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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
21 June 2018 (21.06.2018)

WIPO | PCT

(10) International Publication Number
WO 2018/108724 A1

(51) International Patent Classification:
A61M 1/00 (2006.01)

(21) International Application Number:
PCT/EP2017/081959

(22) International Filing Date:
08 December 2017 (08.12.2017)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/433,179 12 December 2016 (12.12.2016) US
62/464,173 27 February 2017 (27.02.2017) US

(71) Applicant: **SMITH & NEPHEW PLC** [GB/GB]; 15 Adam Street, London WC2N 6LA (GB).

(72) Inventors: **HARTWELL, Edward, Yerbury**; Smith & Nephew Wound Management, 101 Hessle Road, Hull HU3 2BN (GB). **SMITH, Damian**; Smith & Nephew Wound Management, 101 Hessle Road, Hull HU3 2BN (GB).

(74) Agent: **HINES, Adam**; 101 Hessle Road, Hull East Yorkshire HU3 2BN (GB).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,

(54) Title: PRESSURE WOUND THERAPY STATUS INDICATION VIA EXTERNAL DEVICE

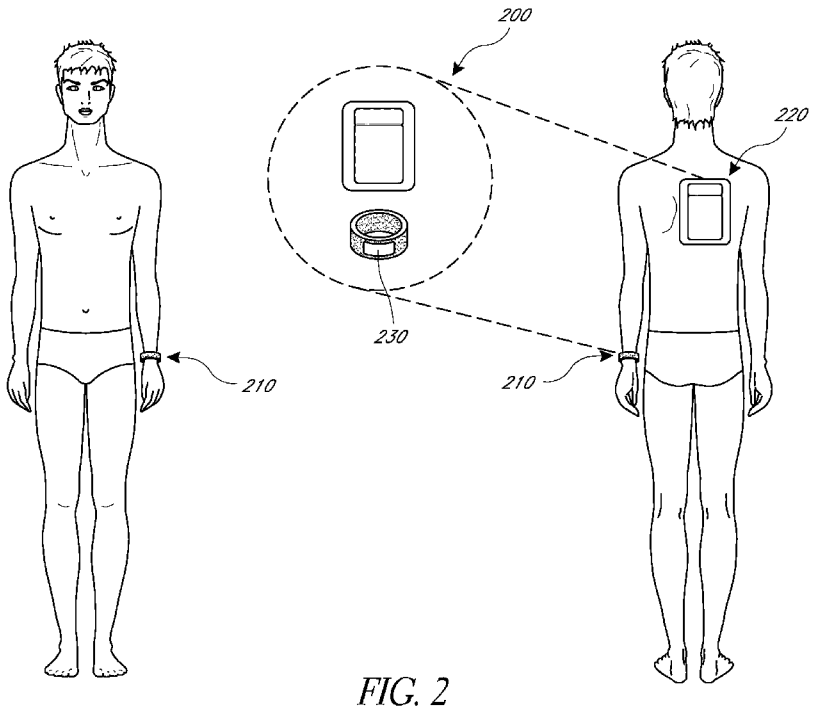

FIG. 2

(57) Abstract: According to certain aspects, a negative pressure wound therapy system can include a negative pressure therapy apparatus configured to apply negative pressure to a wound of a patient. The negative pressure therapy device can include a wound dressing configured to be placed over the wound, a negative pressure source supported by the wound dressing, and a controller. The controller can include a processor configured to determine operating data of the negative pressure therapy apparatus and transmit the operating data. The negative pressure wound therapy system can further include a wireless communication device having a controller with one or more processors. The controller of the wireless communication device can be configured to be communicatively coupled to the negative pressure therapy apparatus and further configured to receive the operating data transmitted by the controller of the negative pressure therapy apparatus. The controller can be further configured to output the operating data.

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SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

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

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

PRESSURE WOUND THERAPY STATUS INDICATION VIA EXTERNAL DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority benefit to U.S. Provisional Application Nos. 62/464173, entitled "PRESSURE WOUND THERAPY STATUS INDICATION VIA EXTERNAL DEVICE," filed February 27, 2017 and 62/433179, entitled "PRESSURE WOUND THERAPY STATUS INDICATION VIA EXTERNAL DEVICE," filed December 12, 2012, each of which is hereby incorporated herein by reference in its entirety.

BACKGROUND

[0002] Embodiments described herein relate to apparatuses, systems, and methods the treatment of wounds, for example using dressings in combination with negative pressure wound therapy.

[0003] Negative pressure wound therapy, which involves the controlled application of sub-atmospheric pressure to a wound environment, is widely recognized as a beneficial mechanism for improving the healing rate of a wound. Sometimes referred to as vacuum assisted closure, topical negative pressure therapy, or reduced pressure wound therapy, negative pressure wound therapy assists in the closure and healing of wounds by reducing tissue oedema; encouraging blood flow; stimulating the formation of granulation tissue; removing excess exudates, and may reduce bacterial load and thus reduce the potential for infection of the wound. Furthermore, negative pressure wound therapy permits less outside disturbance of the wound and promotes more rapid healing.

SUMMARY

[0004] In some embodiments, a negative pressure wound therapy system includes a negative pressure therapy apparatus configured to apply negative pressure to a wound of a patient. The negative pressure therapy apparatus can include a wound dressing configured to be placed over the wound, a negative pressure source supported by the wound dressing, and a controller that includes one or more processors. The controller can be configured to determine one or more

operating data of the negative pressure therapy apparatus, and transmit the one or more operating data. The negative pressure wound therapy system can further include a wireless communication device. The wireless communication device can include a controller having one or more processors. The controller of the wireless communication device can be configured to be communicatively coupled to the negative pressure therapy apparatus and can be further configured to receive the one or more operating data transmitted by the controller of the negative pressure therapy apparatus and output the received one or more operating data.

[0005] The system of the preceding paragraph may also include any combination of the following features described in this paragraph, among others described herein. The controller of the negative pressure therapy apparatus can be configured to transmit the one or more operating data responsive to at least one of an occurrence of an event, an expiration of a time interval, or a request received from the wireless communication device. The one or more operating data can include one or more of power status data, error data, negative pressure data, wound data, dressing data, connection data, activity data, or patient data.

[0006] The system of any of the preceding paragraphs may also include any combination of the following features described in this paragraph, among others described herein. The wound can be located in an area that is outside of the patient's vision or reach. The area can include at least one of a back, shoulder, leg, hip, foot, or buttocks of the patient. The area can include at least a portion of the patient's posterior.

[0007] The system of any of the preceding paragraphs may also include any combination of the following features described in this paragraph, among others described herein. The system can include another negative pressure therapy apparatus. The another negative pressure therapy apparatus can include another wound dressing configured to be placed over another wound and another negative pressure source supported by the another wound dressing. The controller of the wireless communication device can be further configured to be communicatively coupled to the another negative pressure therapy apparatus. The controller of the wireless communication device can be further configured to receive another one or

more operating data transmitted by another controller of the another negative pressure therapy apparatus; and output the received one or more operating data and the received another received one or more operating data.

[0008] The system of any of the preceding paragraphs may also include any combination of the following features described in this paragraph, among others described herein. The system can include another wireless communication device. The another wireless communication device can include a controller with one or more processors. The another wireless communication device can be configured to be communicatively coupled to the negative pressure therapy apparatus. The wireless communication device can further include a display configured to output the one or more operating data. The wireless communication device can include a housing enclosing a memory and the controller of the wireless communication device, the housing sized to be worn by the patient or by a caregiver. The wireless communication device can be worn on a wrist of a patient or a caregiver. For example, the wireless communication device can be a watch, wristband, or the like.

[0009] In some embodiments, a wireless communication device for communicating with a negative pressure therapy apparatus can include a memory and a controller including one or more processors. The controller can be configured to generate a request for one or more operating data of a negative pressure therapy apparatus. The negative pressure therapy apparatus can include a wound dressing configured to be placed over a wound of a patient and a negative pressure source supported by the wound dressing. The negative pressure apparatus can be configured to provide negative pressure therapy to the wound. The request can be based upon at least one of an occurrence of an event, a received user input, or an expiration of a time interval. The controller can be further configured to transmit the request to the negative pressure therapy apparatus, receive the one or more operating data from the negative pressure therapy apparatus, and output the one or more operating data.

[0010] The device of the preceding paragraph may also include any combination of the following features described in this paragraph, among others described herein. The one or more operating data can include one or more of power

status data, error data, negative pressure data, wound data, dressing data, connection data, activity data, or patient data. The wound can be located in an area that is outside of the patient's vision or reach. The area can include at least one of a back, shoulder, leg, hip, foot, or buttocks of the patient. The area can include at least a portion of the patient's posterior. The device can further include a display configured to output the one or more operating data.

[0011] The device of any of the preceding paragraphs may also include any combination of the following features described in this paragraph, among others described herein. The device can include a housing enclosing the memory and the controller. The housing can be sized to be worn by the patient or by a caregiver. The housing can be sized to be worn on a wrist. The controller can be further configured to generate another request for one or more operating data of another negative pressure therapy apparatus comprising another wound dressing configured to be placed over another wound and another negative pressure source supported by the another wound dressing. The controller can be further configured to transmit the another request. The controller can be further configured to receive the one or more operating data of the another negative pressure therapy apparatus. The controller can be further configured to output the one or more operating data of the negative pressure therapy apparatus and the one or more operating data of the another negative pressure therapy apparatus.

[0012] In some embodiments, a non-transitory computer storage medium can include instructions for wirelessly communicating with a plurality of negative pressure therapy apparatuses. The instructions when executed by a processor can cause the processor to perform a method that includes generating a request for one or more operating data of a negative pressure therapy apparatus. The negative pressure therapy apparatus can be configured to be placed over a wound of a patient and further configured to provide negative pressure therapy to the wound. The request can be based upon at least one of an occurrence of an event, a received user input, or an expiration of a time interval. The method can further include transmitting the request to the negative pressure therapy apparatus,

receiving the one or more operating data from the negative pressure therapy apparatus, and outputting the one or more operating data.

[0013] The non-transitory computer storage medium of the preceding paragraph may also include any combination of the following features described in this paragraph, among others described herein. Outputting the one or more operating data can include displaying the one or more operating data. The wound can be located in an area that is outside of the patient's vision or reach. The area can include at least one of a back, shoulder, leg, hip, foot, or buttocks of the patient. The area can include at least a portion of the patient's posterior. The one or more operating data can include one or more of power status data, error data, negative pressure data, wound data, dressing data, connection data, activity data, or patient data.

[0014] The non-transitory computer storage medium of any of the preceding paragraphs may also include any combination of the following features described in a paragraph, among others described herein. The method can further include generating another request for another one or more operating data of another negative pressure therapy apparatus configured to be placed over another wound of the patient and further configured to provide negative pressure therapy to the another wound. The method can further include transmitting the another request to the another negative pressure therapy apparatus. The method can further include receiving the another one or more operating data from the another negative pressure therapy apparatus. The method can further include outputting the one or more operating data and the another one or more operating data. The another one or more operating data can include one or more of: power status data, error data, negative pressure data, wound data, dressing data, connection data, activity data, or patient data.

[0015] In some embodiments, a wireless communication device for communicating with a negative pressure wound therapy system can can include a memory and a controller including one or more processors. The controller can be configured to wirelessly communicate with a plurality of negative pressure apparatuses. The plurality of negative pressure apparatuses can be configured to be

positioned on a patient and further configured to provide negative pressure therapy to a plurality of wounds. Each of the plurality of negative pressure apparatuses can include a wound dressing that can be configured to be placed over a wound of the patient. Each of the plurality of negative pressure apparatuses can further include a negative pressure source supported by the wound dressing, and a controller that can be configured to control the negative pressure source. The controller can be further configured to receive first and second operating data associated with provision of negative pressure therapy by at least first and second negative pressure apparatuses, respectively, and generate a notification based on the received operating data. The notification can include information identifying the first and second negative pressure apparatuses and the respective first and second operating data.

[0016] The device of the preceding paragraph may also include any combination of the following features described in this paragraph, among others described herein. The first and second operating data can include one or more of power status data, error data, negative pressure data, wound data, dressing data, connection data, activity data, or patient data.

[0017] In some embodiments, a method of communicating within a negative pressure wound therapy system can include wirelessly communicating, using a wireless communication device positioned on a patient's wrist, with a negative pressure apparatus. The negative pressure apparatus can include a wound dressing positioned over a wound of a patient and a negative pressure source supported by the wound dressing. The negative pressure therapy device can provide negative pressure therapy to the wound. The wireless communication can be based upon at least one of an occurrence of an event, a received user input, or an expiration of a time interval. The method can further include outputting one or more operating data associated with provision of negative pressure therapy by the negative pressure apparatus.

[0018] The method of the preceding paragraph may also include any combination of the following features described in this paragraph, among others described herein. Wirelessly communication can include receiving, at the wireless

communication device, the one or more operating data from the negative pressure therapy apparatus. Wirelessly communicating can further include generating, at the wireless communication device, a request for the one or more operating data of the negative pressure therapy apparatus. The request can be based upon the at least one of an occurrence of an event, a received user input, or an expiration of a time interval. Wirelessly communicating can further include transmitting the request to the negative pressure therapy apparatus. The method can further include generating another request for one or more operating data of another negative pressure therapy apparatus. The another negative pressure therapy apparatus can include another wound dressing positioned over another wound of the patient and another negative pressure source supported by the another wound dressing. The another negative pressure therapy device can provide negative pressure therapy to the another wound. The method can further include transmitting the another request, receiving the one or more operating data of the another negative pressure therapy apparatus, and outputting the one or more operating data of the another negative pressure therapy apparatus. The wound can be located in an area that is outside of the patient's vision or reach. The area can include at least one of a back, shoulder, leg, hip, foot, or buttocks of the patient. The area can include at least a portion of the patient's posterior.

[0019] Any of the features, components, or details of any of the arrangements or embodiments disclosed in this application, including without limitation any of the pump embodiments and any of the negative pressure wound therapy embodiments disclosed below, are interchangeably combinable with any other features, components, or details of any of the arrangements or embodiments disclosed herein to form new arrangements and embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIGURE 1A illustrates a perspective view of a negative pressure therapy apparatus according to some embodiments.

[0021] FIGURE 1B illustrates a top view of the negative pressure therapy apparatus of FIGURE 1A.

[0022] FIGURE 2 illustrates a negative pressure wound therapy system according to some embodiments.

[0023] FIGURE 3 illustrates an electrical component schematic of a negative pressure therapy apparatus according to some examples.

[0024] FIGURE 4 illustrates an electrical component schematic of a wireless communication device (WCD) according to some examples.

DETAILED DESCRIPTION

[0025] Embodiments disclosed herein relate to apparatuses and methods of negative pressure therapy include a wireless communication device configured to be communicatively coupled to a negative pressure therapy apparatus.

[0026] It will be understood that embodiments of the present disclosure are generally applicable to use in topical negative pressure (TNP) therapy systems. Briefly, negative pressure wound therapy assists in the closure and healing of many forms of "hard to heal" wounds by reducing tissue oedema; encouraging blood flow and granular tissue formation; removing excess exudate and may reduce bacterial load (and thus infection risk). In addition, the therapy allows for less disturbance of a wound leading to more rapid healing. TNP therapy systems may also assist on the healing of surgically closed wounds by removing fluid and by helping to stabilize the tissue in the apposed position of closure. A further beneficial use of TNP therapy can be found in grafts and flaps where removal of excess fluid is important and close proximity of the graft to tissue is required in order to ensure tissue viability.

[0027] As is used herein, reduced or negative pressure levels, such as -X mmHg, represent pressure levels relative to ambient atmospheric pressure, which can correspond to 760 mmHg (or 1 atm, 29.93 inHg, 101.325 kPa, 14.696 psi, etc.). Accordingly, a negative pressure value of -X mmHg reflects absolute pressure that is X mmHg below, for example, 760 mmHg or, in other words, an absolute pressure of (760-X) mmHg. In addition, negative pressure that is "less" or "smaller" than X mmHg corresponds to pressure that is closer to atmospheric pressure (e.g.,-40 mmHg is less than -60 mmHg). Negative pressure that is "more" or "greater" than -X

mmHg corresponds to pressure that is further from atmospheric pressure (e.g., -80 mmHg is more than -60 mmHg). In some embodiments, local ambient atmospheric pressure is used as a reference point, and such local atmospheric pressure may not necessarily be, for example, 760 mmHg.

[0028] The negative pressure range for some embodiments of the present disclosure can be approximately -80 mmHg, or between about -20 mmHg and -200 mmHg. Note that these pressures are relative to ambient atmospheric pressure, which can be 760 mmHg. Thus, -200 mmHg would be about 560 mmHg in practical terms. In some embodiments, the pressure range can be between about -40 mmHg and -150 mmHg. Alternatively a pressure range of up to -75 mmHg, up to -80 mmHg or over -80 mmHg can be used. Also in other embodiments a pressure range of below -75 mmHg can be used. Alternatively, a pressure range of over approximately -100 mmHg, or even -150 mmHg, can be supplied by the negative pressure apparatus.

[0029] In some embodiments, negative pressure wound therapy systems can have a variety of components including a source of negative pressure (such as a pump), other electrical components, and a wound dressing. While some negative pressure wound therapy systems include a negative pressure source located in a remote location from the wound dressing, it can be desirable (for example, to provide increased system portability) for the negative pressure source and other electronic components to be incorporated into the wound dressing. In such instances, user interface component(s) (such as button(s), switch(es), speaker(s), screen(s), etc.) and the like are also combined with the wound dressing. However, when user interface components of the negative pressure wound therapy system are incorporated into the wound dressing, if the user's wound, and thus the placement of the wound dressing, is outside a patient's vision or reach (for instance, on the user's back, posterior, shoulder, leg, hip, foot, or buttocks), the user's ability to interface with the negative pressure wound therapy system can be limited. In some embodiments, a wireless communication device, external to the integrated negative pressure therapy apparatus, can allow the user or another individual (such as a caregiver) to communicate with the negative pressure wound therapy system. While

certain embodiments described herein are directed to or utilize a wireless communication device (WCD), the communication device of any of the described embodiments can support wired communication.

[0030] Some embodiments are directed to a system, computer-readable medium, method, and apparatus for communicating with a negative pressure therapy apparatus that includes a wound dressing and a negative pressure source supported by the wound dressing. According to certain aspects, a negative pressure wound therapy system can include a negative pressure therapy apparatus configured to apply negative pressure to a wound of a patient. The negative pressure therapy device can include a wound dressing configured to be placed over the wound, a negative pressure source supported by the wound dressing, and a controller. The controller can include a processor configured to determine operating data of the negative pressure therapy apparatus, and transmit the operating data. The negative pressure wound therapy system can further include a wireless communication device communicatively coupled to the negative pressure therapy apparatus and configured to receive and output the operating data.

[0031] It will be appreciated that throughout this specification reference is made to a wound. It is to be understood that the term wound is to be broadly construed and encompasses open and closed wounds in which skin is torn, cut or punctured or where trauma causes a contusion, or any other superficial or other conditions or imperfections on the skin of a patient or otherwise that benefit from reduced pressure treatment. A wound is thus broadly defined as any damaged region of tissue where fluid may or may not be produced. Examples of such wounds include, but are not limited to, abdominal wounds or other large or incisional wounds, either as a result of surgery, trauma, sternotomies, fasciotomies, or other conditions, dehisced wounds, acute wounds, chronic wounds, subacute and dehisced wounds, traumatic wounds, flaps and skin grafts, lacerations, abrasions, contusions, bums, diabetic ulcers, pressure ulcers, stoma, surgical wounds, trauma and venous ulcers or the like.

[0032] FIGURES 1A-1B illustrates a wound dressing 100 incorporating the source of negative pressure and/or other electronic components within the

wound dressing. As is illustrated, the negative pressure therapy apparatus 100 incorporates a negative pressure source (such as the pump) and/or other electronic components within a wound dressing. The apparatus 100 is illustrated as a wound dressing configured to be placed over a wound. The wound dressing can include an electronics area 161 and an absorbent area 160. The dressing can comprise a wound contact layer (not shown) and a moisture vapor permeable film or cover layer 113 positioned above the contact layer and other layers of the dressing. The wound dressing layers and components of the electronics area as well as the absorbent area can be covered by one continuous cover layer 113 as shown in FIGS. 1A-1B.

[0033] The area 161 can include an electronics cassette and/or electronics unit positioned below a cover layer 113 of the dressing. The negative pressure source can be positioned in the area 161. In some embodiments, the electronics unit can be surrounded by a material to enclose or encapsulate the negative pressure source and electronics components. The electronics unit can be in contact with the dressing layers in the area 160 and be covered by the cover layer 113. The electronics unit includes a lower or wound facing surface that is closest to the wound (not shown) and an opposite, upper surface, furthest from the wound when the wound dressing is placed over a wound.

[0034] The electronics area 161 can include a source of negative pressure (such as a pump) and some or all other components of the TNP system, such as power source(s), sensor(s), connector(s), user interface component(s) (such as button(s), switch(es), speaker(s), screen(s), etc.) and the like, that can be integral with the wound dressing. For example, the electronics area 161 can include a button or switch 111 as shown in FIG. 1A-1B. The button or switch 111 can be used for operating the pump (e.g., turning the pump on/off).

[0035] The absorbent area 160 can include an absorbent material 112 and can be positioned over the wound site. The electronics area 161 can be positioned away from the wound site, such as by being located off to the side from the absorbent area 160. The electronics area 161 can be positioned adjacent to and in fluid communication with the absorbent area 160 as shown in FIGS. 1A-1B. In

some embodiments, each of the electronics area 161 and absorbent area 160 may be rectangular in shape and positioned adjacent to one another.

[0036] In some embodiments, additional layers of dressing material can be included in the electronics area 161, the absorbent area 160, or both areas. In some embodiments, the dressing can comprise one or more spacer layers and/or one or more absorbent layer positioned above the contact layer and below the wound cover layer 113 of the dressing.

[0037] In operation, the wound dressing is placed over a wound such as to provide a substantially fluid-tight seal over the wound. For example, the cover layer can extend beyond the combined areas 161 and 160 and can include adhesive that seals the dressing to skin surrounding the wound. As another example, the bottom of the dressing can have adhesive. The negative pressure source provides negative pressure to the wound and, as a result, fluid (such as exudate) is aspirated from the wound. The removed fluid can be trapped or otherwise stored in the absorbent. Although illustrated without a canister, the negative pressure apparatus 100 can operate with a canister configured to store at least some fluid removed from the wound.

[0038] The negative pressure source and/or the electronics can be supported by the wound dressing, such as embedded in the dressing as is shown in FIGURES 1A-1B. In other embodiments, one or more of the negative pressure source and/or the electronics can be partially embedded in the wound dressing, positioned on the top, bottom, or side of the wound dressing, and the like. Additional embodiments of negative pressure apparatuses are described in Appendices A and B, each of which is incorporated by reference in its entirety.

[0039] In some examples, the negative pressure apparatus 100 can determine and/or record one or more operating data. Operating data can take many forms including patient data and negative pressure apparatus 100 data. For instance, operating data can include power status data, error data, negative pressure data, dressing data, connection data, activity data, patient data, and the like. It should be noted that such operating data categories can overlap.

[0040] Power status data can include any data relating to operating conditions or power status of the negative pressure apparatus 100. For instance, power status data can include data reflecting battery status, power consumption, power level, operating conditions (normal, error, etc.), system power status (such as on/off, standby, pause, etc.), and the like.

[0041] Error data can include any data relating to negative pressure apparatus 100 malfunctions or any abnormality in the operation of the negative pressure therapy apparatus. For instance, error data can include data reflecting a dressing problem, pressure leak, under-pressure, over-pressure, pairing/connection problem, compliance monitoring, etc.

[0042] Negative pressure data can include any data relating to operation of the negative pressure source. For instance, negative pressure data can include data reflecting pressure levels, negative pressure source activity data, loss of suction, over-pressure, under-pressure and the like.

[0043] Dressing data can include dressing capacity, saturation level of the dressing, orientation/motion data, suction data, etc. Connection data can include information such as pairing status of a communication device, connection status, etc.

[0044] Operating data can include activity data (such as log(s)), which includes therapy delivery information, such as therapy duration; alarm log(s), which includes alarm type and time of occurrence; error log(s), which includes internal error information, transmission errors, and the like; therapy duration information, which can be computed hourly, daily, and the like; total therapy time, which includes therapy duration from first applying a particular therapy program or programs; lifetime therapy information; device information, such as the serial number, software version, battery level, etc.; location tracking/device location information; patient information; and so on.

[0045] Patient data can include any data relating to physiological data or patient wound data. For instance, patient data can include physiological data such as blood pressure, heart rate, patient activity (such as indication that the patient has

turned, moved, etc.) and the like. It can also include data reflecting wound data such as wound healing status, estimation of healing time, percent healed, etc.

[0046] Wound healing status data can be determined by the wound apparatus device in a variety of ways. For instance, the negative pressure therapy apparatus can be configured to monitor blood flow of the wound area and collect and record such blood flow data. The rate of blood flow at the wound site can be used to determine a stage in the healing process of the wound (for example, low blood flow can indicate an early stage of healing while higher blood flow can indicate the wound is close to being healed). The blood flow data can be processed by the negative pressure therapy apparatus, the WCD, or a remote device and used to determine what stage the wound is of the healing process. As such, the WCD, negative pressure therapy apparatus, or remote device can be configured to communicate that the wound is not healed, partially healed, completely healed, or the wound is healed within a percentage range (such as 40-50%, 50-60%, 70-80%, 80-90%, or the like). As another example, the negative pressure therapy apparatus can monitor the rate of fluid removal from the wound and determine the stage of the healing process. In some circumstances, reduction in the rate of fluid removal can indicate that the wound is healing.

[0047] FIGURE 2 illustrates a negative pressure wound therapy system 200 comprising a WCD 210 configured to communicate with a negative pressure therapy apparatus 220 according to some embodiments. Although FIGURE 2 depicts the WCD 210 having a housing sized as a wearable wristband, the WCD 210 can take many forms including wearable and non-wearable devices. For instance, the WCD 110 can take the form of a mobile phone, tablet, computer, MP3 player, pager, watch, PDA, necklace, ring, arm band, belt, chest strap or any device that can be configured to trigger indications or alerts to a user or another individual. Additionally, the WCD can take the form of an application or program, for instance a smart phone application.

[0048] The negative pressure wound therapy system 200 can include the negative pressure therapy apparatus 220 configured to apply negative pressure to a wound of a patient and the WCD 210 configured to be communicatively coupled to

the negative pressure therapy apparatus 220. The negative pressure therapy apparatus 220 can be the same as the negative pressure therapy apparatus 100 of FIGURES 1A-1B. As is illustrated, the negative pressure therapy apparatus 220 is positioned on the patient's back, which makes it difficult to operate the apparatus 220. In other circumstances, the negative pressure therapy apparatus 220 can be positioned on another place on the body that is difficult to access. For example, the wound (or negative pressure therapy apparatus 220) can be located in an area that is outside of the patient's vision or reach (such as on at least a portion of the patient's posterior, back, shoulder, leg, hip, foot, or buttocks). To solve the problems of operating the negative pressure therapy apparatus 220, the negative pressure therapy apparatus 220 and the WCD 210 can be configured to wirelessly communicate with each other over wireless networks (such as Wi-Fi internet networks, Bluetooth networks, etc.), telecommunications networks (such as 3G networks, 4G networks, etc.) or any other wireless or wired communication method.

[0049] In some cases, the negative pressure therapy apparatus 220 can communicate operating data (e.g., operating data can include power status data, error data, negative pressure data, dressing data, connection data, activity data, patient data, dressing data, or the like) to the WCD 210. For example, the negative pressure therapy apparatus 220 can transmit operating data (a) upon the occurrence of an event (such as a detected operating condition and/or an error) (b) in repeated time intervals, (such as, once every minute, ten minutes, thirty minutes, 2 hours, 4 hours, etc.) and/or (c) in response to a received request. One or more triggers and/or parameters for transmitting the operating data can be configured by a user, such as the patient, caregiver, etc. An "event" can, for example, be any deviation in measured, tracked, or calculated operating data, such as a detected error, a change in power status, an alarm indicator, an event defined by a user, or the like.

[0050] The negative pressure therapy apparatus 220 can be interrogated by the WCD 210. For example, the negative pressure therapy apparatus 220 can be responsive to interrogation by communicating operating data. Communication can be done over secure communications protocols. By way of example, the negative pressure therapy apparatus 220 can release internal data only to the WCD 210 with

the correct passwords and/or data protocols. As another example, the negative pressure therapy apparatus 220 and the WCD 210 are securely paired prior to communication of data. Although the illustrated example of FIGURE 2 depicts a single WCD 210, it will be understood that the negative pressure wound therapy system 200 can include more than one WCD 210 configured to communicate with a negative pressure therapy apparatus 220. For example, a first WCD 210 can transmit a request for reception by a negative pressure therapy apparatus 220. In response to receiving the request by the first WCD, the negative pressure therapy apparatus 220 can broadcast operating data capable of being received by at least the first WCD and a second WCD. In examples such as these, the first WCD can be used by a first user, such as a patient, and the second WCD can be used by a second user, such as a caregiver, or vice versa. As another example, the caregiver can use the first WCD to transmit one or more commands to operate the negative pressure therapy apparatus 220, while patient can use the second WCD to only receive operating data. As such, the WCD can operate in several different modes, including a caregiver mode and a patient mode.

[0051] For instance, it is desirable for a caregiver to know whether a patient's negative pressure therapy apparatus 220 is functioning properly. As a result, the caregiver can use a first WCD to transmit a request to the patient's negative pressure therapy apparatus. In response to receiving the request from the first WCD, the patient's negative pressure therapy apparatus can transmit operating data to just one or both the first WCD operated by the caregiver and a second WCD, for instance, operated by the patient.

[0052] A negative pressure therapy apparatus 220 can simultaneously receive and/or respond to requests from one or more WCDs. In some aspects, the one or more WCDs can communicate with a negative pressure therapy apparatus 220 using handover communications. For instance, the negative pressure therapy apparatus can determine which WCD among a plurality of WCDs is closest and/or would have the most reliable communication connection with the negative pressure therapy apparatus. Likewise, each of the WCDs of a plurality of WCDs could make this determination. For example, upon determining that a second WCD is a more

suitable connection (such as based on proximity, reliability, etc.), a first WCD in communication with the negative pressure therapy apparatus can handover communication to a second WCD.

[0053] Although the illustrated example of FIGURE 2 depicts a single negative pressure therapy apparatus 220, in some aspects, the negative pressure wound therapy system 200 can include two or more negative pressure therapy apparatuses, which can be positioned to treat various different wounds of a patient and/or wounds of different patients. For example, a communication link can be established between a first WCD and a first negative pressure therapy apparatus and the first WCD and a second negative pressure therapy apparatus.

[0054] For example, it can be desirable for a caregiver to monitor more than one patient, each patient using a negative pressure therapy apparatus. The WCD 210 can communicate (e.g. paired via Bluetooth, connected via Wi-Fi, etc.) with a first negative pressure therapy apparatus treating a wound of patient one and a second negative pressure therapy apparatus treating a wound of patient two. In these examples, WCD can be configured to communicate with the first and second negative pressure therapy apparatuses individually or as a group. Using a user interface of the WCD, a nurse can choose to request operating data from one or both connected negative pressure therapy apparatuses. In response to the request, each negative pressure therapy apparatus can transmit at least the requested operating data to the WCD. The WCD can receive, store and process the transmitted data and generate an output based at least upon the received data.

[0055] In examples such as these, it can be desired for the two or more negative pressure therapy apparatuses to include a patient or apparatus identifier along with its response or otherwise associate transmitted data with identification of a transmitting apparatus. For instance, the patient or apparatus identifier can be received by the WCD and used to generate a log of patient or apparatus specific data. In other instances, the identifier can be used by the WCD to identify which information to display. In cases when more than one WCD communicates data with a negative pressure apparatus, identifying information of a WCD can similarly be transmitted to the negative pressure therapy apparatus.

[0056] In some cases, multiple negative pressure therapy apparatuses can communicate with multiple WCDs.

[0057] A WCD 210 can be configured to transmit one or more commands or instructions to a negative pressure therapy apparatus 220. These instructions can be created by a user of the WCD 210 or can be automatically created by the WCD 210. The instructions sent by the WCD 210 can alter operating settings (thereby controlling operating data) or any other negative pressure apparatus setting. For instance, the WCD 210 can instruct the negative pressure therapy apparatus 220 to pause, turn on, turn off, increase pressure, reduce pressure, etc. As another example, the WCD 210 can transmit a command to active the negative pressure source to apply negative pressure to the wound, a command to change the negative pressure level, a command to deactivate the negative pressure source, and the like.

[0058] The WCD 210 can be pre-programmed to work with the negative pressure therapy apparatus 220. For instance, the WCD 210 can be pre-programmed to communicate exclusively with a specific negative pressure apparatus. As another example, the WCD 210 can be pre-programmed to communicate with a negative pressure apparatus 220, but not exclusively, and the WCD 210 can accept other connections. In some examples, the WCD 210 is not pre-programmed to communicate with any specific negative pressure device but can be configured to communicate with a negative pressure device. Similarly, a negative pressure apparatus 220 can be pre-programmed to communicate with a WCD or may not be programmed but can be configured to communicate with a WCD 210.

[0059] Although not shown, in some examples, the negative pressure therapy apparatus 220 and/or WCD 210 can communicate with a remote computer or server, for instance, via the cloud. The remote computer or server can include a data storage processor and a web interface for accessing the remote computer. In some instances, the remote computer or server can function as a communication device 210.

[0060] The WCD 210 can provide indicators, signals and/or alarms to communicate data to the user. For instance, the WCD 210 can include one or more speaker(s), display(s), light source(s), tactile devices, etc., and/or combinations

thereof. The indicators can include any visual, audible, and tactile indications. For instance, if the user is blind, the WCD 210 can be configured to provide an audible alarm and/or vibration. If the user is deaf, the WCD 210 can be configured to provide a visual alarm and/or vibration. In some examples, the user can change the type of indication based on his or her preference.

[0061] A WCD can comprise a display, for example display 230 as illustrated in FIG. 2. The display 230 can be a touch screen display or other screen, such as an LCD screen. In some examples, the display can provide a user with an option to select one or more operating data to view. For instance, the display can provide a list of operating data options for selection by a user. In response to user selection of an operating data option, the WCD can communicate with a negative pressure therapy apparatus and generate an output on the display corresponding to the operating data option selected by the user. In other examples, the WCD can provide at least one real time operating data from the negative pressure therapy apparatus to the display.

[0062] The display 230 can include one or more indicators. For instance, an active (such as lit) indicator of the one or more indicators can represent a one or more operating data of the negative pressure therapy apparatus. For example, a dressing indicator of the one or more indicators can provide an indication as to presence of leaks in the negative pressure therapy apparatus, and an active dressing indicator can represent a leak. As another example, a dressing capacity indicator of the one or more indicators can provide an indication as to the remaining fluid capacity of the wound dressing or canister, and an active dressing capacity indicator can represent that the wound dressing or canister is at or nearing capacity. As yet another example, a battery indicator of the one or more indicators can provide an indication as to remaining capacity or life of a power source, such as batteries, and an active battery indicator can represent a low capacity. In some embodiments, the one or more indicators can represent a combination of one or more of the above events of the negative pressure therapy apparatus or other operating or failure conditions of the negative pressure therapy apparatus.

[0063] The WCD 210 can be powered in a number of ways including but not limited to battery power, harvesting a user's body heat to convert into electricity, wireless power transfer, and the like. A battery can be any suitable battery for use in the WCD, including, for example, a lithium-ion battery, lithium polymer battery, or the like, and can be rechargeable. The battery can be charged in any suitable way including but not limited to inductive charging.

[0064] In some cases, the WCD 210 can harvest a user's body heat and convert it into electricity sufficient to power some or all of the WCD 210. In some examples, the WCD 210 includes a heat sink which converts body heat into electrical power. However, in some cases, heat sinks can make the WCD 210 heavy, stiff, and/ or bulky. Thus, in other examples, the WCD 210 can make use of thermoelectric generators (TEGs) to generate electricity by making use of the temperature difference between the user's body and the ambient air. In some embodiments, the negative pressure therapy apparatus can be powered using one or more technologies described herein.

[0065] FIGURE 3 illustrates an electrical component schematic 300 of the negative pressure therapy apparatus 220 according to some examples. Electrical components can operate to accept user input, provide output to the user, operate the pump assembly of the negative pressure therapy apparatus, provide network connectivity, and so on. Electrical components can be mounted on one or more PCBs. As is illustrated, the negative pressure therapy apparatus 220 can include multiple processors. It may be advantageous to utilize multiple processors in order to allocate or assign various tasks to different processors.

[0066] The negative pressure therapy apparatus 220 can comprise a user interface processor or controller 310 configured to operate one or more components for accepting user input and providing output to a user, such as the display, buttons, etc. Input to and output from the negative pressure therapy apparatus 220 can be controlled by an input/output (I/O) processor 390. For example, the I/O processor 390 can receive data from one or more ports, such as serial, parallel, hybrid ports, and the like. The controller 310 can receive data from and provide data to one or more expansion module 360, such as one or more USB ports, SD ports, Compact

Disc drives, DVD drives, FireWire ports, Thunderbolt ports, PCI Express ports, and the like.

[0067] The controller 310, along with other controllers or processors 380, can store data in one or more memory 350, which can be internal and/or external to the controller 310. Any suitable type of memory can be used, including volatile and/or non-volatile memory, such as RAM, ROM, magnetic memory, solid-state memory, magnetoresistive random-access memory (MRAM), and the like.

[0068] The controller 310 can be a general purpose controller, such as a low-power processor. In other instances, the controller 310 can be an application specific processor. Still, in other examples, the controller 310 can be configured as a "central" processor in the electronic architecture of the negative pressure therapy apparatus 220, and the controller 310 can coordinate the activity of other processors, such as a pump control processor 370, communications processor 330, and one or more additional processors 380. The controller 310 can run a suitable operating system, such as a Linux, Windows CE, VxWorks, etc.

[0069] A pump control processor 370 can be configured to control the operation of a negative pressure source of the negative pressure therapy apparatus. The pump control processor can control the level of negative pressure which can be pressure set or selected by a user. The negative pressure source can be a suitable pump, such as a diaphragm pump, peristaltic pump, rotary pump, rotary vane pump, scroll pump, screw pump, liquid ring pump, diaphragm pump operated by a piezoelectric transducer, voice coil pump, and the like.

[0070] In some cases, one or more of processors described herein in connection with FIGURE 3 other than the controller 310 are not used, and the controller 310 performs one or more tasks of such omitted one or more processors. In some embodiments, the controller 310 is the only processor of the negative pressure therapy apparatus 220, and the controller 310 performs one or more tasks of the other processors described herein.

[0071] The negative pressure therapy apparatus 220 can be configured to communicate with at least one WCD 210. For example, the negative pressure

therapy apparatus 220 can include a communication processor 320 configured to wirelessly communicate with a WCD 210. The wireless communication processor 320 can be configured to provide wireless communication over wireless networks (such as Wi-Fi internet networks, Bluetooth networks, etc.), over telecommunications networks (such as 3G networks, 4G networks, etc.), or over any other suitable wireless connection.

[0072] The communication processor 320 can be a transceiver or a receiver configured to receive one or more request signals from a WCD. For instance, the negative pressure therapy apparatus 220 can be interrogated by a WCD 210. In this aspect, the negative pressure therapy apparatus 220 is responsive to the interrogation by sending a response reflecting operating data. In some examples, the communication processor 320 can be a transceiver or a one-way transmitter configured to transmit one or more signals based at least in part on one or more operating data.

[0073] The communication processor 320 can be a transceiver that, for instance, handshakes with at least one WCD 210 to communicate data from the negative pressure therapy apparatus to a WCD 210. Accordingly, the negative pressure therapy apparatus 220 can respond to data requests from at least one WCD 210. In still another aspect, a negative pressure therapy apparatus 220 can reflect or redirect event or operating data to at least one WCD 210 in response to a WCD 210 radiating a negative pressure therapy apparatus 220 with transponder frequencies.

[0074] The communications processor 320 can include a transceiver. The negative pressure therapy apparatus 220 can be configured to listen for interrogating signals from the WCD 210 and, in turn, can relay event or operating data from the negative pressure therapy apparatus 220 to the WCD 210. Alternatively, the negative pressure therapy apparatus 220 can relay event or operating data at set time intervals or when the negative pressure therapy apparatus 220 accumulates data close to an internal storage limit.

[0075] The negative pressure therapy apparatus 220 can include internal memory 350 and can store one or more event or operating data in the memory 350.

When the memory 250 is nearly full, the negative pressure therapy apparatus 220 can transmit the stored data wirelessly to a WCD 210. In some embodiments, stored data is transmitted to a WCD 210 in response to receiving a request and/or occurrence of a triggering condition. In some implementations, the negative pressure therapy apparatus 220 can periodically transmit stored data. Other transmission protocols can be used without departing from the scope of this disclosure.

[0076] Communication processor 320 can be a secure communications port. By way of example, a negative pressure therapy apparatus 220 can release internal data only to a WCD 210 with the correct passwords and/or data protocols. In another example, the communication processor 320 can be an infrared communications port. Such a port, in one aspect, can be configured to communicate with at least one WCD in secure communication protocols.

[0077] In some cases, the negative pressure therapy apparatus 220 does not include a user interface (i.e., display screen, buttons, etc.). In these instances, the communication processor 320 can be a receiver or transceiver configured to receive instructions, user input, or other data from at least one WCD 210. In some instances, a negative pressure therapy apparatus 220 can include a limited set of user input components (such as an on/off button, Bluetooth pairing, etc.).

[0078] FIGURE 4 illustrates an electrical component schematic 400 of the WCD 210 according to some examples. As shown, the WCD 210 can comprise a user interface processor or controller 411 configured to operate one or more components configured to accept user input (such as touch screen display, keyboard, button(s), voice command, etc.), transmit operating data requests or operation instructions (such as pump control, negative pressure selection, etc.), receive one or more signals representing operating data, provide output to a user (such as via a display, indication, signal and/or alarm), provide network connectivity, and so on.

[0079] Input to and output from a WCD 210 can be controlled by an input/output (I/O) processor 461. For example, the I/O processor can receive data from one or more ports, such as serial, parallel, hybrid ports, and the like. The controller 411, along with other controllers or processors, can store data in one or

more memory 451, which can be internal and/or external to the controller 411. Any suitable type of memory can be used, including volatile and/or non-volatile memory, such as RAM, ROM, magnetic memory, solid-state memory, Magnetoresistive random-access memory (MRAM), and the like.

[0080] A communications processor 431 can be configured to provide wired and/or wireless connectivity. The communications processor 431 can utilize one or more antenna(s) 441 for sending and receiving. In some embodiments, the communications processor 431 can provide one or more of the following types of connections: Global Positioning System (GPS) technology, cellular connectivity (such as 2G, 3G, LTE, and 4G), Wi-Fi connectivity, Internet connectivity, Bluetooth connectivity, and the like.

[0081] The communication processor 421 can be a one-way receiver configured to receive signals (for instance, signals representing operating data) from a negative pressure therapy apparatus 220. As mentioned above, operating data can include information related to power status data, error data, negative pressure data, dressing data, connection data, activity logs, patient data and the like.

[0082] The communication processor 421 can be a transceiver configured to both transmit requests to and receive responses from a negative pressure therapy apparatus 220. For instance, by integrating a transceiver and antenna with a processing section, the WCD 210 can interrogate negative pressure therapy apparatus for operating data information. In this way, users of the WCD 210 can learn of the negative pressure therapy apparatus operating data at any desired time. In one example, the WCD 210 can receive input from a user, wherein the user is requesting one of more operating data. The WCD 210 can generate a request based at least in part on the user input and transmit the request to a negative pressure therapy apparatus 220. Thereafter, the WCD 210 can receive a response from the negative pressure therapy apparatus 220, from which the WCD 210 can interpret the one or more operating data requested by the user.

[0083] A WCD 210 can transmit control instructions to the negative pressure therapy apparatus. For instance, by sending control instructions, a user

can use the WCD 210 to control the pump, adjust the level of negative pressure, toggle the power of the negative pressure therapy apparatus, and the like.

[0084] The communication processor 421 can be a transceiver that handshakes with a negative pressure therapy apparatus 220 to communicate. Accordingly, a WCD 210 can transmit data requests to at least one negative pressure therapy apparatus 220. In still another aspect, the WCD 210 can "radiate" the negative pressure therapy apparatus 220 with transponder frequencies and, in response, the negative pressure therapy apparatus 220 can "reflect" event or operating data to a WCD.

[0085] The WCD 210 can include a receiver 421 from which it can communicate externally to the negative pressure therapy apparatus 220. The WCD 210 can listen for data from the negative pressure therapy apparatus 220 and collect that data for subsequent relay or use. In some aspects, the WCD can receive operating data (a) in response to its request; (b) upon the occurrence of an event (such as a detected error); or (c) in repeated time intervals, (such as once every ten minutes, thirty minutes, 2 hours, 4 hours, etc.).

[0086] The WCD 210 can be utilized to perform one or more of the following: initialization and programming of the negative pressure therapy apparatus 220, firmware and/or software upgrades, maintenance and troubleshooting, selecting and adjusting therapy parameters, and the like.

[0087] In some cases, one or more of processors described herein in connection with FIGURE 4 other than the controller 411 are not used, and the controller 411 performs one or more tasks of such omitted one or more processors. In some embodiments, the controller 411 is the only processor in the WCD 210, and the controller 411 performs one or more tasks of the other processors described herein.

Terminology

[0088] Depending on the embodiment, certain operations, acts, events, or functions of any of the processes described herein can be performed in a different

sequence, can be added, merged, or left out altogether (such as not all are necessary for the practice of the processes). Moreover, in certain embodiments, operations, acts, functions, or events can be performed concurrently, such as through multi-threaded processing, interrupt processing, or multiple processors or processor cores or on other parallel architectures, rather than sequentially.

[0089] Systems and processors described herein may comprise software, firmware, hardware, or any combination(s) of software, firmware, or hardware suitable for the purposes described herein. Software and/or firmware may be stored on non-transitory computer readable media. Software and other processors may reside and execute on servers, workstations, personal computers, computerized tablets, PDAs, and other computing devices suitable for the purposes described herein. Software and other processors may be accessible via local memory, via a network, via a browser, or via other means suitable for the purposes described herein. Data structures described herein may comprise computer files, variables, programming arrays, programming structures, or any electronic information storage schemes or methods, or any combinations thereof, suitable for the purposes described herein. User interface elements described herein may comprise elements from graphical user interfaces, interactive voice response, command line interfaces, and other suitable interfaces.

[0090] Further, the processing of the various components of the illustrated systems can be distributed across multiple machines, networks, and other computing resources. In addition, two or more components of a system can be combined into fewer components. Various components of the illustrated systems can be implemented in one or more virtual machines, rather than in dedicated computer hardware systems and/or computing devices. Likewise, the data repositories shown can represent physical and/or logical data storage, including, for example, storage area networks or other distributed storage systems. Moreover, in some embodiments the connections between the components shown represent possible paths of data flow, rather than actual connections between hardware. While some examples of possible connections are shown, any of the subset of the

components shown can communicate with any other subset of components in various implementations.

[0091] Any patents and applications and other references noted above, including any that may be listed in accompanying filing papers, are incorporated herein by reference. Aspects of the disclosure can be modified, if necessary, to employ the systems, functions, and concepts of the various references described herein to provide yet further implementations.

[0092] Features, materials, characteristics, or groups described in conjunction with a particular aspect, embodiment, or example are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith. All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features or steps are mutually exclusive. The protection is not restricted to the details of any foregoing embodiments. The protection extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0093] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of protection. Indeed, the novel methods and systems described herein may be embodied in a variety of other forms. Furthermore, various omissions, substitutions and changes in the form of the methods and systems described herein may be made. Those skilled in the art will appreciate that in some embodiments, the actual steps taken in the processes illustrated or disclosed may differ from those shown in the figures. Depending on the embodiment, certain of the steps described above may be removed, others may be added. For example, the actual steps or order of steps taken in the disclosed processes may differ from those shown in the figure. Depending on the embodiment, certain of the steps described above may be removed, others may be added. For instance, the various components illustrated in

the figures may be implemented as software or firmware on a processor, controller, ASIC, FPGA, or dedicated hardware. Hardware components, such as processors, ASICs, FPGAs, and the like, can include logic circuitry. Furthermore, the features and attributes of the specific embodiments disclosed above may be combined in different ways to form additional embodiments, all of which fall within the scope of the present disclosure.

[0094] Although the present disclosure includes certain embodiments, examples and applications, it will be understood by those skilled in the art that the present disclosure extends beyond the specifically disclosed embodiments to other alternative embodiments or uses and obvious modifications and equivalents thereof, including embodiments which do not provide all of the features and advantages set forth herein. Accordingly, the scope of the present disclosure is not intended to be limited by the specific disclosures of preferred embodiments herein, and may be defined by claims as presented herein or as presented in the future.

[0095] Conditional language, such as “can,” “could,” “might,” or “may,” unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while other embodiments do not include, certain features, elements, or steps. Thus, such conditional language is not generally intended to imply that features, elements, or steps are in any way required for one or more embodiments or that one or more embodiments necessarily include logic for deciding, with or without user input or prompting, whether these features, elements, or steps are included or are to be performed in any particular embodiment. The terms “comprising,” “including,” “having,” and the like are synonymous and are used inclusively, in an open-ended fashion, and do not exclude additional elements, features, acts, operations, and so forth. Also, the term “or” is used in its inclusive sense (and not in its exclusive sense) so that when used, for example, to connect a list of elements, the term “or” means one, some, or all of the elements in the list. Likewise the term “and/or” in reference to a list of two or more items, covers all of the following interpretations of the word: any one of the items in the list, all of the items in the list, and any combination of the items in the list. Further, the term “each,” as used herein, in addition to having its

ordinary meaning, can mean any subset of a set of elements to which the term “each” is applied. Additionally, the words “herein,” “above,” "below," and words of similar import, when used in this application, refer to this application as a whole and not to any particular portions of this application.

[0096] Conjunctive language such as the phrase “at least one of X, Y, and Z,” unless specifically stated otherwise, is otherwise understood with the context as used in general to convey that an item, term, etc. may be either X, Y, or Z. Thus, such conjunctive language is not generally intended to imply that certain embodiments require the presence of at least one of X, at least one of Y, and at least one of Z.

[0097] Language of degree used herein, such as the terms “approximately,” “about,” “generally,” and “substantially” as used herein represent a value, amount, or characteristic close to the stated value, amount, or characteristic that still performs a desired function or achieves a desired result. For example, the terms “approximately”, “about”, “generally,” and “substantially” may refer to an amount that is within less than 10% of, within less than 5% of, within less than 1% of, within less than 0.1% of, and within less than 0.01% of the stated amount. As another example, in certain embodiments, the terms “generally parallel” and “substantially parallel” refer to a value, amount, or characteristic that departs from exactly parallel by less than or equal to 15 degrees, 10 degrees, 5 degrees, 3 degrees, 1 degree, or 0.1 degree.

[0098] The scope of the present disclosure is not intended to be limited by the description of certain embodiments and may be defined by the claims. The language of the claims is to be interpreted broadly based on the language employed in the claims and not limited to the examples described in the present specification or during the prosecution of the application, which examples are to be construed as non-exclusive.

WHAT IS CLAIMED IS:

1. A negative pressure wound therapy system comprising:

a negative pressure therapy apparatus configured to apply negative pressure to a wound of a patient, the negative pressure therapy apparatus comprising:

a wound dressing configured to be placed over the wound,

a negative pressure source supported by the wound dressing, and

a controller comprising one or more processors, the controller configured to:

determine one or more operating data of the negative pressure therapy apparatus, and

transmit the one or more operating data; and

a wireless communication device comprising a controller including one or more processors, the controller of the wireless communication device configured to be communicatively coupled to the negative pressure therapy apparatus and further configured to receive the one or more operating data transmitted by the controller of the negative pressure therapy apparatus and output the received one or more operating data.

2. The system according to any of the preceding claims, wherein the controller of the negative pressure therapy apparatus is configured to transmit the one or more operating data responsive to at least one of an occurrence of an event, an expiration of a time interval, or a request received from the wireless communication device.

3. The system according to any of the preceding claims, wherein the one or more operating data comprises one or more of: power status data, error data, negative pressure data, wound data, dressing data, connection data, activity data, or patient data.

4. The system according to any of the preceding claims, wherein the wound is located in an area that is outside of the patient's vision or reach.

5. The system according to Claim 4, wherein the area includes at least one of a back, shoulder, leg, hip, foot, or buttocks of the patient.

6. The system according to any of Claims 4 or 5, wherein the area includes at least a portion of the patient's posterior.

7. The system according to any of the preceding claims, further comprising another negative pressure therapy apparatus including another wound dressing configured to be placed over another wound and another negative pressure source supported by the another wound dressing, wherein the controller of the wireless communication device is further configured to be communicatively coupled to the another negative pressure therapy apparatus.

8. The system according to Claim 7, wherein the controller of the wireless communication device is further configured to:

receive another one or more operating data transmitted by another controller of the another negative pressure therapy apparatus; and

output the received one or more operating data and the received another received one or more operating data.

9. The system according to any of the preceding claims, further comprising another wireless communication device including another controller with one or more processors, the another controller of the another wireless communication device configured to be communicatively coupled to the negative pressure therapy apparatus.

10. The system according to any of the preceding claims, wherein the wireless communication device further comprises a display configured to output the one or more operating data.

11. The system according to any of the preceding claims, wherein the wireless communication device comprises a housing enclosing a memory and the controller of the wireless communication device, the housing sized to be worn by the patient or by a caregiver.

12. A wireless communication device for communicating with a negative pressure therapy apparatus, the wireless communication device comprising:

a memory; and

a controller comprising one or more processors, the controller configured to:

generate a request for one or more operating data of a negative pressure therapy apparatus comprising a wound dressing configured to be placed over a wound of a patient and a negative pressure source supported by the wound dressing, the negative pressure apparatus configured to provide negative pressure therapy to the wound, the request based upon at least one of an occurrence of an event, a received user input, or an expiration of a time interval;

transmit the request to the negative pressure therapy apparatus;

receive the one or more operating data from the negative pressure therapy apparatus; and

output the one or more operating data.

13. The device according to Claim 12, wherein the one or more operating data comprises one or more of: power status data, error data, negative pressure data, wound data, dressing data, connection data, activity data, or patient data.

14. The device according to any of Claims 12 or 13, wherein the wound is located in an area that is outside of the patient's vision or reach.

15. The device of Claim 14, wherein the area includes at least one of a back, shoulder, leg, hip, foot, or buttocks of the patient.

16. The device according to any of Claims 14 or 15, wherein the area includes at least a portion of the patient's posterior.

17. The device of according to any of Claims 1212 to 16, further comprising a display configured to output the one or more operating data.

18. The device of according to any of Claims 12 to 17, further comprising a housing enclosing the memory and the controller, the housing sized to be worn by the patient or by a caregiver.

19. The device according to Claim 18, wherein the housing is sized to be worn on a wrist.

20. The device of according to any of Claims 12 to 19, wherein the controller is further configured to:

generate another request for one or more operating data of another negative pressure therapy apparatus comprising another wound dressing

configured to be placed over another wound and another negative pressure source supported by the another wound dressing;

transmit the another request;

receive the one or more operating data of the another negative pressure therapy apparatus; and

output the one or more operating data of the negative pressure therapy apparatus and the one or more operating data of the another negative pressure therapy apparatus.

21. A non-transitory computer storage medium comprising instructions for wirelessly communicating with a plurality of negative pressure therapy apparatuses, the instructions when executed by a processor cause the processor to perform a method that comprises:

generating a request for one or more operating data of a negative pressure therapy apparatus configured to be placed over a wound of a patient and further configured to provide negative pressure therapy to the wound, the request based upon at least one of an occurrence of an event, a received user input, or an expiration of a time interval;

transmitting the request to the negative pressure therapy apparatus;

receiving the one or more operating data from the negative pressure therapy apparatus; and

outputting the one or more operating data.

22. The non-transitory computer storage medium according to Claim 21, wherein outputting the one or more operating data comprises displaying the one or more operating data.

23. The non-transitory computer storage medium according to any of Claims 21 or 22, wherein the wound is located in an area that is outside of the patient's vision or reach.

24. The non-transitory computer storage medium according to Claim 23, wherein the area includes at least one of a back, shoulder, leg, hip, foot, or buttocks of the patient.

25. The non-transitory computer storage medium according to any of Claims 23 or 24, wherein the area includes at least a portion of the patient's posterior.

26. The non-transitory computer storage medium according to any of Claims 21 to 25, wherein the one or more operating data comprises one or more of: power status data, error data, negative pressure data, wound data, dressing data, connection data, activity data, or patient data.

27. The non-transitory computer storage medium according to any of Claims 21 to 26, wherein the method further comprises:

generating another request for another one or more operating data of another negative pressure therapy apparatus configured to be placed over another wound of the patient and further configured to provide negative pressure therapy to the another wound;

transmitting the another request to the another negative pressure therapy apparatus;

receiving the another one or more operating data from the another negative pressure therapy apparatus; and

outputting the one or more operating data and the another one or more operating data.

28. The non-transitory computer storage medium according to Claim 27, wherein the another one or more operating data comprises one or more of: power status data, error data, negative pressure data, wound data, dressing data, connection data, activity data, or patient data.

29. A wireless communication device for communicating with a negative pressure wound therapy system, the wireless communication device comprising:

a memory; and

a controller comprising one or more processors, the controller configured to:

wirelessly communicate with a plurality of negative pressure apparatuses configured to be positioned on a patient and further configured to provide negative pressure therapy to a plurality of wounds, each of the plurality of negative pressure apparatuses comprising a wound dressing configured to be placed over a wound of the patient, a negative pressure source supported by the wound

dressing, and a controller configured to control the negative pressure source;

receive first and second operating data associated with provision of negative pressure therapy by at least first and second negative pressure apparatuses, respectively, and

generate a notification based on the received operating data, the notification including information identifying the first and second negative pressure apparatuses and the respective first and second operating data.

30. The device according to Claim 29, wherein the first and second operating data comprises one or more of: power status data, error data, negative pressure data, wound data, dressing data, connection data, activity data, or patient data.

31. A method of communicating within a negative pressure wound therapy system, the method comprising:

wirelessly communicating, using a wireless communication device positioned on a patient's wrist, with a negative pressure apparatus comprising a wound dressing positioned over a wound of a patient and a negative pressure source supported by the wound dressing, wherein the negative pressure therapy device provides negative pressure therapy to the wound, and wherein the wireless communication is based upon at least one of an occurrence of an event, a received user input, or an expiration of a time interval; and

outputting one or more operating data associated with provision of negative pressure therapy by the negative pressure apparatus.

32. The method according to Claim 31, wherein said wirelessly communicating comprises:

receiving, at the wireless communication device, the one or more operating data from the negative pressure therapy apparatus.

33. The method according to any of Claims 31 or 32, wherein said wirelessly communicating further comprises:

generating, at the wireless communication device, a request for the one or more operating data of the negative pressure therapy apparatus,

wherein the request is based upon the at least one of an occurrence of an event, a received user input, or an expiration of a time interval; and

transmitting the request to the negative pressure therapy apparatus.

34. The method according to any of Claims 31-33, further comprising:

generating another request for one or more operating data of another negative pressure therapy apparatus comprising another wound dressing positioned over another wound of the patient and another negative pressure source supported by the another wound dressing, wherein the another negative pressure therapy device provides negative pressure therapy to the another wound;

transmitting the another request;

receiving the one or more operating data of the another negative pressure therapy apparatus; and

outputting the one or more operating data of the another negative pressure therapy apparatus.

35. The method according to any of Claims 31 to 34, wherein the wound is located in an area that is outside of the patient's vision or reach.

36. The method according to Claim 35, wherein the area includes at least one of a back, shoulder, leg, hip, foot, or buttocks of the patient.

37. The method according to any of Claims 35 or 36, wherein the area includes at least a portion of the patient's posterior.

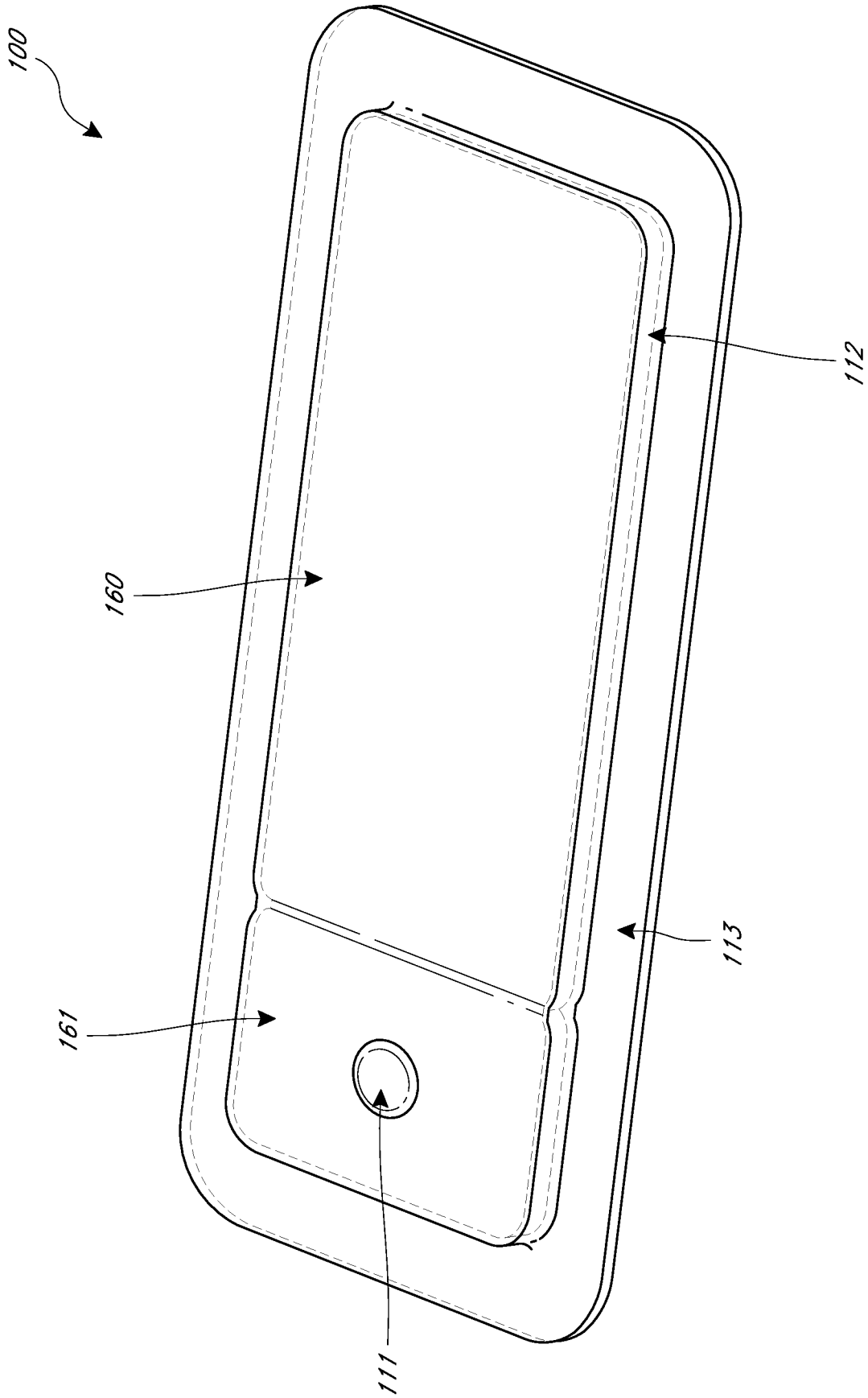

FIG. 1A

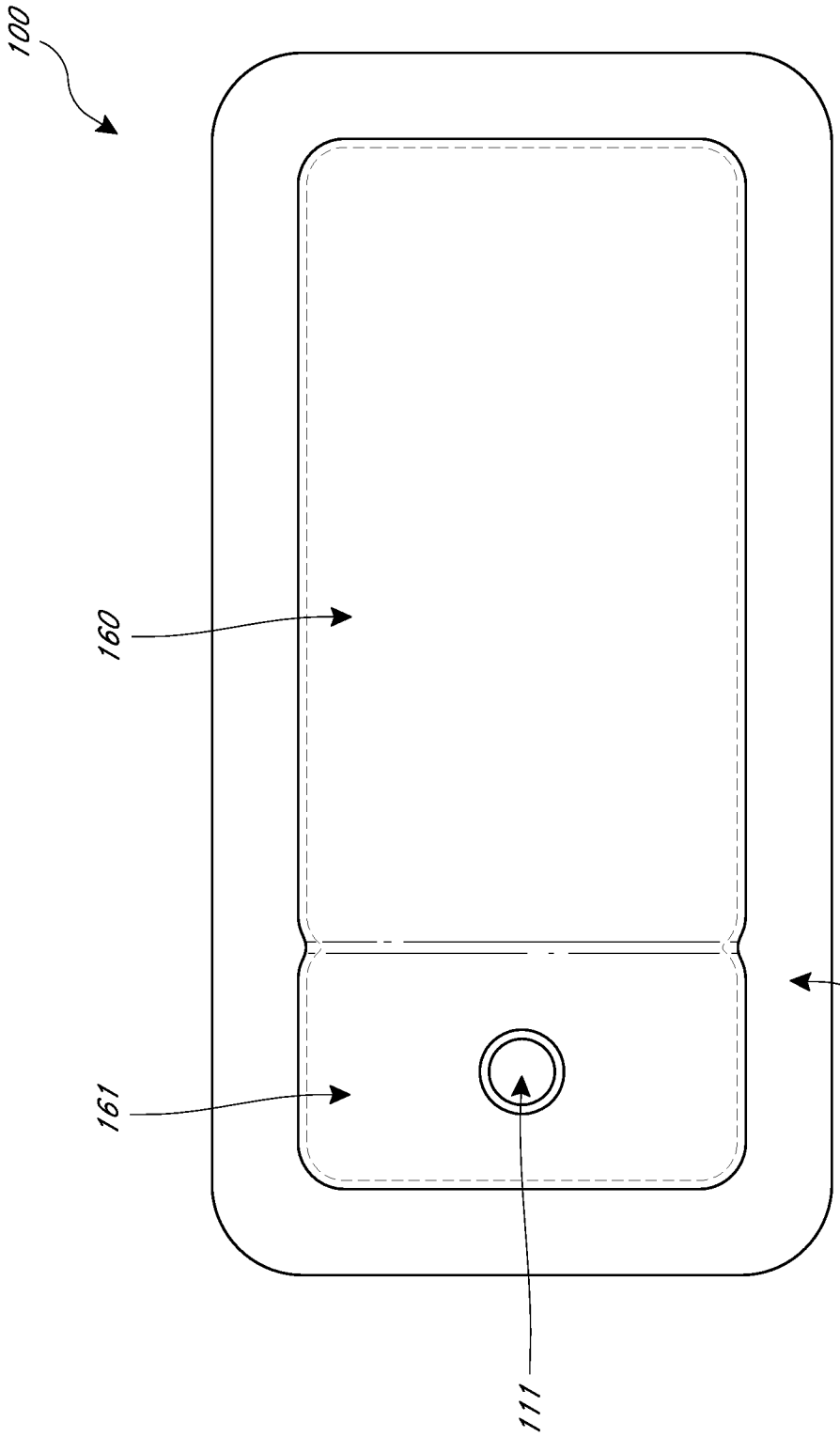

FIG. 1B

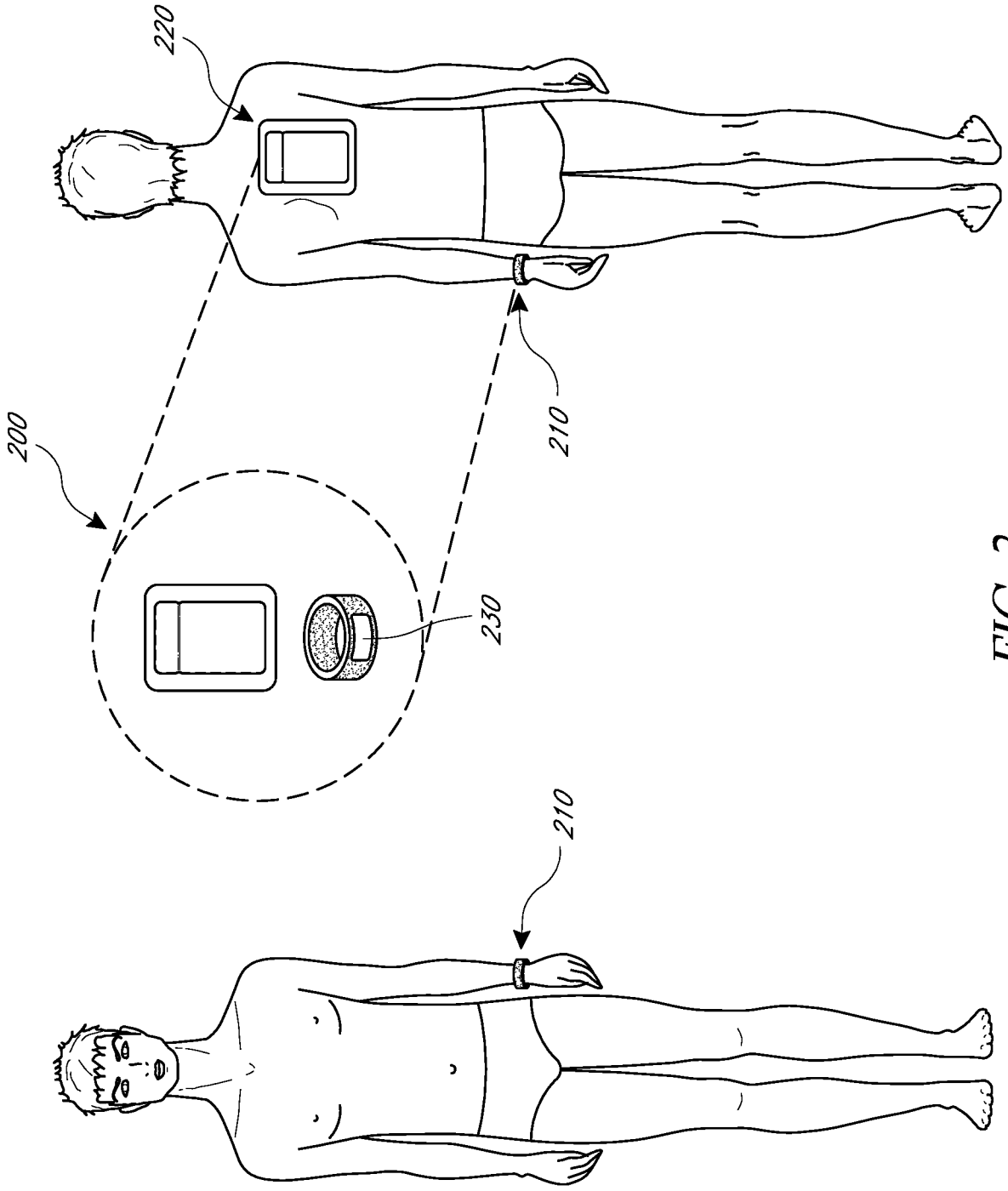

FIG. 2

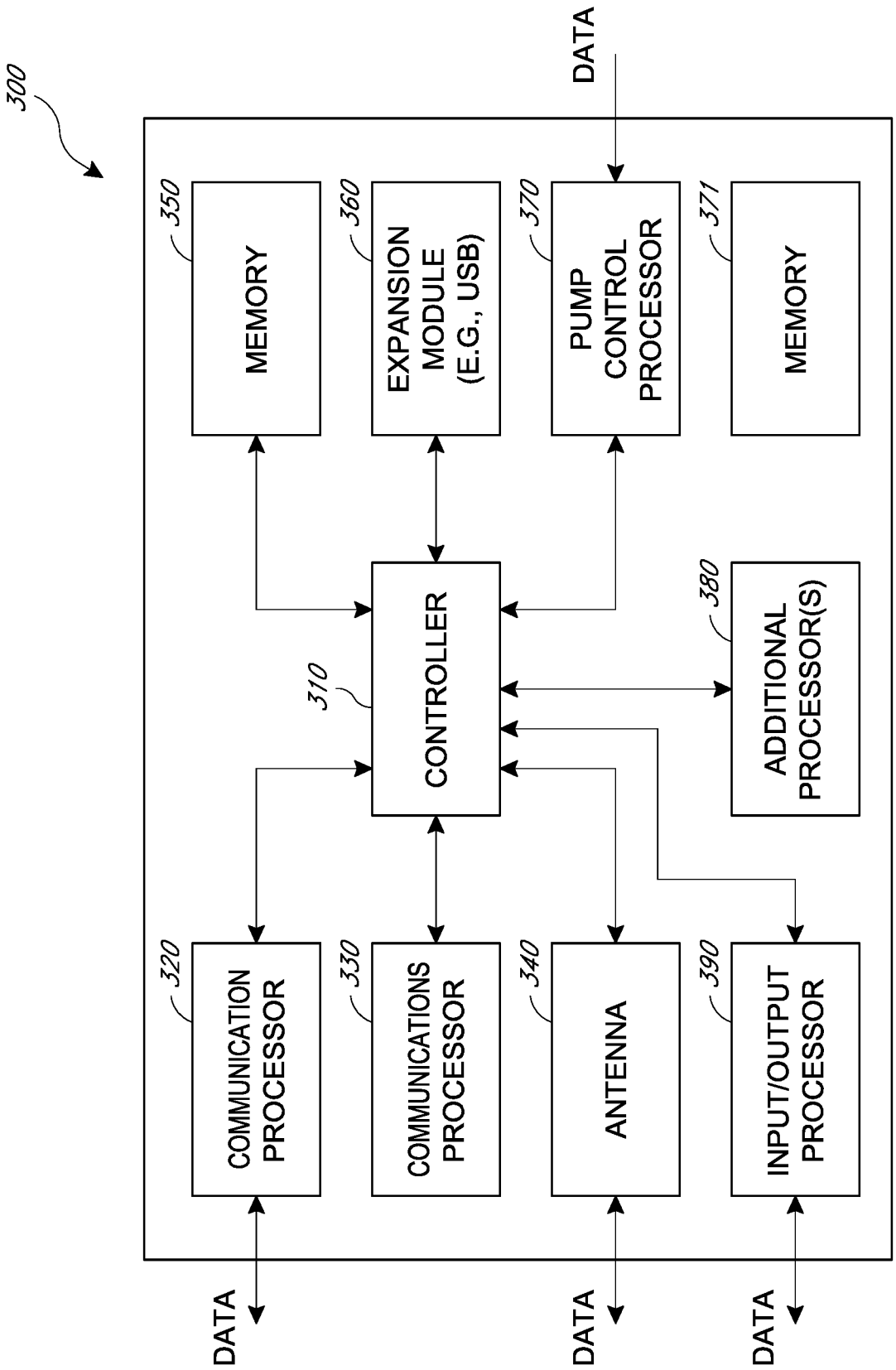
300
DATA
350
MEMORY
360
EXPANSION MODULE (E.G., USB)
370
PUMP CONTROL PROCESSOR
371
MEMORY
310
CONTROLLER
380
ADDITIONAL PROCESSOR(S)
320
COMMUNICATION PROCESSOR
330
COMMUNICATIONS PROCESSOR
340
ANTENNA
390
INPUT/OUTPUT PROCESSOR
DATA
DATA
DATA

FIG. 3

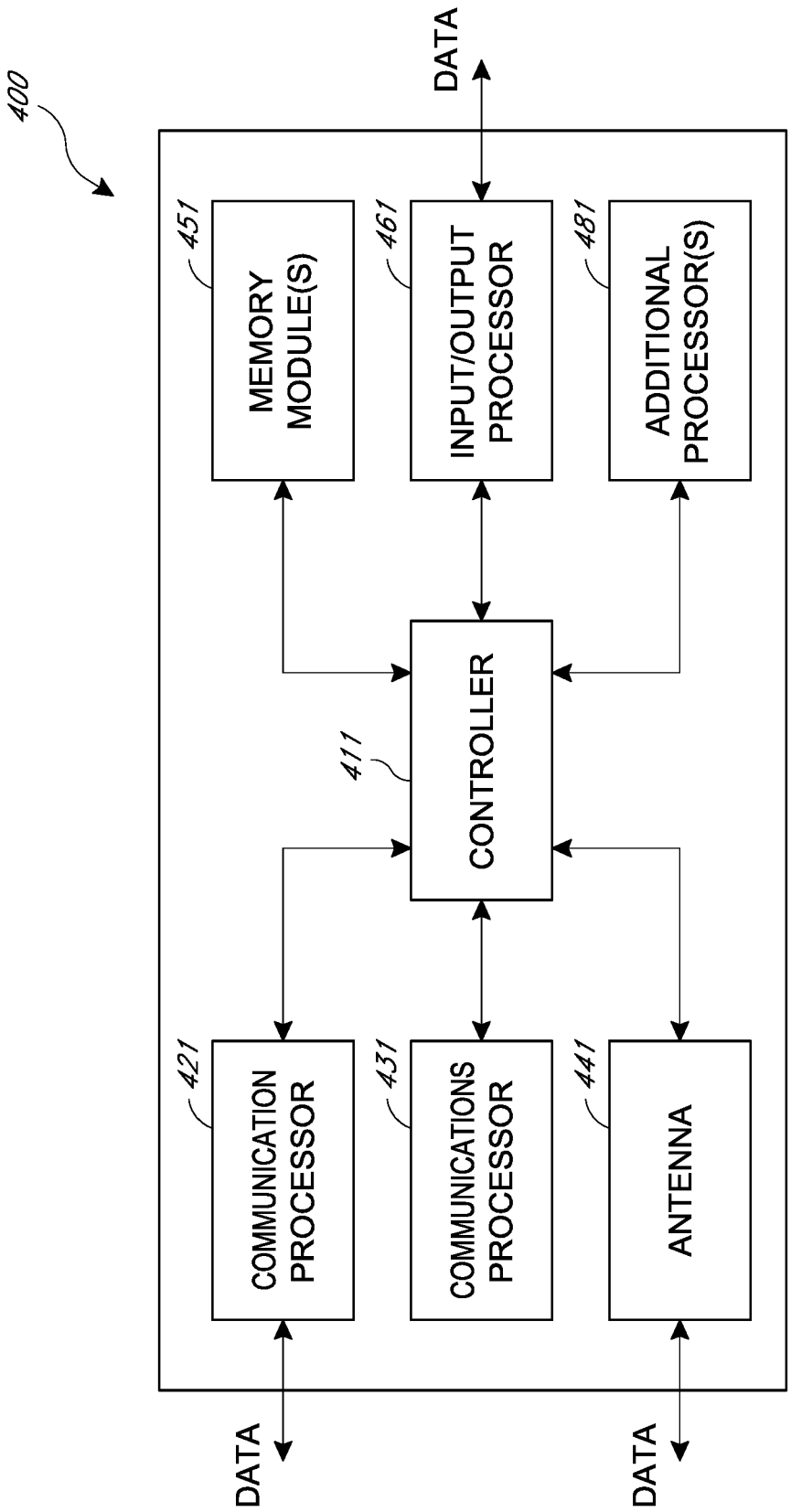
400
DATA
451
MEMORY MODULE(S)
461
INPUT/OUTPUT PROCESSOR
481
ADDITIONAL PROCESSOR(S)
411
CONTROLLER
421
COMMUNICATION PROCESSOR
431
COMMUNICATIONS PROCESSOR
441
ANTENNA
DATA
DATA

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/081959

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61M1/00
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)
A61M A61F

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	WO 2016/107775 A2 (SMITH & NEPHEW [GB]) 7 July 2016 (2016-07-07) paragraphs 0012, 0041, 0043-0045, 0053, 0055, 0057; figures 1-6	1-11
X	WO 2012/057881 A1 (KCI LICENSING INC [US]; COULTHARD RICHARD DANIEL JOHN [GB]; LOCKE CHRI) 3 May 2012 (2012-05-03) paragraphs 0057, 0071, 0072, 0088, 0090; figures 9-12	1-11
X	US 2015/025482 A1 (BEGIN MILES [US] ET AL) 22 January 2015 (2015-01-22) paragraphs 0067, 0070, 0075, 0078, 0084; figures 14, 15, 16F; claim 12	1-11

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[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
2 March 2018	09/05/2018

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	Martin Amezaga, J

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2016/061146 A1 (KCI LICENSING INC [US]) 21 April 2016 (2016-04-21) paragraphs 0020, 0022, 0046, 0054, 0055; figures 1, 4 -----	1-11

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2017/081959

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. [X] Claims Nos.: 31-37
because they relate to subject matter not required to be searched by this Authority, namely:

Claim 31 therapy method. See 0057 in scope.

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

1-11

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: 1-11

A negative pressure wound therapy system comprising: a negative pressure therapy apparatus configured to apply negative pressure to a wound of a patient, the negative pressure therapy apparatus comprising: a wound dressing configured to be placed over the wound, a negative pressure source supported by the wound dressing, and a controller comprising one or more processors, the controller configured to: determine one or more operating data of the negative pressure therapy apparatus, and transmit the one or more operating data; and a wireless communication device comprising a controller including one or more processors, the controller of the wireless communication device configured to be communicatively coupled to the negative pressure therapy apparatus and further configured to receive the one or more operating data transmitted by the controller of the negative pressure therapy apparatus and output the received one or more operating data.

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2. claims: 12-20

A wireless communication device for communicating with a negative pressure therapy apparatus, the wireless communication device comprising: a memory; and a controller comprising one or more processors, the controller configured to: generate a request for one or more operating data of a negative pressure therapy apparatus comprising a wound dressing configured to be placed over a wound of a patient and a negative pressure source supported by the wound dressing, the negative pressure apparatus configured to provide negative pressure therapy to the wound, the request based upon at least one of an occurrence of an event, a received user input, or an expiration of a time interval; transmit the request to the negative pressure therapy apparatus; receive the one or more operating data from the negative pressure therapy apparatus; and output the one or more operating data.

---

3. claims: 21-28

A non-transitory computer storage medium comprising instructions for wirelessly communicating with a plurality of negative pressure therapy apparatuses, the instructions when executed by a processor cause the processor to perform a method that comprises: generating a request for one or more operating data of a negative pressure therapy apparatus configured to be placed over a wound of a patient and further configured to provide negative pressure therapy to the wound, the request based upon at least one of an

occurrence of an event, a received user input, or an expiration of a time interval; transmitting the request to the negative pressure therapy apparatus; receiving the one or more operating data from the negative pressure therapy apparatus; and outputting the one or more operating data.

---

4. claims: 29, 30

A wireless communication device for communicating with a negative pressure wound therapy system, the wireless communication device comprising: a memory; and a controller comprising one or more processors, the controller configured to: wirelessly communicate with a plurality of negative pressure apparatuses configured to be positioned on a patient and further configured to provide negative pressure therapy to a plurality of wounds, each of the plurality of negative pressure apparatuses comprising a wound dressing configured to be placed over a wound of the patient, a negative pressure source supported by the wound dressing, and a controller configured to control the negative pressure source; receive first and second operating data associated with provision of negative pressure therapy by at least first and second negative pressure apparatuses, respectively, and generate a notification based on the received operating data, the notification including information identifying the first and second negative pressure apparatuses and the respective first and second operating data.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2017/081959

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		EP 3207478 A1	23-08-2017
		JP 2017535321 A	30-11-2017
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		WO 2016061146 A1	21-04-2016