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(54) SURGICAL TABLE CONTROL DEVICE

(57) A surgical table control device (20) comprising a user interface (21) and device control circuitry (24). The user interface (21) comprises an input (22a-h) to enable a user to control movement of a corresponding movable section (14a-e) of a surgical table (10). The device control circuitry (24) is configured to receive a suggested position of the corresponding movable section (14a-e) of the surgical table (10). The device control circuitry (24) is further configured to determine when the corresponding movable section (14a-e) of the surgical table (10) is in the suggested position, and notify a user when the corresponding movable section (14a-e) of the surgical table (10) is in the suggested position. The device control circuitry (24) is further configured to, in response to an interaction of a user with the input (22a-h) of the user interface (21), send a signal to move the corresponding movable section (14a-e) of the surgical table (10) according to the interaction of the user with the input (22a-h).

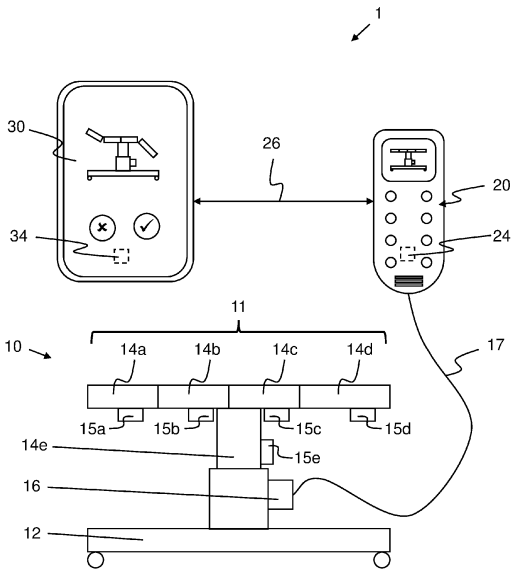

Figure 1

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Description

[0001] The present disclosure relates to a surgical table control device, a surgical table comprising a surgical table control device, and a surgical table positioning system comprising a surgical table control device. More specifically, the present disclosure relates to a surgical table control device configured to control a movable section of a surgical table.

[0002] Surgical tables typically comprise movable sections that enable a patient supported on the table to be positioned in an optimal position for the surgical procedure that is being performed. Generally, the patient support surface of a surgical table comprises several movable sections, including a head section, a body section, a seat section, and a leg section. The height of the table is also typically adjustable. The movable sections of a surgical table are often movable by actuators that are controlled by control circuitry. A surgical table control device is typically coupled to the table control circuitry, and is configured to enable a user to control the actuators to adjust the position of the movable sections of the table.

[0003] Often in surgical procedures, the surgeon is not in control of the surgical table control device, and so is also not in direct control of the position of the surgical table. This can be for a variety of reasons, such as the surgeon is performing a complex procedure on the patient, or the surgeon is operating a robotic operating system from a console that is remote from the surgical table. When a surgeon is not in control of the surgical table control device, the surgeon is required to instruct another person to control the surgical table control device to position the surgical table in a desired position. However, there is a risk that the person controlling the position of the surgical table may misunderstand the instructions from the surgeon, or may not correctly hear the instructions from the surgeon.

[0004] It would be desirable to be able to reliably position a surgical table accurately in a desired position of a person who is not directly in control of the table.

[0005] According to the present disclosure, there is provided a surgical table control device comprising a user interface and device control circuitry. The user interface comprises an input to enable a user to control movement of a corresponding movable section of a surgical table. The device control circuitry is configured to receive a suggested position of the corresponding movable section of the surgical table. The device control circuitry is further configured to determine when the corresponding movable section of the surgical table is in the suggested position, and notify a user when the corresponding movable section of the surgical table is in the suggested position. The device control circuitry is further configured to, in response to an interaction of a user with the input of the user interface, send a signal to move the corresponding movable section of the surgical table according to the interaction of the user with the input.

[0006] By configuring a surgical table control device to receive a suggested position of a movable section of the surgical table, and notify a user when the movable section is in the suggested position, the surgical table control device of this disclosure advantageously enables a person remote from the surgical table to suggest a position for the movable section of the surgical table, and a person at the surgical table in control of the surgical table control device to reliably position the movable section of the surgical table accurately in the suggested position. As an example, such a surgical table control device may be particularly useful in robotic surgery scenarios, wherein a surgeon is remote from the surgical table at the robotic control console, and needs to instruct a person located at the surgical table, such as an anaesthetist, to position a movable section of the surgical table in a particular manner for a procedure.

[0007] According to the present disclosure, there is also provided a surgical table comprising: a movable section; an actuator configured to move the movable section; and a surgical table control device. The surgical table control device comprises a user interface and device control circuitry. The user interface comprises an input to enable a user to control movement of the movable section of the surgical table. The device control circuitry is configured to receive a suggested position of the corresponding movable section of the surgical table. The device control circuitry is further configured to determine when the movable section of the surgical table is in the suggested position, and notify a user when the corresponding movable section of the surgical table is in the suggested position. The device control circuitry is further configured to, in response to an interaction of a user with the input of the user interface, send a signal to control the actuator to move the movable section of the surgical table according to the interaction of the user with the input.

[0008] In some embodiments, the surgical table comprises table control circuitry. The table control circuitry may be coupled to the actuator to control movement of the actuator. The surgical table control device may be coupled to the table control circuitry. In these embodiments, the device control circuitry is configured to, in response to an interaction of a user with the input of the user interface, send a signal to the table control circuitry to control the actuator to move the movable section of the surgical table according to the interaction of the user with the input.

[0009] According to the present disclosure, there is also provided a surgical table positioning system comprising: a surgical table; and a surgical table control device. The surgical table comprises a movable section; and an actuator configured to move the movable section. The surgical table control device is couplable to the surgical table. The surgical table control device comprises a user interface and device control circuitry. The user interface comprises an input to enable a user to control movement of the movable section of the surgical table. The device control circuitry is configured to receive a suggested position of the corresponding movable section of the surgi-

cal table. The device control circuitry is further configured to determine when the movable section of the surgical table is in the suggested position, and notify a user when the corresponding movable section of the surgical table is in the suggested position. The device control circuitry is further configured to, in response to an interaction of a user with the input of the user interface, send a signal to the surgical table to control the actuator to move the movable section of the surgical table according to the interaction of the user with the input.

[0010] In some embodiments, the surgical table positioning system further comprises a remote device. The remote device is a separate device from the surgical table and the surgical table control device. The remote device may be couplable to the surgical table control device. The remote device may be couplable to the surgical table control device in any suitable manner. The remote device may be couplable to the surgical table control device by a wired connection. The remote device may be couplable to the surgical table control device by a wireless connection.

[0011] Advantageously, providing a remote device that is a separate device from the surgical table and the surgical table control device that is couplable to the surgical table control device, may enable a person, such as a surgeon who is not positioned at the surgical table, to send a suggested position for the movable section of the surgical table to the surgical table control device. This may enable a person operating the surgical table control device to reliably position the movable section of the surgical table accurately in the suggested position.

[0012] The remote device is configured to send a suggested position of the corresponding movable section of the surgical table to the surgical table control device. The surgical table control device is configured to receive the suggested position of the corresponding movable section of the surgical table from the remote device.

[0013] The surgical table control device may be a handheld device that is configured to be held in the hand of a user. The surgical table control device may be part of a surgical table or may be couplable to a surgical table. The surgical table control device may be couplable to a surgical table in any suitable way. The surgical table control device may be couplable to a surgical table by a wired connection. The surgical table control device may be couplable to a surgical table by a wireless connection.

[0014] The surgical table control device comprises a user interface. The user interface comprises an input. As used herein, an "input" refers to a feature or a region of a device at which a user can interact with the device to make a selection or to enter information.

[0015] In some embodiments, the input is a physical input, such as a button, a switch, or a dial. In some embodiments, the input comprises a button or a switch that is depressible by a user. In some embodiments, the input comprises a dial or a knob that is rotatable by a user. In some embodiments, the input comprises a key of a keyboard that is depressible by a user. In some embodiments, the surgical table control device may comprise a touchscreen display, and the input may be a region of the touchscreen display that is selectable by a touch of a finger of a user.

[0016] In some preferred embodiments, the user interface comprises a plurality of inputs. In embodiments in which the user interface comprises a plurality of inputs, each input may be configured to enable a user to control movement of one or more corresponding movable sections of a surgical table.

[0017] In some embodiments, the control device comprises a display. In some preferred embodiments, the user interface comprises the display. In some particularly preferred embodiments, the display is a touchscreen display.

[0018] Where the control device comprises a display, the user interface may comprise a graphical user interface (GUI) displayed on the display. Where the user interface comprises a GUI, the input may be displayed on the GUI. Where the user interface comprises a GUI, the input on the GUI may comprise an input region on the display. Where the user interface comprises a GUI, the input on the GUI may comprise a graphical icon.

[0019] The user interface may comprise any suitable number and arrangement of inputs. In some embodiments, the user interface may comprise an arrangement of one or more physical inputs, such as one or more buttons, switches, and knobs. In some embodiments, the user interface may be a graphical user interface. In some embodiments, the user interface may comprise one or more physical inputs and a graphical user interface.

[0020] Where the control device comprises a display, the device control circuitry may be configured to display the current position of the corresponding movable section of the surgical table on the display. Where the control device comprises a display, the device control circuitry may be configured to display the received suggested position of the corresponding movable section of the surgical table on the display.

[0021] In some preferred embodiments where the control device comprises a display, the device control circuitry is configured to display an indicator informing a user how to move the corresponding movable section of the surgical table to the suggested position. Advantageously, this may make it easier for a person operating the surgical table control device to move the corresponding movable section of the surgical table towards the suggested position. The indicator may comprise an arrow pointing in a direction corresponding to the direction in which the corresponding movable section of the surgical table needs to be moved to reach the suggested position. The indicator may comprise a plus or a minus sign indicating that a height or angle of inclination of the corresponding movable section needs to be increased or decreased to reach the suggested position.

[0022] The surgical table control device comprises device control circuitry.

[0023] The device control circuitry is configured to re-

ceive a suggested position of the corresponding movable section of the surgical table. The device control circuitry is further configured to determine when the corresponding movable section of the surgical table is in the suggested position. In some embodiments, the device control circuitry is configured to receive a current position of the corresponding movable section of the surgical table. In embodiments where the device control circuitry is configured to receive a current position of the corresponding movable section of the surgical table, the determination of when the corresponding movable section of the surgical table is in the suggested position may comprise comparing the received current position of the corresponding movable section of the surgical table to the received suggested position of the corresponding section of the surgical table.

[0024] The device control circuitry is further configured to notify a user when the corresponding movable section of the surgical table is in the suggested position. In some embodiments, the device control circuitry is configured to send a notification signal when the corresponding movable section reaches the suggested position.

[0025] The device control circuitry is further configured to, in response to an interaction of a user with the input of the user interface, send a signal to move the corresponding movable section of the surgical table according to the interaction of the user with the input. In some preferred embodiments, the device control circuitry is configured to, in response to a continuous interaction of a user with the input of the user interface, send signals to continuously move the corresponding movable section of the surgical table until the interaction of the user with the input of the user interface stops. In some particularly preferred embodiments, the device control circuitry is configured to stop sending signals to continuously move the corresponding movable section of the surgical table in response to a continuous interaction of a user with the input of the user interface when it is determined that the corresponding movable section of the surgical table is in the suggested position, regardless of whether the continuous user interaction with the input stops. Advantageously, this may improve the reliability of the positioning of the surgical table accurately in the suggested position.

[0026] In some of these preferred embodiments, the device control circuitry is configured to stop sending signals to continuously move the corresponding movable section of the surgical table in response to a continuous interaction of a user with the input of the user interface when it is determined that the corresponding movable section of the surgical table is in the suggested position, and to resume sending a signal to move the corresponding movable section of the surgical table after the continuous user interaction with the input has stopped and when a new user interaction with the user input is initiated.

[0027] The device control circuitry typically comprises a controller. The controller may comprise a microprocessor. The microprocessor may be a programmable microprocessor, a microcontroller, or an application specific integrated chip (ASIC) or other electronic circuitry capable of providing control. The device control circuitry may also comprise further electronic components.

[0028] The device control circuitry may comprise a receiver configured to receive the suggested position of the corresponding movable section of the surgical table. Where the surgical table positioning system comprises a remote device, the receiver may be configured to receive the suggested position of the corresponding movable section of the surgical table from the remote device. The device control circuitry may comprise a receiver configured to receive a current position of the corresponding movable section of the surgical table. Where the surgical table comprises table control circuitry, the receiver may be configured to receive a current position of the corresponding movable section of the surgical table from the table control circuitry.

[0029] The device control circuitry may comprise a transmitter configured to send a signal to move the corresponding movable section of the surgical table according to the interaction of the user with the input. The device control circuitry may comprise a transmitter configured to send a signal to notify a user when the corresponding movable section of the surgical table is in the suggested position.

[0030] The device control circuitry may be configured to receive and send various types of signals for communication with other devices. The device control circuitry may comprise various hardwired communication circuitry. For example, the device control circuitry may comprise one or more hardwired ports, such as parallel ports, serial ports, coaxials, universal serial bus (USB), SPI, I2C, UART, fibre optic, ethernet, other general pin input/output (GPIO), and other analogue and/or digital ports. The device control circuitry may comprise various wireless communications circuitry for wireless communications. For example, the device control circuitry may comprise circuitry to enable wireless communication via wireless protocols such as Bluetooth®, Zigbee®, Wi-25 Fi®, WiMAX, 3G, 4G or 5G technology, radio frequency (RF), infrared (IR), sonar, and other wireless or mobile communications protocols.

[0031] The device control circuitry is configured notify a user when the corresponding movable section of the surgical table is in the suggested position. The device control circuitry may be configured to send a notification signal to notify a user when the corresponding movable section reaches the suggested position. In some preferred embodiments, the surgical table control device comprises a notifier. The notifier is configured to notify a user when the corresponding movable section is in the suggested position. The notifier may be coupled to the device control circuitry. In these preferred embodiments, the device control circuitry may be configured to send a notification signal to the notifier when the corresponding movable section reaches the suggested position.

[0032] In some embodiments, the notifier comprises

an audible notifier. For example, the notifier may comprise a loudspeaker or a buzzer. In these embodiments, the notification comprises an audible notification. In these embodiments, the surgical table control device may be configured to emit a sound when the corresponding movable section of the surgical table reaches the suggested position.

[0033] In some embodiments, the notifier comprises a visual notifier. For example, the notifier may comprise one or more lights. Where the control device comprises a display, the visual notifier may comprise a region on the display, or a graphical icon displayed on the display. In these embodiments, the notification comprises a visual notification. In these embodiments, the surgical table control device may be configured to illuminate a light or display a graphical indication when the corresponding movable section of the surgical table reaches the suggested position.

[0034] In some embodiments, the notifier comprises a haptic notifier. In these embodiments, the notification comprises a haptic notification. For example, the haptic notification may be a vibration or a series of vibrations. In these embodiments, the surgical table control device may be configured to vibrate when the corresponding movable section of the surgical table reaches the suggested position.

[0035] In some embodiments, the device control circuitry is configured to send a notification signal to the surgical table. In these embodiments, the surgical table may be configured to notify a user that the corresponding movable section of the surgical table is in the suggested position. In these embodiments, the surgical table may comprise a notifier. The notifier may comprise at least one of a visual notifier, an audible notifier, and a haptic notifier. The notifier of the surgical table may comprise any of the notifiers described above for the surgical table control device.

[0036] In some embodiments where a remote device is coupled to the surgical table control device, the device control circuitry is configured to send a notification signal to the remote device. In these embodiments, the remote device may be configured to notify a user that the corresponding movable section of the surgical table is in the suggested position. In these embodiments, the remote device may comprise a notifier. The notifier may comprise at least one of a visual notifier, an audible notifier, and a haptic notifier. The notifier of the remote device may comprise any of the notifiers described above for the surgical table control device.

[0037] The surgical table control device is configured to enable a user to control one or more movable sections of a surgical table.

[0038] In some embodiments, the surgical table control device is part of a surgical table. Where the surgical table control device is part of a surgical table, the surgical table control device may be an integral part of a surgical table.

[0039] In some embodiments, the surgical table control device is a separate device to the surgical table. In some of these embodiments, the surgical table control device is couplable to a surgical table. The surgical table control device may be couplable to a surgical table in any suitable manner. The surgical table control device may be couplable to a surgical table by a wired connection. The surgical table control device may be couplable to a surgical table by a wireless connection.

[0040] A surgical table may comprise one or more movable sections. Typically, a surgical table comprises a plurality of movable sections. The movable sections may include one or more sections of a patient support surface of the surgical table. The movable sections of a patient support surface may include one or more of: a head section, a body section, a leg section, and a foot section. The movable sections of a surgical table may also include the column supporting the patient support surface, which controls the height of the patient support surface.

[0041] The surgical table may comprise an actuator. An actuator may be coupled to the movable section of the surgical table and configured to move the movable section. Movement of the movable section of the surgical table may be controlled by an actuator. The actuator may be any suitable type of actuator. For example, the actuator may be a linear actuator or a rotary actuator.

[0042] The surgical table may comprise a plurality of actuators. Where a surgical table comprises a plurality of movable sections, each of the movable sections may be controlled by a separate actuator. Each of the movable sections of the surgical table may be coupled to an actuator.

[0043] The surgical table may further comprise table control circuitry. The table control circuitry may be configured to control the movement of the one or more movable sections of the surgical table. Where the movement of a movable section is controlled by an actuator, the table control circuitry may be coupled to the actuator, and configured to control the actuator to control the movement of the movable section.

[0044] The input of the user interface of the surgical table control device may be configured to move any movable section of the surgical table. Where the surgical table comprises a patient support surface having movable sections including one or more of: a head section, a body section, a seat section, and a leg section, the input may be configured to move one of: the head section, the body section, the seat section, and the leg section. The input may be configured to move the column supporting the patient support surface to control the height of the patient support surface. The input may comprise one of:

- a head up input, which is configured to move the head section of the patient support surface up;
- a head down input, which is configured to move the head section of the patient support surface down;
- a body up input; which is configured to move the body section of the patient support surface up;
- a body down input, which is configured to move the body section of the patient support surface down;

- a seat up input; which is configured to move the seat section of the patient support surface up;
- a seat down input, which is configured to move the seat section of the patient support surface down;
- a leg up input; which is configured to move the leg section of the patient support surface up;
- a leg down input, which is configured to move the leg section of the patient support surface down;
- a column up input; which is configured to move the column supporting the patient support surface up;
- a column down input, which is configured to move the column supporting the patient support surface down;

[0045] As used herein, the terms "up" and "down" are not limited to one of translational movement or rotational movement of a movable section of the surgical table, but rather encompass translational movement, rotational movement, and a combination of both translational movement and rotational movement. Moving a movable section of a patient support surface of the surgical table "up" refers to moving the movable section of the patient support surface to raise the portion of a person supported on the movable section. Moving a movable section of a patient support surface of the surgical table "down" refers to moving the movable section of the patient support surface to lower the portion of a person supported on the movable section.

[0046] In some embodiments, the input of the user interface of the surgical table control device may be configured to control movement of more than one corresponding movable sections of a surgical table. For example, the input may be configured to move both the body section and the seat section of the patient support surface of the table at the same time. In some preferred embodiments, the input may be configured as one of:

- a Trendelenburg input, which is configured to increase the Trendelenburg angle of the patient support surface, i.e., the angle at which the patient support surface is tilted, relative to the horizontal, with the patient's feet elevated above the patient's head;
- a reverse Trendelenburg input, which is configured to increase the reverse Trendelenburg angle of the patient support surface, i.e., the angle at which the patient support surface is tilted, relative to the horizontal, with the patient's head elevated above the patient's feet;
- a flex up input, which is configured to move the patient support surface to raise both the head and legs of a patient above the pelvis of the patient; and
- a flex down input, which is configured to move the patient support surface to lower both the head and legs of a patient below the pelvis of the patient.

[0047] In some preferred embodiments, the user interface comprises a plurality of inputs. Where the user interface comprises a plurality of inputs, each input may be configured to enable a user to control movement of one or more corresponding movable sections of a surgical table. For example, the user interface may comprise one or more of: a head up input; a head down input; a body up input; a body down input; a seat up input; a seat down input; a leg up input; a leg down input; a column up input; a column down input; a Trendelenburg input; a reverse Trendelenburg input; a flex up input; and a flex down input.

[0048] In some embodiments, the surgical table is configured to enable independent movement of movable sections of a surgical table at the left and right sides of the table. Accordingly, the user interface of the surgical table control device may further comprise inputs configured to control each of the left and right sides of the movable sections.

[0049] The surgical table may be configured to monitor the position of a movable section of the surgical table. Where the surgical table comprises table control circuitry, the table control circuitry may be configured to monitor the position of a movable section of the surgical table. The table control circuitry may be configured to send the current position of a movable section of the surgical table to the surgical table control device.

[0050] The surgical table may be configured to monitor the position of a movable section in any suitable way. In some embodiments, the table control circuitry may be configured to monitor the current supplied to an actuator coupled to a movable section to monitor the position of the movable section. In some embodiments, the surgical table may comprise a position sensor, such as an accelerometer or other inclinometer or tilt sensor. The position sensor may be arranged to monitor the position of a movable section of the surgical table. Where the surgical table comprises a plurality of movable sections, the surgical table may comprise a plurality of position sensors, each position sensor being arranged to monitor the position of a movable section of the surgical table. Where the surgical table comprises table control circuitry, the position sensor, or each position sensor, may be coupled to the table control circuitry.

[0051] In some embodiments, the surgical table positioning system comprises a remote device. The remote device may be any suitable device, terminal or console that is separate from the surgical table and the surgical table control device. For example, the remote device may be a terminal or console of a robotic surgery system, a smartphone, a tablet computer, a laptop computer, or a desktop computer.

[0052] In some embodiments, the remote device may comprise a user interface. The user interface of the remote device may comprise an input. The input may be a physical input, such as a button, a switch, a dial, or a key. In some embodiments, the remote device may comprise a touchscreen display, and the input may be a region of the touchscreen display that is selectable by a touch of a finger of a user. In some preferred embodiments, the user interface of the remote device comprises a plurality

of inputs. In embodiments in which the user interface of the remote device comprises a plurality of inputs, each input may be configured to enable a user to suggest a position of one or more corresponding movable sections of a surgical table.

[0053] In some embodiments, the remote device comprises a display. In some preferred embodiments, the user interface of the remote device comprises the display. The display may be is a touchscreen display.

[0054] Where the remote device comprises a display, the user interface may comprise a graphical user interface (GUI) displayed on the display. Where the user interface of the remote device comprises a GUI, the input may be displayed on the GUI. Where the user interface of the remote device comprises a GUI, the input on the GUI may comprise an input region on the display. Where the user interface of the remote device comprises a GUI, the input on the GUI may comprise a graphical icon.

[0055] Where the remote device comprises a display, the remote device may be configured to display suggested position of the corresponding movable section of the surgical table input by the user into the remote device on the display.

[0056] The user interface of the remote device may comprise any suitable number and arrangement of inputs. The user interface of the remote device may comprise an arrangement of at least one of: one or more physical inputs, such as one or more buttons, switches, and knobs; and a graphical user interface. In some embodiments, the user interface may comprise one or more physical inputs and a graphical user interface.

[0057] The remote device typically comprises a controller. The controller may comprise a microprocessor. The microprocessor may be a programmable microprocessor, a microcontroller, or an application specific integrated chip (ASIC) or other electronic circuitry capable of providing control. The remote device may also comprise further electronic components.

[0058] The remote device is configured to send a suggested position of the corresponding movable section of the surgical table to the surgical table control device. The remote device may comprise a transmitter configure to send the suggested position of the corresponding movable section of the surgical table to the surgical table control device.

[0059] The remote device may comprise a receiver configured to receive a notification from the surgical table control device indicating that the corresponding movable section of the surgical table is in the suggested position. The remote device may comprise a receiver configured to receive a current position of the corresponding movable section of the surgical table.

[0060] The remote device may be configured to receive and send various types of signals for communication with other devices. The remote device may comprise various hardwired communication circuitry. For example, the remote device may comprise one or more hardwired ports, such as parallel ports, serial ports, coaxials, universal serial bus (USB), SPI, I2C, UART, fibre optic, ethernet, other general pin input/output (GPIO), and other analogue and/or digital ports. The remote device may comprise various wireless communications circuitry for wireless communications. For example, the remote device may comprise circuitry to enable wireless communication via wireless protocols such as Bluetooth®, Zigbee®, Wi-Fi®, WiMAX, 3G, 4G or 5G technology, radio frequency (RF), infrared (IR), sonar, and other wireless or mobile communications protocols.

[0061] According to the present disclosure, there is also provided a method of controlling the position of a movable section of a surgical table, the method comprising: receiving a suggested position of the movable section of the surgical table at a surgical table control device; determining when the movable section of the surgical table is in the suggested position; notifying a user when the movable section of the surgical table is in the suggested position; and in response to an interaction of a user with an input of the user interface, sending a signal from the surgical table control device to move the movable section of the surgical table according to the interaction of the user with the input.

[0062] In some embodiments, in response to a continuous interaction of a user with the input of the user interface, the method comprises sending signals to continuously move the corresponding movable section of the surgical table until the interaction of the user with the input of the user interface stops. The method may further comprise stopping sending signals to continuously move the corresponding movable section of the surgical table in response to a continuous interaction of a user with the input of the user interface when it is determined that the corresponding movable section of the surgical table is in the suggested position, regardless of whether the continuous user interaction with the input stops. In some preferred embodiments, the method comprises stopping sending signals to continuously move the corresponding movable section of the surgical table in response to a continuous interaction of a user with the input of the user interface when it is determined that the corresponding movable section of the surgical table is in the suggested position, and resuming sending a signal to move the corresponding movable section of the surgical table after the continuous user interaction with the input has stopped and when a new user interaction with the user input is initiated.

[0063] The method may further comprise inputting a suggested position of the movable section of the surgical table to a remote device; and sending the suggested position of the movable section of the surgical table from the remote device to the surgical table control device.

[0064] In some embodiments the surgical table control device comprises a display, and the method further comprises displaying the current position of the corresponding movable section of the surgical table on the display. The method may further comprise displaying the received suggested position of the corresponding movable

section of the surgical table on the display. The method may further comprise displaying an indicator informing a user how to move the corresponding movable section of the surgical table to the suggested position.

[0065] The notifying a user when the movable section of the surgical table is in the suggested position may comprise sending a notification signal when the corresponding movable section reaches the suggested position. The notification signal may be sent to a notifier of the surgical table control device.

[0066] In some embodiments, the method comprises the surgical table control device receiving a current position of the corresponding movable section of the surgical table. The method may further comprise the surgical table sending a current position of the corresponding movable section of the surgical table to the surgical table control device. The determining of when the corresponding movable section of the surgical table is in the suggested position may comprise comparing the received current position of the corresponding movable section of the surgical table to the received suggested position of the corresponding section of the surgical table.

[0067] The invention is defined in the claims. However, below there is provided a non-exhaustive list of non-limiting clauses in accordance with the disclosure. Any one or more of the features of these clauses may be combined with any one or more features of another clause, embodiment, or example described herein.

1. A surgical table control device comprising:

    a user interface comprising an input to enable a user to control movement of a corresponding movable section of a surgical table; and
    device control circuitry configured to:

        receive a suggested position of the corresponding movable section of the surgical table;
        determine when the corresponding movable section of the surgical table is in the suggested position;
        notify a user when the corresponding movable section of the surgical table is in the suggested position; and
        in response to an interaction of a user with the input of the user interface, send a signal to move the corresponding movable section of the surgical table according to the interaction of the user with the input.

2. A surgical table control device according to clause 1, wherein the device control circuitry is configured to, in response to a continuous interaction of a user with the input of the user interface, send signals to continuously move the corresponding movable section of the surgical table until the interaction of the user with the input of the user interface stops.

3. A surgical table control device according to clause 2, wherein the device control circuitry is configured to stop sending signals to continuously move the corresponding movable section of the surgical table in response to a continuous interaction of a user with the input of the user interface when it is determined that the corresponding movable section of the surgical table is in the suggested position, regardless of whether the continuous user interaction with the input stops.

4. A surgical table control device according to clause 2 or clause 3, wherein the device control circuitry is configured to stop sending signals to continuously move the corresponding movable section of the surgical table in response to a continuous interaction of a user with the input of the user interface when it is determined that the corresponding movable section of the surgical table is in the suggested position, and to resume sending a signal to move the corresponding movable section of the surgical table after the continuous user interaction with the input has stopped and when a new user interaction with the user input is initiated.

5. A surgical table control device according to any one of clauses 1 to 4, wherein the input of the user interface is a physical input, such as a button, switch, or dial.

6. A surgical table control device according to any one of clauses 1 to 5, wherein the control device further comprises a display.

7. A surgical table control device according to any one of clauses 1 to 4, wherein the control device further comprises a display, and wherein the user interface comprises a graphical user interface (GUI) displayed on the display.

8. A surgical table control device according to clause 7, wherein the input on the graphical user interface is a graphical icon.

9. A surgical table control device according to any one of clauses 6 to 8, wherein the device control circuitry is configured to display the current position of the corresponding movable section of the surgical table on the display.

10. A surgical table control device according to any one of clauses 6 to 9, wherein the device control circuitry is configured to display the received suggested position of the corresponding movable section of the surgical table on the display.

11. A surgical table control device according to any one of clauses 6 to 10, wherein the device control circuitry is configured to display an indicator informing a user how to move the corresponding movable section of the surgical table to the suggested position.

12. A surgical table control device according to clause 11, wherein the indicator comprises an arrow pointing in a direction corresponding to the direction in which the corresponding movable section of the

surgical table needs to be moved to reach the suggested position.

13. A surgical table control device according to clause 11 or clause 12, wherein the indicator comprises a plus or a minus sign indicating that a height or angle of inclination of the corresponding movable section needs to be increased or decreased to reach the suggested position.

14. A surgical table control device according to any one of clauses 1 to 13, wherein the device control circuitry is configured to send a notification signal when the corresponding movable section reaches the suggested position.

15. A surgical table control device according to any one of clauses 1 to 13, wherein the surgical table control device comprises a notifier configured to notify a user when the corresponding movable section is in the suggested position.

16. A surgical table control device according to clause 15, wherein the device control circuitry is configured to send a notification signal to the notifier when the corresponding movable section reaches the suggested position.

17. A surgical table control device according to clause 15 or clause 16, wherein the notifier comprises an audible notifier, and the notification comprises an audible notification.

18. A surgical table control device according to any one of clauses 15 to 17, wherein the notifier comprises a visual notifier, and the notification comprises a visual notification

19. A surgical table control device according to any one of clauses 15 to 18, wherein the notifier comprises a haptic notifier, and the notification comprises a haptic notification

20. A surgical table control device according to any one of clauses 1 to 19, wherein the device control circuitry comprises a receiver configured to receive the suggested position of the corresponding movable section of the surgical table.

21. A surgical table control device according to any one of clauses 1 to 20, wherein the device control circuitry is configured to receive a current position of the corresponding movable section of the surgical table.

22. A surgical table control device according to clause 21, wherein the device control circuitry comprises a receiver configured to receive a current position of the corresponding movable section of the surgical table.

23. A surgical table control device according to clause 21 or clause 22, wherein the determination of when the corresponding movable section of the surgical table is in the suggested position comprises comparing the received current position of the corresponding movable section of the surgical table to the received suggested position of the corresponding section of the surgical table.

24. A surgical table control device according to any one of clauses 1 to 23, wherein the user interface comprises a plurality of inputs, and wherein each input is configured to enable a user to control movement of one or more corresponding movable sections of a surgical table.

25. A surgical table comprising:

a movable section;
an actuator configured to move the movable section; and
a surgical table control device as recited in any one of clauses 1 to 24, wherein the surgical table control device is configured to control the actuator to control the movement of the movable section.

26. A surgical table according to clause 25, wherein the surgical table further comprises table control circuitry configured to control the actuator to move the movable section, and wherein the surgical table control device is coupled to the table control circuitry, and is configured to send signals to the table control circuitry to control the actuator to move the movable section.

27. A surgical table positioning system comprising:

a surgical table comprising:

a movable section; and
an actuator configured to move the movable section; and

a surgical table control device as recited in any one of clauses 1 to 24, wherein the surgical table control device is couplable to the surgical table, and is configured to send signals to the surgical table to control the actuator to move the movable section.

28. A surgical table positioning system according to clause 27, wherein the surgical table further comprises table control circuitry configured to control the actuator to move the movable section, and wherein the surgical table control device is couplable to the table control circuitry, and is configured to send signals to the table control circuitry to control the actuator to move the movable section.

29. A surgical table positioning system according to clause 27 or clause 28, wherein the surgical table positioning system further comprises a remote device, the remote device being couplable to the surgical table control device, and the remote device being configured to send a suggested position of the movable section of the surgical table to the surgical table control device, and wherein the device control circuitry of the surgical table control device is configured to receive the suggested position of the mov-

able section of the surgical table from the remote device.

30. A method of controlling the position of a movable section of a surgical table, the method comprising:

receiving a suggested position of the movable section of the surgical table at a surgical table control device;
determining when the movable section of the surgical table is in the suggested position;
notifying a user when the movable section of the surgical table is in the suggested position; and
in response to an interaction of a user with an input of a user interface of the surgical table control device, sending a signal from the surgical table control device to move the movable section of the surgical table according to the interaction of the user with the input.

31. A method according to clause 30, wherein the method further comprises, in response to a continuous interaction of a user with the input of the user interface, sending signals to continuously move the corresponding movable section of the surgical table until the interaction of the user with the input of the user interface stops.

32. A method according to clause 31, wherein the method further comprises stopping sending signals to continuously move the corresponding movable section of the surgical table in response to a continuous interaction of a user with the input of the user interface when it is determined that the corresponding movable section of the surgical table is in the suggested position, regardless of whether the continuous user interaction with the input stops.

33. A method according to clause 31 or clause 32, wherein the method further comprises stopping sending signals to continuously move the corresponding movable section of the surgical table in response to a continuous interaction of a user with the input of the user interface when it is determined that the corresponding movable section of the surgical table is in the suggested position, and resuming sending a signal to move the corresponding movable section of the surgical table after the continuous user interaction with the input has stopped and when a new user interaction with the user input is initiated.

34. A method according to any one of clauses 30 to 33, wherein the method further comprises inputting a suggested position of the movable section of the surgical table to a remote device; and sending the suggested position of the movable section of the surgical table from the remote device to the surgical table control device.

35. A method according to any one of clauses 30 to 34, wherein the surgical table control device comprises a display.

36. A method according to clause 35, wherein the method further comprises displaying the current position of the corresponding movable section of the surgical table on the display.

37. A method according to clause 35 or clause 36, wherein the method further comprises displaying the received suggested position of the corresponding movable section of the surgical table on the display.

38. A method according to any one of clauses 35 to 37, wherein method further comprises displaying an indicator informing a user how to move the corresponding movable section of the surgical table to the suggested position.

39. A method according to any one of clauses 30 to 38, wherein the notifying a user when the movable section of the surgical table is in the suggested position comprises sending a notification signal when the corresponding movable section reaches the suggested position.

40. A method according to clause 39, wherein the notification signal is sent to a notifier of the surgical table control device.

41. A method according to any one of clauses 30 to 40, wherein the method further comprises the surgical table control device receiving a current position of the corresponding movable section of the surgical table.

42. A method according to clause 41, wherein the method further comprises the surgical table sending a current position of the corresponding movable section of the surgical table to the surgical table control device.

43. A method according to clause 41 or clause 42, wherein the determining of when the corresponding movable section of the surgical table is in the suggested position may comprise comparing the received current position of the corresponding movable section of the surgical table to the received suggested position of the corresponding section of the surgical table.

[0068] Examples will now be further described with reference to the figures in which:

Figure 1 shows a schematic illustration of a surgical table control system according to an embodiment of the disclosure;
Figure 2 shows a schematic illustration of the remote device and the surgical table control device of Figure 1, when the surgical table control device has received a suggested position from the remote device;
Figure 3 shows a schematic illustration of the surgical table control system of Figure 1, when the surgical table is positioned in the suggested position;
Figure 4 shows a schematic illustration of a surgical table control device according to another embodiment of the disclosure; and
Figure 5 shows a flow diagram of a method of controlling the position of a surgical table according to

an embodiment of the disclosure.

Figures 1, 2, and 3 show a surgical table positioning system 1 comprising: a surgical table 10, a surgical table control device 20 and a remote device 30.

[0069] The surgical table 10 comprises a patient support surface 11 supported on a base frame 12. The patient support surface 11 comprises a plurality of movable sections 14a-d that are movable relative to each other to alter the position of a patient supported on the patient support surface 11. The movable sections 14a-d of the patient support surface 11 include: a head section 14a, a body section 14b, a seat section 14c, and a leg section 14d. Each movable section 14a-d of the patient support surface 11 is coupled to a respective actuator 15a-d, each actuator 15a-d being configured to move the movable section 14a-d to which it is coupled relative to the other movable sections 14a-d. The patient support surface 11 is supported above the base frame 12 by a column 14e. The column 14e is another movable section of the surgical table 10. The column 14e is movable relative to the base frame 12 to raise and lower the patient support surface 11. The column 14e is coupled to an actuator 15e, which is configured to move the column 14e up and down relative to the base frame 12.

[0070] The surgical table 10 further comprises table control circuitry 16. The table control circuitry 16 is coupled to each of the actuators 15a-e, and is configured to control the actuators 15a-e to control movement of the movable sections 14a-e of the patient support surface 11.

[0071] The surgical table 10 further comprises a plurality of position sensors (not shown). Each of the position sensors is arranged to monitor the position of a movable section of the surgical table 10, and is coupled to the table control circuitry 16. The table control circuitry 16 is configured to monitor the position of each of the movable sections 14a-e using the position sensors to detect the current position of the surgical table 10.

[0072] The surgical table control device 20 is a device that enables a user to control the movable sections 14a-e of the surgical table 10. The surgical table control device 20 comprises: a user interface 21 including a plurality of inputs 22a-h, and a display 23. Each input 22a-h of the user interface 21 is configured to enable a user to control movement of one or more corresponding movable sections 14a-e of the surgical table 10. In this embodiment, the inputs 22a-h are configured as follows:

- a Trendelenburg increase input 22a, which is configured to increase the Trendelenburg angle of the patient support surface, i.e., the angle at which the patient support surface is tilted, relative to the horizontal, with the patient's feet elevated above the patient's head;
- a Trendelenburg decrease increase input 22e, which is configured to decrease the Trendelenburg angle of the patient support surface, i.e., the angle at which the patient support surface is tilted, relative to the horizontal, with the patient's feet elevated above the patient's head;
- a reverse Trendelenburg increase input 22b, which is configured to increase the reverse Trendelenburg angle of the patient support surface, i.e., the angle at which the patient support surface is tilted, relative to the horizontal, with the patient's head elevated above the patient's feet;
- a reverse Trendelenburg increase input 22f, which is configured to increase the reverse Trendelenburg angle of the patient support surface, i.e., the angle at which the patient support surface is tilted, relative to the horizontal, with the patient's head elevated above the patient's feet;
- a flex up input 22c, which is configured to move the patient support surface to raise both the head and legs of a patient above the pelvis of the patient;
- a flex down input 22g, which is configured to move the patient support surface to lower both the head and legs of a patient below the pelvis of the patient;
- a column up input 22d, which is configured to raise the patient support surface 11 by raising the column 14e; and
- a column down input 22h, which is configured to lower the patient support surface 11 by lowering the column 14e.

[0073] In this embodiment, each of the inputs 22a-h comprises a physical button that is depressible by a user.

[0074] The surgical table control device 20 further comprises device control circuitry 24. The device control circuitry 24 is coupled to the user interface 21, such that an interaction of a user with an input 22a-h of the user interface 21 is detected by the device control circuitry 24.

[0075] The surgical table control device 20 is coupled to the surgical table 10 via a wired connection 17. The wired connection 17 enables signals and data to be sent from the surgical table 10 to the surgical table control device 20, and enables signals and data to be sent from the surgical table control device 20 to the surgical table 10. The table control circuitry 16 comprises a receiver (not shown) for receiving signals and data from the device control circuitry 24, and a transmitter (not shown), for sending signals and data to the device control circuitry 24. Similarly, the device control circuitry 24 comprises a receiver (not shown) for receiving signals and data from the table control circuitry 16, and a transmitter (not shown), for sending signals and data to the table control circuitry 16.

[0076] The device control circuitry 24 is configured to, in response to a user pressing an input button 22a-h of the user interface 21, send a signal to the table control circuitry 16 to move the movable sections 14a-e of the surgical table 10 corresponding to the input 22a-h that is pressed by the user. The table control circuitry 16 is configured to, in response to receiving the signal from the device control circuitry 24, send a signal to the actuators 15a-e to move the movable sections 14a-e of the surgical

table 10 corresponding to the input 22a-h that is pressed by the user. In this way, the surgical table control device 20 is configured to control the movement of the movable sections 14a-e of the surgical table 10.

[0077] The table control circuitry 16 of the surgical table 10 is further configured to send an indication of the current position of the movable sections 14a-e of the surgical table, detected by the position sensors, to the device control circuitry 24. The device control circuitry 24 of the surgical table control device 20 is further configured to, in response to receiving the indication of the current position of the movable sections 14a-e from the table control circuitry 16, display the current position of the surgical table 10 on the display 23 of the user interface 21. In this embodiment, the current position of the surgical table 10 is displayed as a graphical representation of the surgical table 10 on the display 23.

[0078] The remote device 30 is a device that enables a user to send a suggested position for the surgical table 10 to the surgical table control device 20. In this embodiment, the remote device 30 is a tablet computer. The remote device 30 comprises a user interface 31 comprising a touchscreen display 32 with a plurality of inputs 33a-b. Each input 33a-b of the user interface 31 is configured to enable a user to input a suggested position for each of the movable sections 14a-e of the surgical table 10. Since the user interface 31 comprises touchscreen display 32, the user interface comprises a graphical user interface (GUI), and the inputs 33a-b comprise regions of the touchscreen display 32 that are selectable by a touch of a finger of a user. In Figures 1, 2, and 3, the user interface 31 is only shown having two inputs 33a-b; however, it will be appreciated that the inputs 33a-b comprise graphical icons displayed on the display 32, and the number of graphical icons displayed on the display 32 can vary depending on the situation, and on the previous interactions of a user with the GUI. In Figures 1, 2, and 3, a suggested position has already been selected by a user of the remote device 30, and the two inputs 33a-b displayed on the GUI are inputs to enable the user to send, 33a, or reject sending, 33b, the suggested position to the surgical table control device 20.

[0079] The remote device 30 further comprises remote control circuitry 34. The remote control circuitry 34 is coupled to the user interface 31, such that an interaction of a user with an input 32a-b of the user interface 31 is detected by the remote control circuitry 34.

[0080] The remote device 30 is coupled to the surgical table control device 20 via a wireless connection 26. The wireless connection 26 enables signals and data to be sent from the remote device 30 to the surgical table control device 20, and enables signals and data to be sent from the surgical table control device 20 to the remote device 30. The device control circuitry 24 comprises a receiver (not shown) for receiving signals and data from the remote control circuitry 34, and a transmitter (not shown), for sending signals and data to the remote control circuitry 34. Similarly, the remote control circuitry 34 comprises a receiver (not shown) for receiving signals and data from the device control circuitry 24, and a transmitter (not shown), for sending signals and data to the device control circuitry 24.

[0081] The remote control circuitry 34 is configured to, in response to a user pressing the send input 33a of the user interface 31, send a signal to the device control circuitry 24 providing an indication of the suggested position of the movable sections 14a-e of the surgical table 10 to the surgical table control device 20. The device control circuitry 24 is further configured to, in response to receiving the signal from the remote control circuitry 34, determine whether the movable sections 14a-e of the surgical table are in the suggested position. The device control circuitry 24 is configured to determine whether the movable sections 14a-e of the surgical table 10 are in the suggested position by comparing the current position the surgical table 10 received from the surgical table 10 to the suggested position of the surgical table 10 received from the remote device 30.

[0082] The device control circuitry 24 is configured to, in response to receiving the signal from the remote control circuitry 34 and determining that the current position of the surgical table 10 is not the suggested position of the surgical table 10, display an indication of how to move the movable sections 14a-e of the surgical table 10 to reach the suggested position on the display 23. In this embodiment, the indication of how to move the movable sections 14a-e of the surgical table 10 to reach the suggested position is in the form of arrows indicating the direction of movement required for a movable section 14a-e, as illustrated in Figure 2. In addition, the input buttons 22a-h of the user interface 21 comprise lights, and the device control circuitry 24 is configured to illuminate the lights of the input buttons 22a-h that need to be pressed to move the movable sections 14a-e of the surgical table 10 to reach the suggested position, also as illustrated in Figure 2.

[0083] The device control circuitry 24 is further configured to in response to a continuous interaction of a user with an input 22a-h of the user interface 21, send signals to the surgical table 10 to continuously move the corresponding movable sections 14a-e of the surgical table 10 until the interaction of the user with the input 22a-h of the user interface stops. In other words, corresponding movable sections 14a-e of the surgical table 10 move continuously while an input 22a-h of the surgical table control device 20 is being pressed by a user, and stop moving when the input 22a-h is released by the user. The device control circuitry 24 is further configured to stop sending signals to the surgical table 10 to continuously move the corresponding movable sections 14a-h of the surgical table 10 in response to a continuous interaction of a user with an input 22a-h of the user interface 21 when it is determined by the device control circuitry 24 that the corresponding movable sections 14a-h of the surgical table 10 are in the suggested position, regardless of whether the continuous user interaction with the

input 22a-h stops. This helps to reliably position the surgical table 10 in the suggested position, even if the user of the surgical table control device does not realise that the movable sections 14a-e of the surgical table 10 have reached the suggested position. The device control circuitry 24 is further configured to resume sending signals to the surgical table 10 to move the corresponding movable sections 14a-e of the surgical table 10 after the continuous user interaction with the input 22a-h has stopped and when a new user interaction with one of the user inputs 22a-h is initiated.

[0084] The surgical table control device 20 further comprises a notifier 25 for notifying a user when the surgical table 10 is in the suggested position. In this embodiment, the notifier 25 comprises a loudspeaker. The device control circuitry 24 is coupled to the notifier 25, and the device control circuitry 24 is configured to send a signal to the notifier 25 when it is determined that the surgical table 10 is in the suggested position. In other words, the surgical table control device 20 is configured to emit a sound when it is determined that the surgical table 10 is in the suggested position to notify a user that the surgical table 10 is in the suggested position, as shown in Figure 3. Such a notification helps alert a user of the surgical table control device that the surgical table is in the suggested position.

[0085] Accordingly, in the surgical table positioning system 1 is configured such that, when the movable sections 14a-e are moved into the suggested position, the movement of the movable sections 14a-e stops, and the surgical table control device 20 plays a sound to indicate that the suggested position has been reached.

[0086] Figure 4 shows a top section of an alternative embodiment of a surgical table control device 20. The surgical table control device 20 of the embodiment of Figure 4 is substantially similar to the surgical table control device of the embodiment of Figures 1, 2, and 3, and like reference numerals are used to denote like features.

[0087] In the embodiment of Figure 4, the surgical table control device 20 comprises a plurality of physical inputs 22a-b, and a touchscreen display 23. In this embodiment, the device control circuitry (not shown) is configured to display the current position of the movable sections 14a-e of the surgical table 10 in two ways. The current position of the movable sections 14a-e is displayed, either individually or collectively, as text options 27a-g. In Figure 4, the display is displaying the following options: the Trendelenburg angle 27a of the patient support surface, the tilt angle 27b of the patient support surface, the height 27c of the patient support surface, the feet position 27d, the leg position 27e, the back position 27f, and the flex angle 27g of the patient support surface.

[0088] The touchscreen display 23 is configured to enable a user to select one of the displayed text options 27a-g. The current position of the movable sections 14a-e corresponding to the selected displayed text option 27c is also displayed on the display 23 in the form of a progress bar 29, with the current position of the movable sections 14a-e corresponding to the selected displayed text option 27c being indicated by a point 29a on the progress bar 29.

[0089] The device control circuitry is further configured to display an indication of how to move the movable sections 14a-e of the surgical table 10 into the suggested position. In Figure 4, the height position 27c is selected by a user on the touchscreen display 23. A graphical indication 28 of how to move the movable sections 14a-e of the surgical table 10 corresponding to the selected displayed text option 27c is displayed on the display, next to the text, in the form of an arrow pointing in the direction required to move the movable sections 14a-e. In addition, the suggested position for the movable sections 14a-e corresponding to the selected displayed text option 27c is shown as a point 29b on the progress bar 29. In Figure 4, the "zero" position 29c, or CPR position, for the movable sections 14a-e corresponding to the selected displayed text option 27c is also displayed on the progress bar 29.

[0090] Figure 5 shows a flow diagram of a method of controlling the position of one or more movable sections 14a-e of the surgical table 10 of Figures 1, 2 and 3.

[0091] The method comprises: a user inputting 101 a suggested position of one or more movable sections 14a-e of the surgical table 10 into a remote device 30; the remote device 30 sending 102 the suggested position of the one or more movable sections 14a-e of the surgical table 10 to the surgical table control device 20; and the surgical table control device 20 receiving 103 the suggested position of the one or more movable sections 14a-e of the surgical table 10.

[0092] The method further comprises the surgical table 10 detecting 104 a current position of the movable sections 14a-e of the surgical table 10, and sending 105 a current position of the movable sections 14a-e of the surgical table 10 to a surgical table control device 20. The method further comprises the surgical table control device 20 receiving 106 the current position of the movable sections 14a-e of the surgical table 10.

[0093] The method further comprises the surgical table control device 20 comparing 107 the received suggested position to the received current position, and determining 108 whether the one or more movable sections 14a-e of the surgical table 10 are in the suggested position.

[0094] If the one or more movable sections 14a-e of the surgical table 10 are determined 109 to be in the suggested position, the surgical table control device notifies 110 the user of the surgical table control device 20 that the one or more movable sections 14a-e of the surgical table 10 are in the suggested position.

[0095] If the one or more movable sections 14a-e of the surgical table 10 are determined 111 not to be in the suggested position, the surgical table control device 20 indicates 112 to a user of the surgical table control device how to adjust the position of the one or more movable sections 14a-e of the surgical table 10 to reach the suggested position.

[0096] The method further comprises, a user interacting 113 with an input of a user interface of the surgical table control device 20, and in response to an interaction of a user with an input of the user interface of the surgical table control device 20, the surgical table control device 20 sending 114 a signal from the surgical table control device 20 to the surgical table 10 to move the one or more movable sections 14a-e of the surgical table 10 according to the interaction of the user with the input of the user interface of the surgical table control device 20.

[0097] The method further comprises: the surgical table 10 receiving 115 the signal from the surgical table control device 20; and the surgical table 10 moving the one or more movable sections 14a-e of the surgical table 10 according to the interaction of the user with the input of the user interface of the surgical table control device 20. The method subsequently comprises reverting to step 104, wherein the surgical table 10 detecting 104 a current position of the movable sections 14a-e of the surgical table 10, and sending 105 a current position of the movable sections 14a-e of the surgical table 10 to a surgical table control device 20. The method continues until the surgical table control device 20 determines that the current position of the surgical table 10 has reached the suggested position of the surgical table 10.

[0098] In this embodiment, in response to a continuous interaction of a user with the input of the user interface, such as pressing and holding an input button, the method comprises sending signals to continuously move the corresponding movable section of the surgical table until the interaction of the user with the input of the user interface stops. The method further comprises stopping sending signals to continuously move the corresponding movable section of the surgical table in response to a continuous interaction of a user with the input of the user interface when it is determined that the corresponding movable section of the surgical table is in the suggested position, regardless of whether the continuous user interaction with the input stops. The method comprises resuming sending a signal to move the one or more movable sections of the surgical table after the continuous user interaction with the input has stopped, and when a new user interaction with the user input is initiated.

Claims

1. A surgical table control device (20) comprising:

a user interface (21) comprising an input (22a-h) to enable a user to control movement of a corresponding movable section (14a-e) of a surgical table (10); and
device control circuitry (24) configured to:

receive a suggested position of the corresponding movable section (14a-e) of the surgical table (10);
determine when the corresponding movable section (14a-e) of the surgical table (10) is in the suggested position;
notify a user when the corresponding movable section (14a-e) of the surgical table (10) is in the suggested position; and
in response to an interaction of a user with the input (22a-h) of the user interface (21), send a signal to move the corresponding movable section (14a-e) of the surgical table (10) according to the interaction of the user with the input (22a-h).

2. A surgical table control device (20) according to claim 1, wherein the device control circuitry (24) is configured to, in response to a continuous interaction of a user with the input (22ah) of the user interface (21), send signals to continuously move the corresponding movable section (14a-e) of the surgical table (10) until the interaction of the user with the input (22a-h) of the user interface (21) stops.

3. A surgical table control device (20) according to claim 2, wherein the device control circuitry (24) is configured to stop sending signals to continuously move the corresponding movable section (14a-e) of the surgical table (10) in response to a continuous interaction of a user with the input (22a-h) of the user interface (21) when it is determined that the corresponding movable section (14a-e) of the surgical table (10) is in the suggested position, regardless of whether the continuous user interaction with the input (22a-h) stops.

4. A surgical table control device (20) according to claim 2 or claim 3, wherein the device control circuitry (24) is configured to stop sending signals to continuously move the corresponding movable section (14a-e) of the surgical table (10) in response to a continuous interaction of a user with the input (22a-h) of the user interface (21) when it is determined that the corresponding movable section (14a-e) of the surgical table (10) is in the suggested position, and to resume sending a signal to move the corresponding movable section (14a-e) of the surgical table (10) after the continuous user interaction with the input (22a-h) has stopped and when a new user interaction with the user input (22a-h) is initiated.

5. A surgical table control device (20) according to any one of claims 1 to 4, wherein the control device further comprises a display (23), and wherein the device control circuitry (24) is configured to display a current position of the corresponding movable section (14a-e) of the surgical table (10) on the display (23).

6. A surgical table control device (20) according to

claim 5, wherein the device control circuitry (24) is configured to display at least one of: the received suggested position of the corresponding movable section (14a-e) of the surgical table (10) on the display (23); and an indicator (28) informing a user how to move the corresponding movable section (14a-e) of the surgical table (10) to the suggested position.

7. A surgical table control device (20) according to any one of claims 1 to 6, wherein the surgical table control device (20) comprises a notifier configured to notify a user when the corresponding movable section (14a-e) is in the suggested position.

8. A surgical table control device (20) according to claim 7, wherein the notifier comprises at least one of:

an audible notifier (25), wherein the notification comprises an audible notification;
a visual notifier, wherein the notification comprises a visual notification; and
a haptic notifier, wherein the notification comprises a haptic notification

9. A surgical table control device (20) according to any one of claims 1 to 8, wherein the device control circuitry (24) is configured to receive a current position of the corresponding movable section (14a-e) of the surgical table (10).

10. A surgical table control device (20) according to claim 9, wherein the determination of when the corresponding movable section (14a-e) of the surgical table (10) is in the suggested position comprises comparing the received current position of the corresponding movable section (14a-e) of the surgical table (10) to the received suggested position of the corresponding section of the surgical table (10).

11. A surgical table (10) comprising:

a movable section (14a-e);
an actuator (15a-e) configured to move the movable section (14a-e); and
a surgical table control device (20) as recited in any one of claims 1 to 10, wherein the surgical table control device (20) is configured to send a signal to control the actuator (15a-e) to control the movement of the movable section (14a-e).

12. A surgical table (10) according to claim 11, wherein the surgical table (10) further comprises table control circuitry (16) configured to control the actuator (15a-e) to move the movable section (14a-e), and wherein the surgical table control device (20) is coupled to the table control circuitry (16), and is configured to send signals to the table control circuitry (16) to control the actuator (15a-e) to move the movable section (14a-e).

13. A surgical table positioning system (1) comprising:

a surgical table (10) comprising:

a movable section (14a-e); and
an actuator (15a-e) configured to move the movable section (14a-e); and

a surgical table control device (20) as recited in any one of claims 1 to 10, wherein the surgical table control device (20) is couplable to the surgical table (10), and is configured to send signals to the surgical table (10) to control the actuator (15a-e) to move the movable section (14a-e).

14. A surgical table positioning system (1) according to claim 13, wherein the surgical table positioning system (1) further comprises a remote device (30), the remote device (30) being couplable to the surgical table control device (20), and the remote device (30) being configured to send a suggested position of the movable section (14a-e) of the surgical table (10) to the surgical table control device (20), and wherein the device control circuitry (24) of the surgical table control device (20) is configured to receive the suggested position of the movable section (14a-e) of the surgical table (10) from the remote device (30).

15. A method of controlling the position of a movable section (14a-e) of a surgical table (10), the method comprising:

receiving (103) a suggested position of the movable section (14a-e) of the surgical table (10) at a surgical table control device (20);
determining (108) when the movable section (14a-e) of the surgical table (10) is in the suggested position;
notifying (110) a user when the movable section (14a-e) of the surgical table (10) is in the suggested position; and
in response to an interaction of a user with an input (22a-h) of a user interface (21) of the surgical table control device (20), sending (114) a signal from the surgical table control device (20) to move the movable section (14a-e) of the surgical table (10) according to the interaction of the user with the input (22a-h).

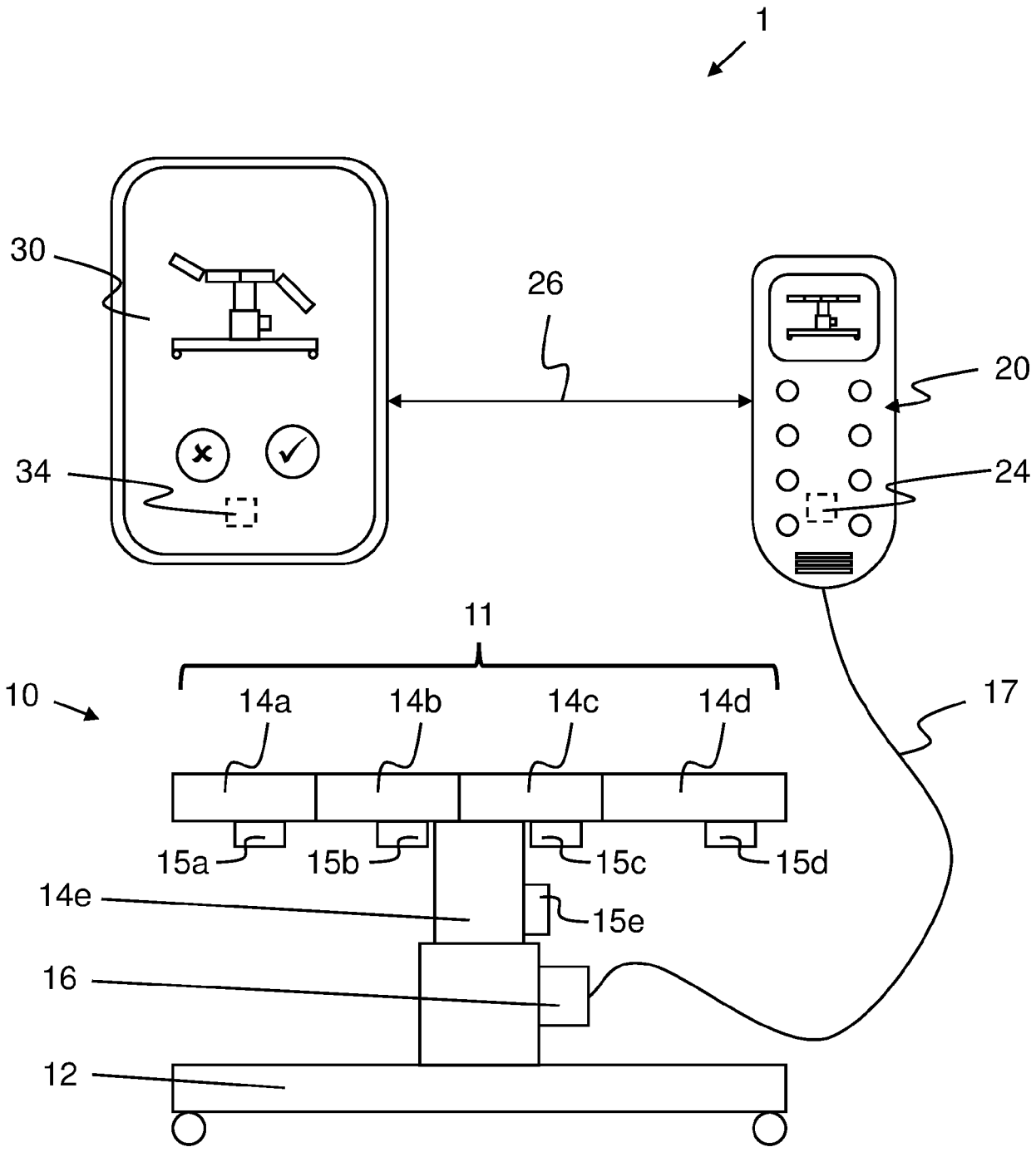

1
30
26
20
34
24
11
10
14a
14b
14c
14d
17
15a
15b
15c
15d
14e
15e
16
12

Figure 1

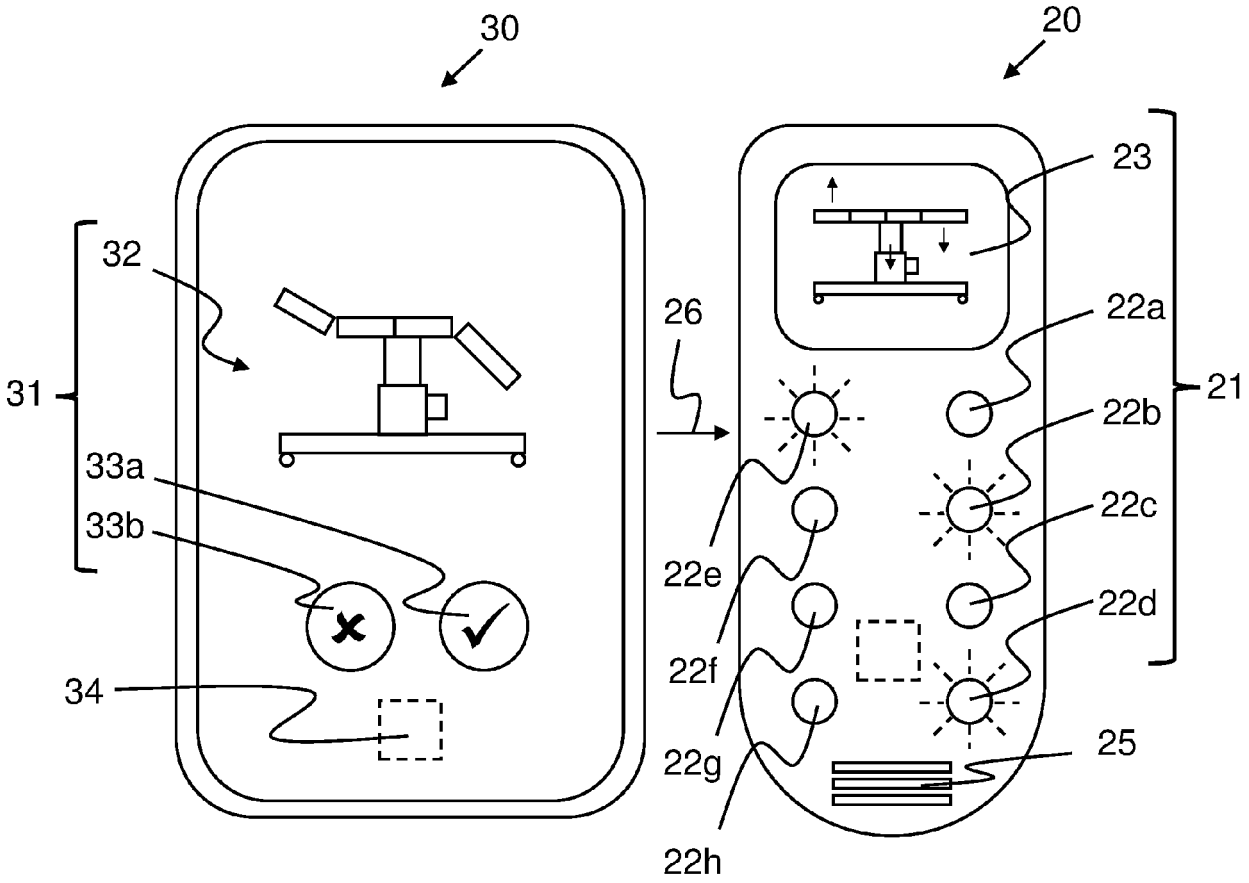


Figure 2

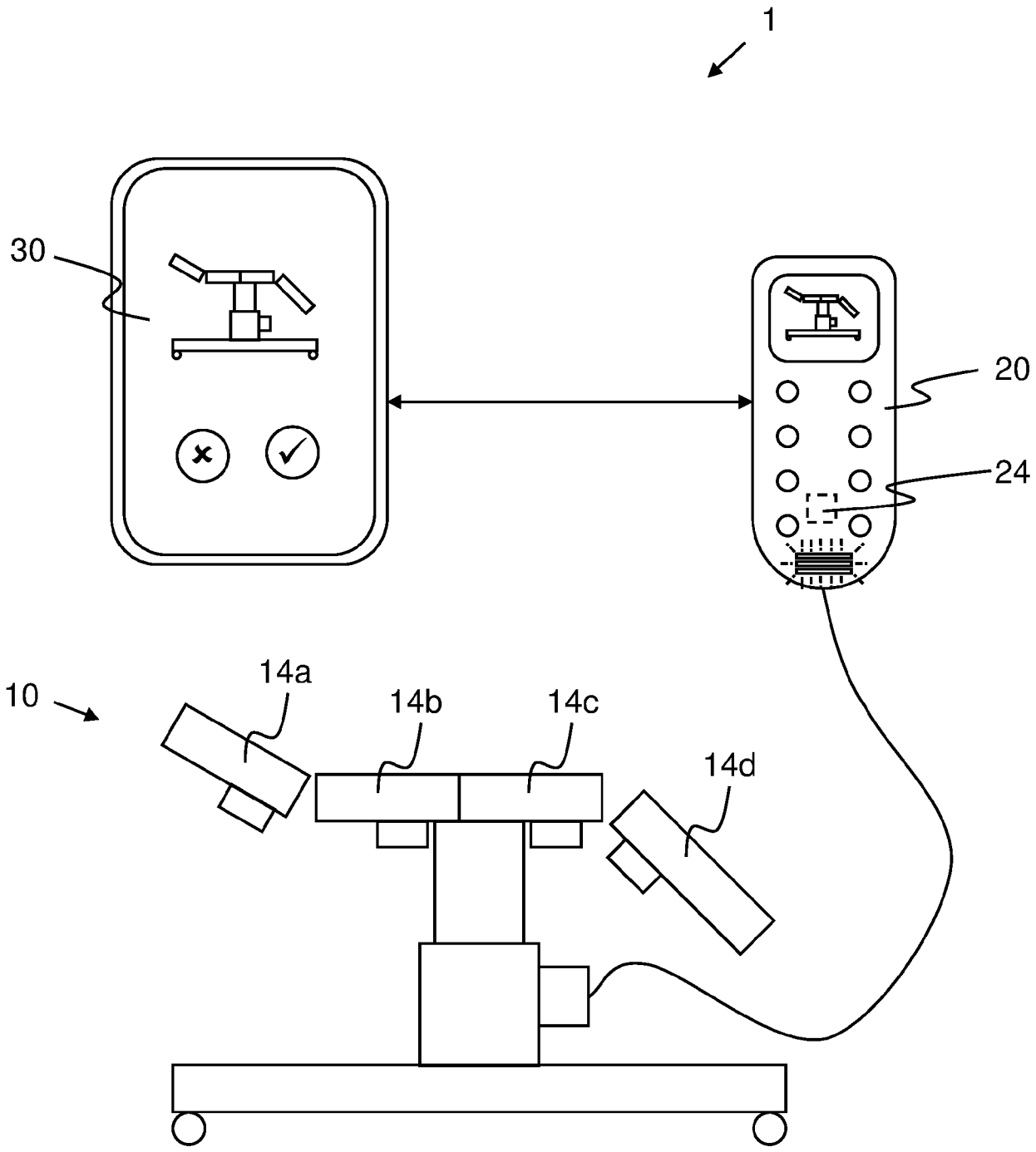


Figure 3

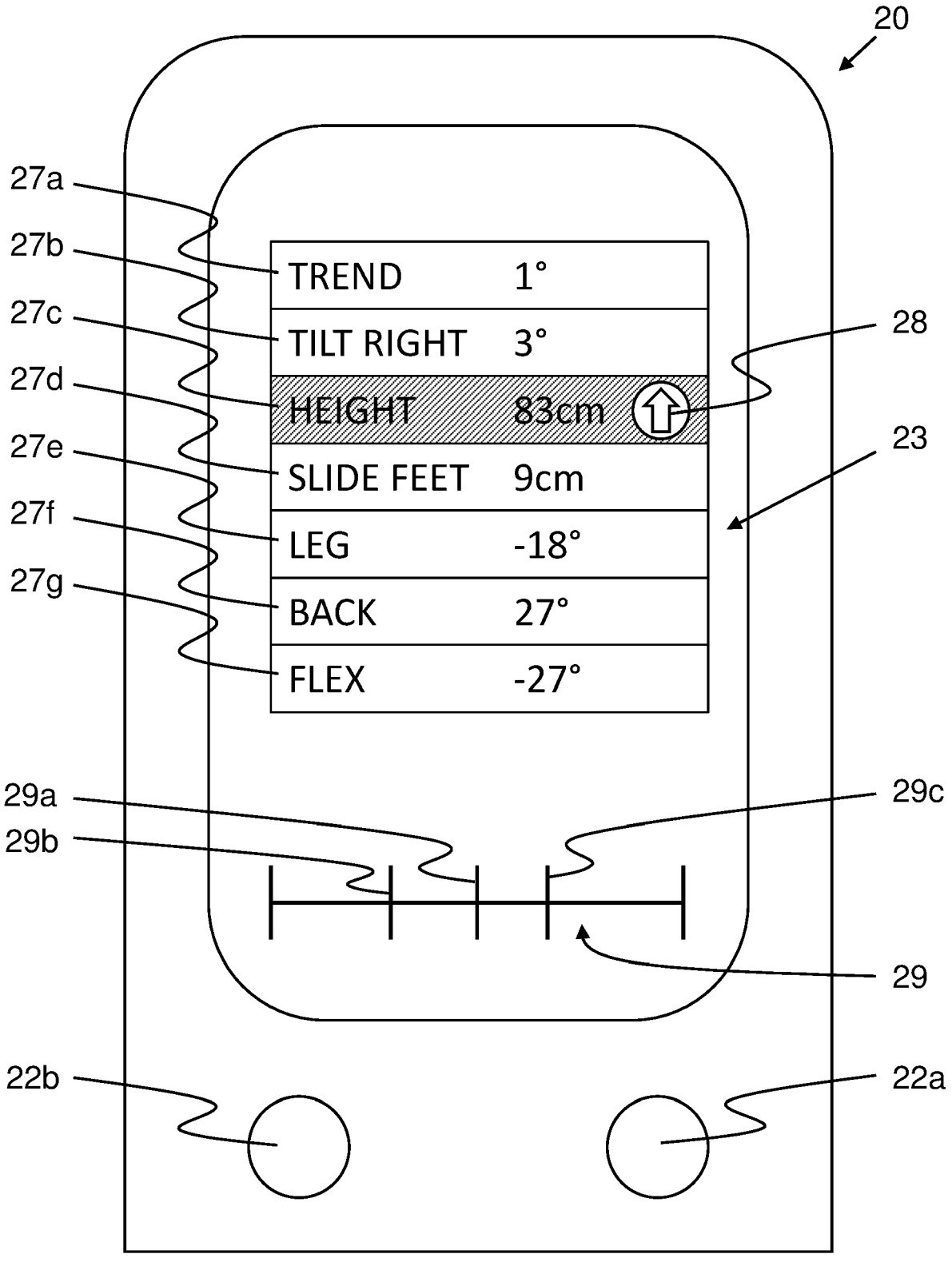
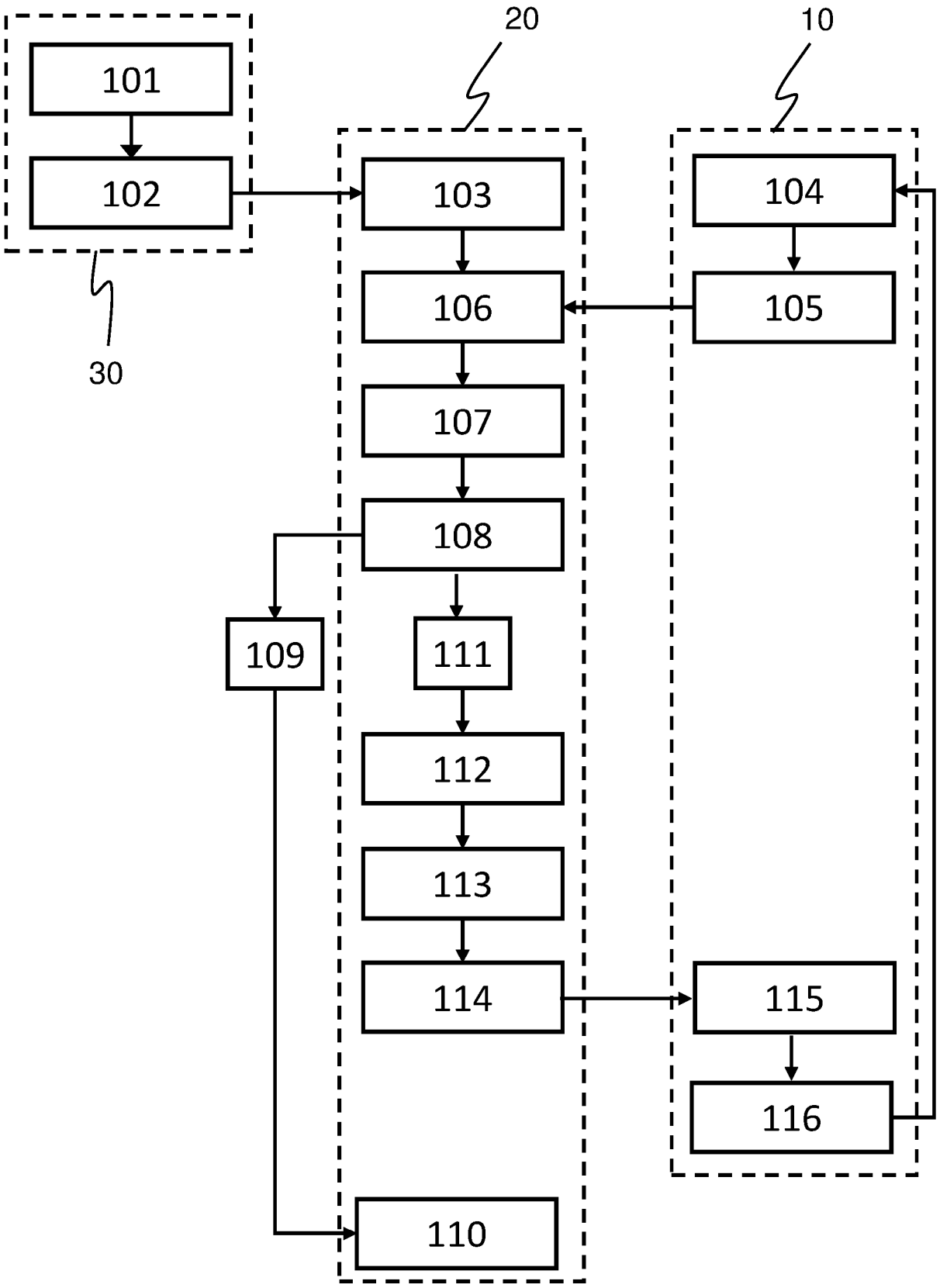

20
27a
27b
27c
27d
27e
27f
27g
TREND 1°
TILT RIGHT 3°
HEIGHT 83cm
SLIDE FEET 9cm
LEG -18°
BACK 27°
FLEX -27°
28
23
29a
29b
29c
29
22b
22a

Figure 4


20
10
101
102
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116
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Figure 5

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EUROPEAN SEARCH REPORT

Application Number
EP 22 16 5679

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 September 2022	Petzold, Jan

CATEGORY OF CITED DOCUMENTS

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