The present invention relates to a negative pressure device for a negative pressure treatment of a lower part of a patient's body, wherein the negative pressure device comprises: a pressure chamber, wherein the negative pressure device is configured to maintain within an interior of the pressure chamber a negative pressure with respect to an ambient pressure, wherein the pressure chamber comprises a first opening, wherein the first opening is configured to introduce the lower part of the patient's body into the interior of the pressure chamber, a closure element arranged around the periphery of the first opening, wherein the closure element is configured to provide an airtight sealing around a patient's body, and -a bed for the substantially horizontal support of the patient, wherein the bed comprises a first bed element having a first lying surface and a second bed element having a second lying surface with a gap between the first bed element and the second bed element to allow the closure element to be moved between the first bed element and the second bed element. The bed is at least partially movable between a treatment position, in which the first bed element is outside the pressure chamber and the second bed element is inside the pressure chamber, and an access position, in which the first bed element is further spaced from the pressure chamber and the second bed element is at least partially moved out of the interior of the pressure chamber through the first opening. The bed comprises a frame element, wherein the frame element is fixedly connected to both the first bed element and the second bed element and that the frame element extends through a second opening from outside into the interior of the pressure chamber.
Title: Negative pressure device

The invention relates to a negative pressure device, in particular lower body negative pressure device for a negative pressure treatment of a patient. Devices of this type are for example known from European Patent publications EP0008719B1 and EP2851052A1.

These negative pressure devices become increasingly popular since they provide a non-invasive medical treatment, without the need for medication, for the cure of a multitude of different physical problems. In medical negative pressure devices, the body part to-be-treated of the patient is subjected to a negative pressure, relative to the ambient pressure. This negative pressure increases the blood flow of the patient towards the areas that are subjected to the negative pressure. The increased blood flow enhances the supply of nutrients and other species that are required for the cure of the physical problems.

EP0008719B1 discloses a medical negative pressure device for the treatment of a patient, wherein the patient is inserted in a pressure chamber on a movable trolley. A lower part of the patient is inserted in the pressure chamber, while an upper part of the patient extends from the pressure chamber into the surroundings. By a sealing closure element that surrounds the patient, a substantially airtight seal is provided between the interior of the pressure chamber and the ambient surroundings by which the pressure in the interior of the pressure chamber is maintained lower than the ambient pressure.

A drawback of the negative pressure device disclosed in EP0008719B1 is the introduction of the patient into the pressure chamber. The patient may be disabled or may have a reduced functioning of the lower part of the body. Therefore, the introduction of the lower part of the patient's body into the pressure may be difficult. The upper part of the patient's body will be supported by the movable trolley, but the lower part has to be lifted in by the operator of the device since the trolley cannot extend into the pressure chamber as a result of the closure element that needs to be installed.

The negative pressure device disclosed in European Patent application EP2851052A1 discloses a solution in which a lying surface, with which the patient's body is supported in the pressure chamber, can at least partially be moved out of the pressure chamber through an opening in the pressure chamber wall. This lying surface comprises two parts of which, during the treatment of the patient, a first part is arranged in the interior of the pressure chamber and a second part is arranged outside the pressure chamber.

When a patient has to be introduced to the pressure chamber, the first part of the lying surface is moved out of the pressure chamber and the second part of the lying surface is moved away from the opening. Both first part and second part are moved substantially
synchronously in order not to change the relative distance between both. After this synchronized movement, the entire lying surface is arranged outside the pressure chamber and the patient can be introduced more easily. The lying surface is required to be split up in two parts to allow for the closure element to be arranged around the patient when the negative pressure device is in use and the negative pressure is applied to the pressure chamber.

A drawback of the negative pressure device from EP2851052A1 however is that the synchronous movement of the two parts of the lying surface adds complexity to the system. The synchronization of the two parts either requires a synchronous movement of two motors, both driving one part of the lying surface, or the temporary mechanical coupling of both parts of the lying surface.

In case of the negative pressure device with two motors, a first motor, by which the first part of the lying surface is driven, needs to be arranged in the interior of the pressure chamber. However, the accessibility of the first motor is thereby heavily decreased. The fact that two motors are used further requires that a control unit is needed to control the speed of both motors in order to ensure similar movement of both parts of the lying surface.

When the two parts of the lying surface were to be temporarily mechanically connected, for example by a connection rod that extends through the opening into the pressure chamber, the connection rod needs to be removed when the patient has been moved into the pressure chamber and installed when the patient needs to be moved from the pressure chamber, in order for the closure element to be installed in an airtight manner. The installation of the connection rod for the mechanical synchronization of the two parts of the lying surface therefore adds an extra step to the operation of the negative pressure device.

It is an object of the present invention to provide a negative pressure device that lacks at least one of the above-mentioned drawbacks of the known negative pressure devices or at least to provide an alternative device.

The present invention provides a negative pressure device, in particular a lowed body negative pressure device, as claimed in claim 1. Such negative pressure device may be used for different types of negative pressure treatment, such as a medical treatment, a therapeutic treatment, a cosmetic treatment or a fitness/health enhancing treatment.

The negative pressure device comprises a pressure chamber, wherein a first opening is arranged in the pressure chamber. The negative pressure device is configured to hold a volume of gas, in particular air, at a negative pressure in an interior of the pressure chamber with respect to the ambient pressure outside. The pressure chamber comprises at least one wall element, which is configured to form a separation between the interior of the pressure chamber and the outside.
The first opening in the pressure chamber is arranged in at least one wall element of the pressure chamber and is configured to allow access to the interior of the pressure chamber. The first opening is configured to receive a lower part of the body of the patient to-be-treated. The first opening has for example a substantially circular shape.

The negative pressure device comprises a closure element which is arranged round the periphery of the first opening in the pressure chamber. The closure element is configured to provide an airtight sealing between the interior of the pressure chamber and the ambient atmosphere. The closure element is configured to be moved between an opened position and a closed position. In the open position, the closure element is configured to provide access to the interior of the pressure chamber through the first opening. However, in the closed position, the closure element is configured to engage and surround the portion of the patient's body that is arranged within the first opening. As a result of the engaged and surrounded patient's body, a substantially airtight sealing is provided by the closure element between the interior of the pressure chamber and the ambient atmosphere.

The closure element may for example be embodied as disclosed in DE 199 12 611, the contents of which are incorporated herein by reference. Such closure element comprises two ring elements between which a flexible sheet of airtight material is arranged. By relative rotation of the first ring element with respect to the second ring element, the flexible sheet can be engaged against a patient's body introduced in the first opening to provide a substantially airtight seal.

The negative pressure device comprises a bed for the substantially horizontal support of the patient. The bed comprises a first bed element having a first lying surface and a second bed element having a second lying surface. A gap is provided between the first bed element and the second bed element to allow the closure element to be moved between the first bed element and the second bed element.

The bed is at least partially movable between a treatment position, in which the first bed element is outside the pressure chamber and the second bed element is inside the pressure chamber, and an access position, in which the first bed element is further spaced from the pressure chamber and the second bed element is at least partially moved out of the interior of the pressure chamber through the first opening.

The gap is configured to provide a transit through the bed, when the bed is in the treatment position, for at least a portion of the closure element. When the patient is placed on the bed, and the bed is moved to the treatment position, a portion of the patient's body is arranged within the first opening of the pressure chamber and therefore also over the gap in between the first bed element and the second bed element. A tight seal of the closure
element around the patient's body can be provided, since the movement of the closure element through the gap is not prevented by either the first or second bed element.

The bed comprises a frame element, wherein the frame element is fixedly connected to the first bed element and the second bed element. Thereby, the frame element extends through a second opening from outside into the interior of the pressure chamber.

The frame element is configured to form a permanent connection between both bed elements, which means that during the normal use of the negative pressure device, the frame element is not configured to be disconnected from either one of the first and second bed elements. It is remarked that, for example in case of maintenance or repair, the frame element can possibly be disconnected from either one of the first and second bed elements.

As a result of a permanent connection between both bed elements, a synchronised movement of both bed elements is no longer required, since the permanent coupling, through the frame element, automatically dictates the bed elements to move simultaneously. Therefore, complex arrangements with synchronized actuator devices, or a temporary mechanical connection between the first and second bed elements are no longer needed.

Since the frame element is not inserted into the interior of the pressure chamber through the first opening, the path of the closure element, when moved from an opened position to a closed position, is also not obstructed by the frame element.

The negative pressure device may comprise a pump device to create and maintain a lower pressure in the interior of the pressure chamber. In another embodiment, the lower pressure may be created using an external pump device.

In an embodiment, the pressure chamber comprises a second opening. The second opening is configured to allow the frame element to extend between the interior and the exterior of the pressure chamber. In an embodiment, the second opening is arranged in the at least one wall element of the pressure chamber.

In an alternative embodiment, the second opening is arranged in the closure element. This means that at least when the closure element is in the closed position, the frame element extends through the second opening in the closure element between the interior and the exterior of the pressure chamber.

The second opening may also be provided between the closure element and the pressure chamber.

In an embodiment, the frame element comprises an elongate shaft, wherein the elongate shaft is configured to substantially extend from the first bed element to the second bed element. The elongate shaft is at least partially arranged in the interior of the pressure chamber wherein, it is extended into the interior of the pressure chamber through the
second opening. The elongate shaft may have any suitable size and shape, for example having a substantially circular cross section.

In an embodiment, the pressure chamber has a substantially cylindrical shape, comprising a cylindrical wall, a front wall and a back wall. The front wall is arranged in a plane that is substantially perpendicular to the longitudinal axis of the cylindrical part of the pressure chamber.

In an embodiment, the front wall and/or back wall is an integral part of the pressure chamber, wherein it is, for example, welded to the cylindrical part of the pressure chamber. In another embodiment, the front wall is releasably connected to the cylindrical part, for example by means of a bolted connection.

In an embodiment, the first opening and the second opening are arranged in the front wall of the pressure chamber. Therefore, the access to the interior of the pressure chamber is provided through the first opening and the second opening in a direction that is substantially parallel to the longitudinal axis of the cylindrical part of the pressure chamber.

In an embodiment, the negative pressure device comprises a linear guiding device, wherein the guiding device is configured to guide a movement of the bed. The guiding device may comprise a substantially linear rail which is arranged parallel to the longitudinal axis of the cylindrical part of the pressure chamber. Therefore, the direction of movement of the guiding device is configured to be perpendicular to the plane of the front wall, the first opening and the second opening. As a result of this perpendicular placement, the bed configured to be moved in a direction perpendicular to the front wall.

A vertical support for the bed is furthermore provided by the linear guiding device. The bed can, for example, comprise at least one rolling device, which is configured to hold the bed still in the vertical direction, but is configured to allow movement in a horizontal direction, parallel to the linear guiding device. The at least one rolling device is thereby supported in the vertical direction by the rail of the linear guiding device.

The linear guiding device is arranged at least partially in the interior of the pressure chamber. The trajectory of the bed along the guiding device is arranged such, that the bed is configured to be introduced into or taken out of the pressure chamber along the guiding device through the first opening.

The linear guiding device comprises an interruption at the location of the closure element to allow the closure element to be moved between the opened position to the closed position, without being hindered, at least in the treatment position of the bed, by the linear guiding device.

In an embodiment, the linear guiding device comprises a locking mechanism, wherein the locking mechanism is configured to hold the bed in a fixed position with respect to the guiding device when the locking mechanism is in a locked state and wherein the locking
mechanism is configured to allow relative movement between the bed and the guiding
device when the locking mechanism is in an unlocked state.

The locking mechanism may comprise at least two locking locations, wherein a first
locking location is arranged such, that when the bed is in a first fixed position, the bed is in
the access position and wherein a second locking location is arranged such, that when the
bed is in a second fixed position, the bed is in the treatment position.

In an embodiment, a sealing ring is arranged round the periphery of the second
opening, wherein the sealing ring comprises an inner contour. The elongate shaft of the
frame element thereby is arranged at least partially in the interior of the sealing ring.

In an embodiment, the cross section of the elongate shaft substantially corresponds
to the inner contour of the sealing ring. The correspondence between the cross section of
the elongate shaft and the inner contour of the sealing ring is thereby configured such, that
a substantially airtight sealing is provided. As a result, a substantially airtight passage for the
elongate shaft from the exterior to the interior of the pressure chamber is provided.

The sealing ring is preferably made of nylon material providing suitable sliding and
sealing characteristics between the second opening and the elongate shaft extending
through the second opening.

In an embodiment, the bed comprises a handle, wherein the handle is configured to
transfer a movement from an operator to the bed. Thereby, a relative movement can be
applied by the operator between the linear guiding device and the bed, wherein, for
example, the bed can be moved by the operator from the access position to the treatment
position or vice versa.

In an embodiment, the negative pressure device comprises an actuator device,
wherein the actuator device is configured to move the bed between the access position and
the treatment position. The actuator device, for example, is an electric motor. With the
actuator device, manual labour by the operator is reduced, since the application of a relative
movement between the linear guiding device and the bed by the operator is no longer
required.

In an embodiment, the negative pressure device comprises a position sensor,
wherein the position sensor is configured to transmit a signal that is representative for the
position of the bed with respect to the pressure chamber. The signal from the position
sensor can be transmitted, for example through a control unit, to the operator. On the basis
of the transmitted signal, it can be determined by the operator whether the bed is in the
treatment position.

Further characteristics and advantages of the negative pressure device according to
the invention will be explained in more detail below with reference to an embodiment which
is illustrated in the appended drawings, in which:

Figure 1 schematically depicts an embodiment of a negative pressure device according to the invention, wherein the bed is in the treatment position;

Figure 2 schematically depicts the embodiment of the negative pressure device of Figure 1, wherein the bed is in the access position;

Figure 3a schematically depicts a section view of the embodiment of Figure 1;

Figure 3b depicts detail A of the section view of Figure 3A;

Figure 4 schematically depicts a section view of a linear guiding device, a front wall, a first opening, a second opening and a bed of the embodiment of Figure 1; and

Figures 5A and 5b depict perspective views of the pressure chamber of the embodiment of Figure 1.

Figures 1 and 2 show an embodiment of a negative pressure device 1 for a negative pressure treatment of the lower part of a patient's body. Such negative pressure treatment may be a medical treatment, a therapeutic treatment, a cosmetic treatment or a fitness/health enhancing treatment.

The negative pressure device 1 comprises a bed 10 that is movable between a treatment position, shown in Figure 1, and an access position, shown in Figure 2. During treatment of a patient, the bed 10 is arranged in the treatment position. In order to facilitate placement of the patient mounting into and out of the negative pressure device 1, the bed 10 can be moved to the access position.

The negative pressure device 1 further comprises a support member 2 and a pressure chamber 20. The support member 2 and the pressure chamber 20 are fixedly connected to each other and the pressure chamber 20 is supported by the support member 2. An interior 21 of the pressure chamber 20 is configured to hold a volume of air at a negative pressure with respect to the ambient pressure. The negative pressure device 1 may comprise a pump device to create and maintain the negative pressure in the interior 21 of the pressure chamber 20.

The pressure chamber 20 comprises a front wall 24, a cylindrical wall 25, and a back wall 26. The front wall 24 is arranged perpendicular to the longitudinal axis of the cylindrical pressure chamber 20. The front wall 24, the cylindrical wall 25 and the back wall 26 define a substantially cylindrical space forming the interior 21 of the pressure chamber 20.

The pressure chamber 20 comprises a first opening 22. This first opening 22 is arranged to allow the lower part of the patient's body to be introduced into the interior 21 of the pressure chamber 20. The first opening 22 is arranged in the front wall 24.
The negative pressure device 1 comprises a closure element 23, only shown in Figure 1, arranged around the periphery of the first opening 22, wherein the closure element 23 is configured to provide an airtight sealing between the interior 21 of the pressure chamber 20 and the ambient atmosphere.

The closure element 23 can be moved between an opened position, wherein access is provided for the patient to enter the interior 21 of the pressure chamber 20 and a closed position, wherein the closure element 23 is configured to firmly surround the portion of the patient's body that is arranged in the first opening 22. In Figure 1, the closure element 23 is shown in the opened position. The closure element may for example be embodied as disclosed in DE 199 12 611, the contents of which are incorporated herein by reference.

Such closure element comprises two ring elements between which a cylindrical flexible sheet of airtight material is arranged. By relative rotation of the first ring element with respect to the second ring element, the flexible sheet can be engaged against a patient's body introduced in the first opening to provide a substantially airtight seal. The diameter of the ring elements may be substantially the same as the diameter of the first opening and the ring elements may be mounted on the front wall 24.

The bed 10 of the negative pressure device 1 is configured for the substantially horizontal support of the patient to be treated. The bed 10 comprises a first bed element 11 and a second bed element 12. A gap 13 is provided between the first bed element 11 and the second bed element 12, wherein the gap 13 is configured to be aligned with the first opening 22 when the bed 10 is in the treatment position. The gap 13 is configured to provide a transit for at least a portion of the closure element 23.

When the bed 10 is in the treatment position, as can be seen in figure 1, the first bed element 11 is arranged adjacent the first opening 22 and the second bed element 12 is arranged in the interior 21 of the pressure chamber 20.

When the bed 10 is in the access position, as can be seen in figure 2, the first bed element 11 is arranged spaced from the first opening 22 and the pressure chamber 20 and the second bed element 12 is arranged at least partially out the interior 21 of the pressure chamber 20.

The bed 10 comprises a frame element 14, as can be seen in figure 2, wherein the frame element 14 is fixedly connected to both the first bed element 11 and the second bed element 12. The frame element 14 extends from the exterior into the interior 21 of the pressure chamber 20 through a second opening 27 (see Figures 3a, 3b and 4). Via the frame element 14, the first bed element 11 and the second bed element 12 are coupled to each other such that a movement of the first bed element 11 is transmitted to the second bed element 12 and vice versa.
The negative pressure device 1 comprises a linear guiding device 30, which is configured to guide a movement of the bed 10. The linear guiding device 30 is arranged at least partially in the interior 21 of the pressure chamber 20 and is, at least partly, fixedly connected to the support member 2.

The linear guiding device 30 comprises an interruption 31, with which the at least one wall element 25 of the pressure chamber 20 is intersected.

The linear guiding device 30 is arranged substantially parallel to the longitudinal axis of the pressure chamber 20, such that a movement of the bed 10 guided by the linear guiding device 30 is configured to be substantially parallel to the longitudinal axis of the pressure chamber 20 and substantially perpendicular to the plane of the front wall 24.

The bed 10 comprises a handle 40, wherein the handle 40 is configured to transfer a movement from an operator to the bed 10. The handle 40 is fixedly connected to the bed 10. Therefore, the bed 10 is configured to be moved by an operator between the access position and the treatment position.

In figures 3a and 4, section views of an embodiment of the negative pressure device 1 according to the invention is shown, in which the second opening 27 is shown. Figure 3b shows a detail A of Figure 3a including the second opening 27. It can be seen that the second opening 27 is arranged in the same plane as the first opening 22. The second opening 27 and the first opening 22 are both arranged in the front wall 24.

The frame element 14 comprises an elongate shaft 15, which extends from the exterior into the interior 21 of the pressure chamber 20 through the second opening 27. With the elongate shaft 15, the first bed element 11 and the second bed element 12 are rigidly connected, but no connection element extends into the interior 21 of the pressure chamber 20 through the first opening 22. The advantage of this construction is that the movement of the closure element between the opened position and the closed position is not hindered by the permanent mechanical connection between the first bed element 11 and the second bed element 12.

The second opening 27 in the pressure chamber 20 comprises a sealing ring 28, which is arranged around the periphery of the second opening 27. The sealing ring 28 comprises an inner contour which is configured to substantially correspond to the cross section of the elongate shaft 15.

Thereby, a substantially airtight sealing is provided between the interior 21 of the pressure chamber 20 and the surroundings of the negative pressure device 1. The sealing ring 28 is preferably made of nylon material providing suitable sliding and sealing characteristics.

The negative pressure device 1 comprises a linear guiding device 30, which is configured to guide a movement of the bed 10. The linear guiding device 30 is arranged at
least partially in the interior 21 of the pressure chamber 20 and is at least partly, fixedly connected to the support member 2.

The linear guiding device 30 is configured to guide the bed 10 in a direction that is substantially parallel to the longitudinal axis of the pressure chamber 20. Thereto, the linear guiding device 30 comprises a substantially linear rail 32, which is arranged at least partially in the interior 21 of the pressure chamber 20, but comprises an interruption 31 at the point where the front wall 24 of the pressure chamber 20 is crossed in order to allow free passage of the closure element 23.

The bed 10 comprises multiple rolling devices 16, which are configured to support the bed 10, but to also allow movement in a horizontal direction, parallel to the rail 32 of the linear guiding device 30 and therefore parallel to the longitudinal axis of the pressure chamber 20.

The negative pressure device 1 further comprises a position sensor 50, which is arranged on the linear guiding device 30 and which is configured to transmit a signal that is representative for the position of the bed 10 with respect to the pressure chamber 20.

As shown in Figures 1 and 2, the negative pressure device 1 comprises a touchscreen 60 to control the negative pressure device 1, for example to carry out a program of alternating pressures in the interior 21 of the pressure chamber 20. The touchscreen 60 may also be used to display relevant process information.

Figures 5a and 6a show perspective views of the pressure chamber 20. In these views, it can be seen that a channel element 29 is provided in a bottom area of the pressure chamber 20 to form a channel 29a in the interior 21 of the pressure chamber 20. The channel 29a is configured to receive the part of the elongate shaft 15 that is present in the interior 21 of the pressure chamber 20. It will be clear that the length of the part of the elongate shaft 15 that is present in the channel 29a depends on the position of the bed 10 with respect to the pressure chamber 20.

Via the elongate shaft 15 extending through the second opening 27, the first bed element 11 and the second bed element 12 are rigidly connected with each other to form a single construction so that the complete bed can be moved between the access position and the treatment position by pushing or pulling one of the first bed element 11 and the second bed element 12. At the same time a gap 13 is provided between the first bed element 11 and the second bed element 12, which gap 13 is aligned with the first opening 22 when the bed 10 is in the treatment position to allow passing of the closure element 13 between the first bed element 11 and the second bed element 12 to substantially close the surface area of the second opening 22 that is not occupied by the patient to be treated.
CLAIMS

1. Negative pressure device for a negative pressure treatment of a lower part of a patient's body, wherein the negative pressure device comprises:
   5 a pressure chamber, wherein the negative pressure device is configured to maintain within an interior of the pressure chamber a negative pressure with respect to an ambient pressure, wherein the pressure chamber comprises a first opening, wherein the first opening is configured to introduce the lower part of the patient's body into the interior of the pressure chamber,
   10 a closure element arranged around the periphery of the first opening, wherein the closure element is configured to provide an airtight sealing of the first opening around a patient's body in the first opening, and
   - a bed for the substantially horizontal support of the patient, wherein the bed comprises a first bed element having a first lying surface and a second bed element having a second lying surface with a gap between the first bed element and the second bed element to allow the closure element to be moved between the first bed element and the second bed element,
       wherein the bed is at least partially movable between a treatment position, in which the first bed element is outside the pressure chamber and the second bed element is inside the pressure chamber, and an access position, in which the first bed element is further spaced from the pressure chamber and the second bed element is at least partially moved out of the interior of the pressure chamber through the first opening.

 characterized in that,

   the bed comprises a frame element, wherein the frame element is fixedly connected to both the first bed element and the second bed element and that the frame element extends through a second opening from outside into the interior of the pressure chamber.

2. Negative pressure device according to claim 1, wherein the pressure chamber comprises the second opening.

3. Negative pressure device according to claim 1, wherein the closure element comprises the second opening.

4. Negative pressure device according to claim 2 or 3, wherein the frame element comprises an elongate shaft which extends into the interior of the pressure chamber through the second opening.
5. Negative pressure device according to any of the preceding claims, wherein the pressure chamber has a substantially cylindrical shape, formed by a cylindrical wall, a front wall and a back wall.

6. Negative pressure device according to claim 5, wherein the first opening and the second opening are arranged in the front wall.

7. Negative pressure device according to any of the preceding claims, wherein the device comprises a linear guiding device configured to guide a movement of the bed, wherein the bed is configured to move along the linear guiding device between the access position and the treatment position.

8. Negative pressure device according to any of the preceding claims, wherein a sealing ring is arranged round the periphery of the second opening, wherein the sealing ring comprises an inner contour.

9. Negative pressure device according to claim 8, wherein the frame element comprises an elongate shaft and wherein the cross section of the elongate shaft corresponds to the inner contour of the sealing ring.

10. Negative pressure device according to claim 8 or 9, wherein the sealing ring is made of a nylon material.

11. Negative pressure device according to any of the preceding claims, wherein the bed comprises a handle, wherein the handle is configured to transfer a movement from an operator to the bed.

12. Negative pressure device according to any of the preceding claims, wherein the negative pressure device comprises an actuator device, wherein the actuator device is configured to move the bed between the access position and the treatment position.

13. Negative pressure device according to claim 12, wherein the actuator device is an electric motor.

14. Negative pressure device according to any of the preceding claims, wherein the negative pressure device comprises a position sensor, wherein the position sensor is configured to provide a signal that is representative for a position of the bed with respect to
the pressure chamber.
**INTERNATIONAL SEARCH REPORT**

**PCT/NL2017/050041**

### A. CLASSIFICATION OF SUBJECT MATTER

INV. A61G10/02

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)

A61G A61H

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

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Date of the actual completion of the international search

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