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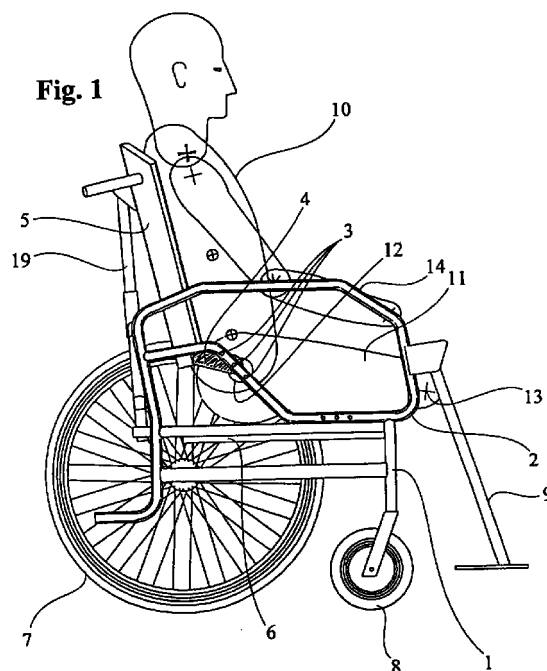
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(54) **Chair adjustment device**

(57) The chair adjustment device comprises coupling means (such as a set of holes or a slot or a plate that can take different orientations) arranged between the chair bearing frame (1) and the chair back (5) for simultaneously varying the position of the pivotal axis of the ends of spacing arms (4) of the chair back (5) with respect to the front edge of the chair seat (6) and the level above the plane of said seat. By such arrangement, the thigh-bone length and the ischial structure of the person which is to use the chair are taken into account and, moreover, when inclining the chair back (5) with respect to the upright position, the chair back (5) and the trunk (10) of the person leaning against the chair back (5) are made concurrently to rotate about a same axis, without causing an undressing of said person.



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Description

[0001] The chairs serving in general as aids for disabled or traumatised people are the subject matter of continuous studies in order to offer an ever increasing comfort.

[0002] The chairs may be made as stationary chairs or wheelchairs.

[0003] To allow an optimum comfort, the size of the available portion of the chair seat must take into account the length of the thigh-bone of the person sitting thereon so that, when the back of the person leans against the chair back, the lower portion of the leg can bend in the proper position without the knees being pushed forward without need.

[0004] Also the chair back must be made with a sufficient extension to allow a correct support to the back of the person sitting on the chair seat, and this is to be achieved whatever the inclination one wishes to give to the chair back itself.

[0005] Furthermore, the movements of the chair back while the person is leaning thereagainst must take place so that no relative sliding movement of the chair back surface and of the person's back occurs, that is without causing any undressing of the person.

[0006] It is absolutely not easy to meet all such requirements together in a single chair.

[0007] The main problem is due to the fact that the persons who are to sit on the chair may have different body structures, more particularly specific lengths of the thigh-bones and specific sizes of the hip-bones and the ischial bones.

[0008] Thus the chairs ought to be manufactured with personalised sizes of their different portions.

[0009] The aim of the present invention is to provide a chair that is not personalised and that can be adapted to the individual cases by simple interventions, without need of modifying the structure, in such a manner therefore that the chair fits to a wide range of people, ranging from people that are in the average short to people that are in the average tall.

[0010] The comfort is to be maintained in respect of both the available seat extension and the chair back position, as well as in respect of the displacements of the chair back itself when passing from the upright position to an inclined position, until reaching a substantially horizontal position.

[0011] The chair according to the invention is so manufactured as to take into account that each person has a given length of the thigh-bone, depending on his/her body size, and to take into account that, when that person is sitting on the chair, the thigh-bone head, housed within the cotyloid cavity of the hip-bone, is at a well defined distance from the chair back and at a well defined level above the seat plane. The level of the thigh-bone head is determined by the ischial structure of said person sitting on the chair.

[0012] When the person is inclined backwards,

his/her trunk rotates by pivoting substantially about the seats (cotyloid cavities of the hip-bone) of the thigh-bone heads. In order no relative sliding movement of the surface of the chair back and of the back of the person sitting on the chair takes place during the movement causing the variation of the inclination of said person, it is necessary that also the chair back rotates about the hypothetical virtual axis passing through the above mentioned seats of the thigh-bone heads.

[0013] According to a first embodiment of the invention, the requirements of the proper seat availability and of the proper positioning of the chair back, pivoted in correspondence of the virtual axis passing through the above mentioned seats of rotation of the thigh-bone heads, are met by providing on the sides of the bearing frame of said chair a set of holes for pivotally coupling the chair back, said set having an inclined arrangement such that the greater the distance of a hole from the front edge of the seat, the higher the level above the plane of said seat.

[0014] Each hole selected for the pivotal coupling of the chair back corresponds with a different position of the virtual axis passing through the rotation seats of the thigh-bone heads of the persons which will sit on the chair.

[0015] It is to be appreciated that the chair back, of which the supporting surface must be spaced apart from the cotyloid cavities of the hip-bone within which the thigh-bone heads of the person sitting on the chair rotate, is equipped in its lower portion with two suitable spacing arms the ends of which are associated with pivot pins for the mounting in said holes.

[0016] Instead of the set of holes with an inclined arrangement provided on each side of the chair bearing frame, a slot can be provided allowing the chair back pivot points to be varied continuously rather than step-wise.

[0017] Alternative solutions to the provision of the set of holes (or of the slot) present on each side of the chair bearing frame can consist in small plates that can be fastened to the chair bearing frame with a sequence of possible orientations and that are equipped in their upper portion with a hole for the pivotal coupling to the chair back spacing arms.

[0018] The different orientations of the small plates make the respective upper hole for the pivotal coupling of the chair back move along a path consisting of an arc of circumference located in the raising quadrant, whereby the plate corresponds with the inclined succession of holes (or the slot) mentioned above.

[0019] The adjustment device described above may be applied to wheel-chairs or to chairs not provided with wheels.

[0020] The above description will be better understood through an examination of the appended drawing sheets. In the drawings:

Fig. 1 is a side view of a wheel-chair, without the

external wheel and with a dummy placed thereon, equipped with a first embodiment of the adjustment device according to the invention;

Fig. 2 is a view of a wheel-chair corresponding to Fig. 1, including the external wheel and without the dummy placed thereon;

Fig. 3 shows a wheel-chair corresponding to Fig. 2, in a side-front axonometric view, with the chair back partially inclined backwards;

Fig. 4 is the side-rear axonometric view of the wheel-chair corresponding to Fig. 3;

Figs. 5 to 8 show four different types of chair bearing frames equipped with the first embodiment of the adjustment device according to the invention;

Figs. 9 to 13 show five different types of bearing frames for wheel-chairs, also equipped with the first embodiment of the adjustment device according to the invention;

Fig. 14 is a schematic representation of a chair with a dummy located thereon, and shows a different embodiment of the adjustment device of the invention

[0021] With reference to the drawings and in particular to Figs. 1 to 4, a chair (in the example shown a wheel-chair) intended for use by disabled or traumatised people has a bearing frame 1 with side elements 2, a reclining chair back 5 supported on its rear side by an adjustable device 19, and a seat 6. Reference 14 denotes the upper parts of side elements 2. Wheels 7, 8 and bearing structures 9 for footrests are associated to bearing frame 1. A dummy, of which the trunk is denoted by reference 10 and the thigh-bone portion by reference 11, schematises a person sitting on the chair. Reference 12 is the position about which the thigh-bone head rotates, namely a position within the cotyloid cavity of the hip-bone, and reference 13 is the position of the articulation of the lower end of the thigh-bone, in correspondence with the knee.

[0022] At the bottom of chair back 5, on both sides thereof, spacing arms 4 are provided for the pivotal connection of chair back 5 to side elements 2 of bearing frame 1. More particularly, the free end of each spacing arm 4 is pivoted, through a suitable pivot pin (not shown), in a hole 3 selected within a set of holes 3 provided in each side element 2. The set of holes 3 are substantially arranged along an inclined line so that the greater the distance of a hole from the front edge of seat 6, the higher the level above the plane of said seat. It can be appreciated that the spacing arm 4 of chair back 5 is pivoted in that hole which is substantially located in correspondence with the virtual axis passing through the cotyloid cavity in the hip-bone where the thigh-bone head of the person (shown by dummy 10) sitting on the chair rotates, i.e. in correspondence with the virtual axis passing through points 12. Each hole selected for the pivotal mounting of the chair back corresponds with a different position of said virtual axis (i.e. a different dis-

tance from the front edge of the seat 6 and a different level above the plane of said seat), so that the chair can be adapted to the specific body structure of the user.

[0023] The invention is not linked to a particular embodiment of bearing frame 1 or to a particular arrangement of wheels 7, 8, as can be appreciated in Figs. 5 to 13.

[0024] In a variant, a slot can be provided on each side element 2 instead of the set of holes 3, thereby allowing the chair back pivot points to be varied continuously rather than stepwise.

[0025] In a different embodiment of the adjustment device of the invention, shown in Fig. 14, the coupling between chair back 5 and side elements 2 of bearing structure 1 makes use of a pair of plates 15, only one being visible in the side view of the Figure. Each plate 15 has in its upper portion a hole 16 which forms the pivot point for the end of the corresponding spacing arm 4 of chair back 5. In its lower portion, each plate 15 is pivotally mounted in 17 on the bearing frame 1. Further holes 18 in plate 15 allows varying the mounting position of the plate on the bearing frame so as to vary the plate orientation. The arrangement is such that, when plates 15 rotate onto bearing frame 1, holes 16 move along respective arcs of circumference.

[0026] Holes 17, 18 may be replaced by a properly shaped slot or by a combination of holes with a properly shaped slot.

[0027] The above description clearly shows the importance of the innovation obtained through the chair adjustment device, which allows adapting the chair in an extremely simple manner and without any previous personalisation to users having different structures as to height and size.

[0028] Any other embodiment, even representing an improvement, that can be made by applying the teachings of the present invention, does not represent a departure from the scope of the invention.

Claims

1. Chair adjustment device, in particular for a chair intended for aid to disabled or traumatised people, which chair comprises a bearing frame (1, 2, 14) with side elements (2, 14), a chair back (5) and a seat (6), the device being characterised in that it comprises, between each side element (2, 14) of the chair bearing frame (1, 2, 14) and the chair back (5), coupling means (3; 15, 16, 17, 18) allowing an adjustment of the distance between the chair back (5) and a front edge of the seat (6) and at the same time an adjustment of the level with respect to the seat itself, so as to take into account the thigh-bone length and the ischial structure of a person which must sit on the chair.
2. Chair adjustment device according to claim 1, characterised in that said coupling means comprise a

set of holes (3) provided on each side element (2) of the bearing frame (1) and arranged so that the greater the hole distance from the front edge of the seat (6) the higher the hole level with respect to the seat itself, and in that the chair back (5) has coupling elements (4) which can be coupled with a selected one of said holes for a stepwise adjustment of the chair back position.

3. Chair adjustment device according to claim 1, characterised in that said coupling means comprise an inclined slot on each side element (2) of the bearing frame (1), along which slot a coupling element (4) of the chair back (5) can be coupled for a continuous adjustment of the chair back position.

4. Chair adjustment device according to claim 1, characterised in that said coupling means comprise a plate (15) equipped in a lower part with means (17, 18) for the pivotal coupling of the plate (15) to a side element (2) of the chair bearing frame (1) according to different orientations, and in an upper part with a hole (16) for the coupling of a coupling element (4) of the chair back (5), said hole (16) describing an arc of circumference when the orientation of the plate (15) is changed.

5. Chair adjustment device according to claim 4, characterised in that said means for the pivotal coupling of the plate (15) on the bearing frame (1) comprise a set of holes (17, 18) or holes in combination with a slot.

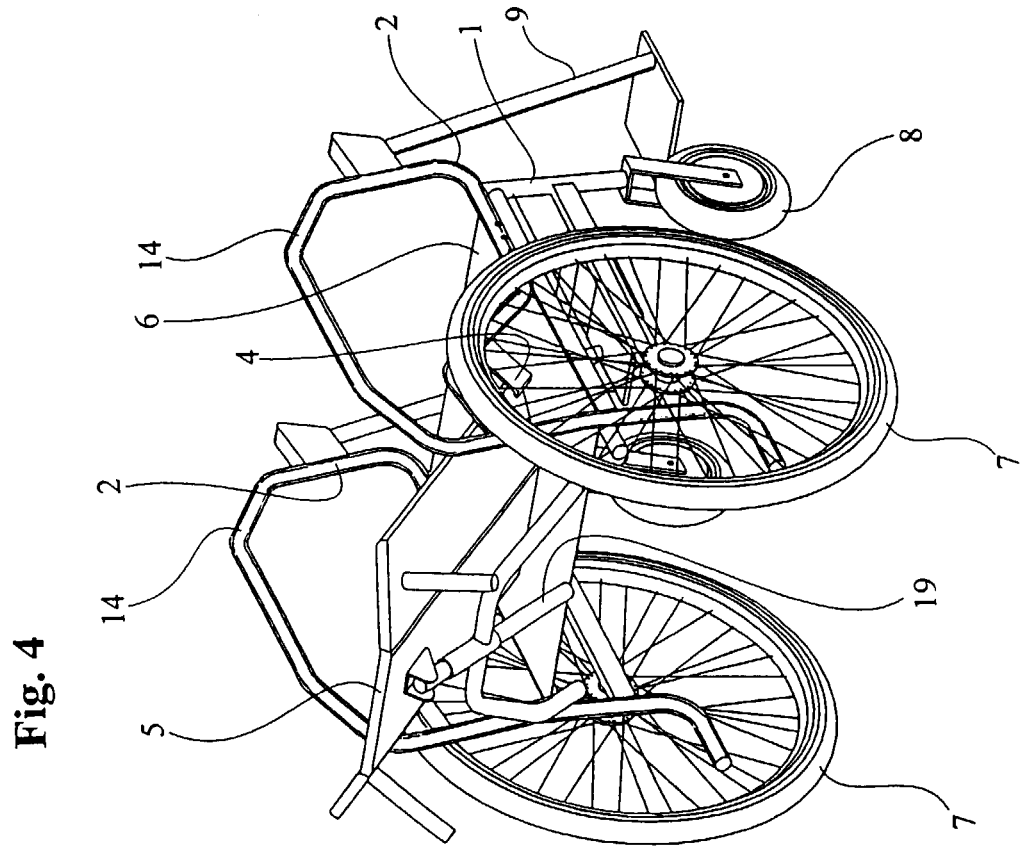
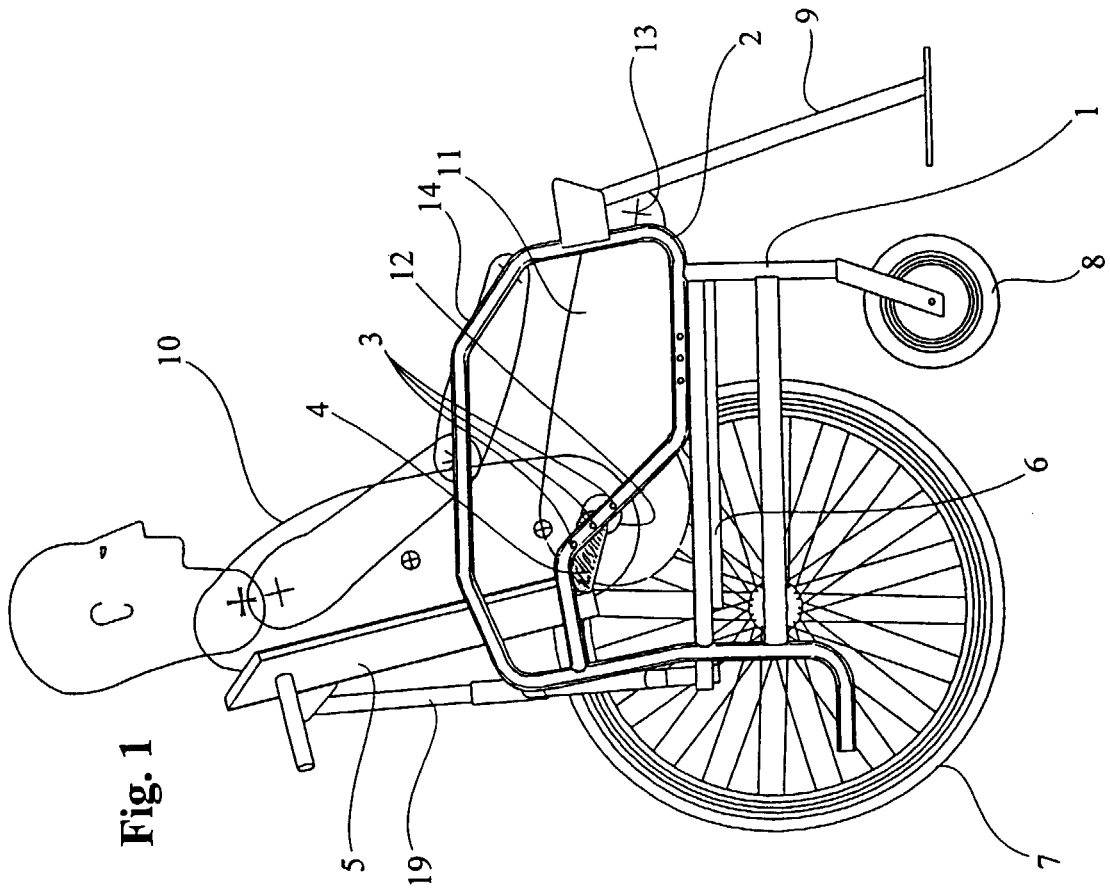
6. Chair adjustment device according to one or more preceding claims, characterised in that said coupling means comprise pivot means for allowing the chair back to be inclined.

7. Chair adjustment device according to claim 6, characterised in that the coupling means are constructed so as to allow adjusting the chair back (5) in such a manner that a pivotal axis of the chair back (5) substantially corresponds with the virtual axis (12) about which the thigh-bone heads rotate within the cotyloid cavities of the hip-bone of the person sitting on the chair.

8. Chair adjustment device according to claims 6 or 7, characterised in that said pivotal axis is so positioned so as to allow the trunk (10) of the person sitting on the chair, when passing from an upright position to an inclined position and vice versa, to become inclined concurrently with a trunk-supporting surface of the chair back (5) and to rotate about the same axis as the chair back, without relative sliding movement of the chair back (5) and the trunk (10).

9. Chair adjustment device according to claims 6 or 7 or 8, characterised in that the chair adjustment in accordance with thigh-bone length and ischial structure of a person which must sit on the chair takes place by simply shifting the pivotal axis (12) of the chair back (5) to a different one of the holes (3, 18) or to a different position within the slots in the coupling means.

10. Chair adjustment device according to the preceding claims, and substantially as described and shown by way of example according to preferred embodiments.



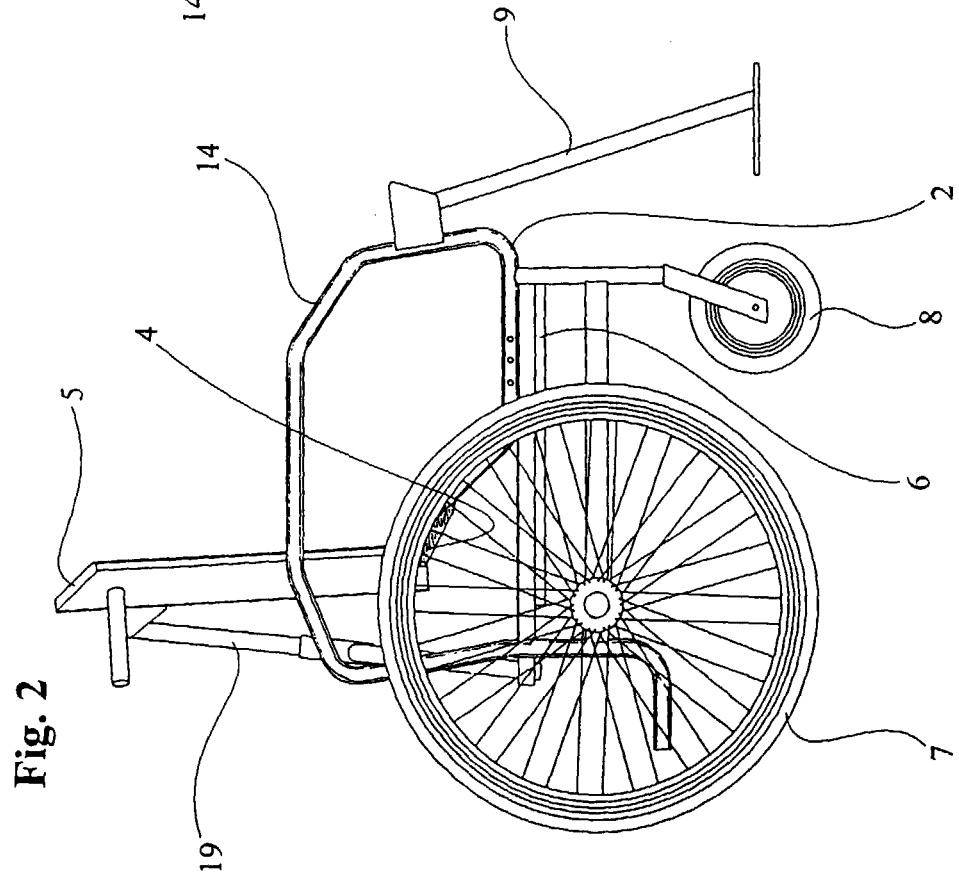
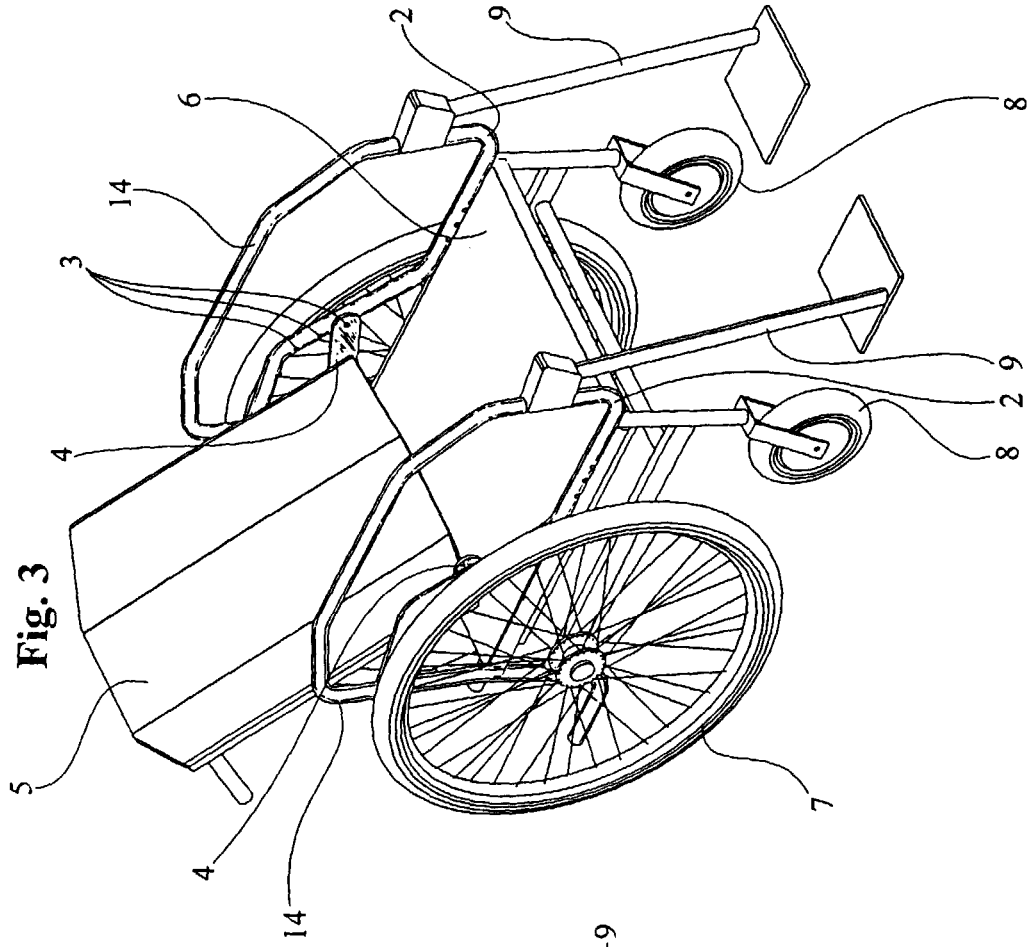


Fig. 5

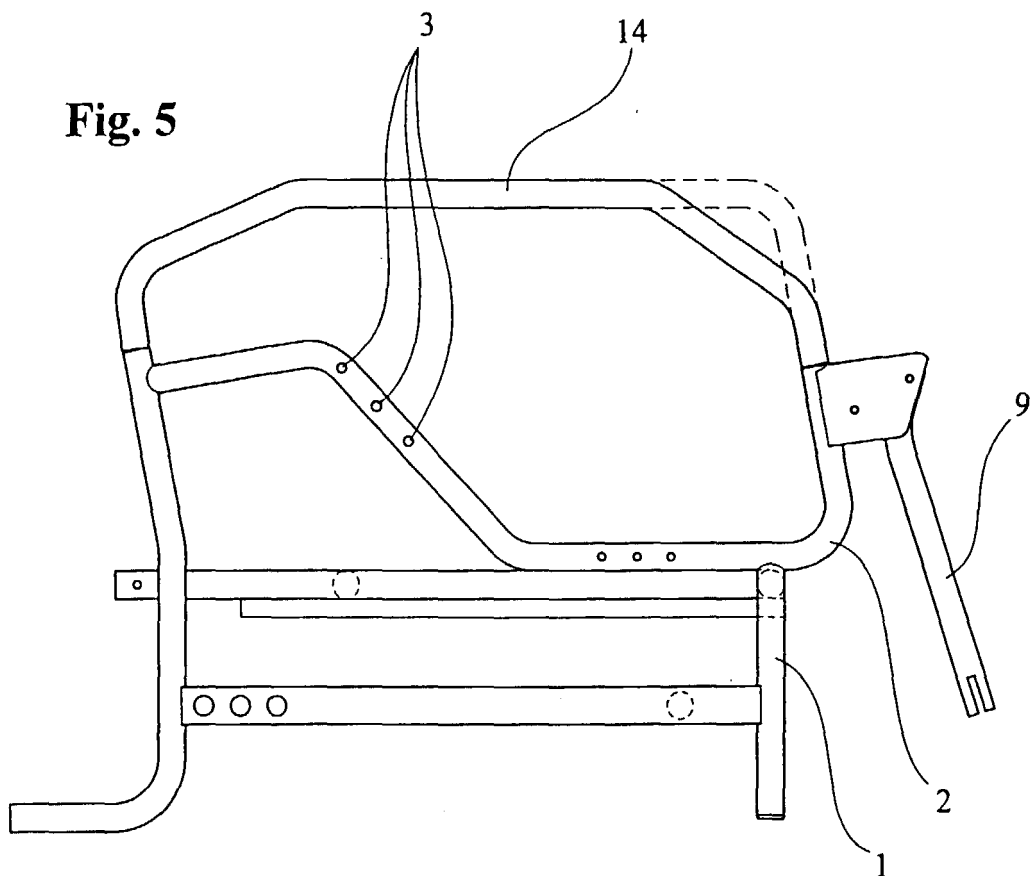


Fig. 6

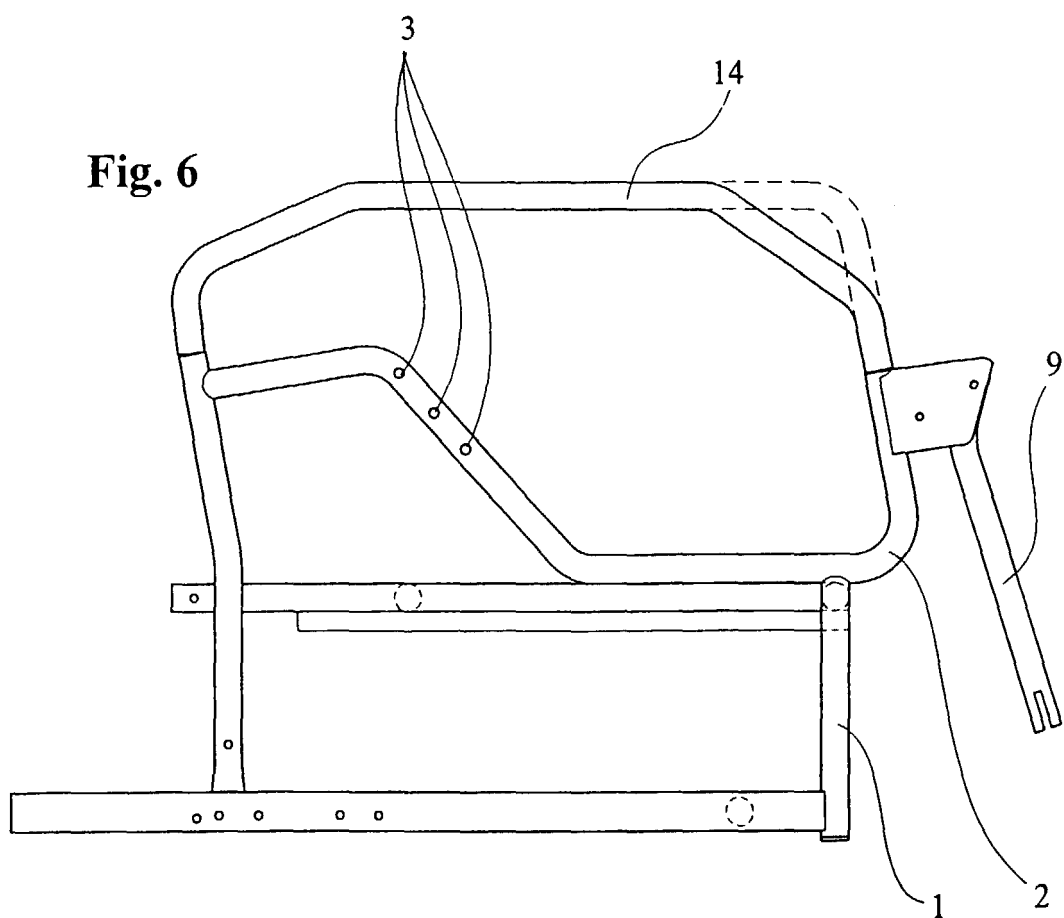


Fig. 7

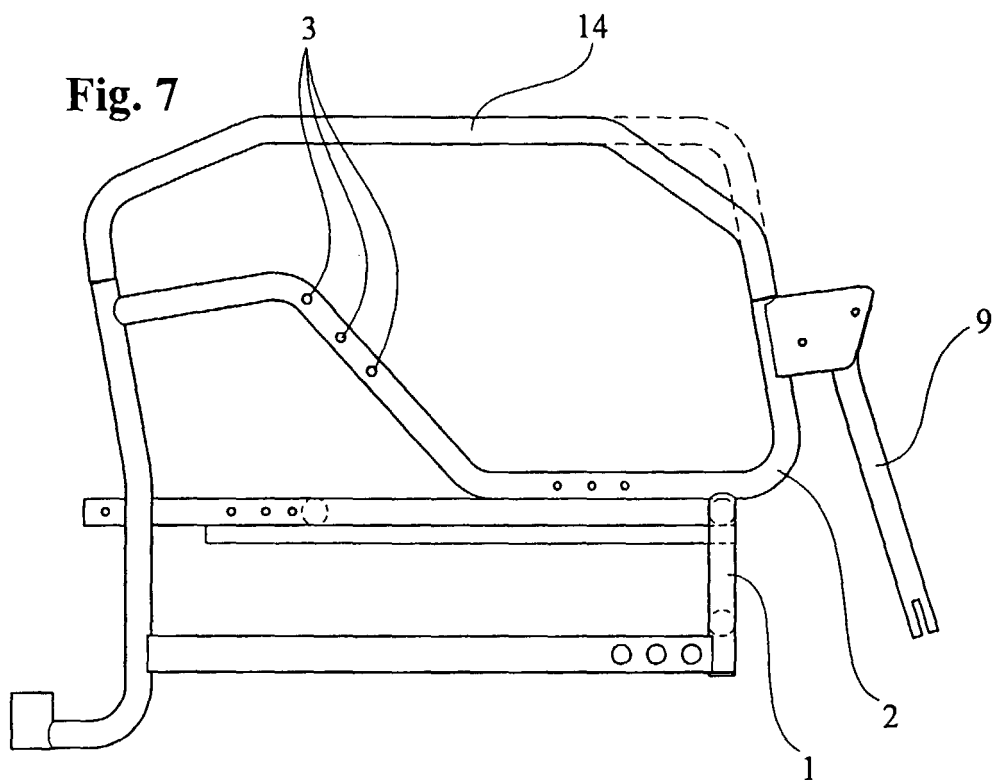
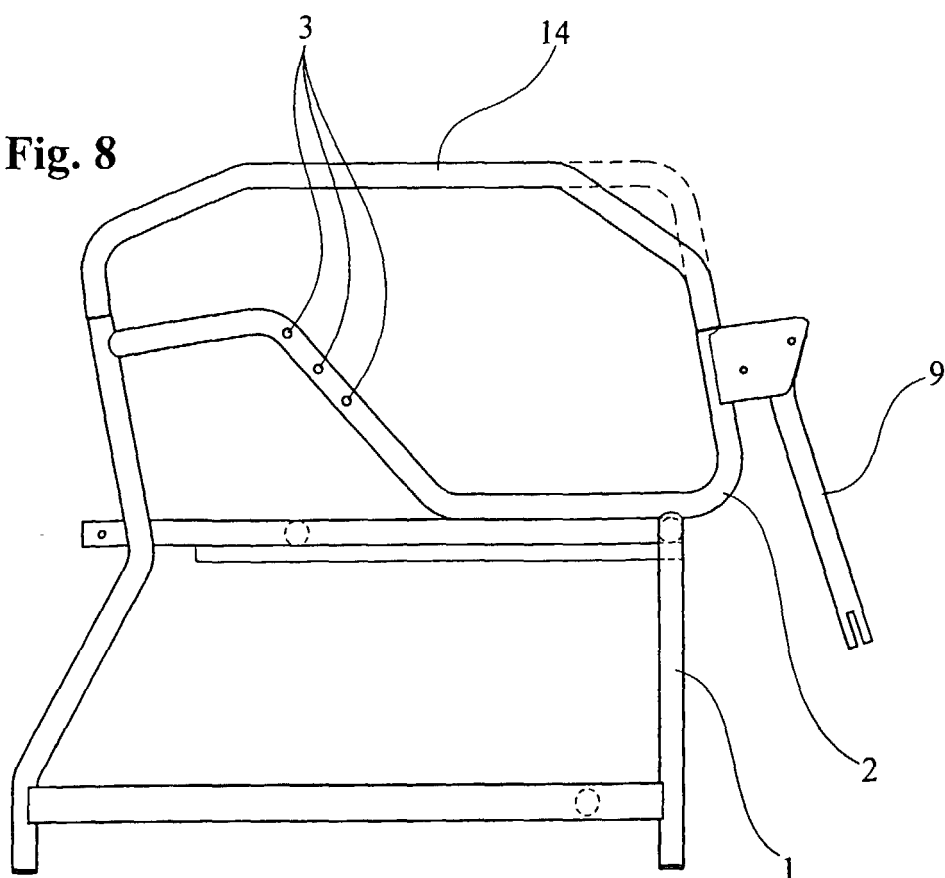


Fig. 8



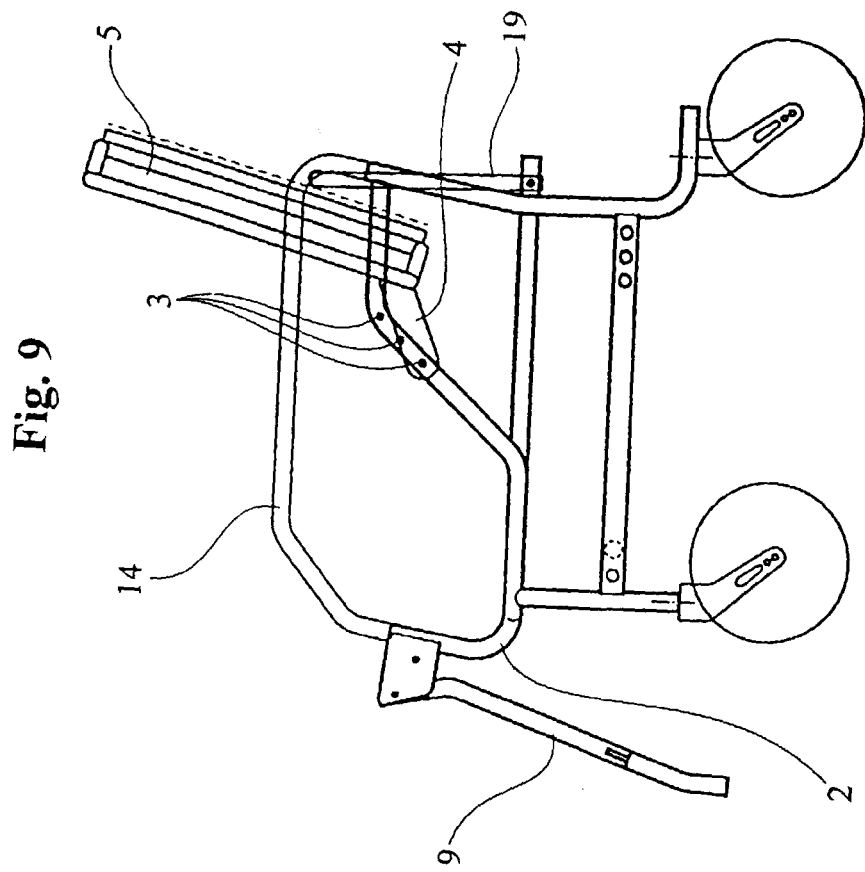
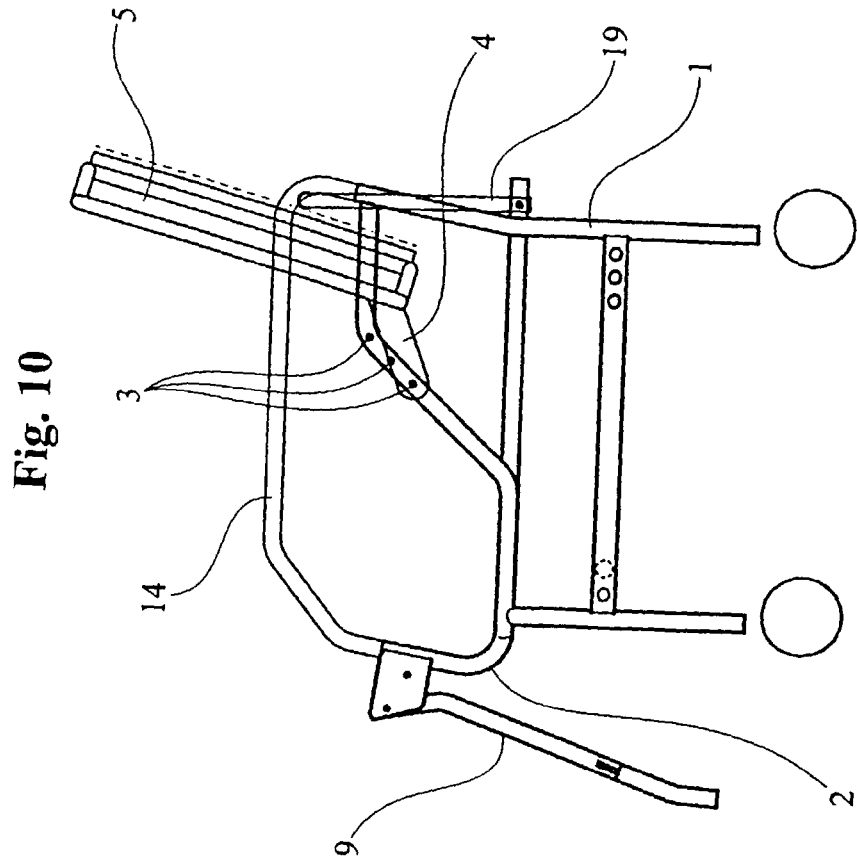


Fig. 12

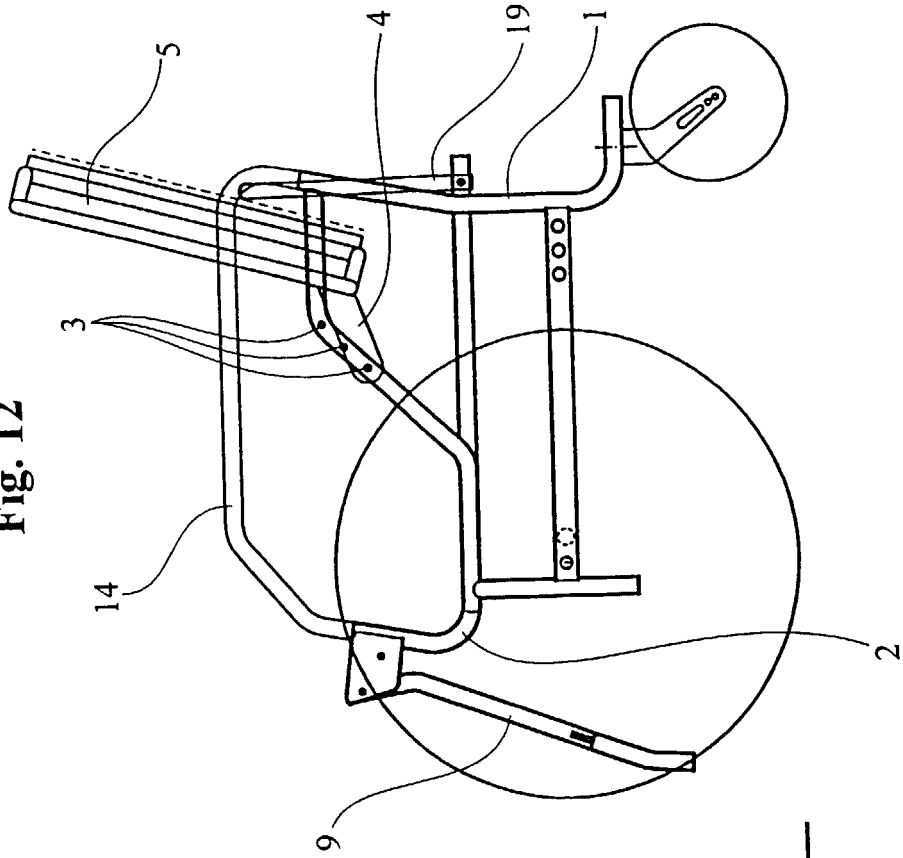


Fig. 11

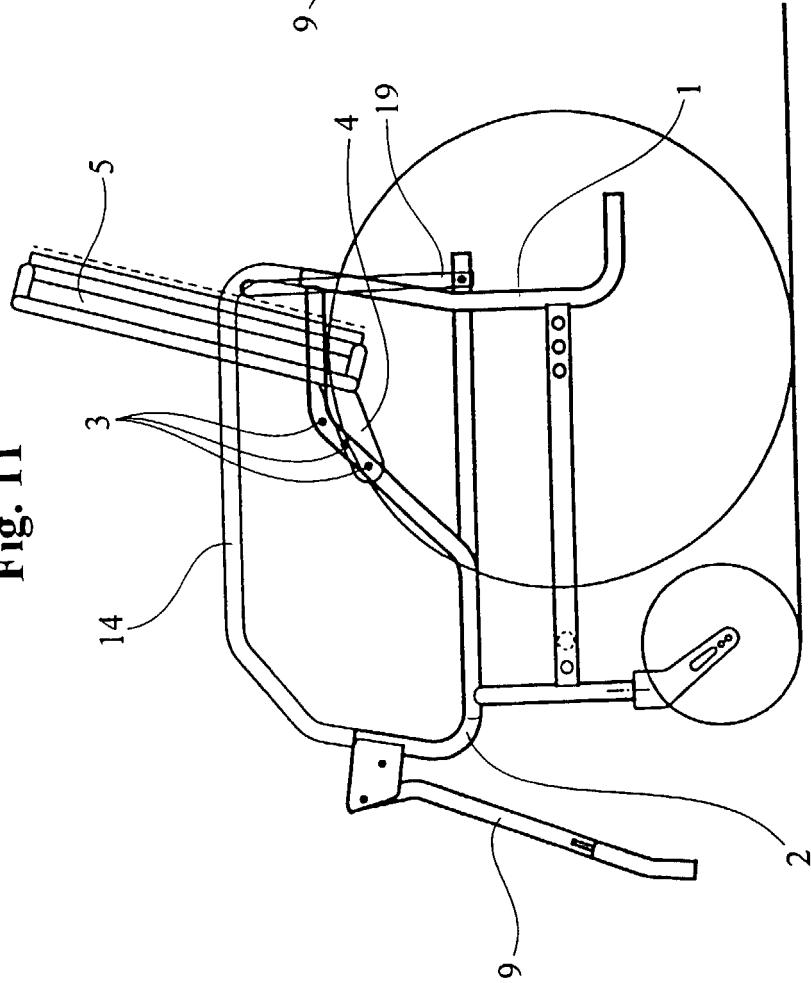


Fig. 14

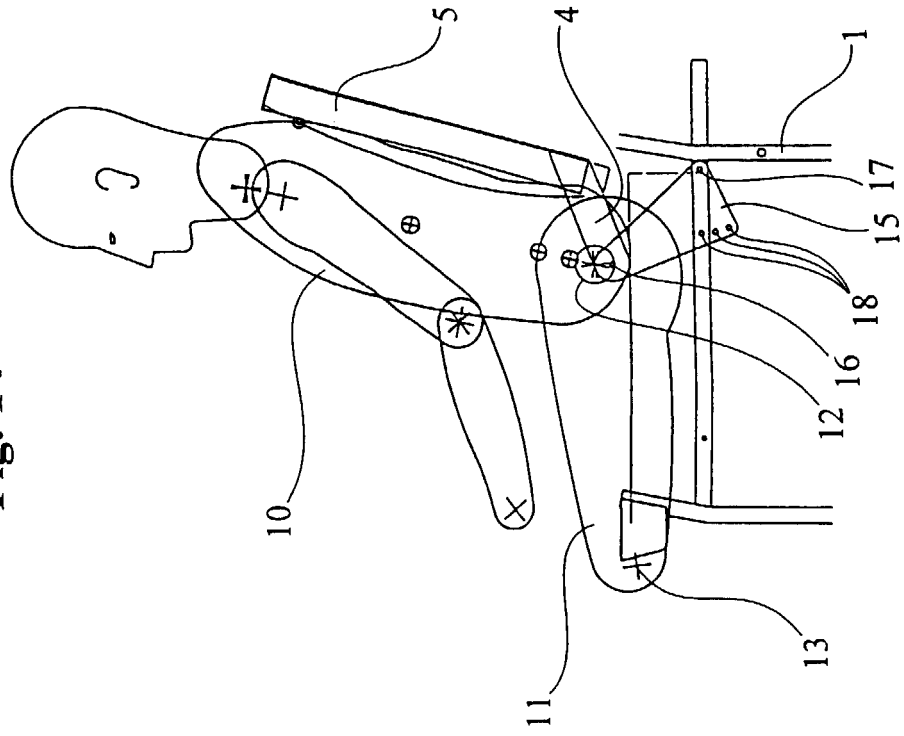


Fig. 13

