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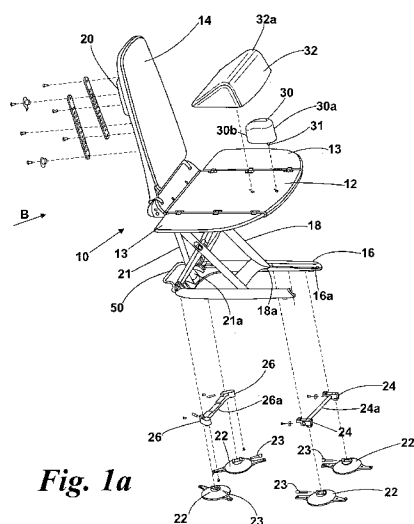


Fig. 1a

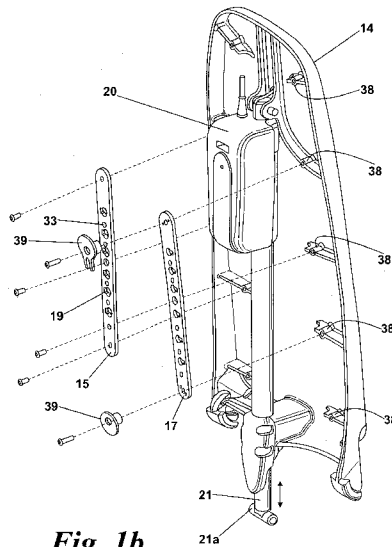


Fig. 1b

(57) Abstract: There is disclosed a moveable bath chair with an optionally reclineable back rest and a seat which may be raised or lowered for example by means of a battery powered actuator. Various improved safety features are disclosed including cupped elastomeric feet which are swivellable to suit the shaped contours of a bath or the like, a quick release mechanism for such elastomeric feet, an adjustable and lockable harness docking system, a seat spigot for safely locating a patient on the chair and the suitably strong construction of the chair components.

Improvements in and relating to moveable bath chairs

This invention relates to moveable bath chairs which include e.g. a fixed or reclinable backrest and a seat which may be raised or lowered by means of e.g. a battery powered actuator, the actuator being in the form of an adjustable arm by which the backrest may be tilted and/or the seat may be raised or lowered, as the case may be.

Collectively, these kinds of moveable chairs must necessarily incorporate many safety features given the wet or humid environment in which they are used and the type of persons which use them, ranging from infant or adult invalids, to the obese, and the infirm elderly.

An object of the present invention is to provide a moveable chair with improved safety features in which the chair is adjustable in a variety of ways to suit the type of person with which it is to be used, and to also facilitate easy handling of the chair for lifting it in and out of a bath.

According to a first aspect of the invention there is provided a moveable chair comprising a chassis for supporting a seat and backrest forming part of the chair, the chassis having feet for bearing against the bottom of a bath, the seat and/or backrest being moveable in response to movement of an actuating arm of a powered actuator CHARACTERISED IN THAT the feet are connected to the chassis, either directly or indirectly, by swivellable couplings, each permitting swivelling movement of each foot in one respective plane only, thereby allowing the chassis and hence the seat to be positioned within the bath in accordance with its shaped contours, and to thereafter remain stabilised until removed from the bath.

Conveniently, the feet at the front of the chair are mounted for swivelling movement in a common plane and the feet at the rear of the chair are mounted for swivelling movement in respective planes of movement which are angularly offset to each other such that the direction of movement of each points towards a respective corner of the bath. This arrangement is particularly advantageous because it permits the moveable chair to be positioned closely to the tap end of the bath, in which position the rear feet of the chair are effectively splayed outwards with respect to each other within the limit afforded by the shape of the bath in this region, whereas the front feet are splayed out towards the sides of the bath substantially along the same plane, the arrangement therefore permitting increased stability, as opposed to conventional feet which may be swivellably mounted for movement in any plane, such as on a ball joint.

Conveniently, at least the free ends of the feet are covered by an elastomeric boot or pad allowing the feet to be releaseably secured to the bath floor by suction.

The feet may be mounted on legs having a height corresponding to the intended user, where the swivellable movement is between the feet and the lower ends of the legs, with the upper ends of the legs being fixed to the chassis, either directly or indirectly. This is particularly advantageous since, in the limit, whatever the length of legs used to suit the intended user the stability of the chair remains the same. Advantageously, respective pairs of legs, such as front and rear pairs are joined together by spacer bars which further help to stabilise the legs relative to each other and the chassis.

Conveniently, at least the rear pair of pads include a quick release

mechanism by which they may be detached from the floor of the bath against suction by being peeled from one side.

In accordance with a second aspect of the invention there is provided a moveable chair comprising a chassis for supporting the seat and backrest forming part of the chair, the chassis having feet for bearing against the bottom of the bath, the seat and/or backrest being moveable in response to movement of an actuating arm of a powered actuator CHARACTERISED IN THAT respective pairs of feet are covered by elastomeric boots or pads allowing them to be releasably secured to the bath floor by suction and in that said pairs of boots or pads are inter-connected at edge position by respective flexible lines joined together by a handle, the pulling of which peels the boots or pads away from the floor of the bath against suction.

Preferably, a pair of guide means, such as guide eyelets, are provided on the chair, such as immediately above the rear pair of feet or pads, with the handle being disposed between the eyelets such that the lifting force of the lines immediately above the feet or pads is in a vertical or substantially vertical direction. Preferably, the lines in this region immediately below the eyelets include stop members to limit the length of travel of the lines so as to, in turn, limit the amount by which the boots or pads can be peeled from the surface of the floor of the bath, thereby ensuring that after initial unpeeling the weight of the moveable chair is substantially borne by the stop members and not the boots or pads.

According to a third aspect of the invention there is provided a moveable chair comprising a chassis for supporting the seat and backrest forming part of

the chair, the chassis having feet for bearing against the bottom of the bath, the seat and/or backrest being moveable in response to movement of an actuating arm of a powered actuator CHARACTERISED IN that the rear of the backrest includes an adjustable and lockable harness receiving gate incorporating multiple docking ports each shaped to allow insertion of a correspondingly shaped connector end of a harness retainer clip, which clip is adapted to, in use, be inserted within a selected one of the docking ports in one orientation and to be rotated to another orientation, such as by 180°, to thereafter releasably lock the harness clip to the harness receiving gate.

Conveniently, the harness receiving gate may itself be positionable and re-positionable at various points up and down the rear of the backrest, a particularly advantageous arrangement which allows for the safe harnessing of any size of individual, an important requirement for chairs having a backrest which may be tilted.

Conveniently, the harness receiving gate also includes formations, such as dimples, between respective docking ports which prevent or inhibit unwanted rotation of the harness connector clip to thereby lessen the risk of unintentional disengagement.

According to a fourth aspect of the invention there is provided a moveable chair comprising a chassis for supporting the seat and backrest forming part of the chair, the seat including an initially substantially contiguous upper surface adapted to receive centrally thereon a removable spreader member for, in use, keeping the legs of an occupant of the chair apart, CHARACTERISED IN THAT underneath the seat are at least two pre-formed spigot receiving bosses having

blanked-off ends corresponding to the underside of the upper surface of the seat in this region such that, upon selection of the required position for the spreader member on the upper surface of the seat a selected spigot receiving boss can then be drilled or otherwise cut therethrough to remove the blanked-off material corresponding to the upper surface of the seat in this region, thereby allowing the or each spigot of the spreader member to be inserted therein for use.

Conveniently, the spigot receiving boss is shaped to receive a resiliently deformable projection, such as a spring-biased steel detente ball, on the spacer member spigot to thereby releasably secure it in position for use, and preferably an additional spigot receiving boss is provided which, in use, is cooperable with an additional spigot on the underside of the spacer member to prevent accidental rotation thereof.

According to a fifth aspect of the invention there is provided a spreader member for a moveable chair in accordance with the fourth aspect of the invention comprising a substantially part-cylindrical first part and a substantially wedge-shaped trailing second part pointing to, in use, the rear of the chair, thereby collectively providing side surfaces corresponding to the inside leg surfaces of a user of the chair. This arrangement is particularly convenient and comfortable for e.g. disabled users whose legs need to be kept apart during washing and where pressure against the inside leg is shared over a relatively large surface area, as opposed to the almost point surface contact resulting from use of a spherical or purely cylindrical spacer member conventionally.

The invention extends also to any novel features described herein, or any novel combination of features described herein, whether or not such features are

described in that combination.

By way of example, embodiments of the invention will now be described with reference to the drawings wherein:

Figure 1a shows a perspective view of one embodiment of a bath chair, some components of which are shown in an exploded manner;

Figure 1b shows a perspective view in the direction of arrow B in Figure 1a, of some components shown in Figure 1a;

Figures 2, 3 and 4 show components of the bath lift shown in Figures 1a and 1b; and

Figure 5 shows an exploded perspective view of a second embodiment of bath chair.

Referring to Figures 1a and b, there is shown a bath chair 10 generally comprising a seat 12 having two side flaps 13, a backrest 14, a generally "U" shaped chassis 16 and a foldable scissor support 18. In use, a battery-powered actuator 20 attached to the backrest 14 has an arm 21 which can extend, and when doing so reacts at its free end 21a to a pivot point on the chassis 16. This extension causes the backrest and seat to extend upwardly to the position shown within the limits defined by the scissor support 18 as its lower front part 18a slides within and along a capture rail 16a forming part of the chassis 16.

The chair 10 is releaseably held in position in a bath (not shown) by use of four sucker feet 22 formed from an elastomeric material and connected to the underside of the chassis 16. A user of the chair can then be lifted and lowered using the lift action into or out of a bath. Side flaps 13 allow easy access to the chair in its shown, upward, position whereat they lie flat across the top of a bath,

and fold upwardly when the chair 10 is lowered into the bath.

The actuator arm 21 can be shortened in length still further when the chair is at its lowermost position, causing the backrest 14 to recline if desired.

In this embodiment, below the chassis 16 are a pair of front of spacer legs 24 interconnected by a spacer bar 24a and a rear pair of spacer legs 26 interconnected by another spacer bar 26a. Each of the legs have mounted thereon a pair of respective feet 22. Each foot 22 is mounted to its respective leg 24, 26 by means of a pivot pin 23, which allows rotation of the respective foot about only one axis/plane, shown as axis "A" in Figure 2. This planar pivoting of the feet 22 allows the chair to be snugly positioned within the bath and to take up the shape of the bath. It will be noted that the rear feet 22 attached to rear legs 26 have pivot pins which are set at approximately 45° to the general centre line of the chair. This angle allows the rear of the seat to be closely positioned at the tap end of the bath where the bath is curved inwardly. The front feet 22 attached to the front legs 24 have mounting pins 23 which are generally parallel with the centre-line of the chair so that these feet can accommodate the generally parallel but curved sides of the centre part of a typical bath and swivel in a common plane.

Also shown in Figure 1a is a removable spreader member 30, which in use is fitted to the upper face of the seat 12 and is used to keep apart the legs of the chair user. The spreader member 30 has a substantially part-cylindrical first part 30a and a substantially wedge-shaped trailing second part 30b such that when the spreader member 30 is mounted in a desired position on the seat 12 it can enable the legs of e.g. a disabled user to be comfortably kept apart during

washing, the shape of the sides of the spreader member 30 providing a relatively large surface area to therefore minimise pressure against the inside legs of the user. Alternatively, the spreader member 30 may be replaced by a moveable generally wedge-shaped knee support member 32 having an elongated upper surface 32a onto which the back of the knees of a user can rest in a raised position. Both the spreader member 30 and the knee support member 32 are alternatively fittable to the upper surface of the chair seat 12. At the underside of the seat 12 are at least two bosses (not shown) having blanked off ends so that they cannot be viewed from above. When customising the chair seat 12 for use the holes for the bosses can be drilled through or otherwise cut to remove the blanking material and thereby allowing locating spigot pins 31 on the underside of the spreader member 30 (and knee support member 32) to locate within the drilled boss. Each member 30 or 32 may have three or more positions in which a locating spigot pin 31 can be fixed, whereby, they can be located in six or more positions on the seat, allowing a customisable seat. Spigot pin 31 may include a spring loaded détente ball co-operable with a complementary groove in the spigot of the seat to thereby realisably secure the member 30 or 32 to the seat 12. More than one spigot pin 31 can also be used to prevent rotation of the members 30 or 32.

Figure 1b shows the rear of the backrest 14 where the actuator 20 is shown attached to the backrest such that its lower moveable arm 21 can extend downwardly to provide the lifting described above. Also shown in Figure 1b are restraint mounting rails 15 and 17, which each have a number of locking apertures, one of which is referenced at 19. Referring also to Figure 4, these

apertures have a keyhole type shape which accepts the free end 41 of a buckle clip 40. In use, the free end 41 of the clip 40 is inserted into the aperture 19 at the chosen position for the intended user and rotated by 180° so that the keyed part 42 of the clip, and hence the clip 40, cannot be accidentally removed from the mounting rails 15, 17. A restraint harness (not shown) is fitted to the slot 43 of the clip 40 held in one restraint mounting rail 15 or 17 and in use extends around a user of the chair and is fitted to the opposite mounting rail 15 or 17 with a similar clip 40. Not only is the clip 40 positionable along the length of a mounting rail 15, 17, in any one of multiple docking ports formed by the locking apertures 19, but also the mounting rails 15, 17 themselves are positionable at one of two heights by fixing them to any three of five spaced mounting sockets 38 formed in the backrest 14, thereby providing a versatile harness securing system. The backrest can also be fitted with a cable tidy, which includes two flanged bosses 39 held on the backrest 14 using the same mounting sockets 38.

Dimples 33, only one of which is referenced, formed on either side of apertures 19, inhibit unwanted rotation of the clip 40, to reduce the risk of unintentional disengagement of it from its chosen position.

Referring to Figure 2, an elastomeric foot 22 is shown in more detail and includes a rigid plastics centre yoke 25 which accepts a complementary metal pin 23 by which it may be pivotally attached to a respective leg 24 or 26. It can be seen that the foot can then only rotate about an axis "A". The foot 22 includes also an elastomeric boot 29 which on its underface has a concavity which acts as a sucker for realisably holding the foot to the side or floor of a bath

when pressed thereagainst. Since it can be a little awkward to remove the suckers 22 once they are held in place on the bath, peelable release tabs 27 are provided which release the suction and make lifting the chair from the bath easier. Each tab 27 has an aperture 28, which aperture allows the fitting of a means for lifting the tabs 27, such as a flexible line.

Referring to Figure 3 a quick release handle 50 is shown. Handle 50 is slideably mounted to chassis 16 (partly shown) such that when the handle 50 is lifted from above it will slide upwardly within apertures in the frame 16 until stops 52 hit the underside of the frame 16. The handle also includes two flanged ends 54 which, in use, are attached to the tabs 27 by flexible lines 55 which extend through the apertures 28 and themselves have flanged ends (shown in broken outline) which prevent the lines 55 from becoming detached of the two rear feet 22. Thus, when the handle is lifted the upward sliding motion of the handle also pulls up the tabs 27 and quickly releases the suction. Undue straining of the tabs 27 is thereafter prevented because the upward motion of the handle is limited to the extent defined by the stops 52.

Figure 5 shows an embodiment of the invention similar to that shown in Figure 1a except that in this embodiment there are no spacer legs 24 or 26 and so the bath chair will sit lower in the bath to accommodate a larger or heavier person without altering the stability of the chair. However, the arrangement of the tilting of the feet 22 is the same. Shown also in more detail in this Figure is the actuator 20 and the arrangement of the scissor support 18.

Embodiments of the invention have been described and illustrated but it will be readily apparent to the skilled addressee that various modifications,

alternatives and variants are possible within the ambit of the invention. In particular, since the chair is to be used in a generally damp environment, the preferred material for the main parts e.g. seat 12, back rest 14, wings 13 and chassis 16 is plastics e.g. polypropylene or nylon. The inventors have realised that plastics containing 30% long strand fibres (e.g glass fibres, of a pre-processed length of about 12 to 25 mm in length) have suitable characteristics for the application described, however plastics containing 20 to 60% long strand fibres should also give satisfactory results. In particular, the inventors have found that polypropylene with the addition of approximately 40% long strand glass fibres provide a suitably strong construction. Also, they have found that using nylon plastics having approximately 50% long strand fibres also provides suitably strong components. Furthermore, to inhibit bacterial growth and the like the inventors have included silver or silver compounds in the plastics material. To provide an aesthetically pleasing colour to the plastics parts titanium oxide is included in the plastics.

Claims

1. A moveable chair comprising a chassis for supporting a seat and backrest forming part of the chair, the chassis having feet for bearing against the bottom
5 of a bath, the seat and/or backrest being moveable in response to movement of an actuating arm of a powered actuator CHARACTERISED IN THAT the feet are connected to the chassis, either directly or indirectly, by swivellable couplings, each permitting swivelling movement of each foot in one respective plane only, thereby allowing the chassis and hence the seat to be positioned
10 within the bath in accordance with its shaped contours, and to thereafter remain stabilised until removed from the bath.
2. A moveable chair as claimed in claim 1, wherein the feet at the front of the chair are mounted for swivelling movement in a common plane and the feet
15 at the rear of the chair are mounted for swivelling movement in respective planes of movement which are angularly offset to each other such that the direction of movement of each points towards a respective corner of the bath.
3. A moveable chair as claimed in claim 1, wherein at least the free ends of
20 the feet are covered by an elastomeric boot or pad allowing the feet to be releaseably secured to the bath floor by suction.
4. A moveable chair as claimed in claims 1, 2 or 3, wherein the feet are mounted on legs having a height corresponding to the intended user, where the

swivellable movement is between the feet and the lower ends of the legs, with the upper ends of the legs being fixed to the chassis, either directly or indirectly.

5. A moveable chair as claimed in claim 4, wherein respective pairs of legs, such as front and rear pairs are joined together by spacer bars which further help to stabilise the legs relative to each other and the chassis.

6. A moveable chair as claimed in claim 3, or claim 4 or 5 when dependent on claim 3, wherein at least the rear pair of pads include a quick release mechanism by which they may be detached from the floor of the bath against suction by being peeled from one side.

7. A moveable chair comprising a chassis for supporting the seat and backrest forming part of the chair, the chassis having feet for bearing against the bottom of the bath, the seat and/or backrest being moveable in response to movement of an actuating arm of a powered actuator CHARACTERISED IN THAT respective pairs of feet are covered by elastomeric boots or pads allowing them to be releasably secured to the bath floor by suction and in that said pairs of boots or pads are inter-connected at edge position by respective flexible lines joined together by a handle, the pulling of which peels the boots or pads away from the floor of the bath against suction.

8. A moveable chair as claimed in claim 7, wherein a pair of guide means, such as guide eyelets, are provided on the chair, such as immediately above the

rear pair of feet or pads, with the handle being disposed between the eyelets such that the lifting force of the lines immediately above the feet or pads is in a vertical or substantially vertical direction.

5 9. A moveable chair as claimed in claim 8, wherein the lines in this region immediately below the eyelets include stop members to limit the length of travel of the lines so as to, in turn, limit the amount by which the boots or pads can be peeled from the surface of the floor of the bath, thereby ensuring that after initial
10 unpeeling the weight of the moveable chair is substantially borne by the stop members and not the boots or pads.

10. A moveable chair comprising a chassis for supporting the seat and backrest forming part of the chair, the chassis having feet for bearing against the bottom of the bath, the seat and/or backrest being moveable in response to
15 movement of an actuating arm of a powered actuator CHARACTERISED IN that the rear of the backrest includes an adjustable and lockable harness receiving gate incorporating multiple docking ports each shaped to allow insertion of a correspondingly shaped connector end of a harness retainer clip, which clip is adapted to, in use, be inserted within a selected one of the docking ports in one
20 orientation and to be rotated to another orientation, such as by 180°, to thereafter releasably lock the harness clip to the harness receiving gate.

11. A moveable chair as claimed in claim 10, wherein the harness receiving gate is itself positionable and re-positionable at various points up and down the

rear of the backrest, a particularly advantageous arrangement which allows for the safe harnessing of any size of individual.

12. A moveable chair as claimed in claim 10 or 11, wherein the harness
5 receiving gate further includes formations, such as dimples, between respective docking ports which prevent or inhibit unwanted rotation of the harness connector clip.

13. A moveable chair comprising a chassis for supporting the seat and
10 backrest forming part of the chair, the seat including an initially substantially contiguous upper surface adapted to receive centrally thereon a removable spreader member for, in use, keeping the legs of an occupant of the chair apart,
CHARACTERISED IN THAT underneath the seat are at least two pre-formed spigot receiving bosses having blanked-off ends corresponding to the underside
15 of the upper surface of the seat in this region such that, upon selection of the required position for the spreader member on the upper surface of the seat a selected spigot receiving boss can then be drilled or otherwise cut therethrough to remove the blanked-off material corresponding to the upper surface of the seat in this region, thereby allowing the or each spigot of the spreader member
20 to be inserted therein for use.

14. A moveable chair as claimed in claim 13, wherein the spigot receiving boss is shaped to receive a resiliently deformable projection, such as a spring-biased steel detente ball, on the spacer member spigot to thereby releasably

secure it in position for use, and preferably an additional spigot receiving boss is provided which, in use, is cooperable with an additional spigot on the underside of the spacer member to prevent accidental rotation thereof.

- 5 15. A spreader member for a moveable chair in accordance with claim 13 comprising a substantially part-cylindrical first part and a substantially wedge-shaped trailing second part pointing to, in use, the rear of the chair, thereby collectively providing side surfaces corresponding to the inside leg surfaces of a user of the chair.

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16. A moveable chair comprising articulated elements, wherein one or more of the elements of the chair is manufactured from a plastics material containing long strand fibres.

- 15 17. A moveable chair as claimed in claim 16, wherein said plastics is polypropylene or nylon.

18. A moveable chair as claimed in claim 17, wherein said long strand fibres are glass fibres and are present in a quantity of 30 to 60% by weight.

20

19. A moveable chair as claimed in claim 18, wherein the plastics is polypropylene and the glass fibres are present in a quantity of about 40% by weight.

20. A moveable chair as claimed in claim 18, wherein the plastics is nylon and the glass fibres are present in a quantity of about 50% by weight.

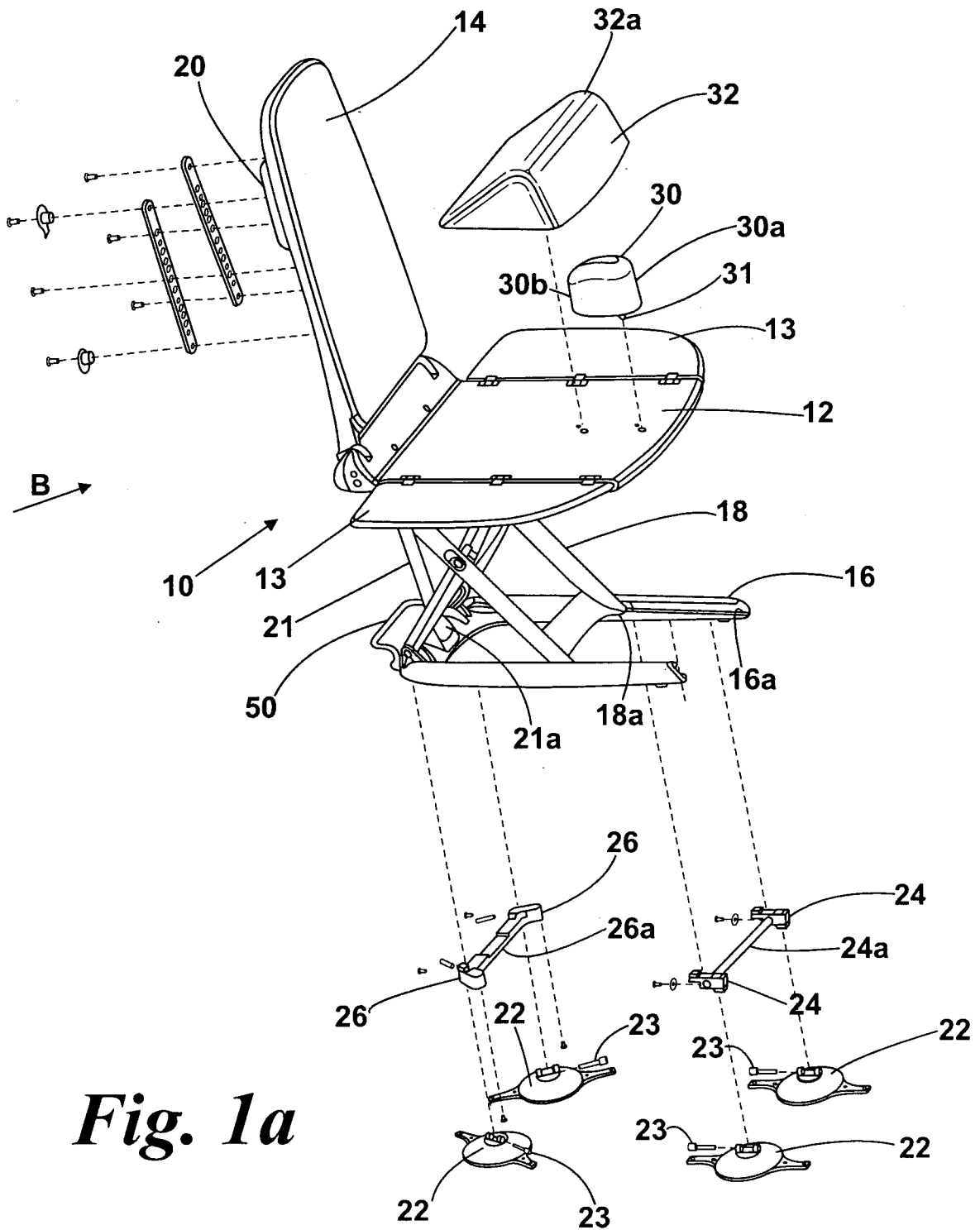
21. A moveable chair as claimed in any one of the preceding claims 16 to 20 wherein the plastics includes silver additives and titanium oxide.

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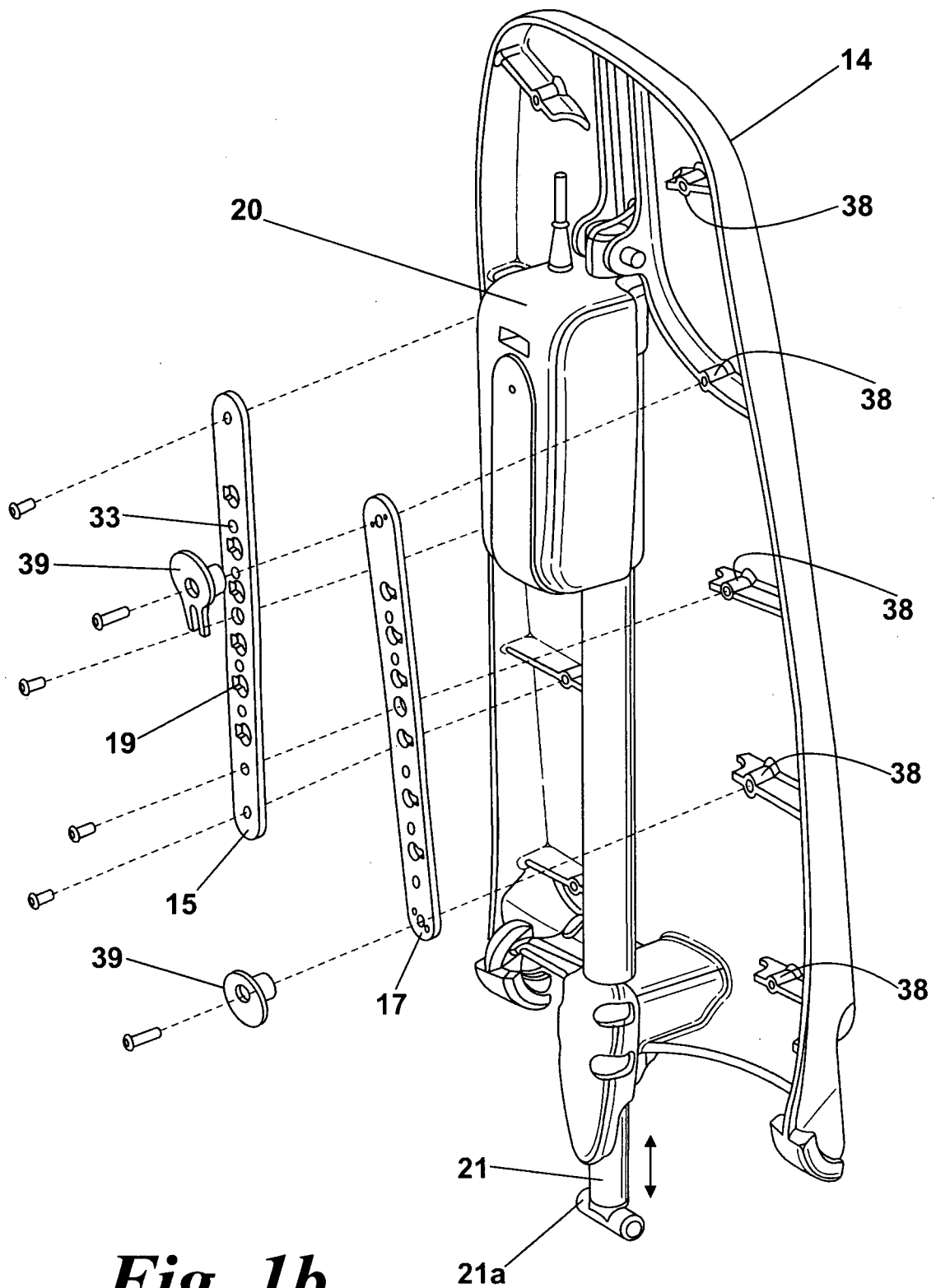


Fig. 1b

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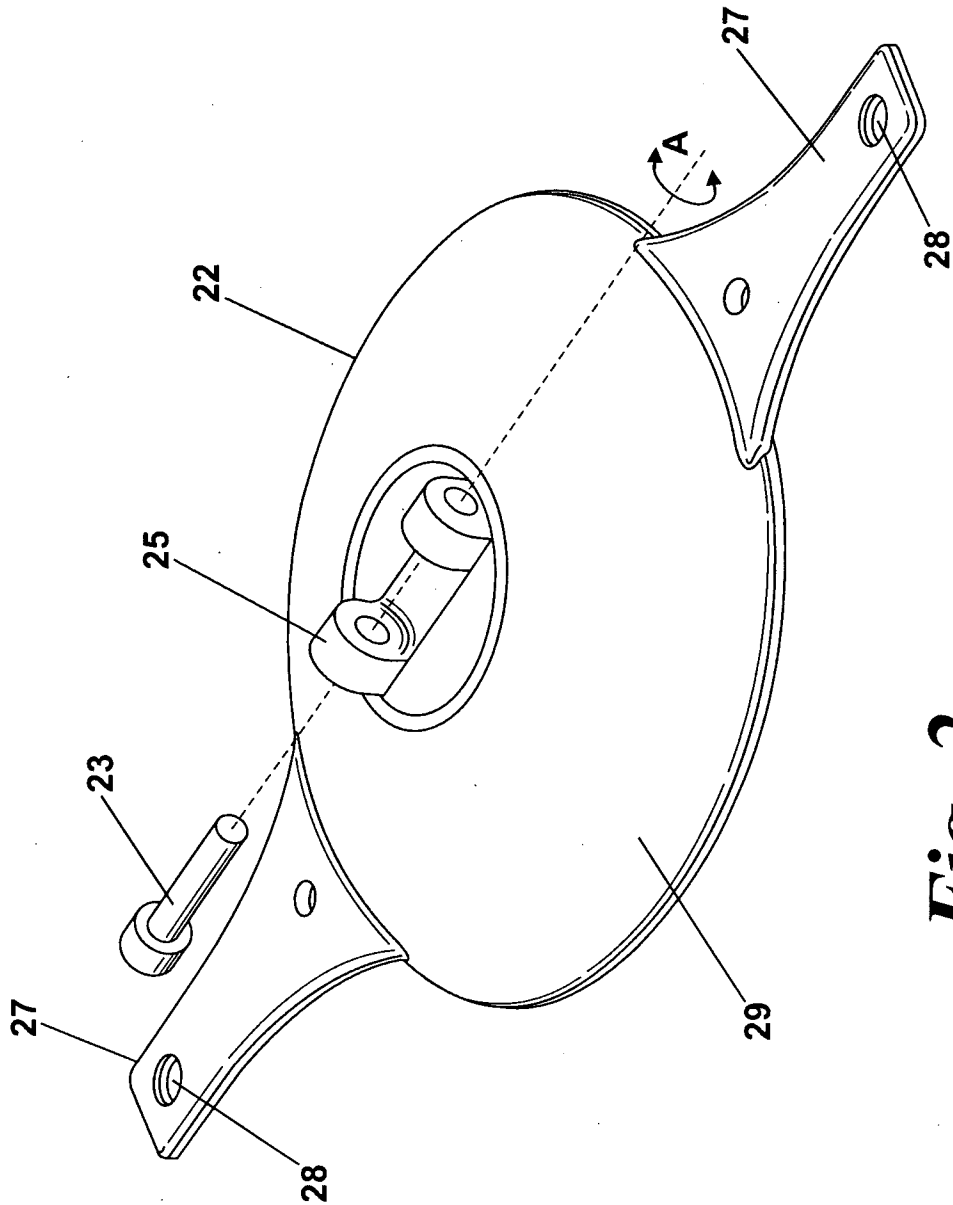


Fig. 2

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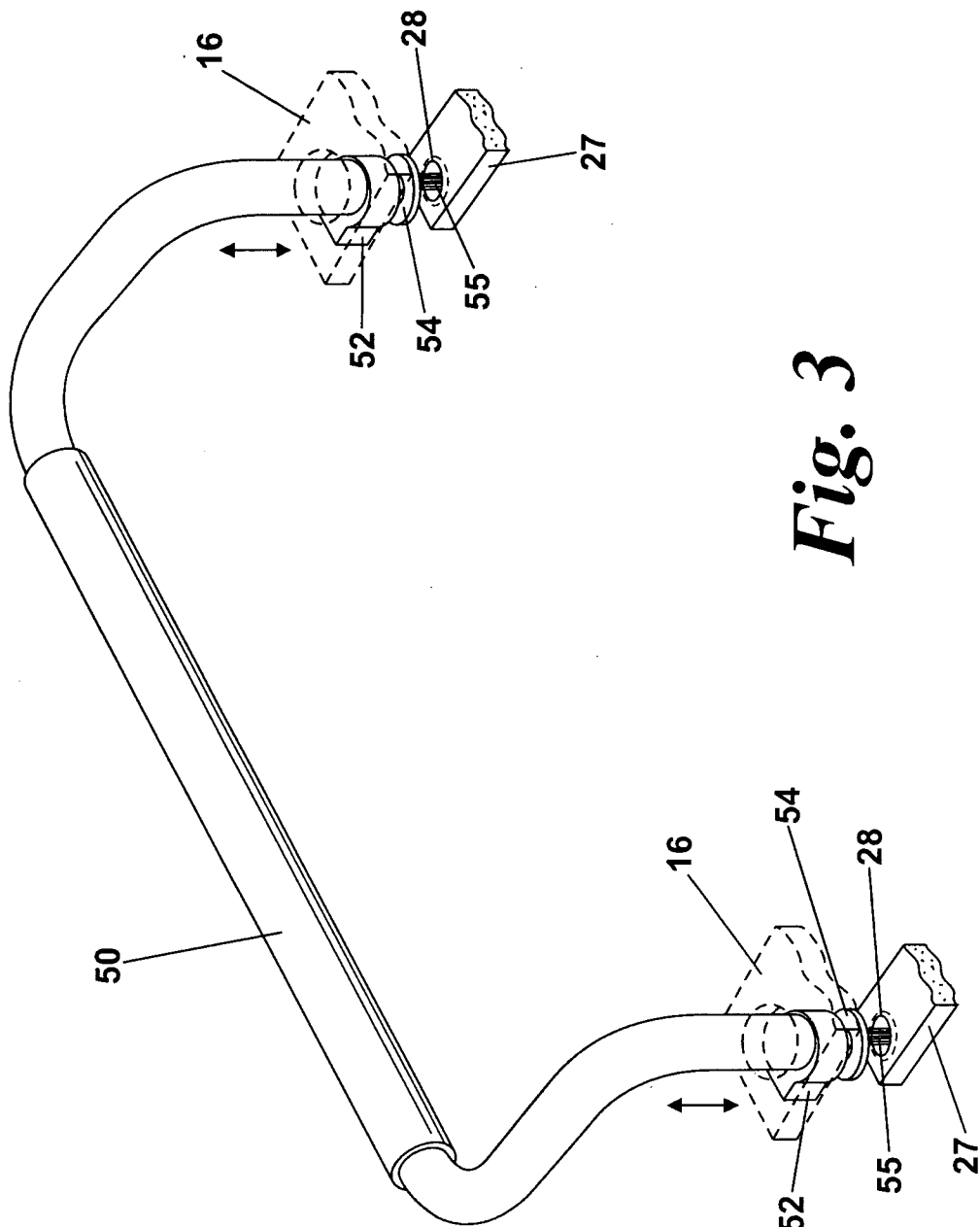


Fig. 3

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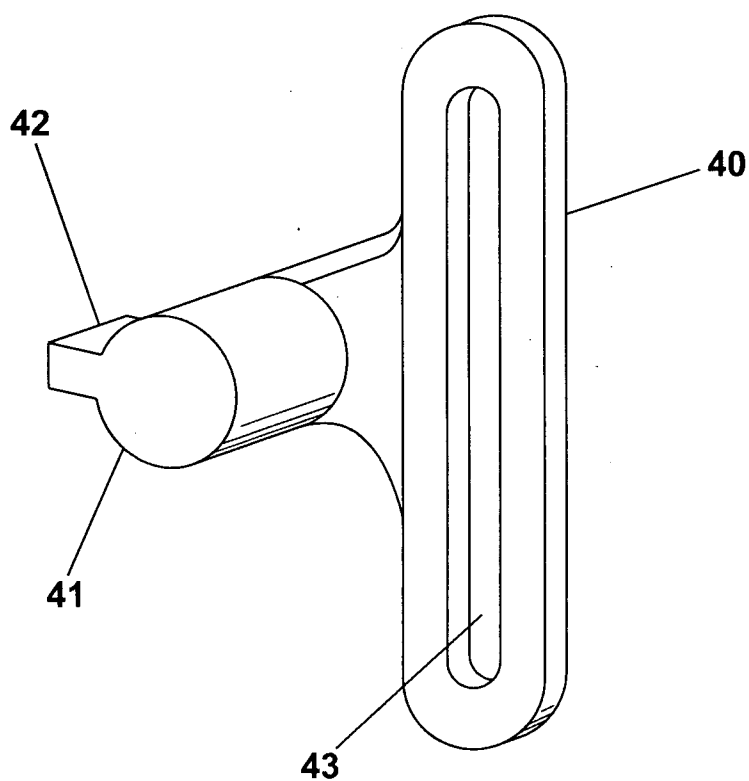
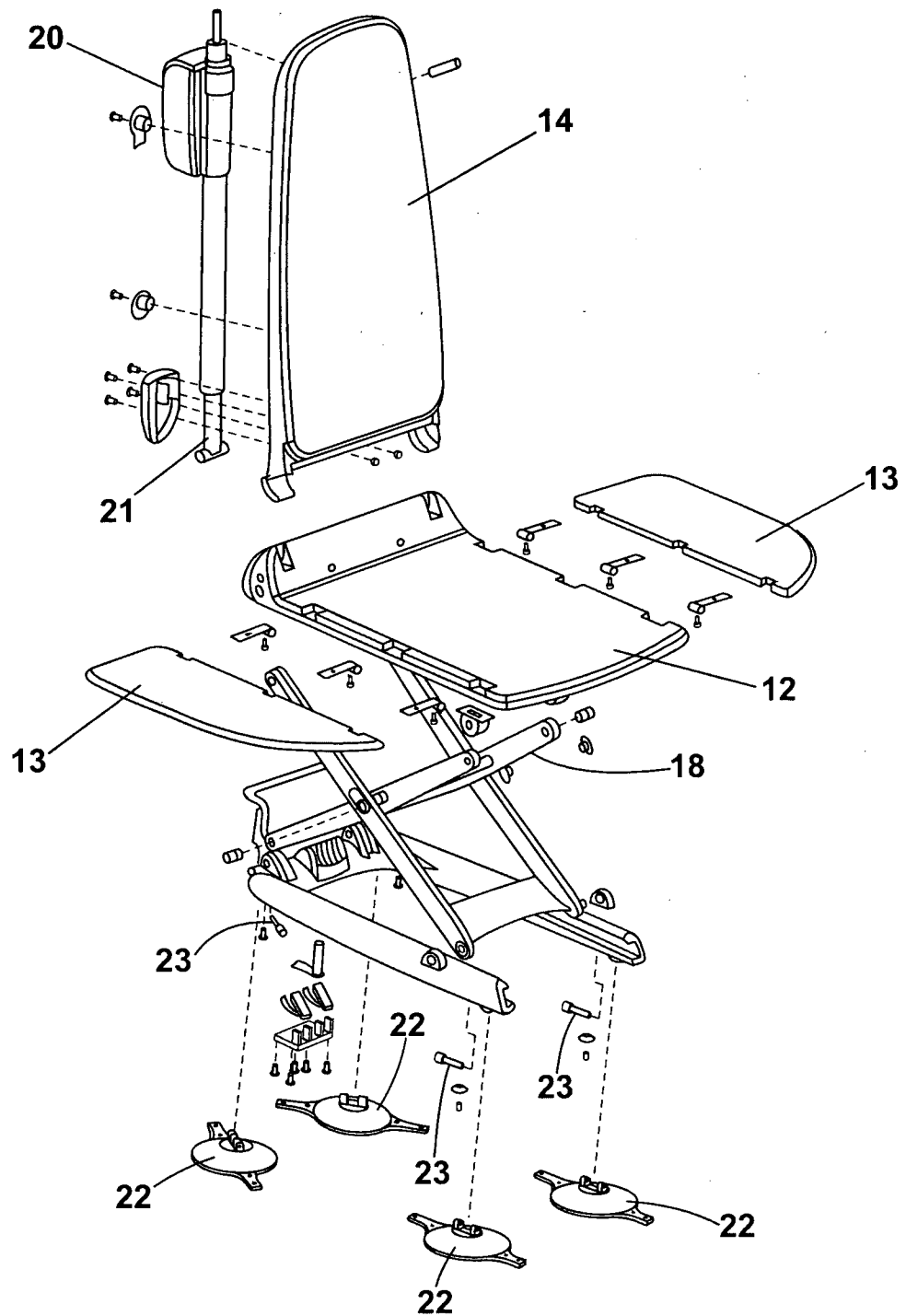


Fig. 4

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**Fig. 5**