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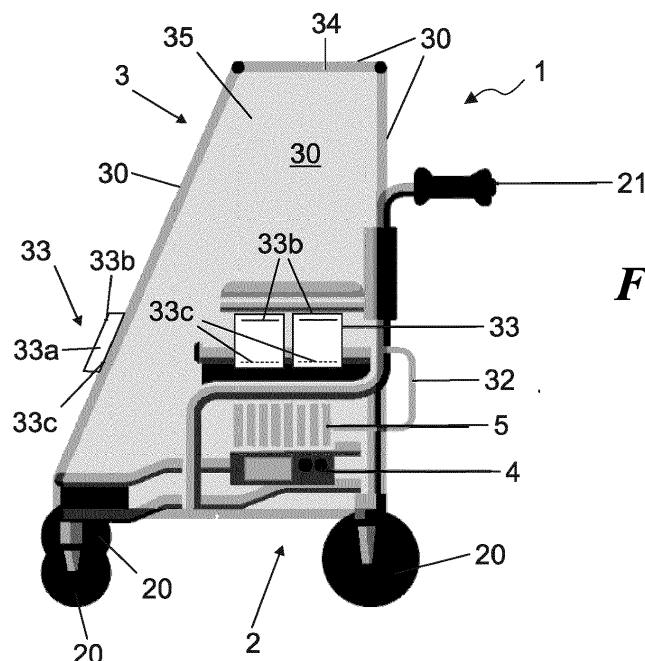
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(54) INSULATING TRANSPORT DEVICE

(57) An insulating transport device (1) is provided, comprising a transport chair (2) suitable to allow a patient to sit and including motion means (20) suitable to allow the motion of the chair (2) on the ground to allow the patient transport; a hermetically sealed chamber (3) including one or more walls (30) developing around the chair (2) so as to contain the patient insulated from an external environment, access means (31) arranged at least at a wall (30) and configured to allow the access of the patient to the chamber (3), at least a nozzle (32) arranged on a wall (30) and configured to allow to introduce air into the chamber (3) and/or to expel air from the

chamber (3); a pressurization apparatus (4) configured to check the pressure inside the chamber (3); filtering means (5) in fluid passage connection with the nozzle (32) and configured to filter air; wherein at least a wall (30) comprises a hull pocket (33) defining a collection volume (33a) adjacent to the chamber (3) and including a first slot (33b) hermetically releasable and configured to put in communication, when opened, the collection volume (33a) with the external environment, and a second hermetically releasable slot (33c) configured to put in communication, when opened, the collection volume (33a) with the chamber (3).

**Fig. 1****EP 4 555 988 A1**

Description

[0001] The present invention relates to an insulating transport device of the type specified in the preamble of first claim.

[0002] In particular, the present invention relates to a transport device capable of allowing to transport a patient, both an infectious or immunosuppressed patient, within any environment.

[0003] Similar devices are described in the patent applications CN2787189Y and US11439554B2.

[0004] As it is known, when it is necessary to transport an infectious or immunosuppressed patient inside an environment in which there could be present other immunosuppressed or infectious patients, it is appropriate to perform the patient transport safely, by avoiding any type of contamination between patient and external environment.

[0005] In this sense, then, it is important that the patient is insulated with respect to the external environment.

[0006] For this reason, several transport devices have been implemented which, substantially, comprise a movable seat which can be insulated inside a chamber accessible from outside only through gloves constrained to the walls of the chamber. An example of such device is described in the patent document CN-Y-2787189. The document describes a wheelchair equipped with half-opened chamber and including an air vent system of the chamber in which the air is filtered by ionizing plasma.

[0007] The device described by CN-Y-2787189 then has the important drawback of not being wholly insulated and not completely avoiding possible contaminations of the patient inside the chamber.

[0008] In order to obviate such drawback other devices were implemented, for example described in the patent documents CN-U-204274835, CN-U-211750559 and CN-U-213157089.

[0009] Such devices have the peculiarity of comprising a hermetically sealed chamber inside thereof the pressure is monitored. In detail, the chamber is pressurized so as to work at negative pressure, that is at lower pressure with respect to the external pressure.

[0010] This type of solution is ideal for infectious patients since the chamber tends to contain internally any bacterium or virus. However, the negative pressure configuration is counterproductive for immunosuppressed patients who are very fragile.

[0011] Therefore, additional devices were implemented, for example described in the patent documents JP-A-2005021433 and CN-U-213157093, which comprise a hermetically insulated and pressurized chamber so as to be able to implement a higher or lower pressure with respect to the external environment, that is a positive or negative pressure in chamber.

[0012] The whole described prior art comprises some important drawbacks.

[0013] In particular, none of the described devices allows to exchange objects with the patient during transport.

port.

[0014] This involves that, during long-term transports, the patient is under insulating condition without being able to interact, in any way, with the external environment. This drawback is further amplified for the devices in which the chamber is pressurized considering that any interaction attempt could alter the operation of the pressurization system and nullify the effects thereof with consequent fatal contamination possibilities.

[0015] In this situation the technical task underlying the present invention is to devise an insulating transport device capable of obviating substantially at least partially the mentioned drawbacks.

[0016] Within said technical task an important object of the invention is to obtain an insulating transport device allowing an operator to interact with the patient even during transport.

[0017] Another important object of the invention is to implement an insulating transport device allowing an operator, or other user, to exchange objects with the patient without altering the device operation.

[0018] In conclusion, an additional task of the invention is to implement an insulating transport device allowing to maintain firmly the pressure inside the chamber even during the interaction between patient and operator.

[0019] The technical task and the specified objects are achieved by an insulating transport device as claimed in the enclosed claim 1.

[0020] Preferred technical solutions are highlighted in the depending claims.

[0021] The features and advantages of the invention are explained hereinafter by the detailed description of preferred embodiments of the invention, with reference to the enclosed drawings, wherein:

Figure 1 shows a side view of an insulating transport device according to the invention;

Figure 2 illustrates a front view of an insulating transport device according to the invention; and

Figure 3 is a detailed view, from the inside of the chamber, of the hull pocket of an insulating transport device according to the invention.

[0022] In the present document, the measurements, values, shapes and geometrical references (such as perpendicularity and parallelism), when associated to words such as "about" or other similar terms such as "approximately" or "substantially", are to be meant as excluding measurements errors or inaccuracies due to production and/or manufacturing errors and, above all, excluding a slight deviation from the value, measurement, shape or geometrical reference thereto it is associated. For example, such terms, if associated to a value, preferably designate a deviation not higher than 10% of the value itself.

[0023] Moreover, when used, terms such as "first", "second", "higher", "lower", "main" and "secondary" do not identify necessarily an order, a relation priority or

relative position, but they can be simply used to distinguish more clearly components different from each other.

[0024] Unless otherwise specified, as it results from the following discussions, it is considered that terms such as "treatment", "computer science", "determination", "calculation", or the like, relate to the action and/or processes of a computer or similar electronic calculation device which manipulates and/or transforms data represented as physical data, such as electronic quantities of registers of a computer system and/or memories into other data similarly represented as physical quantities within computer systems, registers or other devices for storing, transmitting or displaying information.

[0025] The measurements and data reported in the present text are to be considered, unless otherwise indicated, as performed under International Standard Atmosphere ICAO (ISO 2533:1975).

[0026] With reference to Figures, the insulating transport device according to the invention is designated as a whole with number 1.

[0027] The device 1 is suitable to protect a patient or an environment, inside thereof the patient passes, during the transport of patient, both an infectious or immunosuppressed patient. Of course, if the patient is infectious, it is suitable that the insulation prevents contaminations of the external environment to the patient, for example a transit line of a hospital. Vice versa, if the patient is immunosuppressed or suffering from diseases which cause high fragility and sickness thereof, it is suitable that the insulation prevents contaminations from the external environment to the patient.

[0028] Generally, the device 1 comprises a chair 2.

[0029] The chair 2 is substantially suitable to allow the patient to sit. Therefore, the chair 2 basically includes at least a plane for resting the patient's legs and buttocks. Of course, the chair 2 can further include a backrest, as well as it can include even supports or rests for feet.

[0030] The chair 2, then, can be a common wheelchair. Preferably, the chair 2 is a transport chair and it differentiates from the wheelchair since it is not equipped with control wheels which are notoriously large.

[0031] In each case, the chair 2 comprises motion means 20.

[0032] The motion means 20 is suitable to allow the shifting of the chair 2 on the ground. Therefore, the motion means 20 allows to transport the patient who is sitting on the chair.

[0033] In detail, the motion means 20 can include, or consist of, wheels or rollers. Additionally, in order to favour the motion of the chair 2, the latter can further comprise gripping means 21.

[0034] The gripping means 21 is substantially configured to allow gripping by a user, generally a healthcare worker, so as to further allow the user to drive the chair 2.

[0035] Generally, the gripping means 21 is positioned behind the backrest of the chair 2, that is at the side of the backrest opposite to the patient. Moreover, preferably, the gripping means 21 includes, or consists of, one or

more handlebars, generally a pair of handlebars.

[0036] The device 1 further comprises a chamber 3.

[0037] The chamber 3 is substantially a casing, defining then a containment volume. Preferably, the chamber 3 is hermetically sealed. Therefore, the containment volume of the chamber 3 is insulated with respect to the external environment.

[0038] The chamber 3, in particular, comprises one or more walls 30.

[0039] The walls 30 substantially are surfaces distributed around the containment volume of the chamber and configured to close hermetically the same. Moreover, the walls 30 develop around the chair 2. In particular, the walls 30 develop around the chair 2 so as to contain the patient insulated from the external environment. Then, the chamber 3 contains the patient.

[0040] Of course, the chamber 3 can be configured according to different modes. For example, it can be a cabin, or capsule, and the walls 30 can be stiff surfaces.

[0041] Or, preferably, the chamber 3 can include a frame 34.

[0042] If present, the frame 34 defines an almost grid-like supporting structure. For example, the frame 34 can include a plurality of mutually constrained or constrainable tubular elements or slender rods. Moreover, the tubular elements or rods can be metallic, for example made of aluminium, preferably light.

[0043] The frame 34 then can be constrained, removably or not, to the chair 2.

[0044] If provided with frame 34, the chamber 3 also comprises a membrane 35.

[0045] The membrane 35 is an element developing mainly along a surface and, then, it is almost bidimensional. The membrane 35, moreover, is preferably deformable.

[0046] Therefore, the membrane 35 is supported by the frame 34.

[0047] Of course, since the chamber 3 is limited by the walls 30, if the chamber 3 comprises the membrane 35, the latter defines the walls 30. In other words, the walls 30 are constituted by the membrane 35.

[0048] The membrane 35 preferably comprises polymeric material. Still more in detail, the membrane 35 comprises transparent polymeric material, for example PVC.

[0049] The chamber 3, as already said, houses the patient. Therefore, the chamber 3 also comprises access means 31.

[0050] The access means 31 is configured to allow the access of the patient to the chamber 3. Therefore, preferably, the access means 31 is arranged at least at a wall 30. Still more in detail, preferably, the access means 31 comprises a slit 31a.

[0051] The slit 31a is implemented at a wall 30. In particular, the slit 31a is substantially a cut dividing a wall 30 into two substantially complementary wall flaps 30. The slit 31a can be implemented in front of the seat, as shown for example in Figure 2, so as to allow the patient

to sit directly while performing the access to the chamber 3. The slit 31a then comprises closing means suitable to guarantee the hermetic closure of the chamber 3.

[0052] Preferably, the slit 31a comprises one to be chosen between a hinge closure and a magnetic closure.

[0053] The chamber 3 further comprises elements allowing to air the chamber 3. Preferably, the chamber 3 comprises at least a nozzle 32.

[0054] The nozzle 32 is an element which puts air into fluid passage communication the air, coming for example from the external environment, with the containment volume of the chamber 3.

[0055] The nozzle 32, then, can be implemented by one simple hole, a flange or by a duct.

[0056] Preferably, the nozzle 32 is arranged on a wall 30. Under this, one means that at least a part of the nozzle 32 lies on the wall 30.

[0057] Then, the nozzle 32 is configured to allow to introduce air in the chamber 3 and/or to expel air from the chamber 3.

[0058] Of course, the chamber 3 could also comprise a plurality of nozzles 32, for example two, one of which for the entry and one for the exit of air.

[0059] In each case, preferably, the chamber 3 comprises a pressurization apparatus 4. The pressurization apparatus 4, first of all, is configured to check the pressure inside the chamber 3. In this regard, preferably, the pressurization apparatus 4 is operatively connected to the nozzle 32. Then, the pressurization apparatus 4 is configured to introduce into, and to expel from, the chamber 3 air with differential flow rate so as to define, on command, a higher or lower pressure inside the chamber 3 with respect to the pressure of the external environment.

[0060] If for example the flow rate entering the chamber 3 is higher than the outgoing flow rate, then the pressure inside the chamber 3 is higher with respect to the external pressure and then the chamber 3 is subjected to a positive pressure which tends to keep possible external contaminants outside the containment volume of the chamber 3.

[0061] On the contrary, if the flow rate entering the chamber 3 is lower than the outgoing flow rate, then the pressure inside the chamber 3 is lower with respect to the external pressure and then the chamber 3 is subjected to a negative pressure which tends to keep possible contaminants inside the containment volume of the chamber 3. Considering that the chamber 3 preferably exchanges air with outside, the device 1 preferably also comprises filtering means 5.

[0062] The filtering means 5, generally, is configured to filter air. Then, preferably, the filtering means 5 is in fluid passage connection with the nozzle 32. For example, it could be contained exactly in the nozzle 32.

[0063] The filtering means 5, in detail, could comprise a HEPA filter.

[0064] The device 1, additionally to what described, could further include a surveillance apparatus. If present,

the surveillance apparatus is preferably integral to the chair 2. Of course, the surveillance apparatus can be removable or fixed with respect to the chair 2. Then, the surveillance apparatus is preferably configured to monitor at least the position of the chair 2 with respect to the external environment. To this regard, the surveillance apparatus can include a GPS tracker or other type of tracker, for example even RFID.

[0065] The device 1, apart from what described, comprises further important features.

[0066] In fact, advantageously, at least one among the walls 30 comprises a hull pocket 33.

[0067] In short, a hull pocket is a pocket allowing the access to the internal volume on two opposite sides without having to maintain the accesses in fluid passage connection. Preferably, the pocket 33 defines a collection volume 33a.

[0068] The collection volume 33a substantially is the space enclosed by the pocket 33. Therefore, it is the space housing the pocket 33. In particular, the collection volume 33a is adjacent to the chamber 3. Then, preferably, the pocket 33 is fastened to a wall 30 which defines itself a portion.

[0069] Preferably, considering that the pocket 33 is a hull pocket, it includes at least a first slot 33b and a second slot 33c.

[0070] Both the first slot 33b and the second slot 33c can be re-closed hermetically. In this regard, preferably, one or more among the slots 33b, 33c can include a hinge closure. Obviously, alternative configuration can also be used, for example Velcro closures, and/ magnetic and/or cursor closures, typical of the containment bags for liquids.

[0071] Moreover, in detail, the first slot 33b is configured to put in communication, when opened, the collection volume 33a with the external environment.

[0072] In the same way, the second slot 33c is configured to put in communication, when opened, the collection volume 33a with the chamber 3.

[0073] Of course, the slots 33b, 33c can be positioned at will on the pocket 33. However, in the preferred but not exclusive embodiment, the slots 33b, 33c are positioned on the pocket 33 so that the position of the first slot 33b defines a higher gravitational potential than the position of the second slot 33c. In other words, with respect to the ground, the first slot 33b is positioned higher, or above, than the second slot 33c. Still more in detail, the slots 33b, 33c are positioned at ends of the pocket 33 opposite with respect to a direction transversal to the ground.

[0074] Then, the slots 33b, 33c are substantially positioned at upper and bottom part of the pocket 33, respectively.

[0075] Therefore, this configuration advantageously allows to introduce by gravity an external object from the first slot 33b and it allows the fall of the external object inside the collection volume 33a towards the second slot 33c.

[0076] Obviously, the positions of the slots 33b, 33c

could also be inverted or they could also be varied and positioned on opposite sides of the pocket 33 at positions having the same gravitational gradient.

[0077] The operation of the previously described device 1 in structural terms is substantially similar to that of the analogous devices of the known art.

[0078] However, differently from all known devices, the device 1 allows the patient and/or the operator to exchange objects between the inside and the outside of the chamber 3.

[0079] Therefore, the device 1 according to the invention achieves important advantages. In fact, the insulating transport device 1 allows an operator to interact with the patient even during transport.

[0080] Moreover, the insulating transport device 1 allows an operator, or other user, to exchange objects with the patient without altering the operation of the device 1.

[0081] In fact, thanks to the hull pocket 33, the insulating transport device 1 allows to maintain firmly the pressure inside the chamber even during the interaction between patient and operator.

[0082] The invention may be subject to variants within the scope of the inventive concept defined by the claims. Within such scope, all details can be replaced by equivalent elements and the materials, shapes and sizes can be any.

Claims

1. An insulating transport device (1) comprising:

- a transport chair (2) suitable to allow a patient to sit and including motion means (20) suitable to allow to move said chair (2) onto the ground to allow the transport of said patient;

- a hermetically sealed chamber (3) including:

- one or more walls (30) developing around said chair (2) so as to contain said patient insulated from an external environment,

- access means (31) arranged at least at one said wall (30) and configured to allow the access of said patient to said chamber (3),

- at least a nozzle (32) arranged on said wall (30) and configured to allow to introduce air in said chamber (3) and/or to expel said air from said chamber (3);

- a pressurization apparatus (4) configured to check the pressure inside said chamber (3);

- filtering means (5) in fluid passage connection with said nozzle (32) and configured to filter said air;

and characterized in that

- at least one said wall (30) comprises a hull pocket (33) defining a collection volume (33a) adjacent to said chamber (3) and including:

- a first slot (33b) hermetically releasable and configured to put in communication, when opened, said collection volume (33a) with said external environment, and
 - a second slot (33c) hermetically releasable and configured to put in communication, when opened, said collection volume (33a) with said chamber (3).

2. The device (1) according to claim 1, wherein said slots (33b, 33c) are positioned on said pocket (33) so that the position of said first slot (33b) defines a higher gravitational potential than the position of said second slot (33c).

3. The device (1) according to the preceding claim, wherein said slots (33b, 33c) are positioned at ends of said pocket (33) opposite with respect to a direction transversal to said ground so as to allow to introduce by gravity an external object from said first slot (33b) and allow the fall of said external object inside said collection volume (33a) towards said second slot (33c).

4. The device (1) according to any one of the preceding claims, wherein one or more among said slots (33b, 33c) comprises a hinge closure.

5. The device (1) according to any one of the preceding claims, wherein said pressurization apparatus (4) is operatively connected to said nozzle (32) and it is configured to introduce into and expel from said chamber (3) said air with differential flow rate so as to define, on command, a higher or lower pressure inside said chamber (3) than the pressure of said external environment.

6. The device (1) according to any one of the preceding claims, wherein said filtering means (5) comprises a HEPA filter.

7. The device (1) according to any one of the preceding claims, wherein said chamber (3) comprises a frame (34) removably constrained to said chair (2) and a deformable membrane (35) sustained by said frame (34) and defining said walls (30).

8. The device (1) according to the preceding claim, wherein said membrane (35) comprises transparent polymeric material.

9. The device (1) according to any one of the preceding claims, wherein said access means (31) comprises a slit (31a) implemented at one said wall (30) and said

slit (31a) comprises one to be chosen from a hinge closure and a magnetic closure.

10. The device (1) according to any one of the preceding claims, further comprising a surveillance apparatus 5
integral to said chair (2) and configured to monitor at
least the position of said chair (2) with respect to said
external environment.

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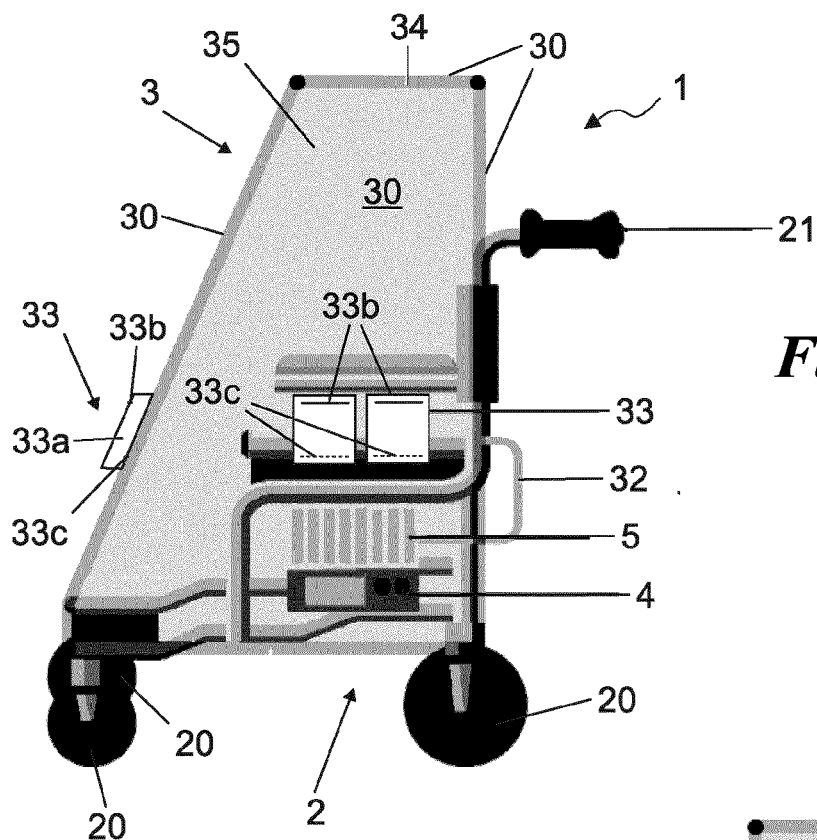


Fig. 1

Fig. 2

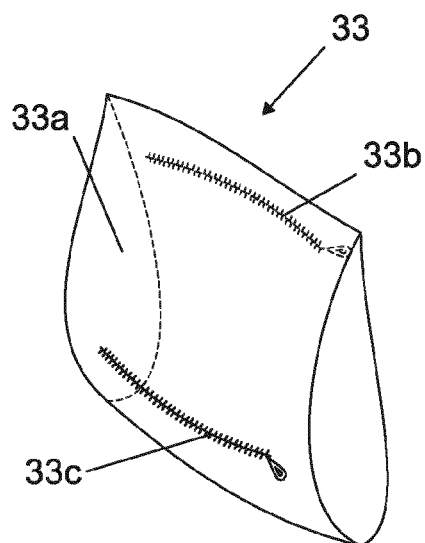
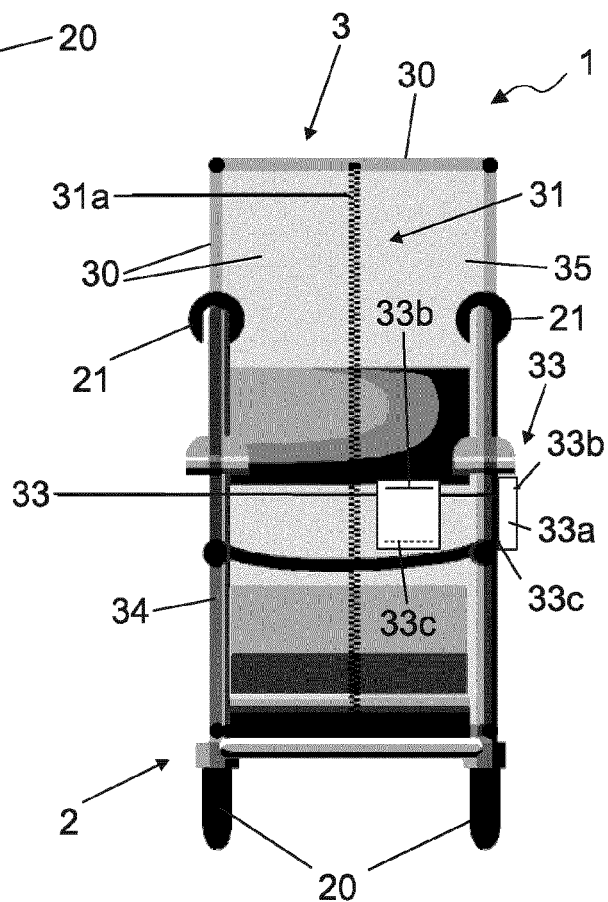


Fig. 3



EUROPEAN SEARCH REPORT

Application Number

EP 23 21 1006

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2014/366881 A1 (MCKEEMAN BRUCE ELGIN [US]) 18 December 2014 (2014-12-18) * paragraph [0044] * * paragraph [0034] * * figures 1-20 *	1-10	INV. A61G5/10 A61G10/00
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 April 2024	Examiner Ong, Hong Djien
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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12-04-2024

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