situation wherein the absorbent core layer is wetted to a third degree on the distal surface of the absorbent core layer and/or wherein a third wetting pattern is detected on the distal surface of the absorbent core layer.

The monitor device is optionally configured to, in accordance with a determination that the operating state is the third operating state, transmit a third monitor signal comprising monitor data indicative of the third operating state of the wound dressing.

The parameter data may be indicative of resistance between the two electrodes of an electrode pair forming a sensor point. For example, the first parameter data, the second parameter data, and the third parameter data, may be indicative of resistance between first electrode pair of the first sensor point, second electrode pair of the second sensor point, and third electrode pair of the third sensor point, respectively. Wetting of the distal surface of the absorbent core layer with exudate, i.e. exudate from the wound being absorbed by the absorbent core layer, is detected by a reduced resistance between the two electrodes of the sensor point(s). The sensor points are arranged or distributed along the distal surface of the absorbent core layer allowing the monitor device to detect and/or derive a degree of wetting and/or a wetting pattern or wetting distribution on the distal surface of the of the absorbent core layer.

In one or more exemplary monitor devices, the parameter data are indicative of a rate of change in resistance between the two electrodes of an electrode pair forming a sensor point. The first parameter data, the second parameter data, and the third parameter data

may be indicative of a rate of change in resistance between first electrode pair of the first sensor point, second electrode pair of the second sensor point, and third electrode pair of the third sensor point, respectively.

In one or more exemplary monitor devices, the wound data comprises fourth wound data from a fourth sensor point of the wound dressing, and wherein to apply a processing scheme comprises to obtain fourth parameter data based on the fourth wound data, and determine an operating state of the wound dressing based on the fourth parameter data.

The monitor device is optionally configured to, in accordance with a determination that the operating state is a fourth operating state, transmit a fourth monitor signal comprising monitor data indicative of the fourth operating state of the wound dressing. The fourth operating state of the wound dressing may correspond to a situation wherein the absorbent core layer is wetted to a fourth degree on the distal surface of the absorbent core layer and/or wherein a fourth wetting pattern is detected on the distal surface of the absorbent core layer.

In one or more exemplary monitor devices, to obtain parameter data comprises to obtain common parameter data of the parameter data based on a plurality of the first wound data, the second wound data, and the third wound data, and wherein to determine the operating state of the wound dressing is based on the common parameter data.

In one or more exemplary monitor devices, to determine an operating state comprises to determine a degree of wetting of the absorbent core layer, such as a degree of wetting of the distal side or surface of the absorbent core material. To determine a degree of wetting of the absorbent core material may comprising to determine if the degree of wetting satisfies first wetting criterion and/or if the degree of wetting satisfies second wetting criterion.

The monitor device is optionally configured to, in accordance with the degree of wetting satisfying first wetting criterion, setting the operating state to be the first operating state and optionally include the degree of wetting in the monitor data.

The monitor device is optionally configured to, in accordance with the degree of wetting satisfying a second wetting criterion, setting the operating state to be the second operating state and optionally include the degree of wetting in the monitor data.

In one or more exemplary monitor devices, to determine an operating state comprises to determine a wetting pattern of the absorbent core layer, such as a wetting pattern on the distal side or surface of the absorbent core material, and optionally to determine a pattern type of the wetting pattern from a plurality of pattern types. To determine a pattern type of the wetting pattern may comprise to determine if the wetting pattern satisfies first pattern type criterion, wherein the pattern type is determined as being a first pattern type if the first pattern type criterion is satisfied. To determine a pattern type of the wetting pattern may comprise to determine if the wetting pattern satisfies second pattern type criterion, wherein the pattern type is determined as being a second pattern type if the second pattern type criterion is satisfied.

The monitor device may be configured to, in accordance with the pattern type being a first pattern type, setting the operating state to be the first operating state and optionally including a pattern representation of the wetting pattern in the monitor data. The pattern representation may comprise a pattern type identifier and/or pattern data indicative of parameter data.

The monitor device may be configured to, in accordance with the pattern type being a second pattern type, setting the operating state to be the second operating state and optionally including a pattern representation of the wetting pattern in the monitor data. The pattern representation may comprise a pattern type identifier and/or pattern data indicative of parameter data.

The monitor device comprises a second interface connected to the processor. The second interface may comprise a loudspeaker connected to the processor, and wherein the processor is configured to transmit a monitor signal via the loudspeaker. In one or more exemplary monitor devices, the second interface comprises an antenna and a wireless transceiver, and wherein the processor is configured to transmit a monitor signal as a wireless monitor signal via the antenna and the wireless transceiver.

A wound dressing system is disclosed, the wound dressing system comprising a wound dressing and a monitor device, the wound dressing comprising an absorbent core layer, wherein the monitor device is a monitor device as described herein.

To obtain first parameter data based on the first wound data may comprise determining one or more first parameters based on the first wound data. To obtain second parameter data based on the second wound data may comprise determining one or more second

parameters based on the second wound data. To obtain third parameter data based on the third wound data may comprise determining one or more third parameters based on the third wound data. In one or more exemplary monitor devices, determination of an operating state may be based on one or more first parameters, such as first primary parameter and/or first secondary parameter of first parameter data. In one or more exemplary monitor devices, determination of an operating state may be based on one or more second parameters, such as second primary parameter and/or second secondary parameter of the second parameter data. In one or more exemplary monitor devices, determination of an operating state may be based on one or more third parameters, such as third primary parameter and/or third secondary parameter of the third parameter data. In one or more exemplary monitor devices, determination of an operating state may be based on one or more fourth parameters, such as fourth primary parameter and/or fourth secondary parameter of the fourth parameter data.

Parameter data, P_1, P_2, ..., P_N, may comprise respective parameters p_1_1, p_2_1, ..., p_N_1 indicative of resistance between the respective two electrodes forming a sensor point of the wound dressing. Parameter data, P_1, P_2, ..., P_N, may comprise respective parameters p_1_2, p_2_2, ..., p_N_2 each indicative of a rate of change in resistance between the respective two electrodes forming a sensor point of the wound dressing. Accordingly, p_1_1 of P_1 may be the resistance measured between the first electrode E_1_1 and the second electrode E_2_1 forming the first sensor point SP_1_1, p_2_1 of P_2 may be the resistance measured between first electrode E_1_1 and the second electrode E_2_2 forming the second sensor point SP_1_2.

In one or more exemplary monitor devices and/or methods, to determine an operating state of the wound dressing is based on a first criteria set based on the first parameter data P_1 (p_1_1) and/or one or more other parameter data P_2 (p_2_1), P_3 (p_3_1), ..., P_N (p_N_1), wherein the operating state is determined to be the first operating state if the first criteria set is satisfied. The first criteria set may comprise one or more first criteria based on one or more of P_1, P_2, ..., P_N. The first criteria set may comprise a first primary criterion based on P_1 (p_1_1). The first criteria set may comprise a first secondary criterion based on P_2 (p_2_1). The first criteria set may comprise a first tertiary criterion based on P_3 (p_3_1). The first criteria set may comprise N first criteria respectively based on P_1, P_2, ..., P_N.

In one or more exemplary monitor devices and/or methods, to determine an operating state of the wound dressing is based on a second criteria set based on the second

parameter data P_2 (p_2_1) and/or one or more other parameter data P_1 (p_1_1), P_3 (p_3_1), ..., P_N (p_N_1), wherein the operating state is determined to be the second operating state if the second criteria set is satisfied. The second criteria set may comprise one or more second criteria based on one or more of P_1, P_2, ..., P_N. The second criteria set may comprise a second primary criterion based on P_1 (p_1_1). The second criteria set may comprise a second secondary criterion based on P_2 (p_2_1). The second criteria set may comprise a second tertiary criterion based on P_3 (p_3_1). The second criteria set may comprise N second criteria respectively based on P_1, P_2, ..., P_N.

In one or more exemplary monitor devices and/or methods, to determine an operating state of the wound dressing may comprise to determine the number of parameters p_1_1, p_2_1, ..., p_N_1 having resistances less than a first threshold as a first common parameter of common parameter data. The operating state of the wound dressing may be based on the number of parameters p_1_1, p_2_1, ..., p_N_1 having resistances less than a first threshold. The operating state of the wound dressing may be determined as the first operating state if the first common parameter being the number of parameters p_1_1, p_2_1, ..., p_N_1 having resistances less than a first threshold is in a first range, e.g. from 0.25N to 0.5N. The first operating state may be indicative of a low-wetted absorbent core layer, i.e. a high degree of remaining absorbent capacity of the wound dressing/absorbent core layer. The operating state of the wound dressing may be determined as the second operating state if the first common parameter being the number of parameters p_1_1, p_2_1, ..., p_N_1 having resistances less than a first threshold is in a second range, e.g. from 0.5N to 0.75N. The second operating state may be indicative of a medium-wetted absorbent core layer, i.e. a medium degree of remaining absorbent capacity of the wound dressing/absorbent core layer.

The operating state of the wound dressing may be determined as a default operating state if the first common parameter being the number of parameters p_1_1, p_2_1, ..., p_N_1 having resistances less than a first threshold is less than a default threshold. The default threshold may be a fixed value or based on the number N of sensor points. The default threshold may be 0.1 N or 0.25 N. The processor is optionally configured to, in accordance with a determination that the operating state is the default operating state, transmit a default monitor signal comprising monitor data indicative of the default operating state of the wound dressing. The default operating state may be indicative of a substantially non-wetted absorbent core layer, i.e. a very high degree of remaining absorbent capacity of the wound dressing/absorbent core layer.

In one or more exemplary monitor devices and/or methods, to determine an operating state of the wound dressing is based on a default criteria set based on parameter data P_1, P_2, ..., P_N, wherein the operating state is determined to be the default operating state if the default criteria set is satisfied. The monitor device may be configured to, in accordance with a determination that the operating state is the default operating state, transmit a default monitor signal comprising monitor data indicative of the default operating state of the wound dressing.

In one or more exemplary monitor devices and/or methods, to determine an operating state of the wound dressing is based on a third criteria set based on parameter data P_1, P_2, ..., P_N, wherein the operating state is determined to be the third operating state if the third criteria set is satisfied. The operating state of the wound dressing may be determined as the third operating state if the first common parameter being the number of parameters p_1_1, p_2_1, ..., p_N_1 having resistances less than a first threshold is in a third range, e.g. from 0.75N to 0.9N.

The processor is optionally configured to, in accordance with a determination that the operating state is the third operating state, transmit a third monitor signal comprising monitor data indicative of the third operating state of the wound dressing. In one or more exemplary monitor devices, the third operating state of the wound dressing corresponds to a situation wherein the absorbent core layer is wetted to a third degree on the distal surface. The third degree may be indicative of low degree of remaining absorbent capacity of the wound dressing/absorbent core layer.

In one or more exemplary monitor devices and/or methods, to determine an operating state of the wound dressing is based on a fourth criteria set based on parameter data P_1, P_2, ..., P_N, wherein the operating state is determined to be the fourth operating state if the fourth criteria set is satisfied. The operating state of the wound dressing may be determined as the fourth operating state if the first common parameter being the number of parameters p_1_1, p_2_1, ..., p_N_1 having resistances less than a first threshold is in a fourth range, e.g. from 0.9N to N.

The processor is optionally configured to, in accordance with a determination that the operating state is the fourth operating state, transmit a fourth monitor signal comprising monitor data indicative of the fourth operating state of the wound dressing. In one or more exemplary monitor devices, the fourth operating state of the wound dressing corresponds

to a situation wherein the absorbent core layer is wetted to a fourth degree on the distal surface. The fourth degree may be indicative of very low or no degree of remaining absorbent capacity of the wound dressing/absorbent core layer.

The monitor device comprises a monitor device housing optionally made of a plastic material. The monitor device housing may be an elongate housing having a first end and a second end. The monitor device housing may have a length or maximum extension along a longitudinal axis in the range from 1 cm to 15 cm. The monitor device housing may have a width or maximum extension perpendicular to the longitudinal axis in the range from 0.5 cm to 3 cm. The monitor device housing may be curve-shaped.

The monitor device comprises a first interface. The first interface may be configured as a wound dressing interface for electrically and/or mechanically connecting the monitor device to the wound dressing. Thus, the wound dressing interface is configured to electrically and/or mechanically couple the monitor device and the wound dressing. The first interface may be configured as an accessory device interface for electrically and//or mechanically connecting the monitor device to an accessory device. The first interface may be configured for coupling to a docking station of the wound dressing system, e.g. for charging the monitor device and/or for data transfer between the monitor device and the docking station.

The first interface of the monitor device may comprise a plurality of terminals, such as two, three, four, five, six, seven or more terminals, for forming electrical connections with respective terminals and/or electrodes of the wound dressing. One or more terminals of the first interface may be configured for forming electrical connections with an accessory device, e.g. with respective terminals of a docking station. The first interface may comprise a ground terminal. The first interface may comprise a first terminal, a second terminal and optionally a third terminal. The first interface may comprise a fourth terminal and/or a fifth terminal. The first interface optionally comprises a sixth terminal. In one or more exemplary monitor devices, the first interface has M terminals, wherein M is an integer in the range from 4 to 16.

The first interface of the monitor device may comprise a coupling part for forming a mechanical connection, such as a releasable coupling between the monitor device and the wound dressing. The coupling part and the terminals of the first interface form (at least part of) a first connector of the monitor device.

The monitor device comprises a power unit for powering the monitor device. The power unit may comprise a battery. The power unit may comprise charging circuitry connected to the battery and terminals of the first interface for charging the battery via the first interface, e.g. the first connector. The first interface may comprise separate charging terminal(s) for charging the battery.

The monitor device may comprise a sensor unit with one or more sensors. The sensor unit is connected to the processor for feeding sensor data to the processor. The sensor unit may comprise an accelerometer for sensing acceleration and provision of acceleration data to the processor. The sensor unit may comprise a temperature sensor for provision of temperature data to the processor.

The monitor device comprises a second interface connected to the processor. The second interface may be configured as an accessory interface for connecting, e.g. wirelessly connecting, the monitor device to one or more accessory devices and transmitting monitor data to the accessory device. The second interface may comprise an antenna and a wireless transceiver, e.g. configured for wireless communication at frequencies in the range from 2.4 to 2.5 GHz. The wireless transceiver may be a Bluetooth transceiver, i.e. the wireless transceiver may be configured for wireless communication according to Bluetooth protocol, e.g. Bluetooth Low Energy, Bluetooth 4.0, Bluetooth 5. The second interface optionally comprises a loudspeaker and/or a haptic feedback element for provision of an audio signal and/or haptic feedback to the user, respectively.

The wound dressing system may comprise a docking station forming an accessory device of the wound dressing system. The docking station may be configured to electrically and/or mechanically couple the monitor device to the docking station.

The docking station may comprise a docking monitor interface. The docking monitor interface may be configured for electrically and/or mechanically connecting the monitor device to the docking station. The docking monitor interface may be configured for wirelessly connecting the monitor device to the docking station. The docking monitor interface of the docking station may be configured to electrically and/or mechanically couple the docking station and the monitor device.

The docking monitor interface of the docking station may comprise, e.g. as part of a first connector of the docking monitor interface, a coupling part for forming a mechanical

connection, such as a releasable coupling between the monitor device and the docking station. The coupling part may be configured to engage with a coupling part of the monitor device for releasably coupling the monitor device to the docking station.

The docking monitor interface of the docking station may comprise, e.g. as part of a first connector of the docking monitor interface, a plurality of terminals, such as two, three, four, five, six, seven or more terminals, for forming electrical connections with respective terminals of the monitor device. The docking monitor interface may comprise a ground terminal. The docking monitor interface may comprise a first terminal and/or a second terminal. The docking station may comprise a third terminal. The docking monitor interface may comprise a fourth terminal and/or a fifth terminal. The docking monitor interface optionally comprises a sixth terminal.

Also disclosed is a monitor device, such as a monitor device as described above, such as a monitor device for connecting to a wound dressing, such as the wound dressing as described herein. The monitor device may comprise: a monitor device housing; electronic circuitry; and a wound dressing interface configured for connecting the monitor device to the wound dressing. The wound dressing interface of the monitor device optionally comprises a monitor device coupling part configured for coupling between the monitor device and the wound dressing,

In one or more exemplary monitor devices, the monitor device comprises an attachment element configured to attach to the wound dressing. The attachment element of the monitor device may be in the form of a clamp configured to clamp to an attachment element of the wound dressing. The attachment element may be in the form of a slit configured to receive an attachment element of the wound dressing. The attachment element may be in the form of a hook element or a loop element configured to engage in a hook and loop coupling, such as Velcro, with the wound dressing. The attachment element may be in the form of a magnetic material configured to magnetically attach to an attachment element of the wound dressing.

The monitor device coupling part is optionally configured to engage with the wound dressing by a linear motion in an engagement direction of the monitor device relative to the wound dressing.

The monitor device may comprise a locking mechanism configured to lock the monitor device in a coupled position with the wound dressing. The locking mechanism of the monitor device may be biased towards locking of the locking mechanism. In one or more exemplary monitor devices, the locking mechanism comprises a locking element configured to unlock or lock the locking mechanism upon user interaction with the locking element. The locking element may comprise a first button being deflectable in a first direction, wherein the first direction is substantially perpendicular to the engagement direction. In one or more exemplary monitor devices, the locking element comprises a first button and a second button, the first button being deflectable in a first direction and the second button being deflectable in a second direction, wherein the first direction is substantially opposite the second direction. The first direction and the second direction may be substantially perpendicular to the engagement direction. The locking element of the monitor device optionally comprises a slider being slidable in a first slider direction. The slider is optionally spring loaded and biased towards a second slider direction. The first slider direction may be opposite the second slider direction. The first slider direction and the second slider direction may be substantially parallel to the engagement direction.

The monitor device, such as the monitor device housing, may have a first surface and a second surface. The first surface may be opposite the second surface. The first surface and/or the second surface may be substantially flat. The monitor device may comprise a rim surface between the first surface and the second surface. The rim surface may be substantially perpendicular to the first surface and/or the second surface.

The monitor device coupling part may be provided at the rim surface, such as at a first part of the rim surface. For example, the monitor device coupling part may be provided by an opening in the rim surface, such as in the first part of the rim surface.

The monitor device may comprise electronic circuitry, e.g. electronic circuitry for receiving, processing, storing and/or transmitting signals and/or data. The electronic circuitry may, for example, include a processor, a wireless communication unit, memory etc. The electronic circuitry may be enclosed by the monitor device housing.

It is an advantage of the present disclosure that a user of a wound dressing, a caretaker or a health care professional is able to monitor and plan the use of the wound dressing. Communication of the operating states of the wound dressing is useful in helping to reduce the risk of a user experiencing leakage from a wound dressing (e.g. exudate

material leakage from the wound dressing), which in turn helps in reducing risks of skin damage to a user and/or helps in providing improved healing conditions for the wound. In particular, determination and communication of operating state according to the present disclosure is performed based on monitor data indicative of a condition of the wound dressing which may not be visible to the user (because it is under the top layer of the wound dressing and/or inside the absorbent core layer). This results in providing a clear distinction or differentiation between different degrees of exudation for different section or zones of the wound.

The present disclosure provides an efficient, and easy-to-use monitoring of a wound dressing system with a high degree of comfort for a user while allowing derivation of an operating state based on monitor data that is not accessible or visible by the user or the health care professional. In other words, the disclosed method allows indication of the dynamic internal state of the wound dressing to a user, which supports the user in operating the wound dressing properly.

Fig. 1 illustrates an exemplary wound dressing system. The wound dressing system 1 comprises a wound dressing 2, 2A, 2B, a monitor device 4, and optionally an accessory device 6 (mobile telephone). The monitor device 4 is connectable to the wound dressing via respective interfaces of the monitor device 4 and wound dressing 2, 2A, 2B. The monitor device 4 is configured for wireless communication with the accessory device 6. Optionally, the accessory device 6 is configured to communicate with a server device 8 of the wound dressing system 1, e.g. via network 10. The server device 10 may be operated and/or controlled by the wound dressing manufacturer and/or a service centre. Wound data and/or parameter data based on the wound data are obtained from electrodes/sensors of the wound dressing 2, 2A, 2B with the monitor device 4. The monitor device 4 processes the wound data and/or parameter data based on the wound data to determine monitor data that are transmitted to the accessory device 6. In the illustrated wound dressing system 1, the accessory device 6 is a mobile phone, however the accessory device 6 may be embodied as another handheld device, such as a tablet device, or a wearable, such as a watch or other wrist-worn electronic device. Accordingly, the monitor device 4 is configured to determine and transmit monitor data to the accessory device 6.

Fig. 2 is a schematic block diagram of an exemplary monitor device. The monitor device 4 comprises a monitor device housing 100, a processor 101, and one or more interfaces,

the one or more interfaces including a first interface 102 (wound dressing interface) and a second interface 104 (accessory interface). The monitor device 4 comprises a memory 106 for storing wound data and/or parameter data based on the wound data. The memory 106 is connected to the processor 101 and/or the first interface 102. The first interface 102 is configured as a wound dressing interface for electrically and/or mechanically connecting the monitor device 4 to the wound dressing, e.g. wound dressing 2. The first interface 102 comprises a plurality of terminals for forming electrical connections with respective terminals of the wound dressing. The first interface 102 comprises a first terminal 110, a second terminal 112 and a third terminal 114. The first interface 102 optionally comprises a fourth terminal 116, a fifth terminal 118 and/or sixth terminal 119. The first interface 102 of the monitor device 4 comprises a coupling part 120 for forming a mechanical connection, such as a releasable coupling, between the monitor device 4 and the wound dressing. The coupling part 120 and terminals 110, 112, 114, 116, 118, 119 of the first interface 102 form (at least part of) a first connector of the monitor device 4. Terminals 110, 112, and 114 may be respectively coupled to first electrodes 210A, 210B, 210C via the monitor interface of the wound dressing, and terminals 116, 118, 119 may be respectively coupled to second electrodes 212A, 212B, 212C via the monitor interface of the wound dressing.

The monitor device 4 comprises a power unit 121 for powering the monitor device and active components thereof, i.e. the power unit 121 is connected to the processor 101, the first interface 102, the second interface 104, and memory 106. The power unit comprises a battery and optionally charging circuitry. The charging circuitry is optionally connected to the battery and terminals of the first interface 102 for charging the battery via terminals of the first interface, e.g. terminals of the first connector.

The second interface 104 of monitor device 4 is configured as an accessory interface for connecting the monitor device 4 to one or more accessory devices such as accessory device 6. The second interface 104 comprises an antenna 122 and a wireless transceiver 124 configured for wireless communication with accessory device(s). Optionally, the second interface 104 comprises a loudspeaker 126 and/or a haptic feedback element 128 for provision of respective audio signal and/or haptic feedback to the user.

The monitor device 6 optionally comprises a sensor unit 140 connected to the processor 101. The sensor unit 140 comprises a temperature sensor for feeding temperature data to

the processor and/or a G-sensor or accelerometer for feeding acceleration data to the processor 101.

The processor 101 is configured to apply a processing scheme, and the first interface 102 is configured for collecting wound data from the wound dressing coupled to the first interface, the wound data comprising wound data from sensor points (electrode pairs) of the wound dressing. The wound data may comprise first wound data WD_1 from a first electrode pair (first sensor point) of the wound dressing, second wound data WD_2 from a second electrode pair (second sensor point) of the wound dressing, and third wound data WD_3 from a third electrode pair (third sensor point) of the wound dressing. In the illustrated monitor device, the processor is configured to collect, WD_1, WD_2, WD_3, ..., WD_9 from nine sensor points of the wound dressing formed by nine electrode pairs being combinations of a first electrode of the first set of first electrodes and a second electrode of the second set of second electrodes. The wound data may be stored in the memory 106 and/or processed in the processor 101 in order to obtain parameter data based on the wound data. The parameter data may be stored in the memory 106. The processor 101 is configured to apply a processing scheme, wherein to apply a processing scheme comprises obtain first parameter data P_1 including p_1_1 being the resistance between the two electrodes forming the first sensor point based on the first wound data; obtain second parameter data P_2 including p_2_1 being the resistance between the two electrodes forming the second sensor point based on the second wound data; obtain third parameter data P_3 including p_3_1 being the resistance between the two electrodes forming the third sensor point based on the third wound data. In other words, the processor 101 is configured to obtain parameters p_1_1, p_2_1, ..., p_9_1 being resistances based on respective wound data WD_1, WD_2, ..., WD_9 obtained between the two electrodes forming the respective sensor points. To apply a processing scheme comprises to determine an operating state of the wound dressing based on one or more, e.g. all, of the parameter data P_1, P_2, ..., P_9 including p_1_1, p_2_1, ..., p_9_1. The operating state is optionally indicative of a degree of wetting or wetting pattern on the distal side of the absorbent core layer of the wound dressing.

The monitor device 4 is optionally configured to, in accordance with a determination that the operating state is a first operating state of the wound dressing, transmit a first monitor signal comprising monitor data indicative of the first operating state of the wound dressing via the second interface, the monitor data optionally including including a pattern representation of the wetting pattern and/or the degree of wetting. The pattern

representation may comprise a pattern type identifier and/or pattern data indicative of or comprising parameter data. Optionally, the monitor device 4 may be configured to, in accordance with a determination that the operating state is a second operating state of the wound dressing, transmit a second monitor signal comprising monitor data indicative of the second operating state of the wound dressing via the second interface, the monitor data optionally including including a pattern representation of the wetting pattern and/or the degree of wetting. The pattern representation may comprise a pattern type identifier and/or pattern data indicative of or comprising parameter data.

Fig. 3 shows a proximal view of an exemplary first adhesive layer of the wound dressing. The first adhesive layer 150 has a proximal surface 150A configured for attachment of the wound dressing to the skin surface of a user. The first adhesive layer has perforations or through-going openings 152 arranged within absorbing region 154 for allowing exudate from the wound to flow through the perforations of first adhesive layer 150 to be absorbed by absorbent core layer arranged on the distal side of the first adhesive layer.

Fig. 4 is a schematic cross-section of an exemplary wound dressing. The wound dressing 2 comprises a first adhesive layer 150 with a proximal surface 150A configured for attachment of the wound dressing to the skin surface of a user. The wound dressing 2 may form part of wound dressing system 1. The wound dressing 2 comprises an absorbent core layer 202 with a proximal surface 202A and a distal surface 202B; an electrode assembly 204, 204A, 204B comprising a plurality of electrodes arranged on a distal side of the absorbent core layer 202; and a top layer 206 at least partly on a distal side of the electrode assembly. The wound dressing comprises a monitor interface 207 configured to connect electrodes of the wound dressing to terminals of monitor device.

Fig. 5 is a proximal view of an exemplary and schematic electrode assembly of wound dressing 2. The electrode assembly 204 comprises a first support layer 208 and a plurality of electrodes printed on a proximal surface 208A of the first support layer, i.e. the plurality of electrodes is arranged on a distal side of the absorbent core layer of the wound dressing. 202. The plurality of electrodes comprises a first set 210 of nine first electrodes 210A, …, 210I and a second set 212 of a second electrode 212A. A sensing part of a first electrode and a sensing part of a second electrode forms a sensor point. The electrode assembly 204 comprises nine sensor points 214 arranged on the proximal surface of the first support layer and distributed along a distal surface of the absorbent core layer, e.g. as shown with nine sensor points arranged in a 3x3 matrix sensor point configuration.

The electrode assembly 204 comprises a first masking layer 216 covering and isolating electrode parts of the first electrodes 210A, ..., 210l and the second electrode 212A. The first masking layer 216 is printed on the first support layer/electrodes and comprises a number of sensor point openings to form respective sensor points of the electrode assembly by exposing sensing parts of first electrodes 210A, ..., 210l and second electrode 212A.

The second electrode 212A operates as a reference electrode (ground) for the first electrodes 210A, ..., 210l and forms a part of the respective sensor points 214 of electrode assembly 204. The sensor points 214 are arranged with a distance between two neighbouring sensor points in the range from 3 mm to 50 mm, e.g. with a center-to-center distance of 30 mm.

Each electrode 210A, ..., 210l , 212 has a respective connection part (connection parts indicated with dashed box 215 for forming a connection to monitor device via a wired or wireless monitor interface of the wound dressing.

Fig. 6 shows a more detailed view of a sensor point 214 of an electrode assembly, e.g. electrode assembly 204, see dashed box in Fig. 5. The sensor point 214 is formed by a first sensing part 218 of a first electrode and a second sensing part 220 of a second electrode. The first sensing part 218 and the second sensing part 220 are exposed to the absorbent core layer of the wound dressing through sensor point opening 222 of the first masking layer 216. Thus, exudate or other fluid reaching the distal surface of the absorbent core layer short-circuits the first sensing part 218 and the second sensing part 220. In the illustrated electrode assembly, the sensor point opening 222 is circular with a radius in the range from 2 to 10 mm.

Fig. 7 is a schematic cross-section of an exemplary wound dressing. The wound dressing 2A comprises a first adhesive layer 150 with a proximal surface 150A configured for attachment of the wound dressing to the skin surface of a user. The wound dressing 2A may form part of wound dressing system 1. The wound dressing 2A comprises an absorbent core layer 202 with a proximal surface 202A and a distal surface 202B; and an electrode assembly 204A comprising a plurality of electrodes arranged on a distal side of the absorbent core layer 202, wherein the plurality of electrodes comprises a first set of first electrodes arranged on a proximal surface 208A and/or distal surface 208B of first support layer 208. The electrode assembly 204A comprises a second support layer 224,

and the plurality of electrodes comprises a second set of second electrodes arranged on a proximal surface and/or distal surface of second support layer 208. The electrode assembly 204A comprises a spacing layer 226 arranged between the first support layer 208 and the second support layer 224. Further, a top layer 206 is arranged at least partly on a distal side of the electrode assembly 204A. The wound dressing 2A comprises a monitor interface 207A configured to connect electrodes of the wound dressing to terminals of monitor device.

Fig. 8 shows a proximal view of an exemplary first support layer 208, e.g. of electrode assembly 204, electrode assembly 204A, electrode assembly 204B. The electrode assembly comprises three first electrodes 210A, 210B, 210C printed on the proximal surface 208A of the first support layer 208, wherein each electrode 210A, 210B, 210C comprises three first sensing parts 218 exposed through respective sensor point openings of first masking layer, see Fig. 9. The first support layer 208 has a plurality of sensor point openings 250 for allowing exudate to pass through the first support layer (from proximal side to distal side) and reach sensing parts of second electrodes arranged on the distal side or distal surface of the first support layer 208. Each sensor point opening 250 is optionally centered in a respective first sensing part 218 of a first electrode. Each first electrode 210A, 210B, and 210C has a connection part 252 for connection to or forming part of a monitor interface of the wound dressing. In one or more exemplary electrode assemblies, e.g. electrode assemblies 204A, 204B shown in Fig. 7, the first electrodes 210A, 210B, 210C may be printed on the distal surface 208B of the first support layer 208.

Fig. 9 shows a proximal view of an exemplary first masking layer 216 of electrode assembly with first support layer of Fig. 8. The first masking layer 216 is printed on the proximal surface/distal surface of first support layer partly covering first electrodes 210A, 210B, and 210C of the electrode assembly. The first masking layer comprises nine sensor point openings 222 arranged to fit a 3x3 matrix sensor point configuration and respectively aligned with first sensing parts 218 of first electrodes 210A, 210B, 210C.

Fig. 10 shows a proximal view of an exemplary second support layer 224, e.g. of electrode assembly 204A. The electrode assembly comprises three second electrodes 212A, 212B, 212C printed on proximal surface 224A of the second support layer 224, wherein each electrode 212A, 212B, 212C comprises three second sensing parts 220 exposed through respective sensor point openings of second masking layer, see Fig. 11. Optionally, the second support layer 224 has a plurality of sensor point openings 254 for

allowing exudate to pass through the second support layer (from proximal side to distal side). Each sensor point opening 254 is optionally centered in a respective second sensing part 220 of a second electrode. Each second electrode 212A, 212B, and 212C has a connection part 256 for connection to or forming part of a monitor interface of the wound dressing.

Fig. 11 shows a proximal view of an exemplary second masking layer 270 of electrode assembly 204A. The second masking layer 270 is printed on the proximal surface 224A of the second support layer 224 partly covering second electrodes 212A, 212B, and 212C of the electrode assembly. The second masking layer 270 comprises nine sensor point openings 272 arranged to fit a 3x3 matrix sensor point configuration and respectively aligned with second sensing parts 220 of second electrodes 212A, 212B, 212C. Referring back to Figs. 7-11, the first sensing parts 218 of first electrodes 210A, 210B, 210C are respectively aligned with a second sensing part 220 of second electrodes 212A, 212B, 212C to form sensor points.

Fig. 12 shows a distal view of an exemplary second support layer 224, e.g. of electrode assembly 204B. The electrode assembly comprises three second electrodes 212A, 212B, 212C printed on distal surface 224B of the second support layer 224, wherein each electrode 212A, 212B, 212C comprises three second sensing parts 220 optionally exposed through respective sensor point openings of second masking layer, see Fig. 13. The second support layer 224 has a plurality of sensor point openings 254 for allowing exudate to pass through the second support layer (from proximal side to distal side) and reach second sensing parts 220 of second electrodes arranged on the distal side or distal surface of the second support layer 224. Each sensor point opening 254 is optionally centered in a respective second sensing part 220 of a second electrode. Each second electrode 212A, 212B, and 212C has a connection part 256 for connection to or forming part of a monitor interface of the wound dressing.

Fig. 13 shows a proximal view of an exemplary and optional second masking layer 270A of electrode assembly 204B or a second masking layer 270A of electrode assembly 204. The second masking layer 270A is printed on the distal surface 224B of the second support layer 224 or on distal surface 208B of the first support layer 208 partly covering second electrodes 212A, 212B, and 212C of the electrode assembly. The second masking layer 270A comprises nine sensor point openings 272 arranged to fit a 3x3 matrix sensor point configuration and respectively aligned with second sensing parts 220

of second electrodes 212A, 212B, 212C. Referring back to Figs. 4 and 7-11, the first sensing parts 218 of first electrodes 210A, 210B, 210C are respectively aligned with a second sensing part 220 of second electrodes 212A, 212B, 212C to form sensor points.

Fig. 14 shows a distal view of an exemplary first support layer 208 of an electrode assembly, e.g. of electrode assembly 204. The electrode assembly comprises three second electrodes 212A, 212B, 212C printed on distal surface 224B of the first support layer 208, wherein each second electrode 212A, 212B, 212C comprises three second sensing parts 220 optionally exposed through respective sensor point openings of second masking layer, see Fig. 13. The first support layer 208 has a plurality of sensor point openings 250 for allowing exudate to pass through the first support layer (from proximal side to distal side) and reach second sensing parts 220 of second electrodes arranged on the distal side or distal surface of the first support layer 208. Each sensor point opening 250 is optionally centered in a respective second sensing part 220 of a second electrode. Each second electrode 212A, 212B, and 212C has a connection part 256 for connection to or forming part of a monitor interface of the wound dressing.

Fig. 15 illustrates a schematic cross-section of a part of a wound dressing comprising an exemplary monitor interface 207. The monitor interface 207 comprises a number of terminals formed by connection parts 252, 256 of first electrodes and second electrodes arranged on proximal and/or distal side of first support layer 208 of the electrode assembly. A first part 280 of electrode assembly 204 extends through a top layer opening 282 in the top layer 206 and outside the absorbent core layer 202 when seen in radial direction R. The connection parts 252, 256 of the electrode assembly are external to the top layer 206 and form terminals of the monitor interface 207. The monitor interface 207 comprises coupling part 284 attached to the electrode assembly 204 by gluing or welding of the coupling part 284 to the distal surface of the first support layer 208 and to the distal surface of the top layer 206.

Fig. 16 is a distal view of a part of a wound dressing with monitor interface 207. The coupling part 284 comprises a first part 286 glued to the first support layer and a second part 288 glued or welded to the distal surface of the top layer 206.

Fig. 17 illustrates a schematic cross-section of a part of a wound dressing comprising an exemplary monitor interface 207A. The monitor interface 207A comprises a number of terminals formed by connection parts 252 of first electrodes arranged on the proximal

surface of first support layer 208 and connection parts 256 of second electrodes arranged on the distal surface of the second support layer 224 of the electrode assembly. The electrode assembly comprises a reinforcement element 290 forming a part of the first part 280 of the electrode assembly. The first part 280 extends through top layer opening 282 in the top layer 206 and outside the absorbent core layer 202 when seen in radial direction R. The monitor interface 207A comprises a coupling part 284 welded to the distal surface of top layer and accommodating/supporting the first part 280 including the reinforcement element 290 and at part of the support layers 208, 224.

A first part 280 of electrode assembly 204 extends through a top layer opening 282 in the top layer 206 and outside the absorbent core layer 202 when seen in radial direction R. The connection parts 252, 256 of the electrode assembly are external to the top layer 206 and form terminals of the monitor interface 207. The monitor interface 207 comprises coupling part 284 attached to the electrode assembly 204 by gluing or welding of the coupling part 284 to the distal surface of the first support layer 208 and to the distal surface of the top layer 206. The first part 280 of the electrode assembly extends into the coupling part 284.

Fig. 18 is a distal view of a part of a wound dressing with monitor interface 207A. The coupling part 284 is welded to the distal surface of the first support layer 206.

Fig. 19 illustrates a schematic cross-section of a part of an exemplary wound dressing. The wound dressing 2B comprises a top layer 206; a first adhesive layer 150 with a proximal surface configured for attachment of the wound dressing to the skin surface of a user; an absorbent core layer 150; an electrode assembly 204, 204A, 204B comprising a plurality of electrodes arranged on a distal side of the absorbent core layer 202 in a second part 281 of the electrode assembly; and a monitor interface 207B configured for connecting the wound dressing to a monitor device, the monitor interface 207B comprising a coupling part 284 and a plurality of terminals 292 formed by connection parts of electrodes of the electrode assembly 204, 204A, 204B, wherein the terminals 292 are configured to form electrical connections with respective terminals of the monitor device. The wound dressing 2B comprises a flexible element 294, the flexible element being bendable and/or twistable between a first flexible element end 296 and a second flexible element end 298, wherein the coupling part 284 is positioned at the first flexible element end 296. The first part 280 of the electrode assembly at least partly forms the first flexible element 296. Optionally, a flexible reinforcement element (not shown) forms a part of the

flexible element. The reinforcement element (not shown) may be arranged on the distal side and/or on the proximal side of the electrode assembly. The flexible reinforcement element may be a sleeve.

The coupling part 284 is configured to engage with the monitor device by a linear motion in an engagement direction X_1 of the monitor device relative to the wound dressing. The engagement direction X_1 is substantially parallel to a longitudinal direction of the flexible element at the first flexible element end.

Optionally, the wound dressing comprises a first attachment element 300, e.g. a hook or loop element, and/or a second attachment element 302 e.g. a hook or loop element, wherein the first attachment element 300 is positioned near or at the first flexible element end 296, e.g. on coupling part 284, and the second attachment element 302 extends on the distal side 206B of the top layer, the first attachment element 300 being configured to attach to the second attachment element 302.

Fig. 20 is a distal view of a part of wound dressing 2B with monitor interface 207B.

Fig. 21 schematically illustrates a flexible element 294 and a coupling part 284 (monitor interface) of a wound dressing, such as the wound dressing 2B. The coupling part 284 is positioned at a first flexible element end 296 of the flexible element 294. Fig. 21 also schematically illustrates a monitor device 4 for coupling with the wound dressing 2B.

The monitor device 4 and/or the wound dressing 2B comprises a locking mechanism configured to lock the monitor device 4 in a coupled position with the wound dressing 2B. The locking mechanism comprises a locking element 304. The locking element 304 is provided on the coupling part 284 of the wound dressing 2B. However, in another exemplary monitor device and/or wound dressing, the locking element 304 may be provided on monitor device 4.

The locking element 304, in the illustrated example, comprises a slider slidable in a first slider direction XS_1 and/or a second slider direction XS_2. The first slider direction XS_1 and the second slider direction XS_2 are, in the illustrated example, substantially parallel to the engagement direction X_1412 and the disengagement direction X_2. The locking element 304 is configured to unlock and/or lock the locking mechanism, such as to unlock the monitor device 4 in the coupled position with the wound dressing and/or to lock the

monitor device 4 in the coupled position with the wound dressing 2B. For example, sliding the slider in the first slider direction XS_1 may unlock the monitor device 4 in the coupled position with the wound dressing 2B, and sliding the slider in the second slider direction XS_2 may lock the monitor device 4 in the coupled position with the wound dressing 2B. Alternatively, the slider may be biased, e.g. spring loaded, towards the second slider direction XS_2, and sliding the slider in the first slider direction XS_1 may unlock the monitor device 4 in the coupled position with the wound dressing 2B. The monitor device 4 optionally comprises an attachment element (not shown, optionally arranged on proximal side of monitor device), such as a look or hook element, configured to attach to the wound dressing, such as to attach to the second attachment element of wound dressing. In one or more exemplary wound dressings, the attachment element of the monitor device is a button element to form a button coupling with the second attachment element.

The use of the terms “first”, “second”, “third” and “fourth”, “primary”, “secondary”, “tertiary”, “quaternary”, “quinary” etc. does not imply any particular order, but are included to identify individual elements. Moreover, the use of the terms “first”, “second”, “third” and “fourth”, “primary”, “secondary”, “tertiary” etc. does not denote any order or importance, but rather the terms “first”, “second”, “third” and “fourth”, “primary”, “secondary”, “tertiary” etc. are used to distinguish one element from another. Note that the words “first”, “second”, “third” and “fourth”, “primary”, “secondary”, “tertiary” etc. are used here and elsewhere for labelling purposes only and are not intended to denote any specific spatial or temporal ordering. Furthermore, the labelling of a first element does not imply the presence of a second element and vice versa.

Although particular features have been shown and described, it will be understood that they are not intended to limit the claimed invention, and it will be made obvious to those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the claimed invention. The specification and drawings are, accordingly to be regarded in an illustrative rather than restrictive sense. The claimed invention is intended to cover all alternatives, modifications, and equivalents.

List of references

1 wound dressing system

2, 2A, 2B wound dressing

4 monitor device

6 accessory device

8 server device

10 network

100 monitor device housing

101 processor 101

102 first interface (wound dressing interface)

104 second interface (accessory interface)

106 memory

110 first terminal

112 second terminal

114 third terminal

116 fourth terminal

118 fifth terminal

119 sixth terminal

120 coupling part

121 power unit

122 antenna

124 wireless transceiver

126 loudspeaker

128 haptic feedback element

140 sensor unit

150 first adhesive layer

150A proximal surface of the first adhesive layer

152 perforations of first adhesive layer

154 absorbing region

202 absorbent core layer

202A proximal surface of absorbent core layer

202B distal surface of absorbent core layer

204, 204A, 204B electrode assembly

206 top layer

207, 207A, 207B monitor interface

208 first support layer

208A proximal surface of first support layer

208B distal surface of first support layer

210 first set of first electrodes

210A, 210B, 210C, 210D, 210E, 210F, 210G, 210G, 210I first electrode

212 second set of second electrodes

212A, 212B, 212C second electrode

214 sensor point

215 connection parts of plurality of electrodes

216 first masking layer

218 first sensing part of first electrode

220 second sensing part of second electrode

222 sensor point opening of first masking layer

224 second support layer

224A proximal surface of second support layer

224B distal surface of second support layer

226 spacing layer

250 sensor point opening of first support layer

252 connection point/part of first electrode

254 sensor point opening of second support layer

256 connection point/part of second electrode

270, 270A second masking layer

272 sensor point openings

280 first part of electrode assembly

281 second part of electrode assembly

282 top layer opening

284 coupling part

286 first part of coupling part

288 second part of coupling part

290 reinforcement element

292 terminals of monitor interface

294 flexible element

296 first flexible element end

298 second flexible element end

300 first attachment element

302 second attachment element

304 locking element

X_1 engagement direction

X_2 disengagement direction

XS_1 first slider direction

XS_2 second slider direction

5

Claims

1. A wound dressing comprising:

a top layer;

a first adhesive layer with a proximal surface configured for attachment of the wound dressing to the skin surface of a user;

an absorbent core layer;

an electrode assembly comprising a plurality of electrodes arranged on a distal side of the absorbent core layer; and

a monitor interface configured for connecting the wound dressing to a monitor device, the monitor interface comprising a plurality of terminals configured to form electrical connections with respective terminals of the monitor device,

wherein the wound dressing comprises a flexible element, the flexible element being bendable and/or twistable between a first flexible element end and a second flexible element end, and wherein the monitor interface comprises a coupling part positioned at the first flexible element end.

2. Wound dressing according to claim 1, wherein a first part of the top layer and a first part of the electrode assembly at least partly forms the first flexible element.

3. Wound dressing according to any of claims 1-2, wherein the coupling part is configured to engage with the monitor device by a linear motion in an engagement direction of the monitor device relative to the wound dressing.

4. Wound dressing according to claim 3, wherein the engagement direction is substantially parallel to a longitudinal direction of the flexible element at the first flexible element end.

5. Wound dressing according to any of claims 1-4, wherein the wound dressing comprises a locking mechanism configured to lock the monitor device in a coupled position with the wound dressing.

6. Wound dressing according to claim 5, wherein the locking mechanism is biased towards locking of the locking mechanism

7. Wound dressing according to any of claims 5-6, wherein the locking mechanism comprises a locking element configured to unlock and/or lock the locking mechanism upon user interaction with the locking element.

8. Wound dressing according to claim 7 as dependent on claim 3, wherein the locking element comprises a first button being deflectable in a first direction, wherein the first direction is substantially perpendicular to the engagement direction.

9. Wound dressing according to claim 7, wherein the locking element comprises a first button and a second button, the first button being deflectable in a first direction and the second button being deflectable in a second direction, wherein the first direction is substantially opposite the second direction.

10. Wound dressing according to claim 9 as dependent on claim 3, wherein the first direction and the second direction are substantially perpendicular to the engagement direction.

11. Wound dressing according to any of claims 7-10, wherein the locking element comprises a slider being slidable in a first slider direction, and wherein the slider is spring loaded and biased towards a second slider direction, wherein the first slider direction is opposite the second slider direction.

12. Wound dressing according to claim 11 as dependent on claim 3, wherein the first slider direction and the second slider direction are substantially parallel to the engagement direction.

13. Wound dressing according to any of the preceding claims, the wound dressing comprising a first attachment element and a second attachment element, wherein the first attachment element is positioned at the first flexible element end and the second attachment element extends on the distal side of the top layer, the first attachment element being configured to attach to the second attachment element.

14. Wound dressing according to claim 13, wherein the first attachment element is in the form of a clamp configured to clamp to the second attachment element.

15. Wound dressing according to claim 13, wherein the first attachment element and the second attachment element form a hook-and-loop coupling.

16. Wound dressing according to claim 13, wherein the first attachment element and the second attachment element form a magnetic coupling.

17. Wound dressing according to any of claims 1-16, wherein the coupling part is configured for forming a mechanical connection, such as a releasable coupling, between the monitor device and the wound dressing.

18. A monitor device for connecting to a wound dressing, the monitor device comprising:

a monitor device housing;

electronic circuitry; and

a wound dressing interface configured for connecting the monitor device to the wound dressing, the wound dressing interface comprising a plurality of terminals for connecting with a plurality of electrodes of the wound dressing, the wound dressing interface comprising a monitor device coupling part configured for coupling between the monitor device and the wound dressing,

wherein the monitor device comprises an attachment element configured to attach to the wound dressing.

19. Monitor device according to claim 18, wherein the attachment element is in the form of a clamp configured to clamp to an attachment element of the wound dressing.

20. Monitor device according to claim 18, wherein the attachment element is in the form of a slit configured to receive an attachment element of the wound dressing.

21. Monitor device according to claim 18, wherein the attachment element is in the form of a hook element or a loop element configured to engage in a hook and loop coupling with the wound dressing.

22. Monitor device according to claim 18, wherein the attachment element is in the form of a magnetic material configured to magnetically attach to an attachment element of the wound dressing.

23. Monitor device according to any of claims 18-22, wherein the monitor device coupling part is configured to engage with the wound dressing by a linear motion in an engagement direction of the monitor device relative to the wound dressing.

24. Monitor device according to any of claims 18-23, the monitor device comprising a locking mechanism configured to lock the monitor device in a coupled position with the wound dressing.

25. Monitor device according to claim 24, wherein the locking mechanism is biased towards locking of the locking mechanism.

26. Monitor device according to any of claims 24-25, wherein the locking mechanism comprises a locking element configured to unlock or lock the locking mechanism upon user interaction with the locking element.

27. Monitor device according to claim 25 as dependent on claim 23, wherein the locking element comprises a first button being deflectable in a first direction, wherein the first direction is substantially perpendicular to the engagement direction.

28. Monitor device according to claim 27, wherein the locking element comprises a first button and a second button, the first button being deflectable in a first direction and the second button being deflectable in a second direction, wherein the first direction is substantially opposite the second direction.

29. Monitor device according to claim 28 as dependent on claim 23, wherein the first direction and the second direction are substantially perpendicular to the engagement direction.

30. Monitor device according to any of claims 26-29, wherein the locking element comprises a slider being slidable in a first slider direction, and wherein the slider is spring loaded and biased towards a second slider direction, wherein the first slider direction is opposite the second slider direction.

31. Monitor device according to claim 30 as dependent on claim 23, wherein the first slider direction and the second slider direction are substantially parallel to the engagement direction.

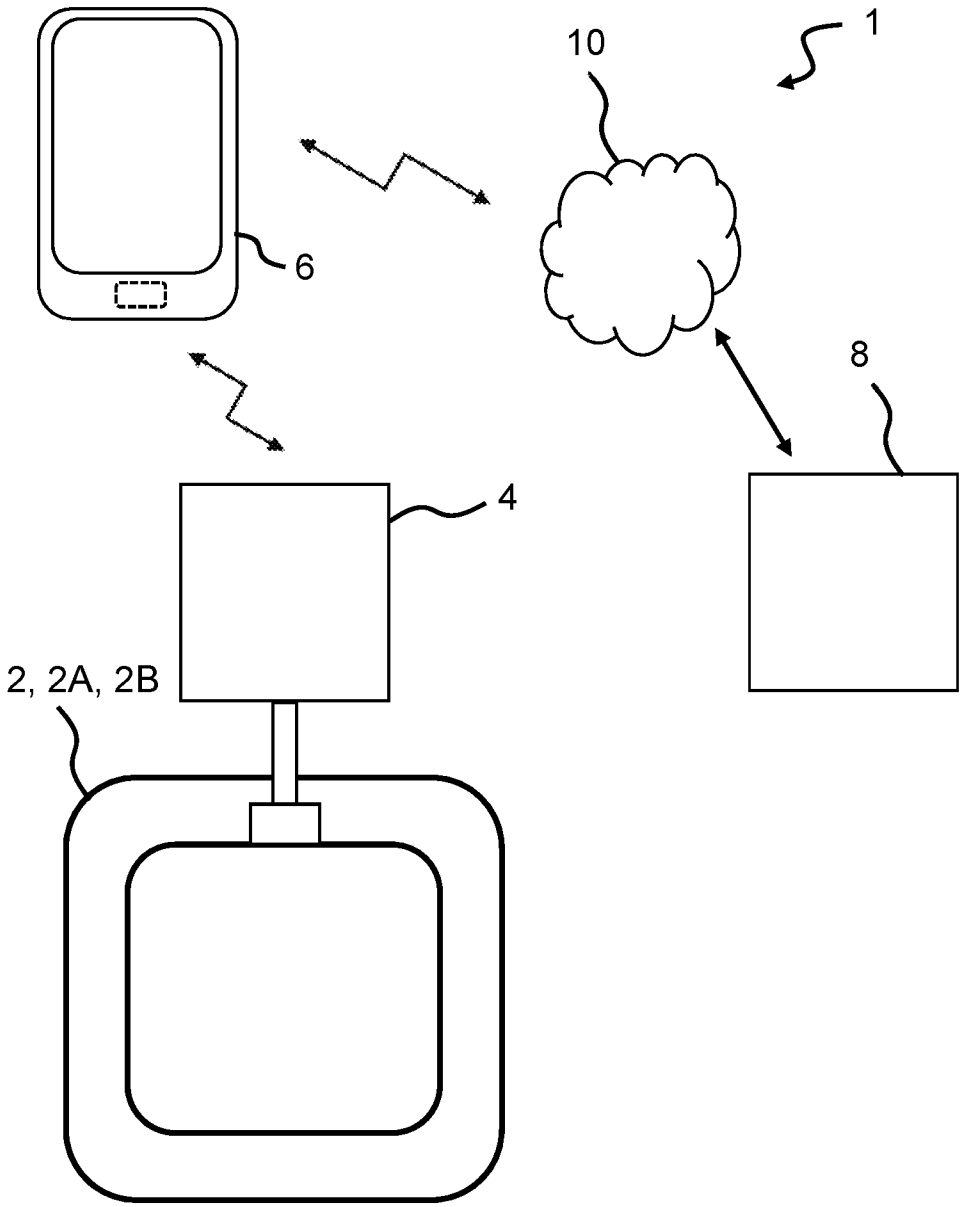


Fig. 1

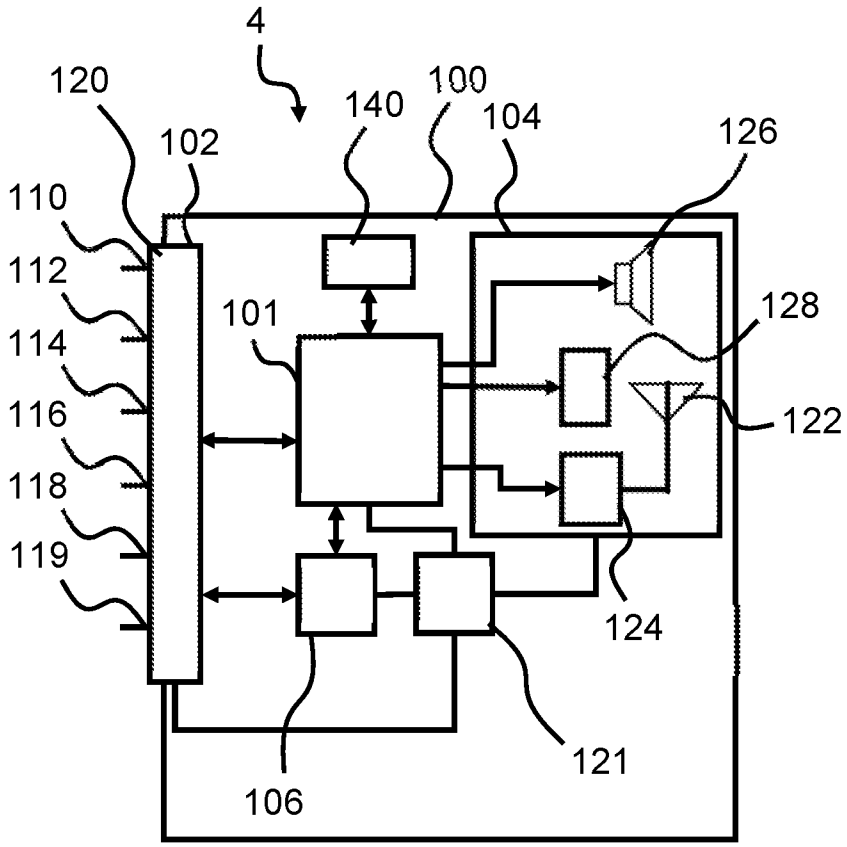

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Fig. 2

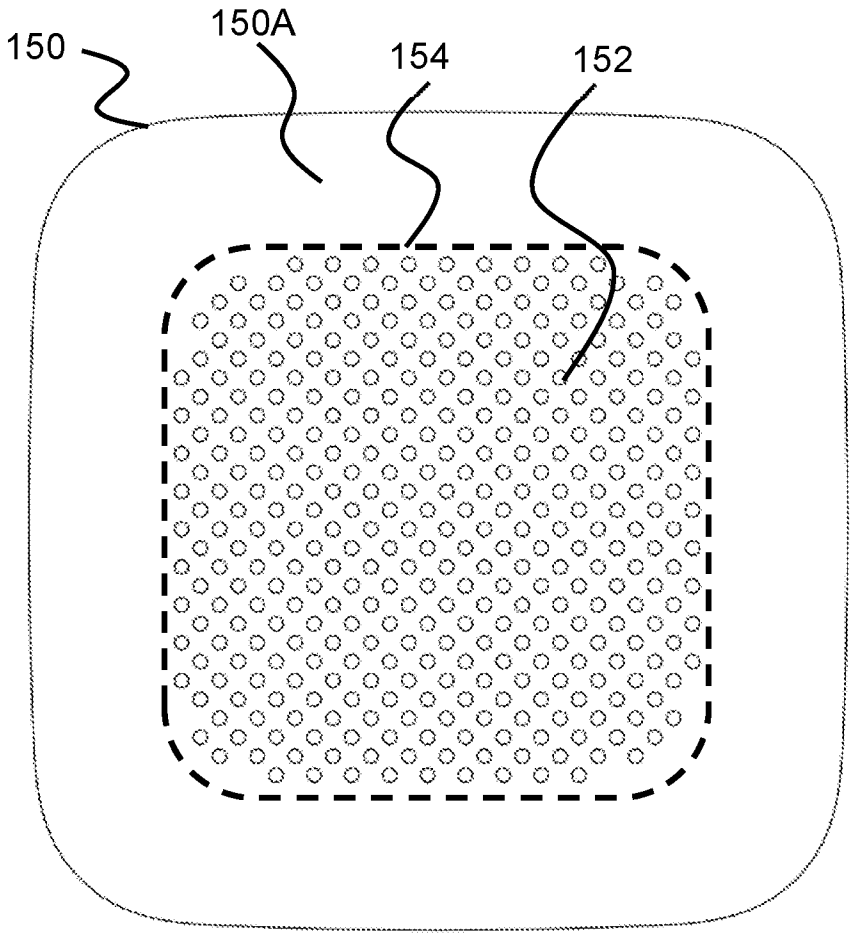

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Fig. 3

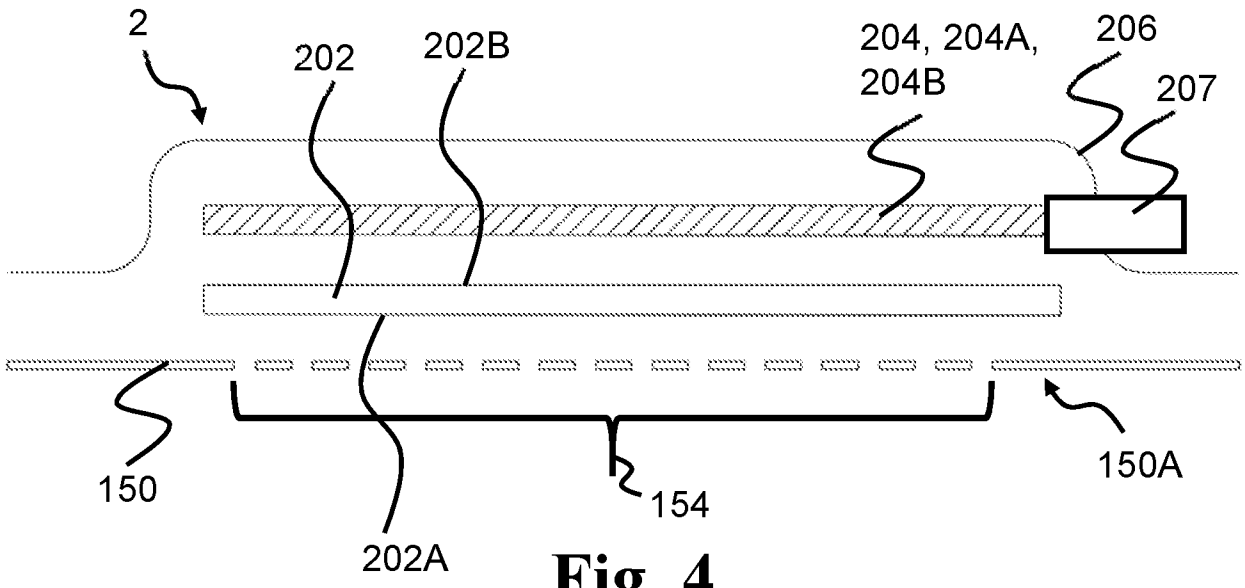

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Fig. 4

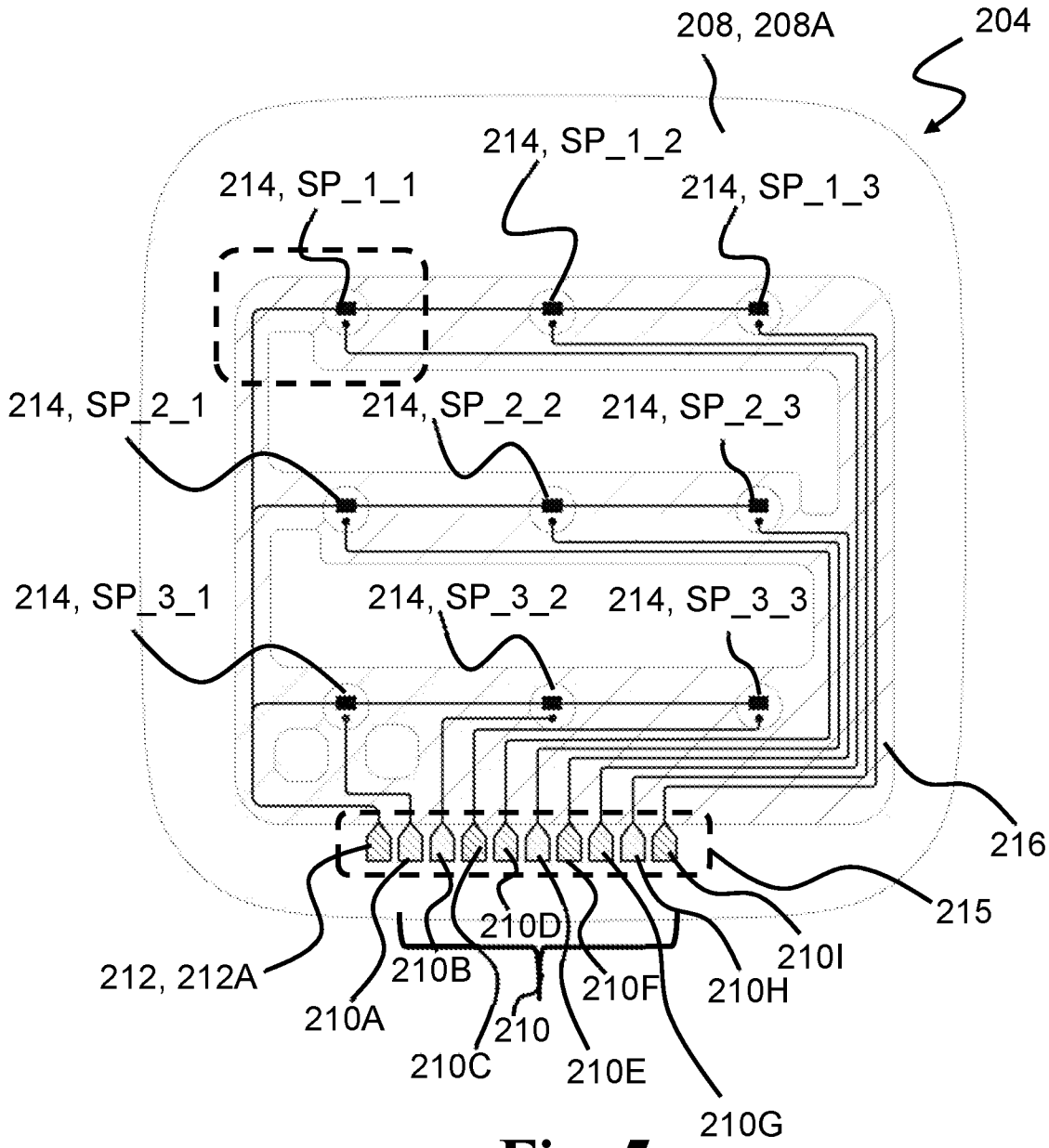

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214, SP_1_3
214, SP_2_1
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214, SP_3_3
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Fig. 5

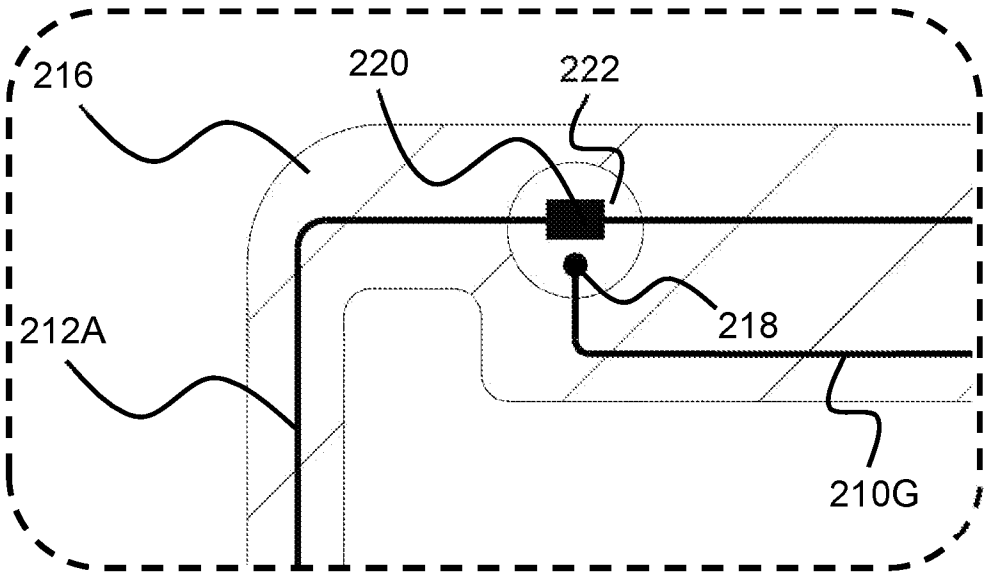

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Fig. 6

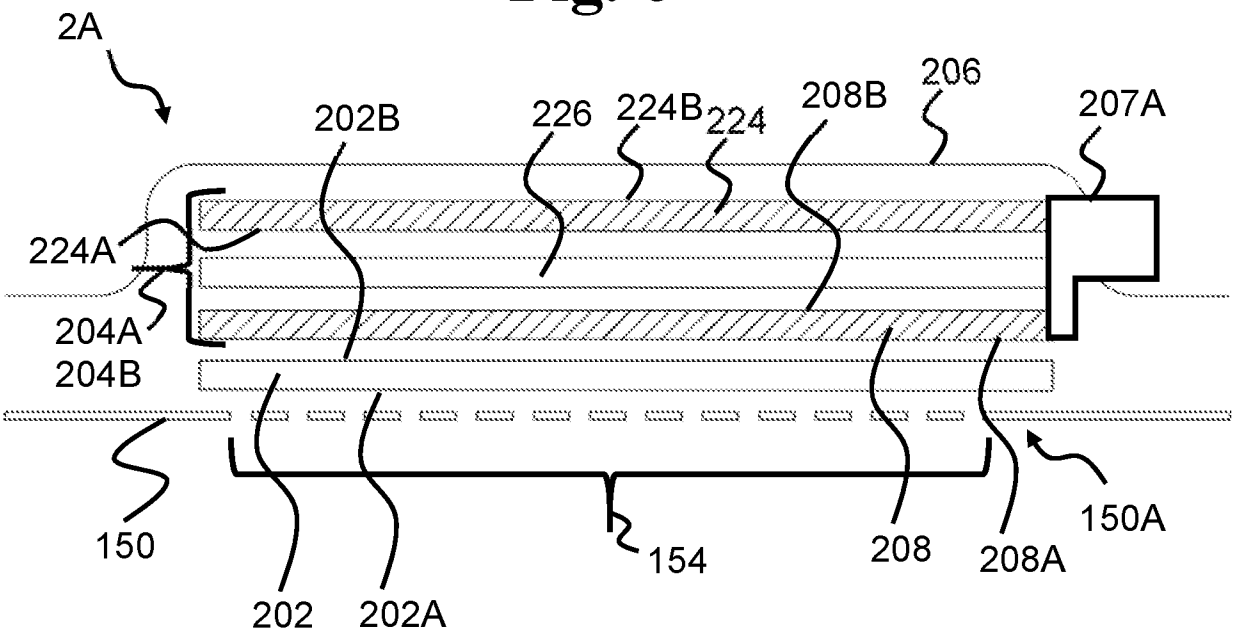

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Fig. 7

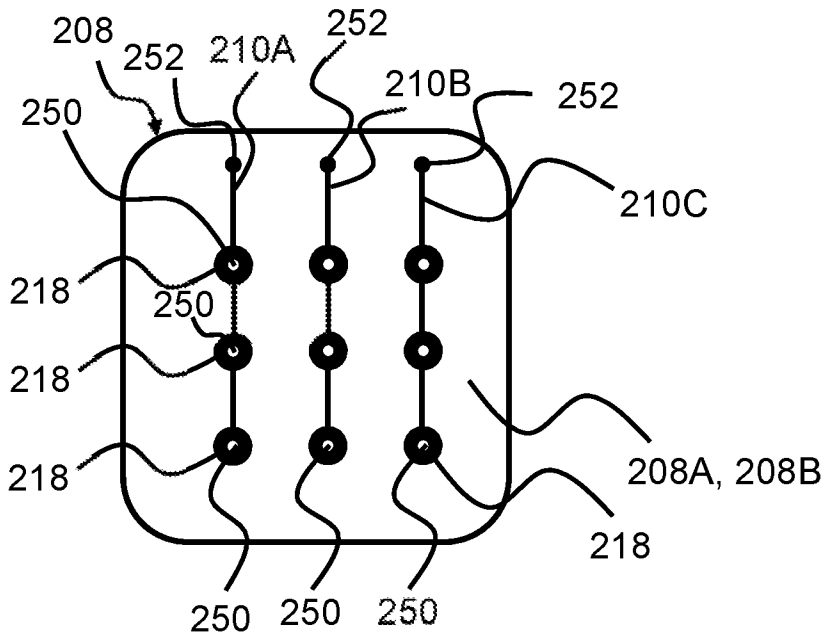

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Fig. 8

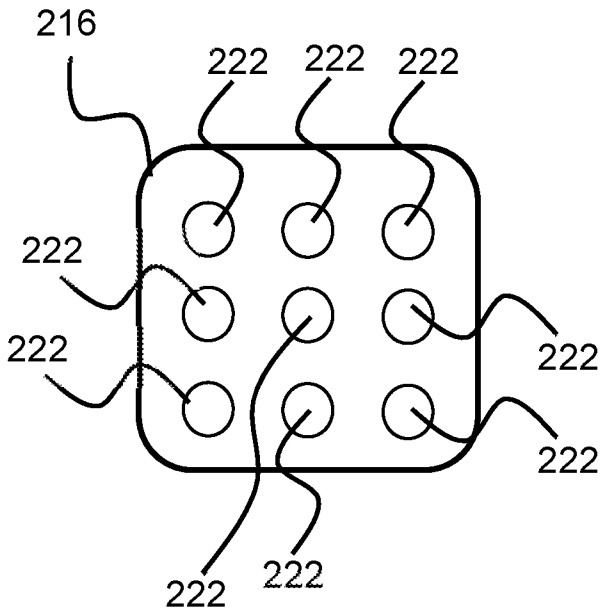

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Fig. 9

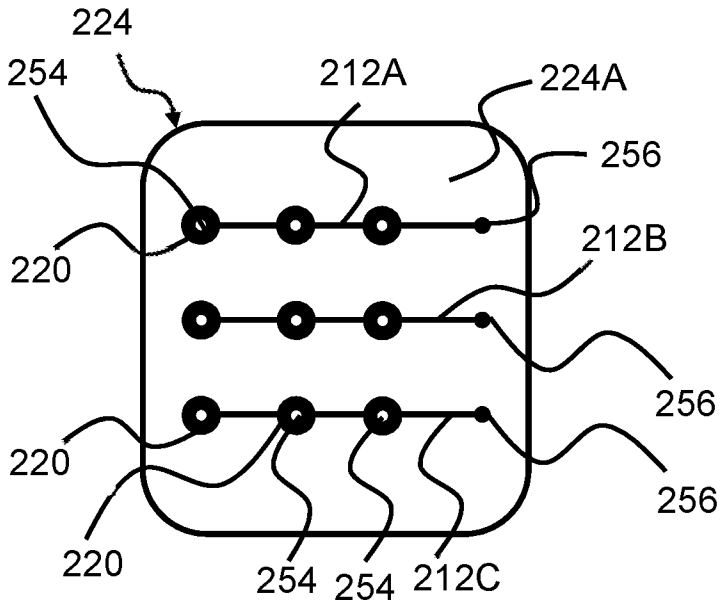

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Fig. 10

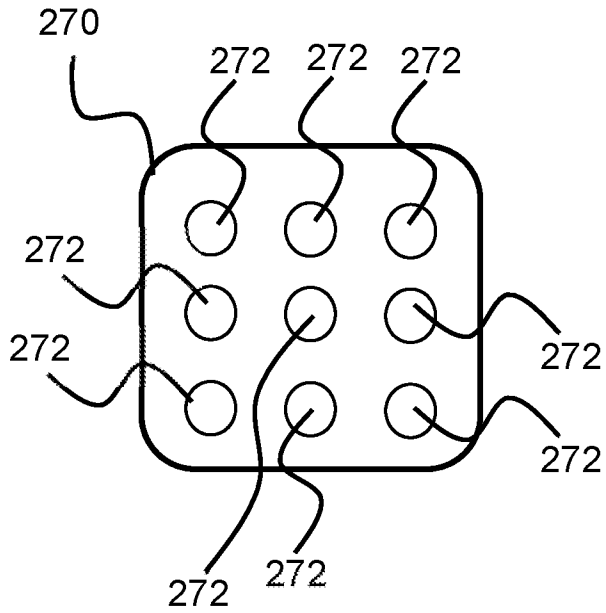

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Fig. 11

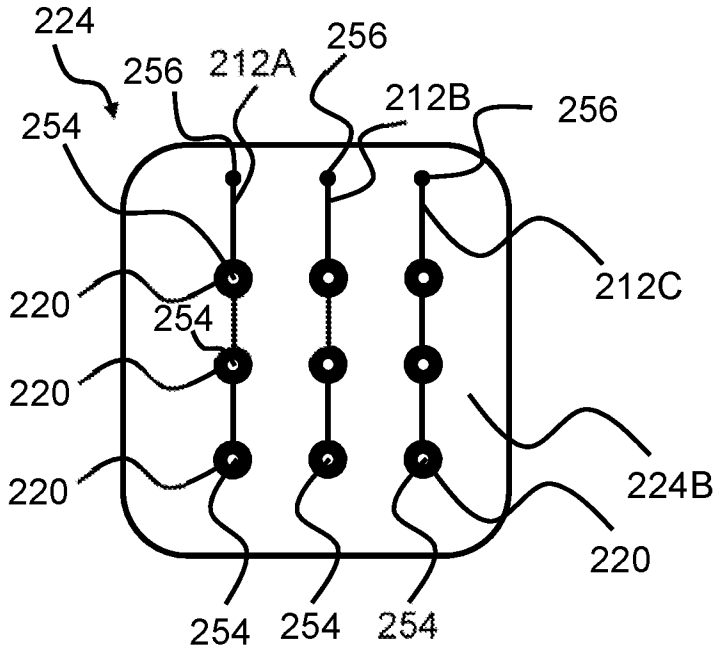

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Fig. 12

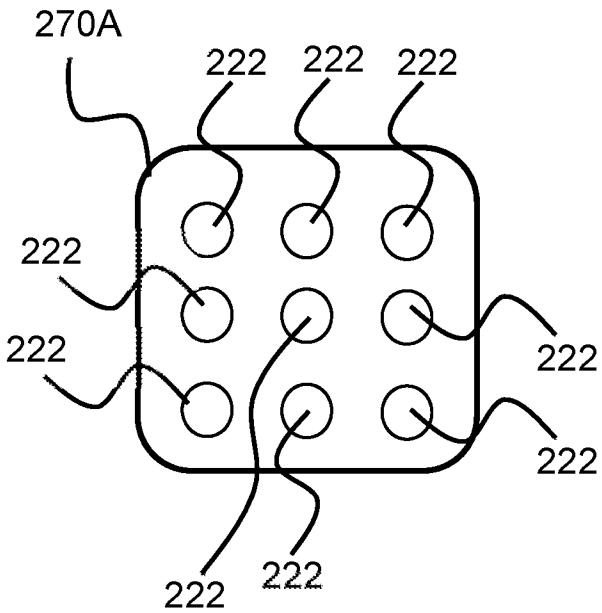

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Fig. 13

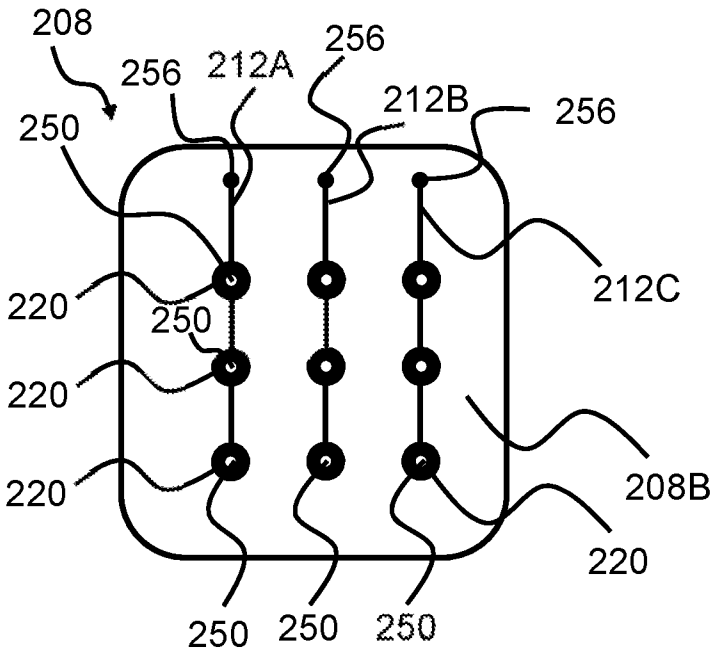

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Fig. 14

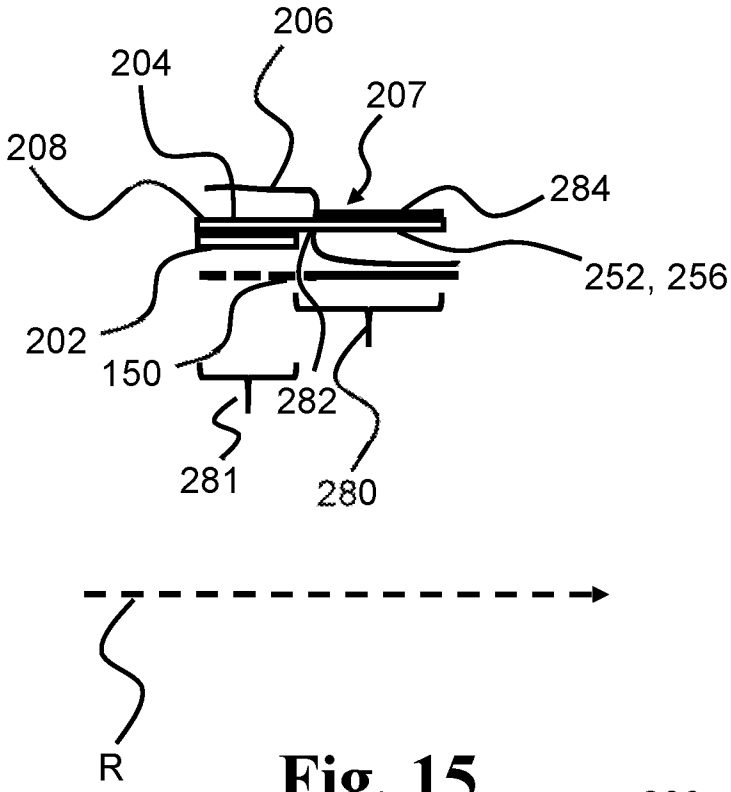

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Fig. 15

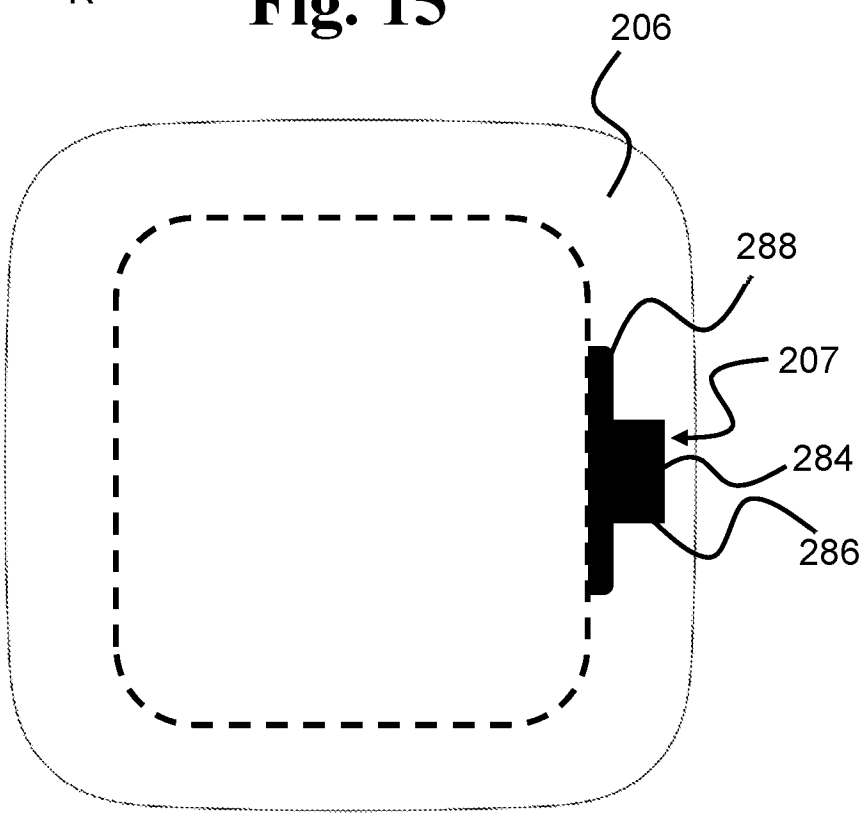

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Fig. 16

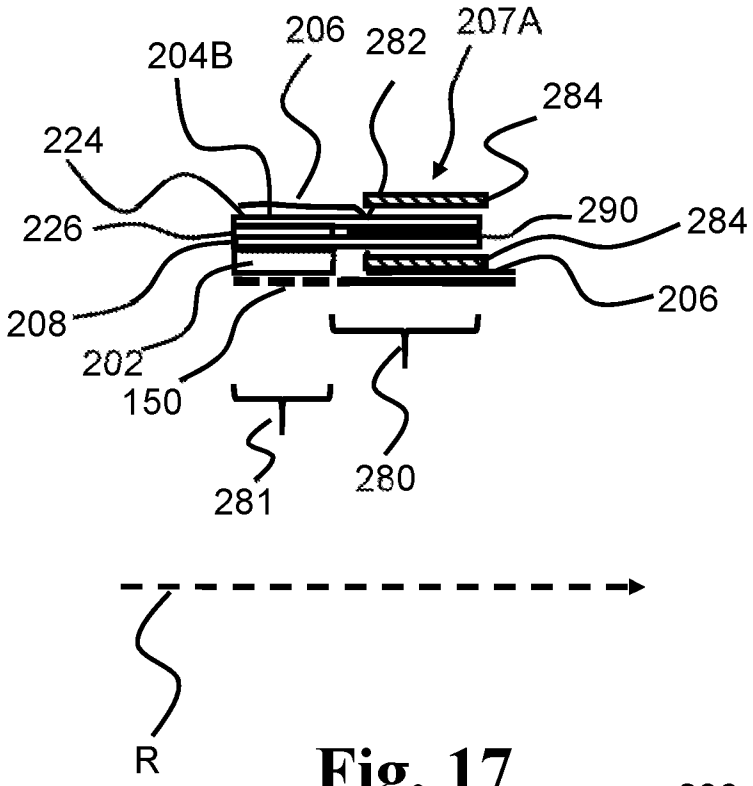

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Fig. 17

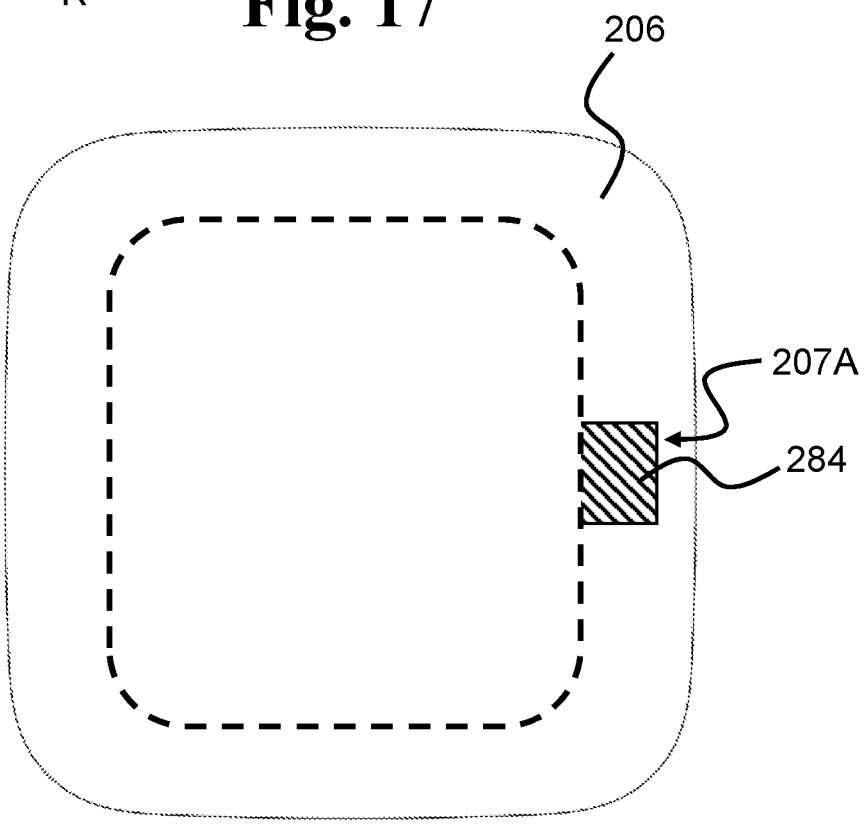

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Fig. 18

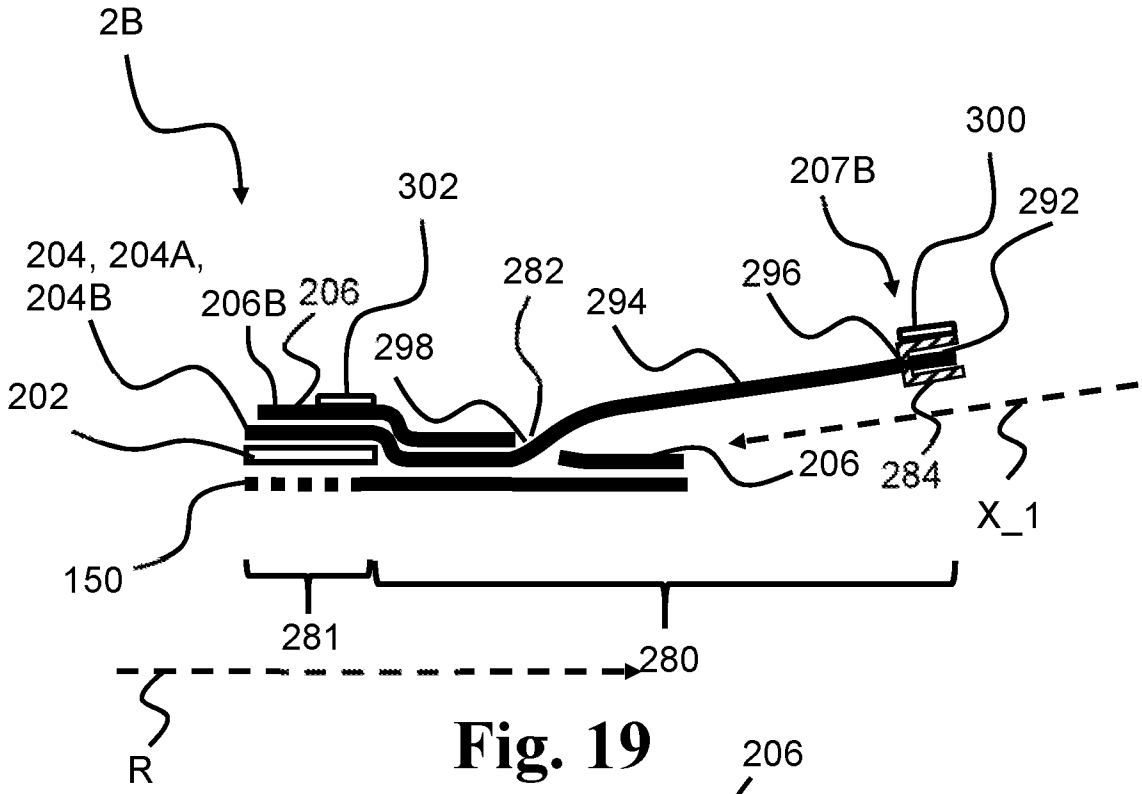

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Fig. 19

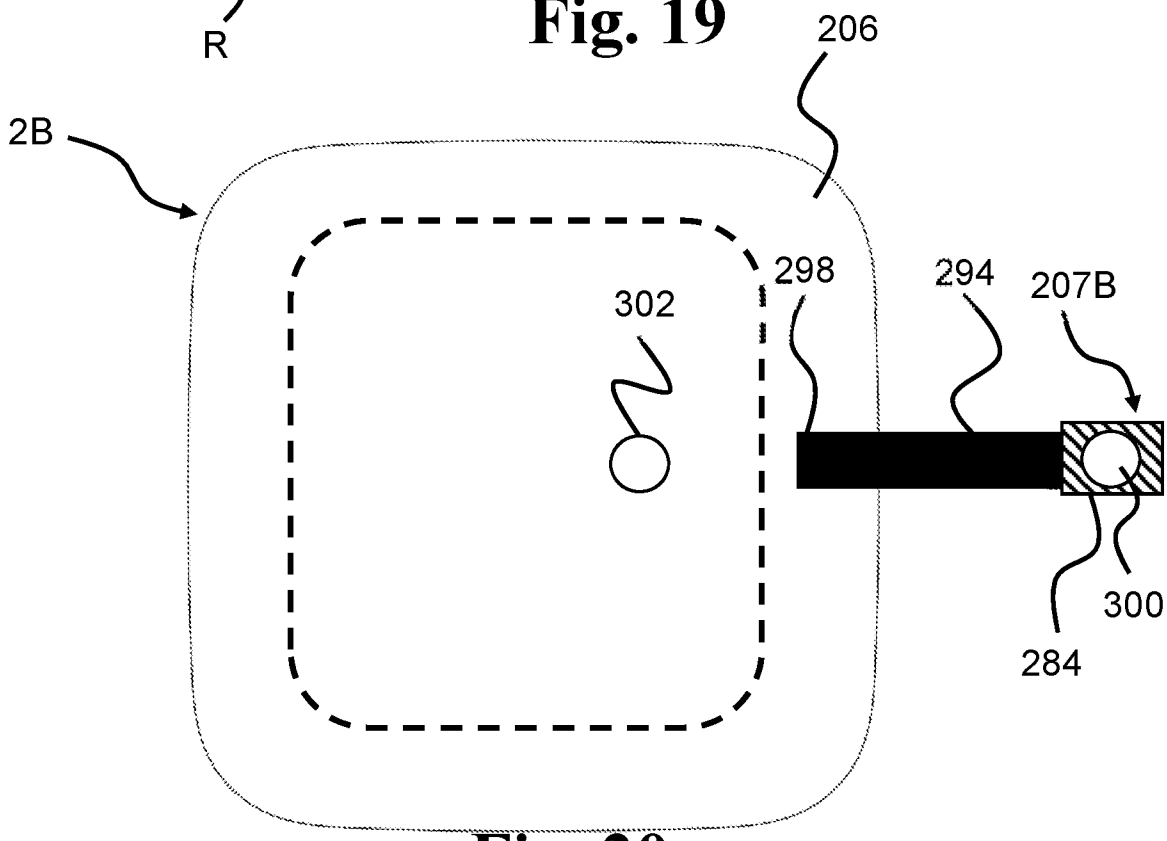

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Fig. 20

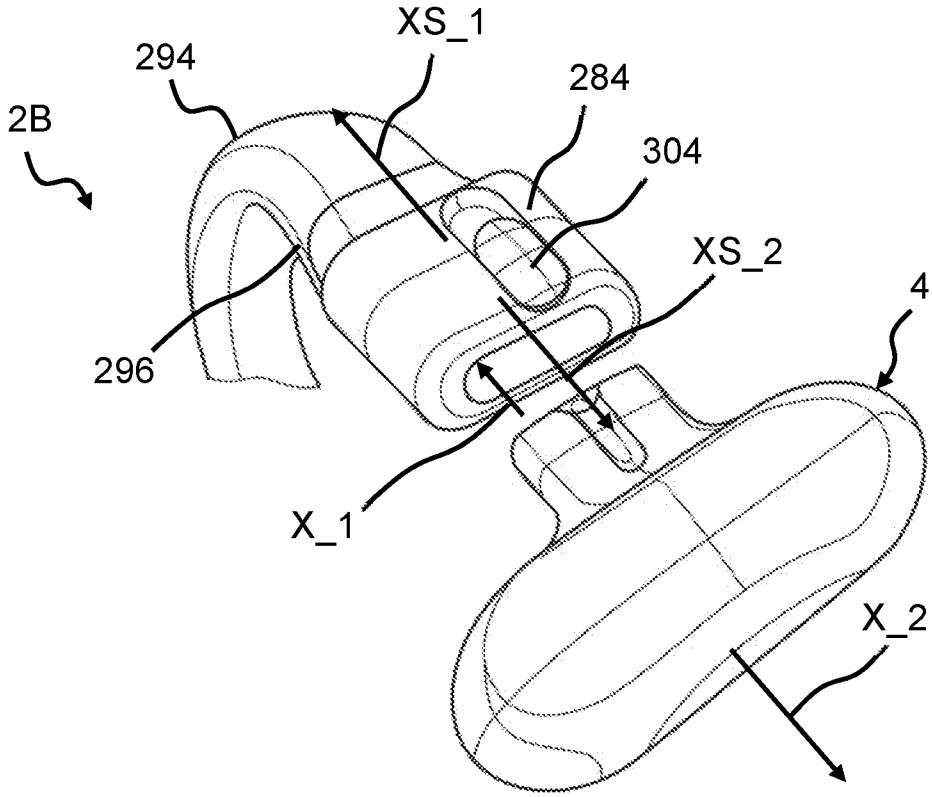


Fig. 21

INTERNATIONAL SEARCH REPORT

International application No
PCT/DK2019/050193

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R12/00
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)
H01R

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	US 2016/361209 A1 (MASHIN-CHI HADI [AU] ET AL) 15 December 2016 (2016-12-15) paragraphs [0059] - [0066]; figure 5	1-4, 13-23 5-12, 24-31
Y	US 2015/180169 A1 (YU WANG-I [TW] ET AL) 25 June 2015 (2015-06-25) paragraphs [0003] - [0032]; figure 2	5-10, 24-29
Y	US 5 993 238 A (KUDO TOSHIHARU [JP] ET AL) 30 November 1999 (1999-11-30) column 6, line 26 - column 7, line 55; figures 1-5	5-12, 24-31
A	US 2002/070868 A1 (JEUTTER DEAN CURTIS [US] ET AL) 13 June 2002 (2002-06-13) paragraph [0074]	13-17, 19-22

-/--

[X] Further documents are listed in the continuation of Box C.

[X] 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	Date of mailing of the international search report
20 August 2019	02/09/2019

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Trachterna, Morten

1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK2019/050193

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.:

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: 1-31

   Wound dressing and monitor device

1.1. claims: 1-17

   A wound dressing

1.2. claims: 18-31

   A monitor device

INTERNATIONAL SEARCH REPORT

International application No
PCT/DK2019/050193

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006/052678 A1 (DRINAN DARREL D [US] ET AL) 9 March 2006 (2006-03-09) paragraphs [0027] - [0043]	1-31

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/DK2019/050193

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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