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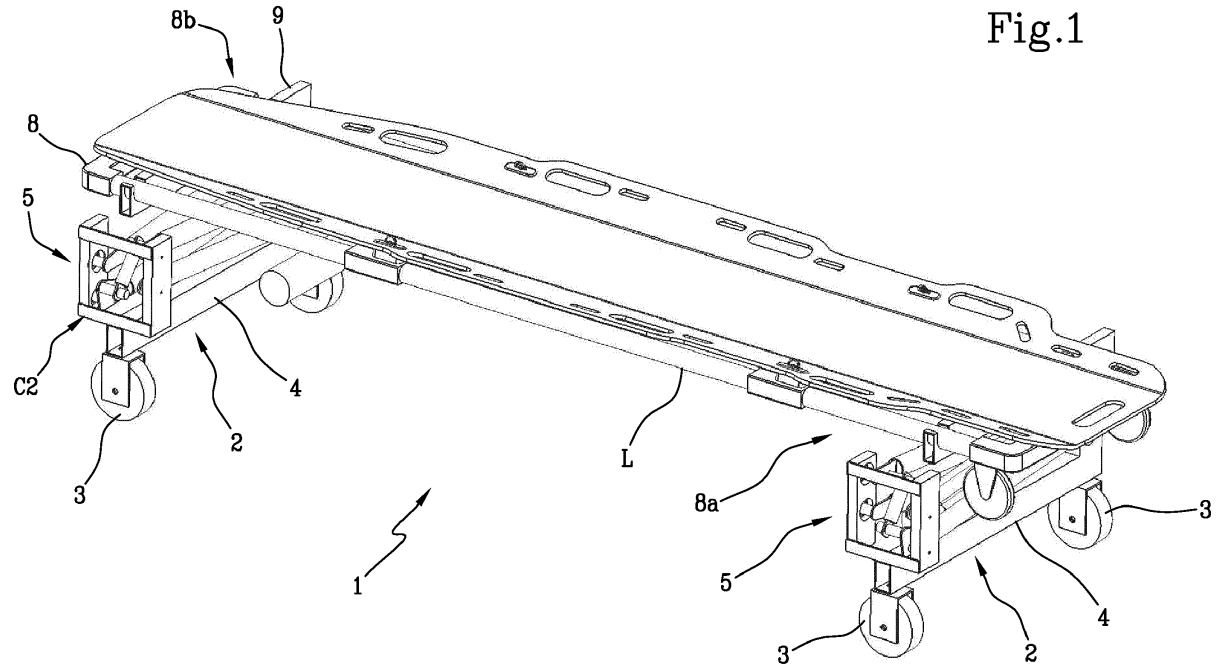
(54) **A FRAME FOR TRANSPORTING A STRETCHER**

(57) A frame (1) for transporting a stretcher (B) comprising at least one movement module (2) equipped with wheels (3) and configured for movement on a surface. The frame (1) also comprises a supporting platform (8) configured to receive in coupling a table of a stretcher (B) and supporting means (5) interposed between the at least one movement module (2) and the supporting platform (8). The supporting means (5) are adjustable so as to vary a height and at least one angle of orientation of the supporting platform (8) during an operational movement of the transport frame (1) along the aforementioned surface so as to compensate for irregularities or inclinations of the surface while maintaining a predetermined spatial orientation of the supporting platform (8).

Fig.1



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Description

[0001] The present invention relates to a frame for transporting a stretcher.

[0002] The term stretcher, or litter, refers to a device for supporting a person, generally infirm or temporarily infirm, configured to allow the suitable movement of the same. Stretchers are widely used in the medical and paramedical professions in order to allow the transfer of a patient from the location in which she/he is located, or from the place of aid, to a location suitable for the administration of adequate medical support.

[0003] In particular, stretchers are part of the basic equipment with which a common ambulance is equipped in order to allow paramedic staff to provide the necessary aid to people in need, for example at the location of a road accident or at the location where a person has fallen ill.

[0004] In these situations, the person is placed lying down on the stretcher, in a position suitable for limiting the occurrence of complications, in order to be able to transport the person onto the ambulance, and thanks to it also to transport the patient to a facility designed to provide suitable health care, for example a hospital.

[0005] Stretchers are also widely used inside the hospital, allowing the hospital nursing staff to transport patients who cannot walk inside the facility, allowing the patients to have the necessary therapies they must undergo performed.

[0006] Such devices are generally connected to suitable transport frames configured to allow the support thereof and facilitate their movement.

[0007] In particular, the aforementioned structures have movement modules equipped with wheels which allow the responsible staff to move the stretcher by exerting force on the frame.

[0008] Furthermore, these frames can comprise linked members which allow an adjustment of the stretcher along orthogonal directions with respect to the ground.

[0009] Disadvantageously, the transport frames belonging to the prior art do not allow an accurate adjustment of the positioning of the stretcher with respect to the ground.

[0010] In particular, these frames are not able to compensate for any unevenness of the surface on which the supporting structure is moved. This drawback is particularly disadvantageous because it does not allow maintaining the transported person in a typically horizontal position.

[0011] Very disadvantageously, the frames of the prior art do not allow modifying the inclination of the stretcher connected thereto so as to ensure a correct positioning of the patient.

[0012] The object of the present invention is therefore to provide a frame for transporting a stretcher capable of allowing the transportability of a patient under optimum conditions.

[0013] The stated technical task and specified objects are substantially achieved by a frame for transporting a stretcher comprising the features disclosed in one or more of the claims.

[0014] The dependent claims correspond to possible embodiments of the invention.

[0015] Further characteristics and advantages of the present invention will become more apparent from the indicative and thus non-limiting description of an embodiment of a frame for transporting a stretcher.

[0016] This description will be set out below with reference to the appended drawings, which are provided solely for indicative and therefore non-limiting purposes, in which:

- figure 1 is a perspective view of a frame for transporting a stretcher in accordance with a particular embodiment;
- figure 2 is a front view of the frame for transporting a stretcher according to a particular operating condition in accordance with the embodiment of figure 1;
- figure 3 is a schematic front view of the frame for transporting a stretcher according to a further operating condition in accordance with the embodiment of figure 1;
- figure 4 is a schematic front view of a frame for transporting a stretcher in accordance with a further embodiment;
- figure 5 is a schematic front view of the frame for transporting a stretcher according to a further operating condition in accordance with the embodiment of figure 4;
- figure 6 is a schematic representation of a transport frame in accordance with a particular operating condition.

[0017] With reference to the accompanying drawings, the reference number 1 has been used to generally designate a supporting frame for a stretcher, indicated hereinafter as frame 1.

[0018] As can be seen in the particular embodiment shown in figures 1-3, the frame 1 comprises two movement modules 2.

[0019] The first movement module 2 is structurally identical to the other movement module 2 with a specular arrangement relative to the previous one.

[0020] Each movement module 2 also has independent movement with respect to the other. In this way the frame has simple construction and/or maintenance.

[0021] Each of these movement modules 2 comprises two wheels 3 respectively connected to the ends of a supporting crosspiece 4. In particular, the supporting crosspiece 4 is connected at one end 4a thereof to supporting means 5 through a first connection portion C1.

[0022] For each movement module 2, these supporting means 5 comprise a first four-bar linkage mechanism 6 mounted on the movement module 2 and a second four-bar linkage mechanism 7 interposed between the first

four-bar linkage mechanism 6 and a supporting platform 8 for a stretcher "B".

[0023] As can be seen in the appended figures, the aforementioned movement modules 2 are respectively connected to a front portion 8a of the supporting platform 8 and to a rear portion 8b of the supporting platform 8. In particular, the first four-bar linkage mechanism 6 comprises a first pair of rods 60 connected to the first connection portion C1 in a first end 60a and a second connection portion C2 in a second end 60b.

[0024] The first linkage mechanism 6 is connected to the second linkage mechanism 7 through the second connection portion C2. In particular, the aforementioned second linkage mechanism 7 comprises a second pair of rods 70 connected to the second connection portion C2 in a first end portion 70a and to a third connection portion C3 in a second end portion 70b.

[0025] This third connection portion C3 is connected to a crosspiece 9 equipped with receiving seats 9a, substantially U-shaped, for receiving respective longitudinal members "L" of the aforementioned supporting platform 8.

[0026] In substance, the relative movement of the aforementioned four-bar linkage mechanisms 6, 7 allows an adjustment of the positioning of the stretcher "B", connected thereto by means of the supporting platform 8, along a substantially vertical direction.

[0027] As can be seen in figure 6, the coordinated adjustment of the supporting means 5 of the movement modules 2 connected respectively to the front portion 8a and rear portion 8b of the platform 8 allows compensating for the unevenness of the surface on which the frame 1 is moved.

[0028] In this way the differentiated adjustment of the supporting means 5 allows, during an operational movement of the frame 1, varying the angle of orientation of the supporting platform 8 corresponding to an angle of inclination with respect to a transverse direction of the stretcher "B".

[0029] In accordance with a further embodiment shown in figures 4 and 5, the four-bar linkage mechanisms 6, 7 can be absent and the supporting means 5 can comprise a robotic arm 10 having a first portion 10a connected to the movement module 2 and a second portion 10b connected to the supporting platform 8.

[0030] In particular, the robotic arm 10 comprises a first rod 101 connected to the movement module 2 and a second rod 102 connected to the supporting platform 8. In particular, the first and the second rods are rotatably coupled to realise a movement of the supporting platform 8 with respect to the movement module 2.

[0031] According to this embodiment, the supporting crosspiece 4 of the movement module 2 can also be realised in the form of a drive shaft on which the wheels 3 are directly placed.

[0032] In accordance with further embodiments of the present invention not shown in the appended figures, the frame 1 can comprise a single movement module 2 and the supporting means 5 can comprise a robotic arm 10 and one or more four-bar linkage mechanisms arranged on this movement module.

[0033] In accordance with further embodiments of the present invention not shown in the appended figures, the frame 1 can comprise two or more movement modules and the supporting means 5 can comprise a robotic arm 10 and one or more four-bar linkage mechanisms arranged on the same movement module or on two different movement modules supporting the same supporting platform 8 without altering the inventive concept of the present invention.

[0034] In general, it can be observed that the frame 1 comprises a movement module 2 configured to allow the movement of the stretcher "B" on a supporting surface. In particular, the movement module 2 comprises a plurality of wheels 3, preferably two wheels 3, that allow transporting the structure without having to lift it from the ground.

[0035] Advantageously, the wheels 3 can be connected to the two ends of the crosspiece 4 so as to impart a high degree of stability to the frame 1.

[0036] In accordance with different embodiments not shown in the appended figures, the movement module 2 can comprise a different number of wheels 3 and the aforementioned wheels 3 can have a different arrangement from the previously mentioned arrangement without altering the inventive concept of the present invention.

[0037] In general the supporting means 5 are configured and/or can be actuated independently from each other to provide a plurality of operating configurations of the frame 1.

[0038] In particular, these supporting means 5 are designed to allow the adjustment of the height and at least one angle of orientation of the aforementioned supporting platform 8 during an operational movement of the frame 1 along a surface. In this way the supporting means allow compensating for irregularities and/or inclinations of the surface on which the frame is moved while maintaining a predetermined spatial orientation of the supporting platform 8, for example a horizontal orientation with respect to an absolute reference system.

[0039] Preferably these supporting means 5 are actuated through the use of at least one electromechanical actuator (not shown in the appended figures). These actuators, preferably, are at least partially connected to the movement module 2.

[0040] According to further embodiments not shown in the appended figures, these actuators are arranged according to solutions which are different from that previously described without altering the inventive concept of the present invention.

[0041] In particular, these supporting means 5 can comprise an automatic adjusting mechanism. This automatic adjusting mechanism is preferably configured to adjust the orientation of the supporting platform 8, and is acting on the supporting means 5 so as to keep con-

stant a spatial orientation of the supporting platform during movement.

[0042] This automatic adjusting mechanism comprises at least one sensor designed to measure the inclination of the supporting platform 8 and/or the surface and/or the movement modules 2 in an operating configuration of the frame 1.

[0043] Preferably, the automatic adjusting mechanism comprises an accelerometer and/or a gyroscope. In addition, the aforementioned automatic adjusting mechanism can comprise a processing unit configured to process at least one input signal coming from at least one sensor and send at least one correction signal to the supporting means 5.

[0044] According to a preferred embodiment of the present invention, the automatic adjusting mechanism comprises at least one optical sensor, preferably of the laser type, or a radio frequency sensor designed to detect the height of the supporting platform 8 relative to a reference surface in an operating configuration of the frame 1.

[0045] In the case of the optical sensor, the same is connected to the aforementioned processing unit that allows processing at least one input signal coming from the optical sensor and sending at least one actuation signal to the supporting means 5.

[0046] In substance, the aforementioned processing unit processes the input signals coming from the sensors and produces output signals to change the position of the supporting platform 8 of the frame 1.

[0047] Preferably, as an automatic adjusting mechanism the supporting means 5 can comprise a mechanism for adjusting an angle of rolling of the supporting platform 8 with respect to a relative longitudinal axis. Advantageously, this mechanism for the orientation of an angle of rolling allows maintaining the supporting platform 8 in a predetermined position regardless of the conformation of the surface on which the frame 1 is resting.

[0048] According to a particular embodiment of the present invention, the frame 1 comprises a user interface module (not shown in the appended figures) designed to allow a user to perform a manual adjustment of the orientation and/or the position of the supporting platform 8 in a plurality of operating configurations.

[0049] In all the embodiments, the supporting means 5 can comprise a crosspiece 9 equipped with receiving seats 9a designed to allow a coupling, preferably a shape coupling, with the supporting platform 8.

[0050] In accordance with a preferred embodiment the receiving seats 9a are U-shaped to receive respective longitudinal members "L" of the supporting platform 8.

[0051] According to different embodiments not shown in the appended figures, the receiving seats 9a can have a different shape from that previously described without altering the inventive concept of the present invention. As can be seen in figures 1 and 6, the supporting platform 8 is configured to receive in coupling a table of a stretcher "B". In particular, the reversible connection means (not shown in the appended figures) allow a reversible connection between the supporting platform and the aforementioned stretcher "B".

[0052] Preferably, these reversible connection means comprise for example shape couplings of the male-female type and/or couplings of the screw-bolt type.

[0053] In use, a user moves the transport frame to which a stretcher "B" is connected. The aforementioned automatic adjusting mechanism allows determining the positioning of the supporting platform 8 relative to the ground by means of a plurality of sensors, for example an accelerometer and/or an optical sensor of the laser type. A processing unit processes the input signals coming from these sensors and sends at least one correction signal to the supporting means 5. In this way, the supporting means 5 maintain a predetermined positioning of the supporting platform 8 relative to the surface of movement, compensating the roughness or unevenness that such surface has.

[0054] It can therefore be seen that the present invention achieves the intended objects thanks to a frame for transporting a stretcher capable of allowing the transportability of a patient under optimum conditions thanks to the presence of suitable supporting means which allow accurately adjusting the positioning of the stretcher with respect to the surface on which the frame is placed.

[0055] Advantageously, the transport frame ensures an accurate positioning of the transported person in the stretcher regardless of the morphology of the surface on which the frame is moved.

[0056] Advantageously, the adjustment of the positioning is obtained by means of an automatic adjusting mechanism and without requiring the action of an operator.

[0057] Moreover, the use of the transport frame is intuitive and does not require the intervention of a specialised operator.

Claims

1. A frame (1) for transporting a stretcher comprising:

- at least one movement module (2) equipped with wheels (3) and configured for moving on a surface;
- a supporting platform (8) configured for receiving in coupling a table of a stretcher (B);
- supporting means (5) interposed between the at least one movement module (2) and the supporting platform (8);

characterised in that the supporting means (5) are adjustable in such a way as to vary a height and at least an angle of orientation of the supporting platform (8) during an operational movement of the transport frame (1) along the surface in such a way as to compensate for irregularities or inclinations of the surface, maintaining a predetermined spatial ori-

entation of the supporting platform (8).

2. The transport frame according to claim 1, wherein the supporting means (5) comprise at least one robotic arm (10) having a first end connected to the movement module (2) and a second end connected to the supporting platform (8).

3. The transport frame according to claim 2, wherein the robotic arm (10) comprises a first rod (101) connected to the movement module (2) and a second rod (102) connected to the supporting platform (8), the first and the second rods (101, 102) being rotatably connected for moving the supporting platform (8) relative to the movement module (2).

4. The transport frame according to any one of the preceding claims, wherein the supporting means (5) comprise at least one four-bar linkage mechanism (6, 7) configured for moving the supporting platform (8) along a substantially vertical direction.

5. The transport frame according to claim 4, wherein the supporting means (5) comprise, for at least one movement module (2), a first four-bar linkage mechanism (6) mounted on the movement module (2) and a second four-bar linkage mechanism (7) interposed between the first four-bar linkage mechanism (6) and the supporting platform (8).

6. The transport frame according to any one of the preceding claims, wherein the supporting means (5) comprise a mechanism for adjusting an angle of rolling of the supporting platform (8) with respect to a relative longitudinal axis.

7. The transport frame according to any one of the preceding claims, comprising two movement modules (2) positioned, respectively, on a front portion (8a) of the supporting platform (8) and on a rear portion (8b) of the supporting platform (8); the movement modules (2) being equal to each other and mounted in a specular fashion on the supporting platform (8).

8. The transport frame according to claim 7, wherein each of the movement modules (2) is connected to the supporting platform (8) by means of respective supporting means (5) and wherein the supporting means (5) are configured and/or can be actuated independently from each other.

9. The transport frame according to any one of the preceding claims, wherein the supporting means (5) comprise a mechanism for automatically adjusting the orientation of the supporting platform (8), acting on the supporting means (5) in such a way as to keep constant a spatial orientation of the supporting platform (8) during the movement on the surface.

10. The transport frame according to claim 9, wherein the automatic adjusting mechanism comprises at least one sensor designed to measure the inclination of the supporting platform and/or the surface and/or the movement modules in an operating configuration of the transport frame (1), the at least one sensor preferably comprising an accelerometer and/or a gyroscope, the automatic adjustment mechanism also comprising a processing unit configured for processing at least one input signal coming from the at least one sensor and sending at least one correction signal to the supporting means (5).

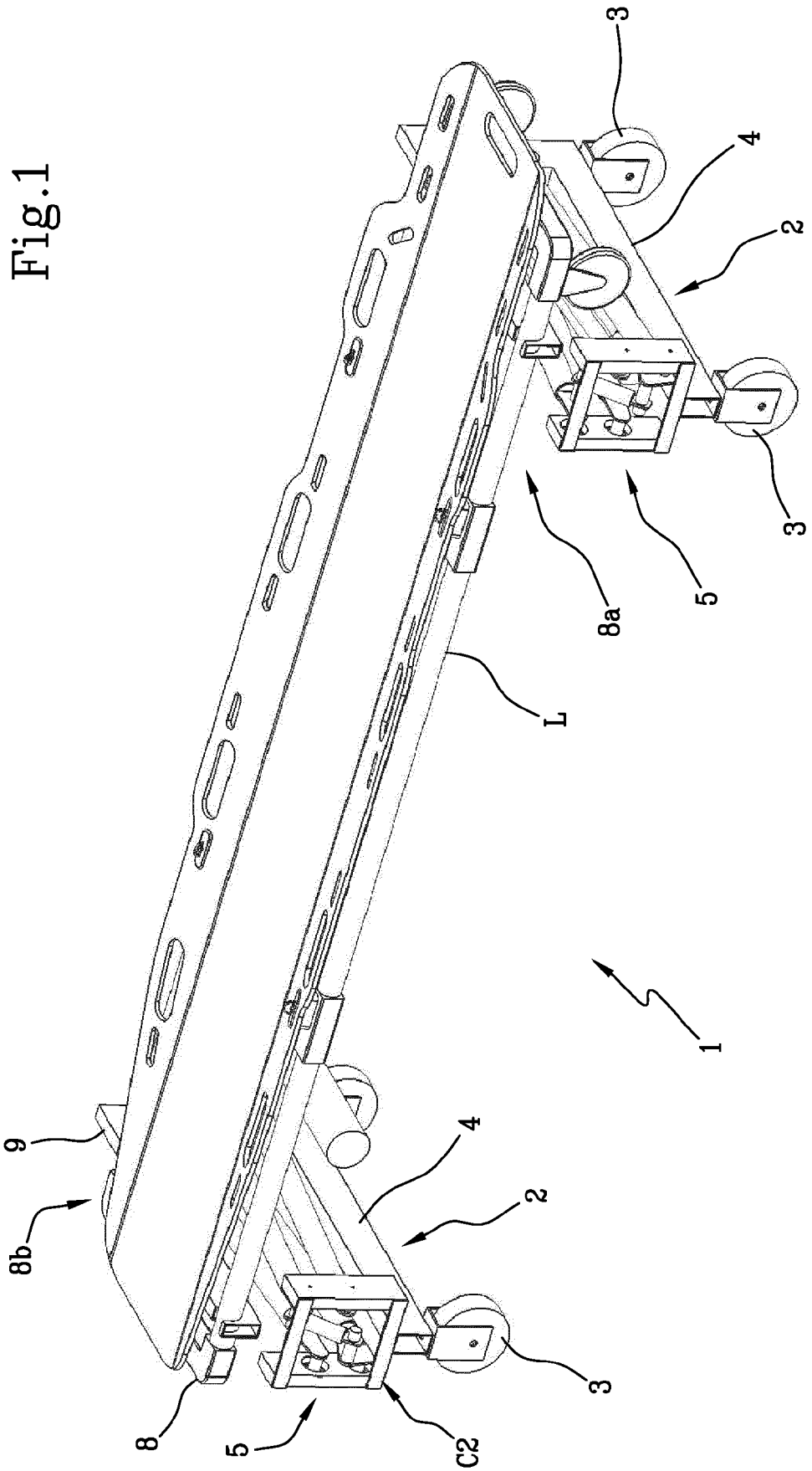
11. The transport frame according to claim 9 or 10, wherein the automatic adjusting mechanism comprises at least one optical sensor, or alternatively a radio frequency sensor, designed to detect the height of the supporting platform relative to a reference surface in an operating configuration of the transport frame (1), the automatic adjustment mechanism also comprising a processing unit designed for processing at least one input signal coming from the at least one sensor and sending at least one actuation signal to the supporting means (5).

12. The transport frame according to any one of the preceding claims, comprising a user interface module designed to allow a manual adjustment of the orientation and/or the position of the supporting platform (8) in a plurality of operating configurations.

13. The transport frame according to any one of the preceding claims, comprising reversible connection means designed to allow a reversible connection between the supporting platform and a table of a stretcher (B).

14. The transport frame according to claim 13, wherein each of the supporting means (5) comprises a crosspiece (9) equipped with receiving seats (9a), preferably U-shaped, the receiving seats (9a) being designed to receive respective longitudinal members (L) of the longitudinal supporting platform (8).

Fig.1



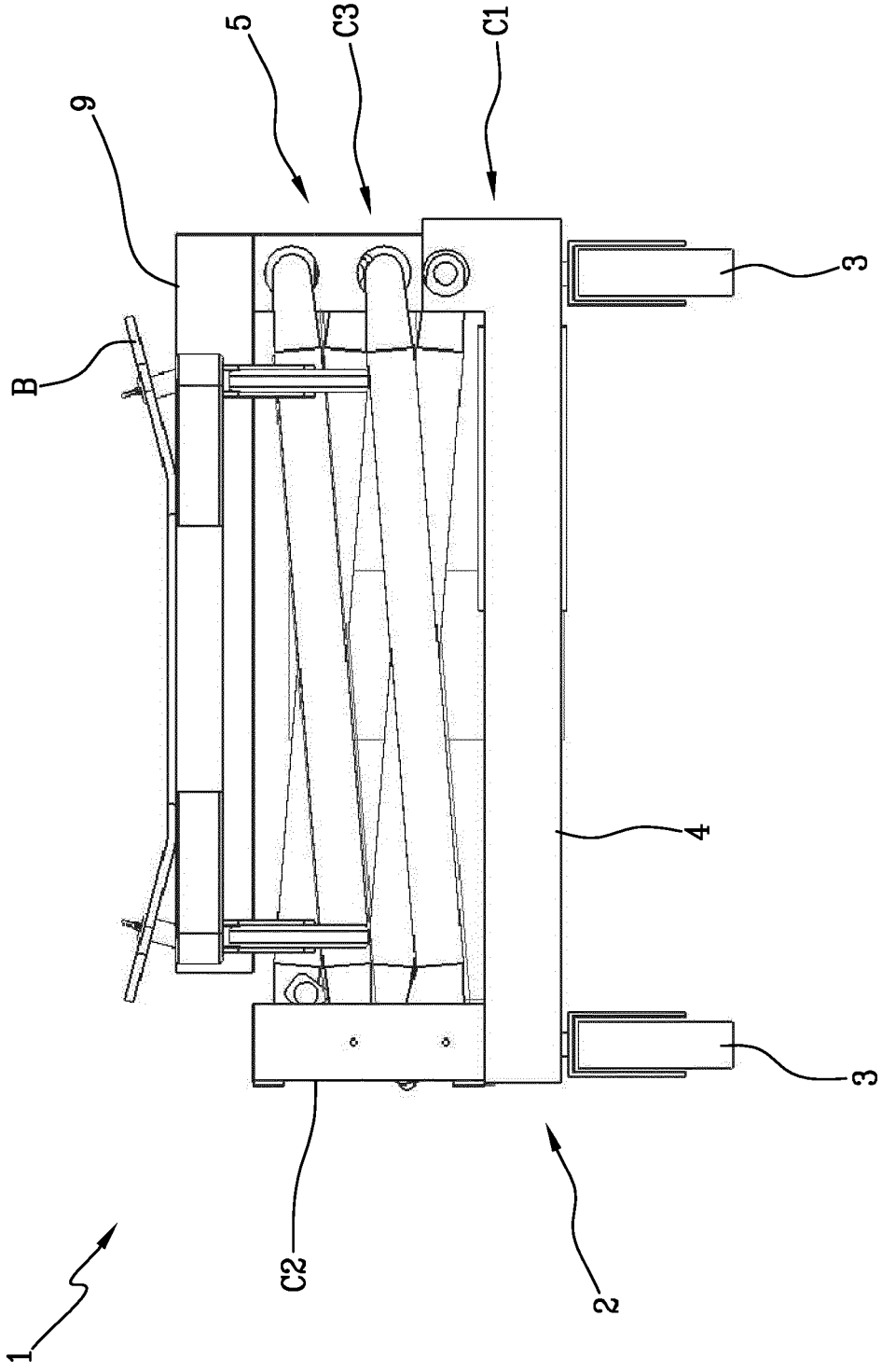
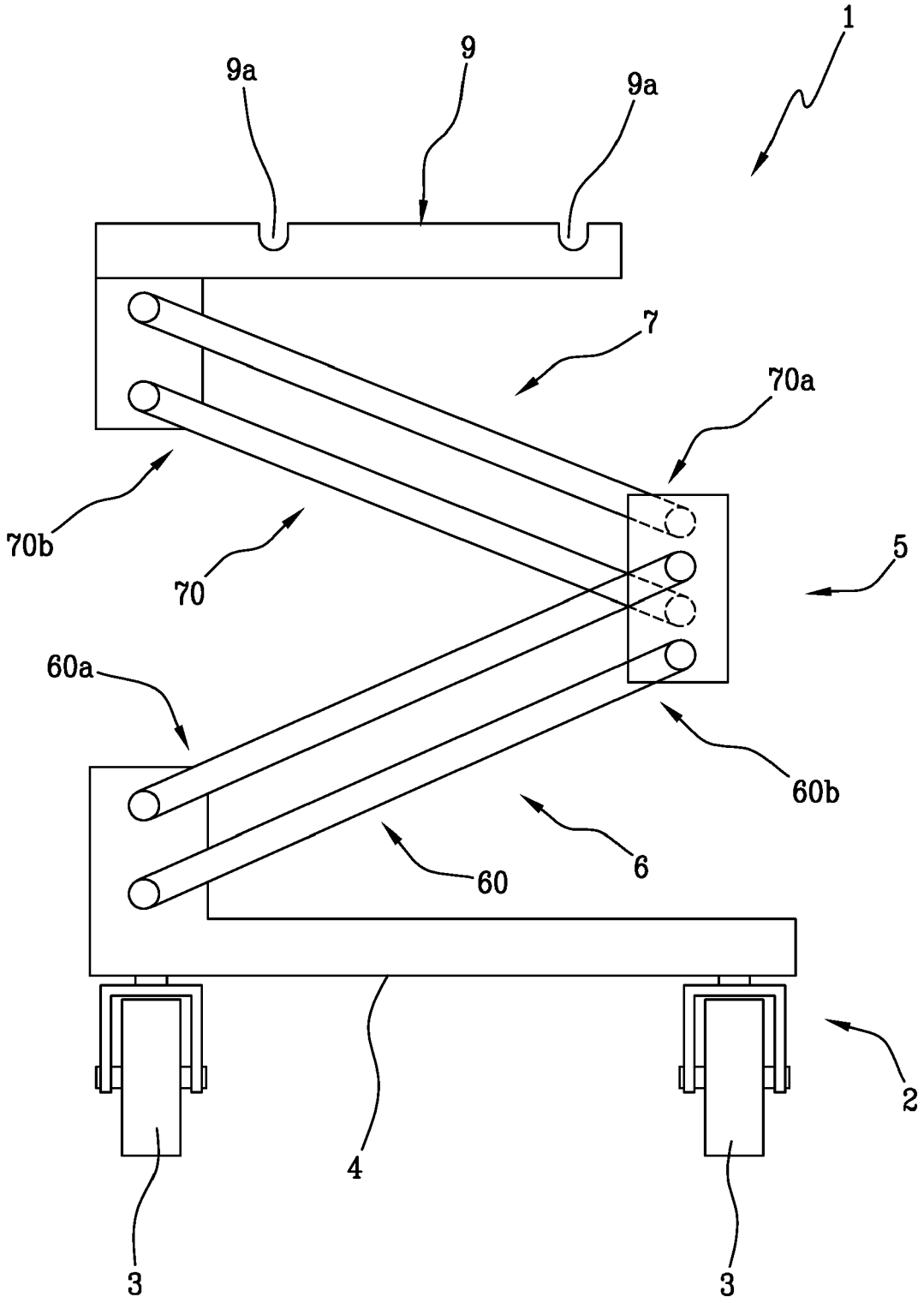


Fig.2

Fig.3



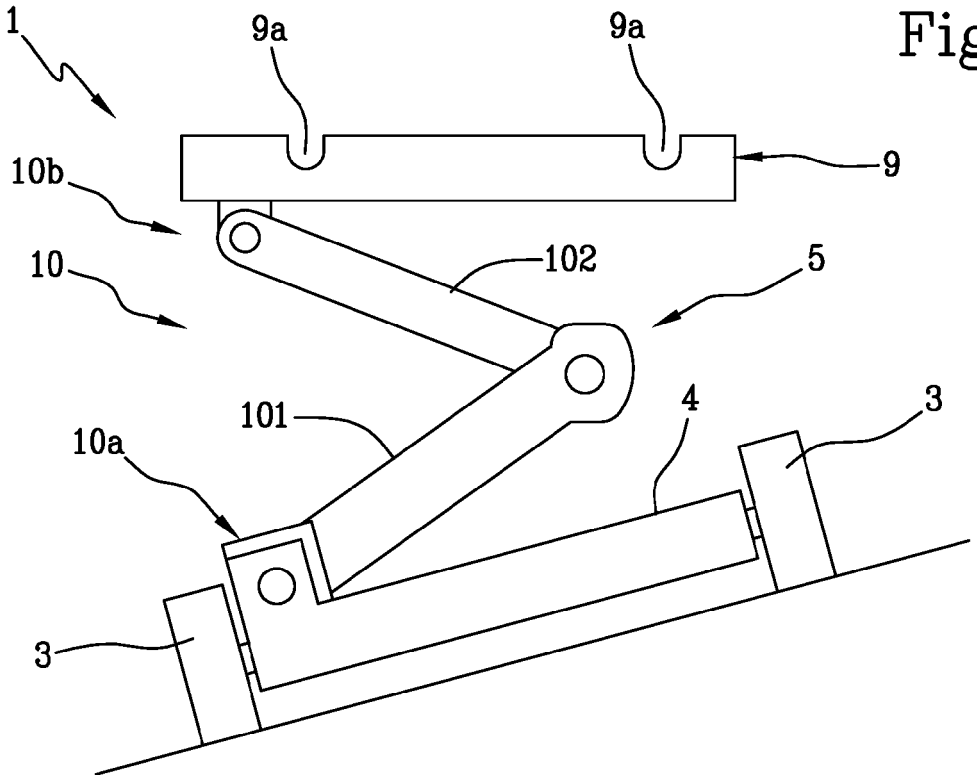


Fig.5

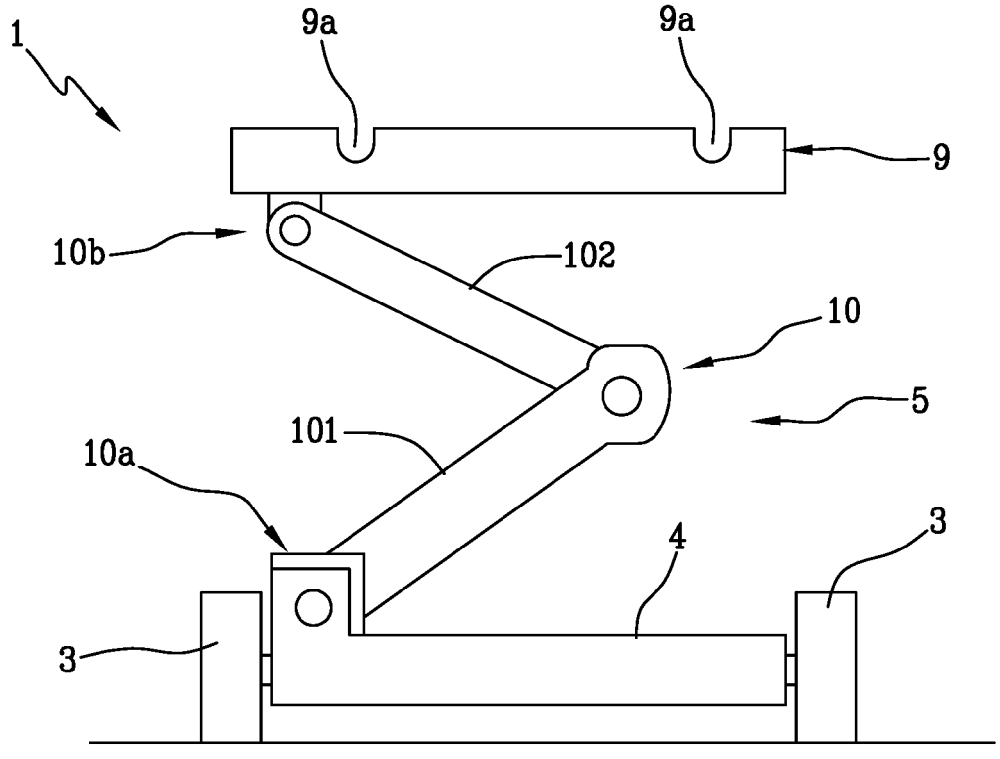
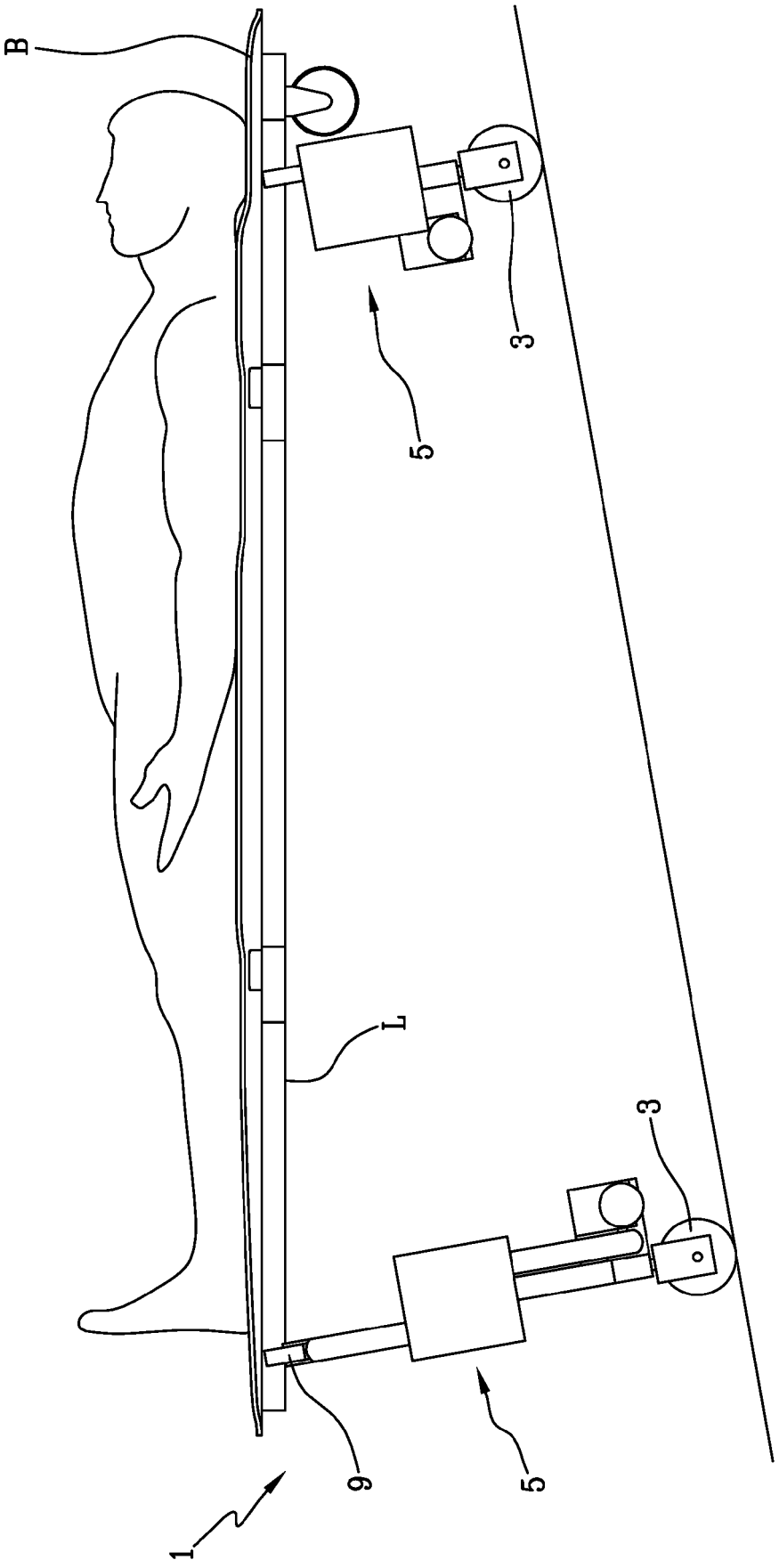


Fig.4

Fig.6



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EUROPEAN SEARCH REPORT

Application Number
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Place of search	Date of completion of the search	Examiner
The Hague	6 August 2019	Birlanga Pérez, J

CATEGORY OF CITED DOCUMENTS

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