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(54) **PEDIATRIC BED WITH SHAPED MOBILE SIDES**

(57) Pediatric bed with shaped movable rails, subdivided in a first portion (20) for bearing legs and pelvis, a second portion (19) for bearing the back, and a third portion (18) for bearing the head, characterized in that side bearing and containment rails for the legs (2), side bearing and containment rails for the trunk (13) and side bearing and containment rails for the head (17) are hinged laterally with respect to said first portion (20), second portion (19) and third portion (18) respectively, said side

rails having an eccentricshaped section with respect to the axis of the hinge and being coated with soft material, so that it is possible to vary their distance from the centre of the bed by simple rotation around the axis, and in that said rails (2, 13, 17) comprise a plurality of pressure sensors (21) on their own outer surface, which are configured to provide a feedback directly proportional to the contact pressure exerted by each rail (2, 13, 18) on the surface in contact to the body of the child laid on the bed.

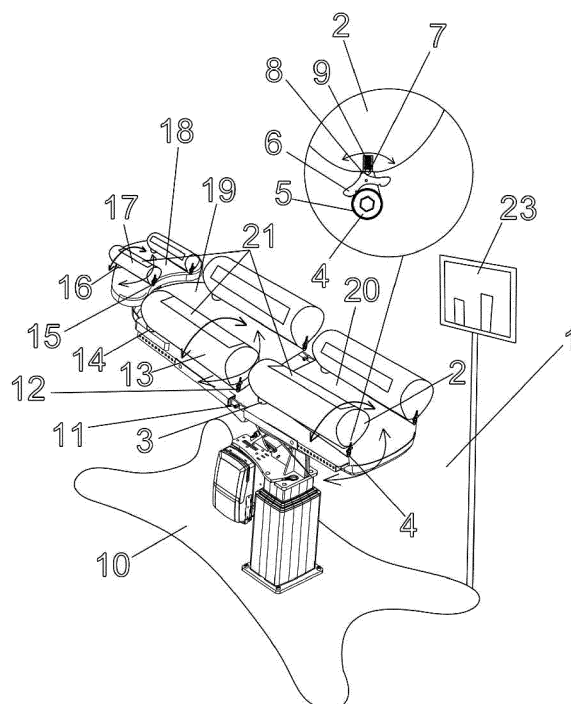


Fig. 1

Description

[0001] The present invention relates to the technical field comprising the pediatric beds, mainly used in rehabilitation centres and hospitals for the rehabilitation of children suffering from musculoskeletal disorders or after traumas.

[0002] In particular, the present invention relates to a pediatric bed with cam shaped movable rails.

[0003] Aim of the present invention is in fact to provide a suitable containment bed able to render the rehabilitation session, carried out by a physiotherapist on a child in pediatric age, comfortable and safe.

[0004] The technical advantage of this kind of containment is that the child (from 0 to 5 years old) is wrapped by rails in soft material, whose particular closing allows a containment similar to a hug, and generally, a feeling of safety to be transmitted to the child. The technical problem connected to the beds known at the state of the art relates to the fact that the child does not feel hugged, since the side containment rails are generally fixed and, anyway, they cannot be adapted to the anatomical shape and the size of the child. The rails of the physiotherapy beds known at the state of the art always leave free space around the child, who is not stably positioned with respect to the bed, and however, does not feel safe regardless of the real risk of falling. So, the physiotherapist, besides focusing on the physiotherapy to be carried out on the child, has also to keep him stably so that he does not rotate on himself or does not move during the exercise.

[0005] At the best of the current inventor's knowledge, containment systems for children in pediatric age on a bed used for physiotherapy are not known at the state of the art, nor are they commonly used, and in particular, containment systems easily and rapidly usable for patients of various size are not known.

[0006] To solve the problem of stability of children on physiotherapy beds thick elements are commonly used, as for example pillows, which are interposed in the spaces between the fixed rail of the bed and the side of the body of the child.

[0007] Anyway, such systems, since they are improvised, do not allow an adjustment of the pressure exerted on the side of the body of the child. In fact, when adding too rigid or too cumbersome thick elements, there is the risk that the excessive pressure can be uncomfortable for the child, if instead, less thick elements are introduced, the problem of stability remains.

[0008] There are also known beds with narrowing rails, this meaning that the rails translate parallel to themselves. Also in this case, since the known mechanisms are configured to move straight rails parallel to the side of the bed, they do not allow to obtain a suitable pressure distribution since the straight rails are not adapted to the anatomy of the body of the patient, so also in this situation there will remain free areas between the rail and the body of the child, with the consequent lack of stable containment of the child on the bed. Furthermore, with such sys-

tems the pressure exerted by each rail is not controlled, and so there is the risk to exert a too strong pressure, or on the contrary a mild one for the containment of the patient.

[0009] Other systems are described in Patents CN204106476, CN109875827, CN210871531, which, anyway, do not solve the above-described technical problems.

[0010] The aim of exerting a correct side containment pressure to keep the child on the bed in stable, comfortable and safe manner is reached by means of a tool comprising the features described in the main claim.

[0011] The dependent claims describe advantageous embodiments of the invention.

[0012] According to an aim, the present invention provides a device able to contain a child efficiently on a pediatric bed for physiotherapy.

[0013] According to another aim, the present invention provides a device able to contain the child by means of movable rails adapting to the anatomy of the child.

[0014] According to another aim, the present invention provides a device able to measure the level of pressure exerted by the rails on the sides of the body of the child, to provide a feedback to the physiotherapist, indicating him the pressure level exerted by each portion of the rail of the bed in the portion in contact with a respective part of the body of the child.

[0015] Yet according to another aim, the present invention provides a device able to show the physiotherapist said pressure level, thus providing measuring data of the pressure exerted by the rails on the body of the child.

[0016] The present invention realizes the prefixed aims since it is a pediatric bed with shaped movable rails, subdivided in a first portion (20) for bearing legs and pelvis, a second portion (19) for bearing the back, and a third portion (18) for bearing the head, characterized in that side bearing and containment rails for the legs (2), side bearing and containment rails for the trunk (13) and side bearing and containment rails for the head (17) are hinged laterally with respect to said first portion (20), second portion (19) and third portion (18) respectively, said side rails having an eccentric-shaped section with respect to the axis of the hinge they are fastened with to the respective portion of the bed, so that it is possible to vary their distance from the centre of the bed by simple rotation around said axis, and in that said rails (2, 13, 17) comprise a plurality of pressure sensors (21) on their own outer surface, which are configured to provide a feedback directly proportional to the contact pressure exerted by each rail (2, 13, 18) on the surface in contact to the body of the child laid on the bed. Preferably, said rails are also coated with a viscoelastic material - such for example a foam of memory-foam type - so that they can adhere correctly to the body of the patient.

[0017] Preferably, said eccentric rails (2, 13, 17) are configured to be rotated around an axis tangent to the outer surface of each of said rails (2, 13, 17).

[0018] All the rails can be also opened, thus widening the bed surface. For example, this is comfortable for five years old children. In this manner, the useful space provided inside the rails is always adapted perfectly to the age of the child, and the bed can be used by means of rapid and simple adjustments for patients of different age and size.

[0019] Preferably, the rotation mechanism of the rails is of self-blocking type. In the drawings, for example a pawl type block is represented, made up of a tilting lever (6), provided with two blocking means and fastened to the rail (2, 12, 17). A sphere (7) pushed by a spring (9) against the central tip (8) of the lever (6) exerts its own pushing action on the lever (6). According to the position of the lever (6), one of the two blocking means engages the teeth (5) of a toothed wheel (4) integral with the bed, and blocks the rotation in a direction of the rail (2, 12, 17).

[0020] By changing the position of the tilting lever (6) it is so possible to block the rotation in a direction or the other one of the rail (2, 12, 17). According to other embodiments, the kinematism for blocking the movement of the rails (2, 12, 17) can be also of friction type or similar. Since the bed comprises a first portion (20) for bearing legs and pelvis and a second portion (19) for bearing the back, which are movable to each other, it can take a configuration in which the patient takes the sitting position.

[0021] A feedback signal for the physiotherapist directly proportional to the contact pressure between the rails and the patient can be provided by a buzzer which produces a sound directly proportional to the contact pressure, subdivided for each of said rails (2, 13, 17). In this manner, the physiotherapist can adjust the push exerted by each rail uniformly, as a function of the feedback signal. In another embodiment, the feedback signal can be provided by means of an interface (22) of graphical type reproducing an image whose dimensions are directly proportional to the contact pressure subdivided for each of said rails (2, 13, 17). Thanks to a monitor, the physiotherapist can see the value of the pressure exerted by the rails, thus allowing to pay attention to sensible areas due to the particular clinical condition of the child and thus rendering the rehabilitation session safer.

[0022] Other features and advantages of the invention will be clear by reading the following description of an embodiment of the invention provided as a way of not limiting example, with reference to the drawings shown in the appended figures. The experts in the field will be able to understand the invention better thanks to a detailed description of the following drawings:

Fig. 1 shows a perspective view of the invention with all its essential elements.

Fig. 2 shows a view of the narrowing of the rails (2) relative to the first portion of the bed (20) at the child's legs.

Fig. 3 shows a view of the narrowing of the rails (13) relative to the second portion of the bed (19) at the

child's trunk.

[0023] These features, together with the whole structure of the invention, allow to obtain relevant advantages from an economic point of view since both the mechanical components and the electronic ones can be easily mass-produced, and at the same time, do not require particular maintenance over the time.

10 Brief description

[0024] The invention realizes the prefixed aims since it provides a pediatric bed with shaped movable rails, comprising a base (10) bearing a column at whose end a pediatric bed is hinged, subdivided in a first portion (20) for bearing legs and pelvis, a second portion (19) for bearing the back, and a third portion (18) for bearing the head, characterized in that on the first portion (20), on the second portion (19) and on the third portion (18), on each end (30, 14, 16) a rail legs (2), a rail trunk (13) and a rail head (17) are hinged respectively, each shaped with cam-shaped section so that they can be brought close again with respective opposite ends and apt to contain the child laid on said bed and on each side of the bed. Said rails (2, 13, 17) are coated on their outer surface with a plurality of pressure sensors (21) configured to detect the contact pressure between the rails and the body of the patient, and connected to a user interface (22).

[0025] Said user interface is configured to provide, when said rails (2, 13, 18) are near the sides of the body of the child laid on the bed, a feedback directly proportional to the contact pressure exerted by each rail (2, 13, 18) on the surface in contact to the body of the child laid on the bed.

Claims

1. Pediatric bed with shaped movable rails, subdivided in a first portion (20) for bearing legs and pelvis, a second portion (19) for bearing the back, and a third portion (18) for bearing the head, characterized in that

side bearing and containment rails for the legs (2), side bearing and containment rails for the trunk (13) and side bearing and containment rails for the head (17) are hinged laterally with respect to said first portion (20), second portion (19) and third portion (18) respectively, said side rails having an eccentric-shaped section with respect to the axis of the hinge they are fastened with to the respective portion of the bed, so that it is possible to vary their distance from the centre of the bed by simple rotation around the axis, and in that said rails (2, 13, 17) comprise a plurality of pres-

sure sensors (21) on their own outer surface, which are configured to detect the pressure contact between the rails and the body of the patient, said device comprising also electronic means configured to acquire the value of the pressure detected by said sensors (21) and a user interface (22) configured to provide a feedback directly proportional to the contact pressure exerted by each rail (2, 13, 18) and the body of the patient laid on the bed.

2. Pediatric bed with shaped movable rails according to claim 1, **characterized in that** the axis of rotation of said rails (2, 13, 17) is tangent to the outer surface of each of said rails (2, 13, 17) .
3. Pediatric bed with shaped movable rails according to claim 1 and 2, **characterized in that** the kinematics of the rotation along the two axes of the rails (2, 13, 17) is of friction type.
4. Pediatric bed with shaped movable rails according to claim 1, **characterized in that** the feedback directly proportional to the contact pressure is provided by a buzzer which produces a sound directly proportional to the contact pressure, subdivided for each of said rails (2, 13, 17) .
5. Pediatric bed with shaped movable rails according to claim 1, **characterized in that** said interface (22) is of graphical type and is configured to reproduce an image having at least a feature directly proportional to the contact pressure detected at each of said rails (2, 13, 17) .

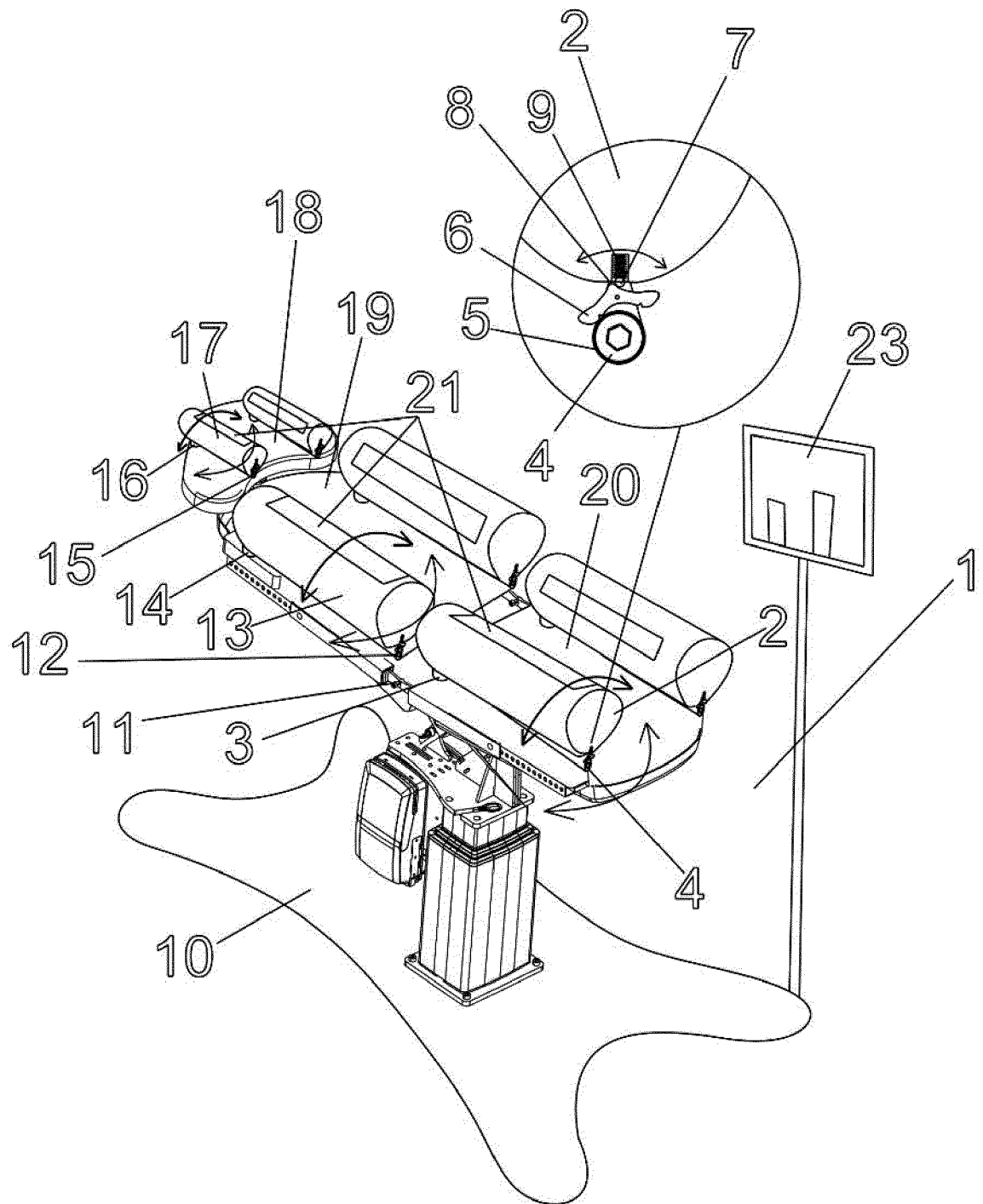


Fig. 1

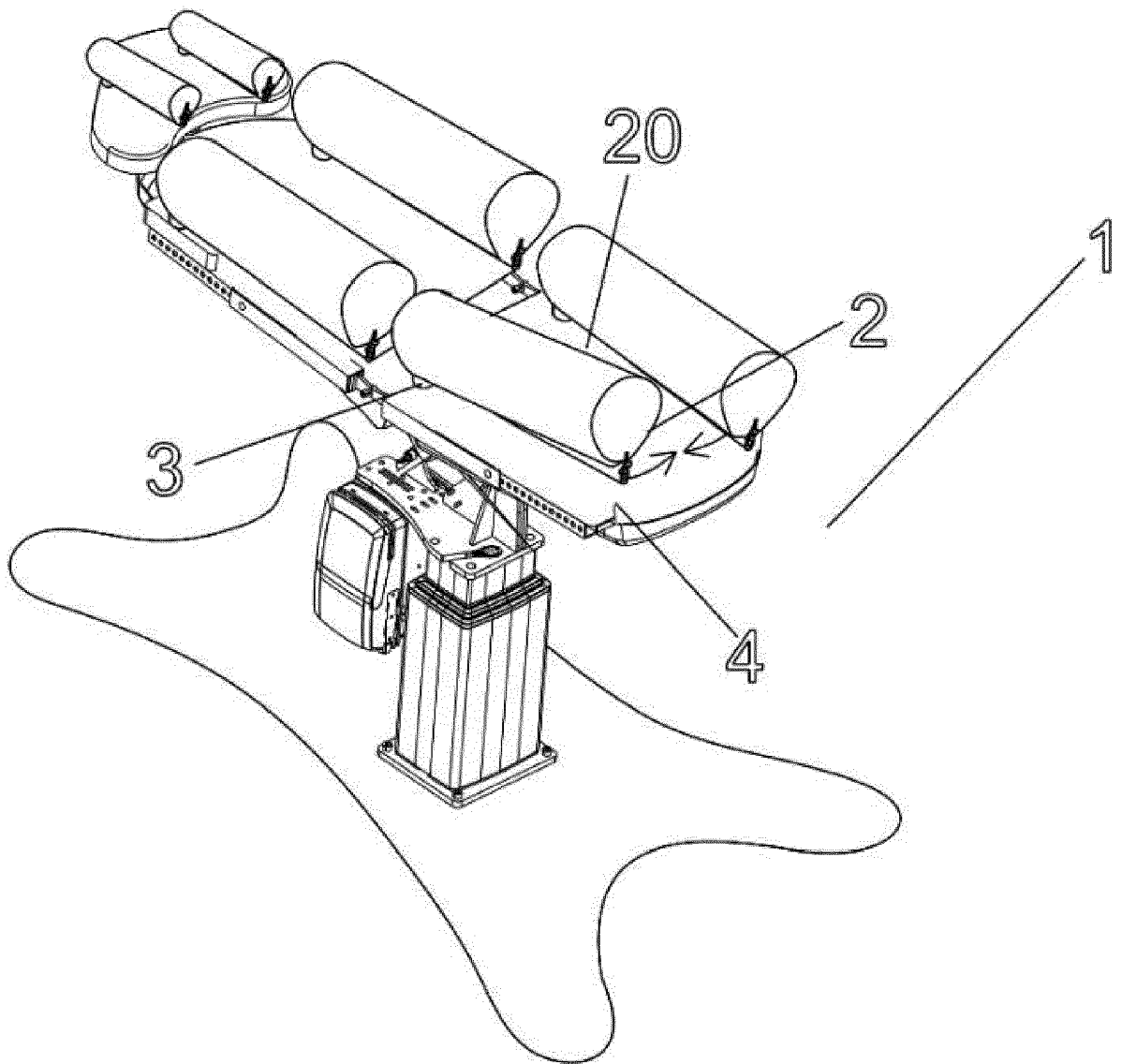


Fig. 2

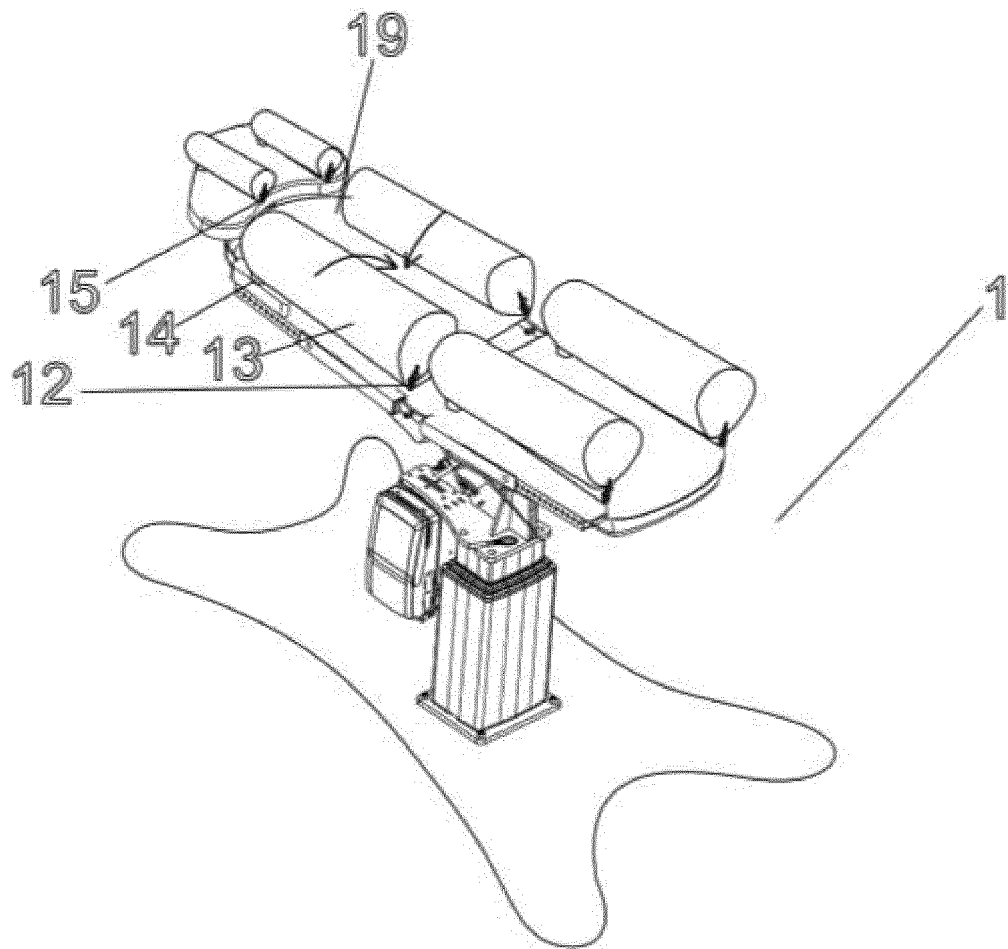


Fig. 3



EUROPEAN SEARCH REPORT

Application Number

EP 21 18 7520

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 7 155 766 B1 (SCOTT TECHNOLOGY LLC [US]) 2 January 2007 (2007-01-02) * figures 1-4 *	1-5	INV. A61G7/05
Y	US 6 381 787 B1 (ROGONE MARY S [US] ET AL) 7 May 2002 (2002-05-07) * figures 5A-7B *	1-5	
Y	GB 2 533 656 A (EC MEDICA LTD [GB]) 29 June 2016 (2016-06-29) * page 7, lines 12-21; figure 1 *	1-5	
			TECHNICAL FIELDS SEARCHED (IPC)
			A61G
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 16 December 2021	Examiner Gkama, Alexandra
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			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 18 7520

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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16-12-2021

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REFERENCES CITED IN THE DESCRIPTION

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