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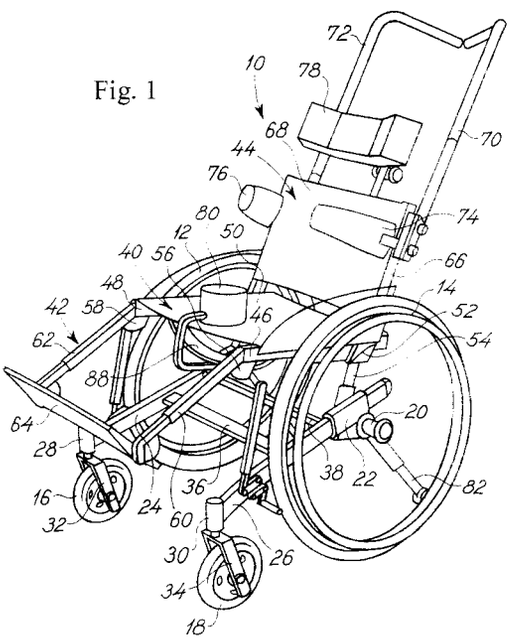
(54) **A wheel chair**

(57) A wheel chair comprises a frame having two side arms, a pair of front wheels fixated rotably and pivotably to the side arms, a seat assembly having a buttocks supporting element and first fixation means for fixating the seat assembly relative to the frame, a back rest assembly having a back supporting element and second fixation means for fixating the back supporting element relative to the frame, a pair of rear wheels mounted rotably at the side arms of the frame and a pair of wheel fixation assemblies mounted movably to the side arms of the frame. The wheel fixation assembly fixates the rear wheels relative to the frame at respective side arms allowing the wheels to be shifted between two or more positions along the side arms and positioning the rear wheels in corresponding alternative positions. The first and/or second fixation means are connected to the wheel fixation assemblies for establishing connection between the seat assembly and/or the back rest assembly, respectively, to the frame for allowing the seat assembly and/or the back rest assembly to be shifted along the wheel fixation assembly between two or more positions relative to the side arms. By the structure of the wheel chair, a stylish and lightweight wheel chair structure allowing an easy changeable and engageable/disengageable structure is provided in which the location of the centre of gravity of the wheel chair is always located within the area covered by the wheels of the wheel chair providing a stable and safe structure.

Fig. 1



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Description

[0001] The present invention relates generally to the technical field of wheel chairs and wheel chair systems allowing a modification of the wheel chair to a specific individual adaptation of the wheel chair to specific applications or in conformity with specific purposes.

[0002] Within the technical field of wheel chairs, wheel chair structures are known which allow for the adjustment of the sizes of the wheels for modifying or adapting a wheel chair in relation to a specific individual or patient. Further within the technical field of wheel chairs, wheel chair structures which are of modular type are known allowing a wheel chair to be designed on the basis of a set of components belonging to a wheel chair system for adapting the wheel chair to the specific individual or patient. Examples of size adjustable wheel chair structures and modular wheel chair structures are disclosed in DE 297 04 034, GB 2 238 275, US 4,462,604, US 5,143,391 and US 5,176,393. Reference is made to the above patent applications and patents and the above US patents are further hereby incorporated in the present specification by reference.

[0003] Common to the known modular or size adjustable wheel chair structures are a limited ability of adjustment or adaptation of the wheel chair to a specific individual or patient and further structures which are not aesthetically pleasant which of course is of utmost importance in relation to structures which are to be used by disabled people or a patient for a longer or shorter period of time. The individual or patient using the wheel chair in most instances considers the wheel chair used by the person or patient in question as the initial presentation of the person or patient to other people meaning that the first impression as to the person's or patient's status, style etc. is to some extent in the first place evaluated on the basis of the design and style of the wheel chair in which the person or patient is sitting. It is to be realised that most persons or patients do not want to be presented to other people in a massive and clumsy looking wheel chair structure but rather presented to other people in an elegant and stylish looking wheel chair.

[0004] It is an object of the present invention to provide a wheel chair allowing the wheel chair to be modified or adapted to a specific individual by modifying the overall size of the wheel chair in compliance with the size of the person or patient to be using the wheel chair.

[0005] It is a further object of the present invention to provide a wheel chair of a structure including a minimum number of components still providing a highly stable and reliable wheel chair structure and at the same time providing an elegant and lightweight looking structure.

[0006] It is a feature of the present invention that the adaptation and modification of the wheel chair is established through the adjustment of a pair of elements which at the same time provide an adjustment of the size of the wheel chair in relation to the dimensions of the wheels to be used for the wheel chair and also an adjustment of the location of the centre of gravity of the wheel chair ensuring that the centre of gravity is always located within the area covered by the wheels of the wheel chair thereby in all embodiments including any specific dimensions of wheels and any accompanying adjustment of the centre of gravity provides a stable and safe wheel chair structure.

[0007] It is a further feature of the present invention that the wheel chair allows for a particular wide range ability of adjustment of the position of the seat and of the back rest and further a particular large range of adjustment of the angular position of the back rest. According to the presently preferred embodiment of the wheel chair according to the present invention, the seat may be adjusted in its longitudinal direction between two end positions varying between 26 cm and 38 cm allowing the seat to be lengthwise repositioned up till 38 cm from its initial position. Further according to the presently preferred embodiment of the wheel chair according to the present invention, the height of the back rest relative to the seat may be adjusted up till 25-40 cm allowing the back rest to be raised or lowered up till 40 cm in relation to the initial position of the back rest. Further in the presently preferred embodiment according to the present invention, the angular position of the back rest may be adjusted between +4° and -30°as the positive angular position defines a position in which the upper edge of the back rest is tilted forward in relation to the vertical position of the back rest whereas the negative values of the angular position defines positions in which the upper edge of the back rest is tilted backwardly relative to the vertical position of the back rest.

[0008] It is a particular feature of the wheel chair according to the present invention that the possibility of modifying the wheel or adjusting the wheel chair in conformity with the individual intended to use the wheel chair may be accomplished by the simple shifting of a pair of supporting elements relative to frame components of the wheel chair, still providing a safe and stable, yet easily adjustable wheel chair structure.

[0009] According to the presently preferred embodiment of the wheel chair according to the present invention, the wheel chair may be modified by accommodating rear wheels within the range 17"-24" allowing the wheel chair to be modified in relation to the user and further to be modified e.g. as the user grows from being a child to become an adult.

[0010] It is a further feature of the present invention that the wheel chair structure including the ability of adjustment and adaptation to a specific individual as to the dimensions of the wheel chair for complying with the physical size requirements of the individual also allows the adaptation of the wheel chair as to its components including side supports, arm rests, back head rest, feet or leg rest etc. still ensuring the combined light weight structure and ability of adjusting or adapting the wheel chair to the size of the individual using the wheel chair.

[0011] It is a still further feature of the present inven-

tion that the wheel chair structure allows the wheel chair to be configurated in accordance with specific requirements as a set of accessory equipment may be used and easily fixated in relation to the frame or any other particular element of the wheel chair structure as the accessory equipment is provided with easy catch and locking elements allowing a swift and easy mounting and demounting of the equipment.

[0012] The above objects, the above advantages and the above features along with numerous other objects, advantages and features which will be evident from the below detailed description of preferred embodiments of the wheel chair according to the present invention are according to a first aspect of the present invention obtained by a wheel chair comprising:

a frame having two side arms defining a front end and a rear end of the frame,
a pair of front wheels fixated rotably and pivotably to the side arms of the frame at the front end thereof,
a seat assembly having a buttocks supporting element and first fixation means for fixating the seat assembly relative to the frame,
a back rest assembly having a back supporting element and second fixation means for fixating the back supporting element relative to the frame,
a pair of rear wheels mounted rotably at the side arms of the frame at the rear end thereof, and
a pair of wheel fixation assemblies mounted movably to the side arms of the frame for fixating the pair of rear wheels relative to the frame at respective side arms thereof so as to allow the wheels to be shifted between at least two positions along the side arms and positioning the rear wheels in corresponding alternative positions, the first fixation means being connected to the wheel fixation assemblies at respective side arms of the frame so as to establish connection between the seat assembly to the frame through the first fixation means and the wheel fixation assemblies and so as to allow the seat assembly to be shifted along with the wheel fixation assemblies relative to the side arms of the frame between the at least two positions relative to the side arms.

[0013] According to the basic realisation of the present invention, the rear wheels are linked to the frame of the wheel chair through a pair of wheel fixation assemblies which allow the rear wheels to be shifted between at least two positions and preferably between a number or an infinite number of positions for allowing the wheel chair to be modified and adapted to a specific individual and at the same time adjust the seat assembly including the buttocks supporting element for maintaining the buttocks supporting element in a position in which the centre of gravity of the wheel chair is always maintained within the area covered by the wheels of the wheel chair thereby providing a safe and stable wheel chair structure irrespective of the possibility of adjusting or modifying the wheel chair in relation to a specific individual constituting the intentional user of the wheel chair.

[0014] The above objects, the above advantages and the above features along with numerous other objects, advantages and features which will be evident from the below detailed description of preferred embodiments of the wheel chair according to the present invention are according to a second aspect of the present invention obtained by a wheel chair comprising:

a frame having two side arms defining a front end and a rear end of the frame,
a pair of front wheels fixated rotably and pivotably to the side arms of the frame at the front end thereof,
a seat assembly having a buttocks supporting element and first fixation means for fixating the seat assembly relative to the frame,
a back rest assembly having a back supporting element and second fixation means for fixating the back supporting element relative to the frame,
a pair of rear wheels mounted rotably at the side arms of the frame at the rear end thereof, and
a pair of wheel fixation assemblies mounted movably to the side arms of the frame for fixating the pair of rear wheels relative to the frame at respective side arms thereof so as to allow the wheels to be shifted between at least two positions along the side arms and positioning the rear wheels in corresponding alternative positions, the second fixation means being connected to the wheel fixation assemblies at respective side arms of the frame so as to establish connection between the back rest assembly to the frame through the second fixation means and the wheel fixation assemblies and so as to allow the back rest assembly to be shifted along with the wheel fixation assemblies relative to the side arms of the frame between the at least two positions relative to the side arms.

[0015] The wheel chair according to the second aspect of the present invention allows the same possibility of adjusting and modifying the wheel chair in relation to the intentional user, still maintaining a safe and reliable wheel chair structure as the back rest being connected to the wheel fixation assemblies are shifted or moved along with the rear wheels as the wheel fixation assemblies are moved between the at least two alternative positions thereby providing a safe and stable wheel chair structure still fulfilling the overall purpose of allowing the wheel chair to be modified or adjusted in relation to a specific intentional user.

[0016] The above objects, the above advantages and the above features along with numerous other objects, advantages and features which will be evident from the below detailed description of preferred embodiments of the wheel chair according to the present invention are

according to a third aspect of the present invention obtained by a wheel chair comprising:

a frame having two side arms defining a front end and a rear end of the frame,
a pair of front wheels fixated rotably and pivotably to the side arms of the frame at the front end thereof,
a seat assembly having a buttocks supporting element and first fixation means for fixating the seat assembly relative to the frame,
a back rest assembly having a back supporting element and second fixation means for fixating the back supporting element relative to the frame,
a pair of rear wheels mounted rotably at the side arms of the frame at the rear end thereof, and
a pair of wheel fixation assemblies mounted movably to the side arms of the frame for fixating the pair of rear wheels relative to the frame at respective side arms thereof so as to allow the wheels to be shifted between at least two positions along the side arms and positioning the rear wheels in corresponding alternative positions, the first and second fixation means being connected to the wheel fixation assemblies at respective side arms of the frame so as to establish connection between the seat assembly and the back rest assembly, respectively, to the frame through the first and second fixation means and the wheel fixation assemblies and so as to allow the seat assembly and the back rest assembly to be shifted along with the wheel fixation assemblies relative to the side arms of the frame between at least two positions relative to the side arms.

[0017] According to the third aspect of the present invention, the seat assembly including the buttocks supporting element and the back rest assembly including the back supporting element are together moved or shifted along with the rear wheels as the wheel fixation assemblies are moved or shifted between the at least two positions for modifying the dimensions of the wheel chair still providing a structure in which the centre of gravity of the wheel chair is always located within the area covered by the wheels of the wheel chair.

[0018] In the present context, terms such as up and down, front and back, lengthwise, longitudinal, transversal etc. always refer to the normal orientation of the wheel chair in which the wheel chair is located on a horizontal supporting surface and in which the longitudinal orientation of the wheel chair is determined from the back of the wheel chair in which the rear wheels are located to the front of the wheel chair at which the front wheels are located as the individual using the wheel chair is sitting in the wheel chair having his front facing from the rear of the wheel chair to the front of the wheel chair as in a conventional wheel chair.

[0019] The wheel fixation assemblies characteristic of the present invention may according to alternative embodiments be implemented in accordance with numerous alternative techniques including plate elements which are bolted onto the frame of the wheel chair by separate locking elements which are fixated by means of locks onto the wheel chair or simply by combined plate and bushing elements which are received on the side arms as the bushing elements of the wheel fixation elements are received on the side arms allowing the wheel fixation assemblies to be moved or shifted along the side arms still safely maintained on the side arms through the corporation between the side arms and the bushings of the wheel fixation assemblies. The plate elements of the wheel fixation assemblies may be adapted with elements serving the purpose of locking or fixating the wheel fixation assemblies relative to the frame thereby ensuring that the wheel fixation assemblies and also the rear wheels and the seat assembly and/or the back rest assembly are safely arrested relative to the frame of the wheel chair. The means for locking the wheel fixation assemblies relative to the frame of the wheel chair may comprise bolts, screws, bayonet couplings, locking pins etc. and the wheel fixation assemblies, preferably the above plate elements of the wheel fixation assemblies, may further include locking elements for locking the seat assembly and/or the back rest assembly relative to the wheel fixation assemblies and preferably further allow the seat assembly and/or the back rest assembly to be pivoted relative to the wheel fixation assemblies and/or removed from the wheel chair for allowing the substitution of the seat assembly and/or the back rest assembly by a different element of a different dimension or structure for allowing the wheel chair to be modified for complying with the requirements of the intentional user of the wheel chair.

[0020] Further, the frame of the wheel chair and/or the wheel fixation assemblies may according to alternative embodiments of the wheel chair according to the present invention be provided with locking elements for allowing additional elements such as arm rests, side supports, back head rest, leg or feet supports to be mounted on the wheel chair and fixated relative to a relevant part of the wheel chair including the frame, the wheel fixation assemblies, the seat assembly and/or the back rest assembly.

[0021] According to a particular advantageous embodiment of the wheel chair according to the present invention, the additional element such as the side support or supports, the arm rest or arm rests and/or the back head rest may be provided with hook-like catching and locking elements allowing the additional elements in question to be easily mounted on and locked and fixated relative to the frame or any other element of the wheel chair thereby providing an easily adjustable wheel chair structure allowing for easy modification of the structure in accordance with specific requirements and also allowing a particular easy disassembling of the wheel chair provided the wheel chair is to be transported e.g. in a car or van.

[0022] According to the above requirements and the

above easy disassembling and also assembling of the wheel chair, the seat assembly is advantageously fixed to the frame of the wheel chair by means of locking means and is disengageable from and raisable from the frame of the wheel chair by disengaging the locking means.

[0023] In the presently preferred embodiment of the wheel chair according to the present invention, the seat assembly is shiftable between two positions, a substantially horizontal position in which the seat assembly locks to the frame of the wheel chair and a substantially vertical position in which the seat assembly is disengaged and raisable from the frame of the wheel chair thereby allowing the seat assembly to be disconnected from and demounted in relation to the wheel chair. The seat assembly further according to the above preferred embodiment of the wheel chair according to the present invention is provided with locking elements for locking the seat assembly in its substantially horizontal position thereby preventing unintentional disassembling and disconnection of the seat assembly from the frame of the wheel chair.

[0024] According to the presently preferred embodiment of the wheel chair according to the three aspects of the present invention, the wheel fixation assemblies are continuously movable along the side arms of the frame between two end positions and being fixable in the end positions and number of intermediate positions preferably an infinite number of intermediate positions between the end positions thereby allowing the wheel chair to be perfectly adapted and fit to the intentional user.

[0025] Further, according to a presently preferred embodiment of the wheel chair according to the three aspects of the present invention, the wheel fixation assemblies which are positioned at opposite sides of the wheel chair at the side arms of the frame of the wheel chair are linked together through a transversal bar thereby providing a rigid structure of the two wheel fixation assemblies and the transversal bar and further ensuring that the two wheel fixation assemblies are always moved together and provide a symmetrical adjustment of the wheel fixation assemblies and thereby also a symmetrical adjustment of the rear wheels and the seat assembly and/or the back rest assembly relative to the frame of the wheel chair.

[0026] The wheel chair according to the present invention may be made from any relevant and useful materials including metal materials such as steel or aluminum or lightweight metal alloys including aluminum or titanium alloys and further relevant and useful plastics materials including fibre, e.g. carbon fibre reinforced plastics materials.

[0027] The invention is now to be further described with reference to the drawings in which

Fig. 1 is an overall, perspective and schematic view of a first and presently preferred embodiment of a wheel chair according to the present invention,

Fig. 2 is a perspective and schematic view illustrating the first embodiment of the wheel chair according to the present invention also shown in fig. 1 in a disassembled state in which the wheel chair may be moved from one location to another,

Figs. 3a-k are elevational side views of alternative embodiments of the wheel chair according to the present invention,

Figs. 4a and 4b are perspective and schematic view illustrating a feature of the wheel chair according to the present invention allowing the seat assembly of the wheel chair to be easily disassembled, and

Fig. 5a, 5b and 5c are perspective and schematic views illustrating catch and locking elements of additional components of the wheel chair allowing easy locking and disassembling of the additional elements in relation to the wheel chair.

[0028] In Fig. 1, an overall, perspective and schematic view of a first and presently preferred embodiment of a wheel chair according to the present invention is shown designated the reference numeral 10 in its entirety. The wheel chair comprises two rear wheels or rear wheel assemblies 12 and 14 and two minor front wheels 16 and 18. The rear wheels 12 and 14 each have a bearing one of which belonging to the rear wheel 14 is designated the reference numeral 20. The bearing is journalled in a bearing assembly 22 which constitutes a central supporting component of the overall frame of the wheel chair 10. The frame of the wheel chair 10 comprises a lower section including two arms 24 and 26 the front end of which are provided with bushings 28 and 30 in which journalling pins are received which journalling pins are connected to front wheel journalling cranks 32 and 34, respectively, for receiving the front wheels 16 and 18, respectively. The arms 24 and 26 are further interconnected through a transversal bar 36 which serves the purpose of establishing a rigid, H-formed lower frame section in which the arms 24 and 26 are positioned in a mutual parallel arrangement.

[0029] The bearing assembly 22 received on and supported by the arm 26 along with its counterpart received on and supported by the arm 24 are interconnected through a transversal bar 38 providing a rigid connection between the two bearing assemblies. The bearing assembly 22 and its counterpart received on and supported by the arm 24 are mounted on the arms 24, 26 of the lower frame section allowing the bearing assemblies to be moved along the arms 24, 26 for positioning the bearing assemblies in a specific distance from the front wheels 16,18 thereby providing the possibility of adjusting the distance between the journals of the rear wheels 12, 14 relative to the front wheels 16, 18. It is to be un-

derstood that the bearing assemblies received on and supported by the arms 24, 26 one of which is illustrated in fig. 1 and designated the reference numeral 22 are interconnected so as to guarantee that the two bearing assemblies are moved together and always maintained in a position in which the transversal bar 38 is kept in a parallel arrangement relative to the transversal bar 36. The bearing assemblies interconnected through the transversal bar 38 are fixated in their intentional position by means of preferably fixation screws or alternatively clamps, lugs, pins or the like for maintaining the bearing assemblies in a specific and fixed position in relation to the arms 24, 26.

[0030] The bearing assemblies described above serve, apart from journalling the rear wheels 12 and 14 relative to the arms 24, 26 of the lower section of the frame, the further purpose of maintaining a seat assembly 40 including a leg rest assembly 42 and further a back rest assembly 44 relative to the lower section of the frame including the parallel arms 24, 26 and the transversal bar 36.

[0031] The seat assembly 40 is generally composed of two side bars 46, 48 on which a buttocks supporting element 50 is resting constituted by a piece of leather or plastics foil. The side bars 46 and 48 are interconnected by means of two transversal bars, one of which is shown in fig. 1 and designated the reference numeral 88. The side bar 46 of the seat assembly 40 is further provided with a fitting 52 from which a pin 54 protrudes downwards. The side bar 48 is provided with a similar fitting and pin corresponding to the fitting 52 and the pin 54 serving the same purpose as the fitting 52 and the pin 54. The pin 54 is received in a bushing of the bearing assembly 22 for fixating the seat assembly 40 and also the leg rest assembly 42 and the back rest assembly 44 relative to the bearing assembly 22. The above described fitting and pin of the side bar 48 of course cooperate with the bearing assembly 32 positioned and fixated to the side bar 24.

[0032] The fitting 52, apart from interconnecting the seat assembly 40 to the two bearing assemblies one of which is designated the reference numeral 22, serves the purpose of allowing the seat assembly 40 and also the back rest assembly 42 to be tilted relative to the bearing assemblies round a rotational axis parallel with the transversal bar 38 and extending through the fitting 52 and the additional fitting positioned at the side bar 48. Apart from the possibility of tilting the seat assembly 40 and also the back rest assembly 44, the fitting 52 and its counterpart at the side bar 48 may be adapted to allow the seat assembly 40 to be shifted lengthwise and arrested in a specific position as the side bars 46 and 48 may be repositioned relative to the corresponding fittings 52 thereby allowing not only a tilting of the seat assembly 40 relative to the supporting frame of the wheel chair, but also a lengthwise adjustment of the seat assembly 40 and further the back rest assembly 44 relative to the supporting frame of the wheel chair 10. The wheel chair 10 further as stated above comprises a leg rest assembly 42 which is tiltable relative to the seat assembly 40 by means of hinges 56, 58 connected to the side bars 46, 48, respectively, and includes two arms 60, 62 which constitute elongatable arms allowing a feet rest 64 connected to the arms 60, 62 to be positioned at a specific distance from the seat assembly 40 for adapting the position of the feet rest 64 relative to the person to be positioned and transported by means of the wheel chair 10.

[0033] The back rest assembly 44 comprise two parallel side bars one of which is illustrated in fig. 1 and designated the reference numeral 66 which side bars support a back supporting element 68 similar to the buttocks supporting element 50. The side bars one of which is designated the reference numeral 66 are linked to the fittings one of which is designated the reference numeral 52 for fixating the back rest assembly 44 relative to the seat assembly 40 preferably in a fixed angular orientation relative to the seat assembly or alternatively in a tiltable orientation allowing the back rest assembly 44 to be rotated round the rotational axis of the fitting 52 relative to the seat assembly 40. From the side bars one of which is designated the reference numeral 66, two handles 70 and 72 protrude upwardly and further support two side supports 74, 76, respectively. Further from the back of the back seat assembly 44, a back head rest 78 protrudes upwardly. The wheel chair 10 is further provided with a patient fixation element 80 positioned on the seat assembly 40, however in alternative embodiments as is illustrated in figs. 3a-3k, the wheel chair may be implemented with arm rests, side plates, a combined side support and arm rest or alternatively without side supports and a patient fixation element 80 allowing the wheel chair to be adapted to specific applications and purposes.

[0034] In Fig. 1, two additional elements constituting safety roller supporting arms 82 and 84 are further illustrated constituting elements well known in the art per se.

[0035] In fig. 2, the wheel chair 10 is illustrated in a disassembled state in which the handles 70, 72 along with the side supports 74, 76 have been removed from the back rest assembly 44 which has further been folded onto the seat assembly 40 thereby producing a shallow assembly including the seat assembly 40 and the back rest assembly 44. Further the back head rest 78 is disassembled from the remaining elements of the wheel chair along with the wheels 12, 14.

[0036] In Fig. 2, the lower section of the frame is further illustrated in the top part of the drawings presenting the arms 24, 26 together with the bearing assemblies 22 and the additional bearing assembly fixated to the arm 24 which bearing element is designated the reference numeral 22'. The bearing assemblies 22 and 22' are as illustrated in Fig. 2 interconnected by the transversal bar 38 and the safety roller supporting arms 82 and 84 are illustrated in positions in which they are folded down into positions parallel with the transversal bar

38.

[0037] It is to be realised that the ability of the wheel chair 10 allowing the seat assembly 40 to be raised and lowered and further shifted lengthwise in relation to the frame of the wheel chair and further the ability of the back rest assembly 44 to be tilted in relation to the seat assembly 40 allows an extreme wide-ranging adjustability of the wheel chair as the seat assembly 40 may be shifted lengthwise in relation to an initial position up to 26-38 cm allowing the seat assembly to be positioned in relation to the frame for accomodating different size of rear wheels and further allowing the position of the seat assembly 40 to be adjusted in relation to a specific user. Further the back rest assembly 44 may be raised or lowered up to 45-40 cm and tilted forward from a horizontal position up to 4° and lowered or tilted backwards until a position of 30° in relation to the vertical orientation is obtained. The feature of easy disassembling of the wheel chair is further illustrated in the detail of figs. 4a and 4b illustrating the locking of the seat assembly 40 relative to the frame.

[0038] In Figs. 3a-3k, various alternative embodiments or implementations of wheel chairs including the bearing assembly characteristic of the present invention allowing the easy adjustment of the positions of the rear wheels relative to the front wheels and further the one point fixation of the seat assembly and further the back rest assembly relative to the wheel supporting lower section of the wheel chair frame. As is evident from Figs. 3a-3k, the various embodiments of the wheel chair may be implemented with additional or supplementary elements improving the comfort of the wheel chair or adapting the wheel chair to a specific individual taking into due consideration the state of health and disableness of the individual or patient. Further, the concept of providing a simple side element interconnecting the wheel supporting frame and the seat rest and optionally also the back rest allows a stable wheel chair to be produced from a minimum number of components and providing a light weight and elegant, still stable and rigid wheel chair structure.

[0039] According to a particular feature of the wheel chair according to the present invention, the seat assembly 40 and the back rest assembly 44 connected to the seat assembly 40 are easily disconnected from the wheel chair allowing an easy demounting and disassembling of the wheel chair or in the alternative a swift and easy mounting of the seat assembly 40 and along therewith also the back rest assembly 44. In figs. 4a and 4b, a detail of the wheel assembly 22 and specific details of the seat assembly 40 are shown illustrating the above easy disassembling feature of the wheel chair. The elements illustrated in figs. 4a and 4b previously described above with reference to figs. 1 and 2 are designated the same reference numerals as above. These previously described elements will be given no additional comments except for the comments relevant to the above feature.

[0040] In figs. 4a and 4b, the transversal bar 38 of the wheel assembly 22 is shown along with the arm 26 of the frame of the wheel chair. Centrally, the transversal bar 38 is provided with an enlarged part 92 from which two plate elements 94 and 96 extend upwardly which plate elements support a transversal pin 98 shown in fig. 4b. From the side bar 48 of the seat assembly 40, two transversal bars 88 and 90 extend to the opposite side bar 46. The transversal bar 88 constitutes a front transversal bar whereas the transversal bar 90 constitutes a rear transversal bar which is hidden in fig. 1 whereas the front transversal bar 88 is disclosed in fig. 1.

[0041] From the lower side of the transversal bar 88, an arm 100 extends rearwardly to a catch or lock 102. The arm 100 centrally comprises a handle 106 which is provided with inner threads in which two threaded pins 108 and 110 are received so as to allow the length of the arm 100 to be adjusted through rotating the handle 106 relative to the pins 108 and 110 thereby causing the length of the arm 100 to be elongated or shortened by turning the handle 106 in the one direction or alternatively in the opposite direction. The specific position of the arm 100 which fixates the seat assembly 40 relative to the frame and also defines the orientation of tilt of the seat assembly 40 relative to the frame is set and maintained by means of two counter nots 112 and 114.

[0042] The catch or lock 102 comprises a bifurcated element which is adapted to be received between the two plate elements 94 and 96 and has a central recess 118 illustrated in fig. 4b for cooperating with the transversal pin 98. The catch or lock further comprises a locking element 116 which is rotatably received within the bifurcated element 102 and has a locking plate which is rotably disengagable from a position below the transversal pin 98 through depressing the locking element 116 from the position shown in fig. 4a causing the catch or lock to be shifted from being engaged in its locking engagement with the transversal pin 98 of the enlarged part 92 of the transversal bar 38 to be disengaged from its locking engagement with the transversal pin 98.

[0043] As the arm 100 is disengaged from the transversal bar 38 by depressing the locking element 116, the seat assembly 40 may be rotated from its substantially horizontal position shown in fig. 4a to a vertical position shown in fig. 4b in which the seat assembly is released or disengaged from the frame of the wheel chair. As is evident from fig. 4a and 4b, the seat assembly 40 is provided with a rotation pin 120 which is journalled in a claw 122, 124 of the pin 54 as the pin 120 is provided with a reduced width in the orientation parallel with the side bars 46 and 48 allowing the pin 120 to be disengaged from the claws 122, 124 in the vertical position shown in fig. 4b, however preventing the pin 120 from being disengaged from the claws 122, 124 in the position shown in fig. 4a. For preventing the arm 100 from swinging freely relative to the seat assembly and possibly causing injure to an individual performing the operation of disengaging the seat assembly 40 from the

frame of the wheel chair 10, the arm 100 is locked to two side plates one of which is shown in figs. 4a and 4b and designated the reference numeral 126 by means of a wire 128. The plate 126 having a counterpart at the opposite side bar 46 supports the pin 120.

[0044] In figs. 5a, 5b and 5c, a locking system is shown allowing an additional element such as a side support, an arm rest a back head rest or any additional element to be fixated and locked relative to the frame of the wheel chair or to the seat or back rest assemblies of the wheel chair. In fig. 5a, the lock is shown designated the reference numeral 130 in its entirety comprising two claw parts 132 and 134 which are interconnected by means of a through-going pin 136 and engaged by means of a spring 138 attempting to press the two parts 132 and 134 apart. The locking part 132 is pivotably connected to a handle 140 comprising a plate element 142 and an eccentric actuator element 144 which cooperates with a circular cylindrical wall part of the claw part 132. As the handle 140 is swung from its position shown in figs. 5a and 5b in which the plate element 142 is positioned juxtaposed the two claw parts 132 and 134 causing the claw parts to be pressed towards one another and towards an open position, the claw part 132 is allowed to move away from the part 134 thereby causing the two claw parts 132 and 134 to be separated.

[0045] The locking element 130 may according to two alternative applications be used in connection with a further fixation element 150 in which the claw part 134 engages and causes the material of the locking element 150 to be slightly deformed and pressed against the arm or tubular element such as the arm 26 of the frame as illustrated in fig. 5b.

[0046] Alternatively, as illustrated in fig. 5c, two parallel locks 130 may be used for catching and locking in relation to a hollow tubular element or arm 26' which is provided with a through-going recess 27' for allowing the claw part 134 of the lock 130 to engage and fixate the lock relative to the arm or tubular 26'. In fig. 5c, a further plate element or pin 150 is shown which is connected to and supported by the two locks 130 and is fixated relative to the tubular element or arm 26' as the locks are caused to press round the tubular element 26' for fixating the locks 130 and thereby also the plate 150 relative to the tubular element or arm 26'.

[0047] Although the present invention has been described above with reference to specific, presently preferred embodiments of the wheel chair according to the present invention, it is obvious to a person having ordinary skill in the art that the above techniques may readily be modified for complying with specific requirements without thereby departing from the protective scope and spirit of the invention as defined in the appending claims. Therefore, any such modifications are to be construed part of the invention as defined in the appending claims.

Claims

1. A wheel chair comprising:

a frame having two side arms defining a front end and a rear end of said frame,
a pair of front wheels fixated rotably and pivotably to said side arms of said frame at said front end thereof,
a seat assembly having a buttocks supporting element and first fixation means for fixating said seat assembly relative to said frame,
a back rest assembly having a back supporting element and second fixation means for fixating said back supporting element relative to said frame,
a pair of rear wheels mounted rotably at said side arms of said frame at said rear end thereof, and
a pair of wheel fixation assemblies mounted movably to said side arms of said frame for fixating said pair of rear wheels relative to said frame at respective side arms thereof so as to allow said wheels to be shifted between at least two positions along said side arms and positioning said rear wheels in corresponding alternative positions, said first fixation means being connected to said wheel fixation assemblies at respective side arms of said frame so as to establish connection between said seat assembly to said frame through said first fixation means and said wheel fixation assemblies and so as to allow said seat assembly to be shifted along with said wheel fixation assemblies relative to said side arms of said frame between said at least two positions relative to said side arms.

2. A wheel chair comprising:

a frame having two side arms defining a front end and a rear end of said frame,
a pair of front wheels fixated rotably and pivotably to said side arms of said frame at said front end thereof,
a seat assembly having a buttocks supporting element and first fixation means for fixating said seat assembly relative to said frame,
a back rest assembly having a back supporting element and second fixation means for fixating said back supporting element relative to said frame,
a pair of rear wheels mounted rotably at said side arms of said frame at said rear end thereof, and
a pair of wheel fixation assemblies mounted movably to said side arms of said frame for fixating said pair of rear wheels relative to said frame at respective side arms thereof so as to

allow said wheels to be shifted between at least two positions along said side arms and positioning said rear wheels in corresponding alternative positions, said second fixation means being connected to said wheel fixation assemblies at respective side arms of said frame so as to establish connection between said back rest assembly to said frame through said second fixation means and said wheel fixation assemblies and so as to allow said back rest assembly to be shifted along with said wheel fixation assemblies relative to said side arms of said frame between said at least two positions relative to said side arms.

3. A wheel chair comprising:

a frame having two side arms defining a front end and a rear end of said frame,
a pair of front wheels fixated rotably and pivotably to said side arms of said frame at said front end thereof,
a seat assembly having a buttocks supporting element and first fixation means for fixating said seat assembly relative to said frame,
a back rest assembly having a back supporting element and second fixation means for fixating said back supporting element relative to said frame,
a pair of rear wheels mounted rotably at said side arms of said frame at said rear end thereof, and
a pair of wheel fixation assemblies mounted movably to said side arms of said frame for fixating said pair of rear wheels relative to said frame at respective side arms thereof so as to allow said wheels to be shifted between at least two positions along said side arms and positioning said rear wheels in corresponding alternative positions, said first and second fixation means being connected to said wheel fixation assemblies at respective side arms of said frame so as to establish connection between said seat assembly and said back rest assembly, respectively, to said frame through said first and second fixation means and said wheel fixation assemblies and so as to allow said seat assembly and said back rest assembly to be shifted along with said wheel fixation assemblies relative to said side arms of said frame between at least two positions relative to said side arms.

4. The wheel chair according to any of the claims 1-3, said wheel fixation assemblies being continuously movable along said side arms of said frame between two end positions and being fixable in said end positions and a number of intermediate positions between said end positions.

5. The wheel chair according to claim 4, each of said wheel fixation assemblies comprising a bushing in which a respective side arm of said frame is received for fixating said wheel fixation assembly relative to said side arm.

6. The wheel chair according to any of the claims 1-5, said wheel fixation assembly being connected through a transversal bar.

7. The wheel chair according to any of the claims 1 or 2 and any of the claims 4-6 claiming dependency from any of the claims 1 or 2, said second fixation means allowing said seat assembly to be tilted relative to said frame.

8. The wheel chair according to any of the claims 1, 3 or 4 and any of the claims 5, 6 or 7 claiming dependency from any of the claims 1, 2 or 4, said first fixation means allowing said back rest assembly to be tilted relative to said frame.

9. The wheel chair according to any of the proceeding claims further comprising a leg rest connected pivotably to said seat assembly.

10. The wheel chair according to any of the preceding claims, further comprising one or more additional elements, such as side supports, arm rests and/or a back head rest.

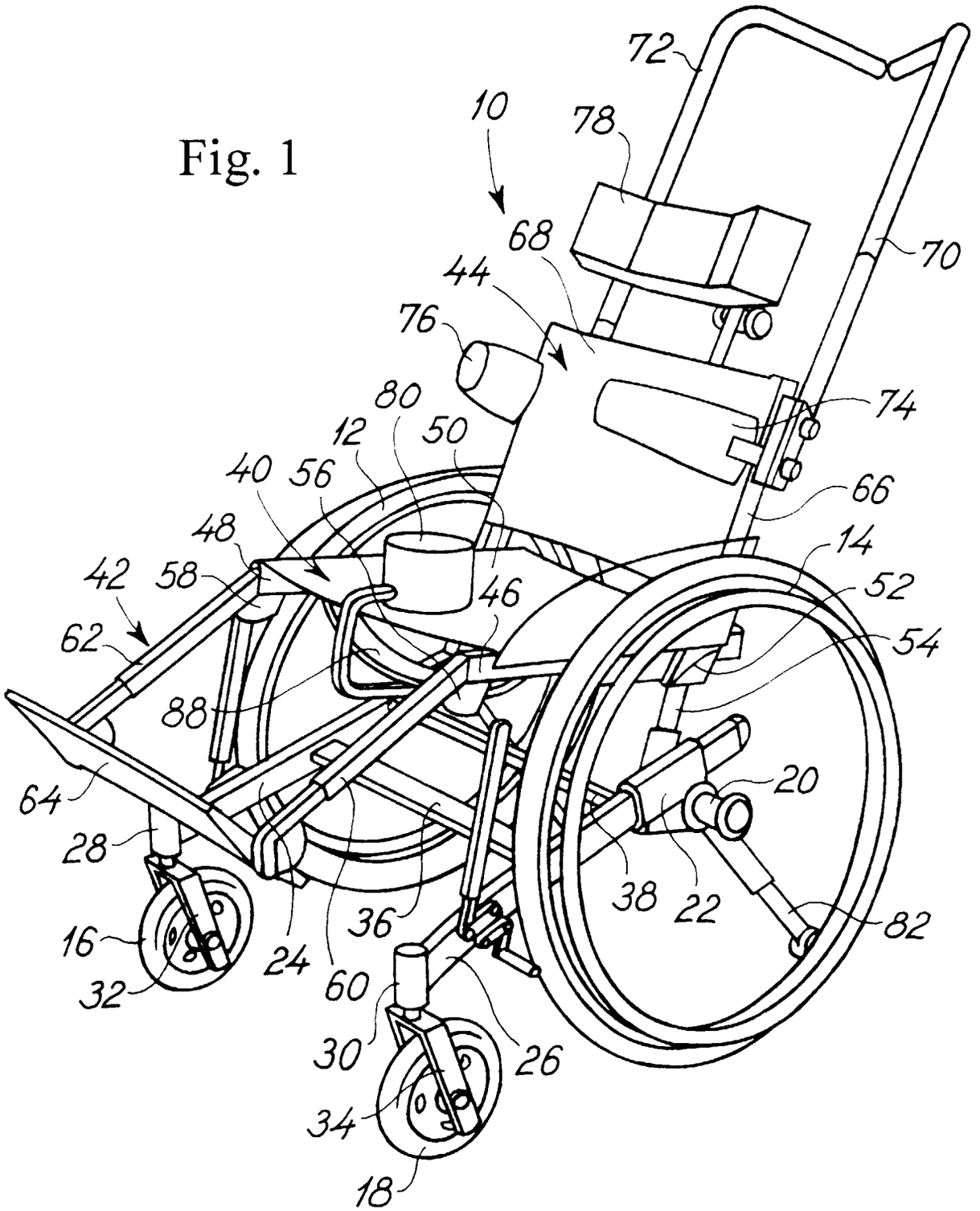
11. The wheel chair according to claim 10, said one or more additional elements being provided with hook shaped catching and locking elements allowing said one or more additional elements to be fixated and locked relative to said frame or any other element of said wheel chair.

12. The wheel chair according to any of the preceding claims, said seat assembly being fixed to said frame of the wheel chair by means of locking means and being disengageable from and raisable from said frame of said wheel chair by disengaging said locking means.

13. The wheel chair according to any of the preceding claims, said seat assembly being turnable between a horizontal position and a vertical position in which horizontal position said seat assembly is fixated relative to said frame of the wheel chair and in which vertical position said seat assembly is disengagable from and raisable from said frame of said wheel chair, and further comprising locking means for locking said seat assembly relative to said frame in said horizontal position.

14. The wheel chair according to any of the preceding claims, said frame, said seat assembly, said back rest assembly and said first and second fixation means and further said wheel fixation assemblies being made from metal such as steel or aluminum or alternatively plastics material such as fibre, e.g. carbon fibre reinforced plastics materials.

Fig. 1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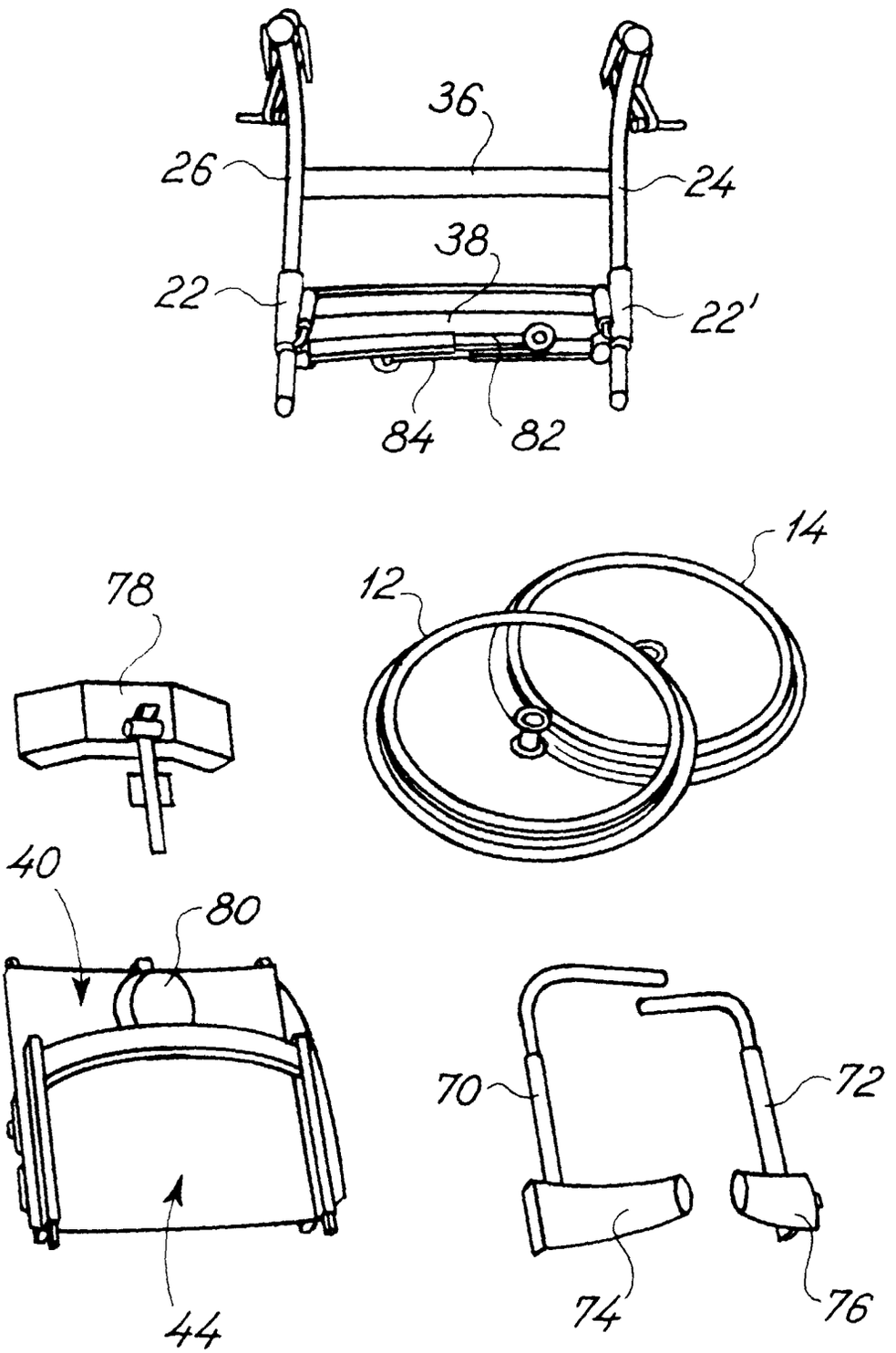

Fig. 2

Fig. 3a

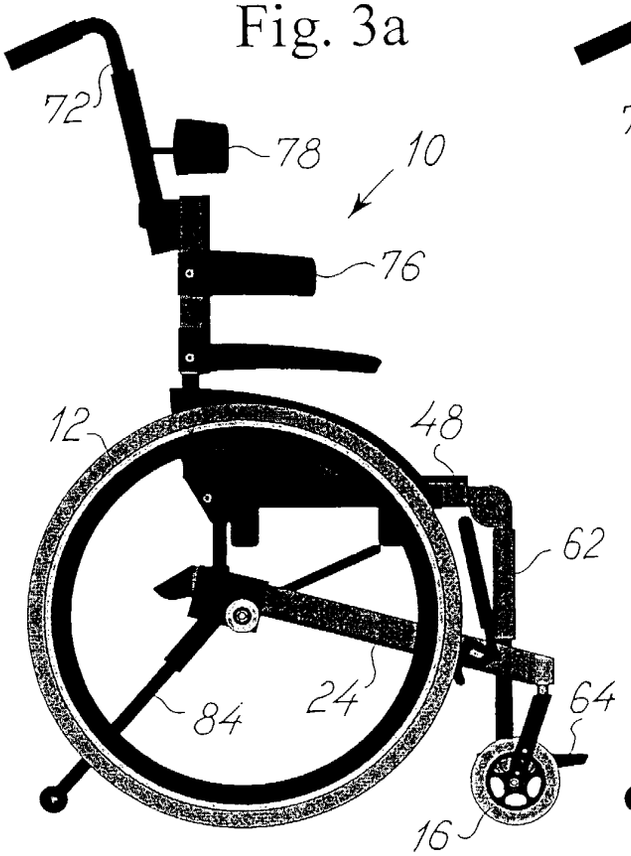

Fig. 3b

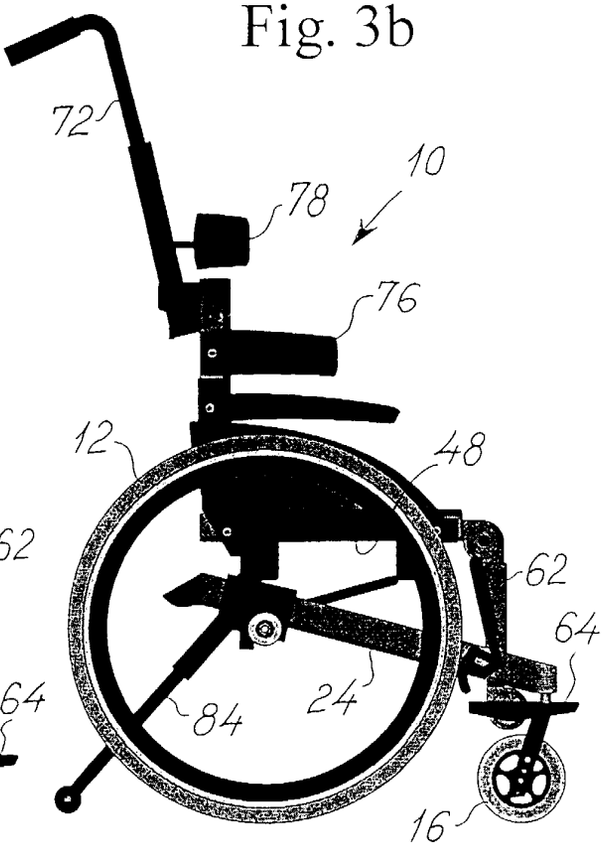

Fig. 3c

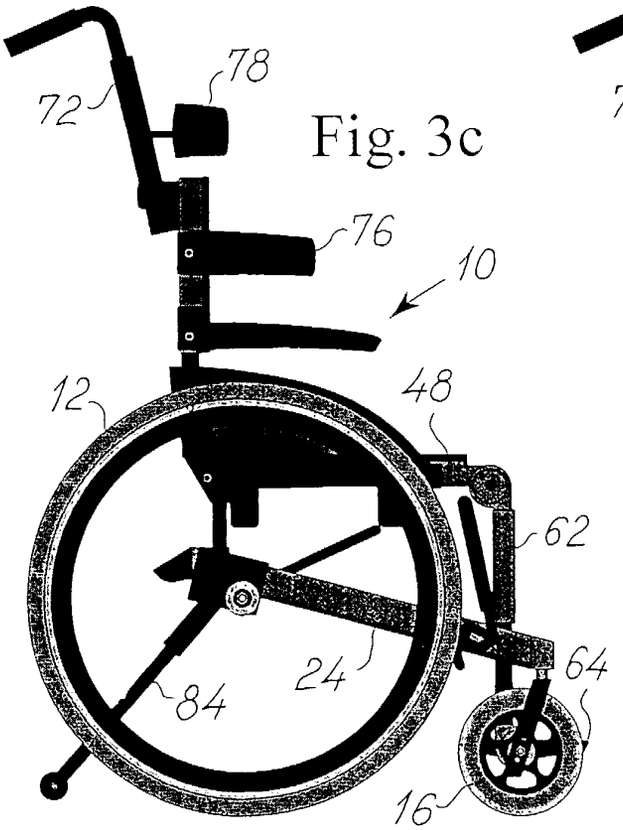

Fig. 3d

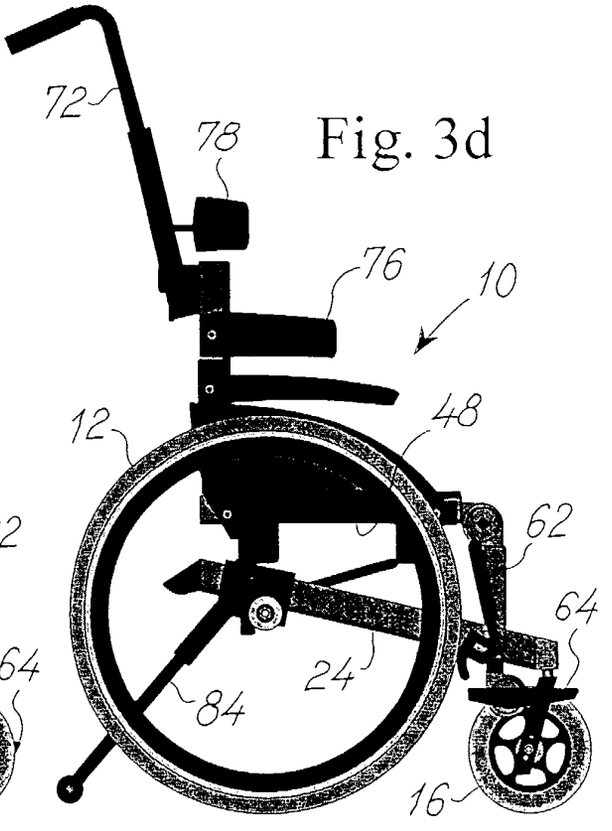

Fig. 3e

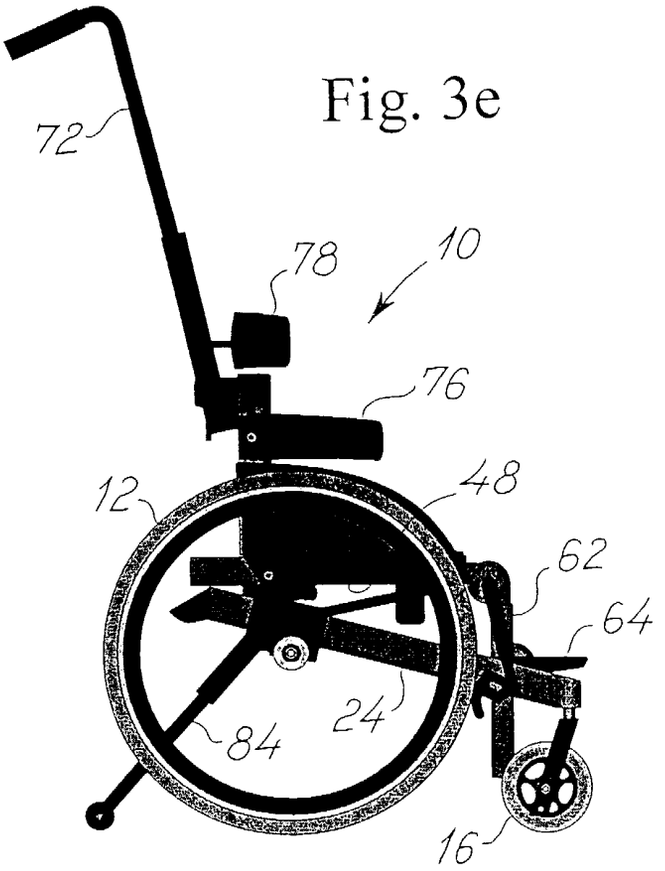

Fig. 3g

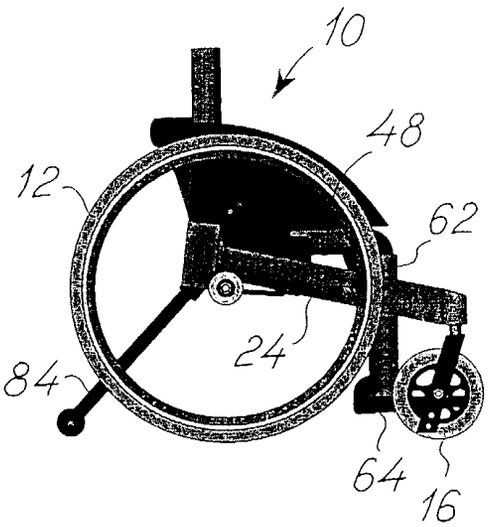

Fig. 3f

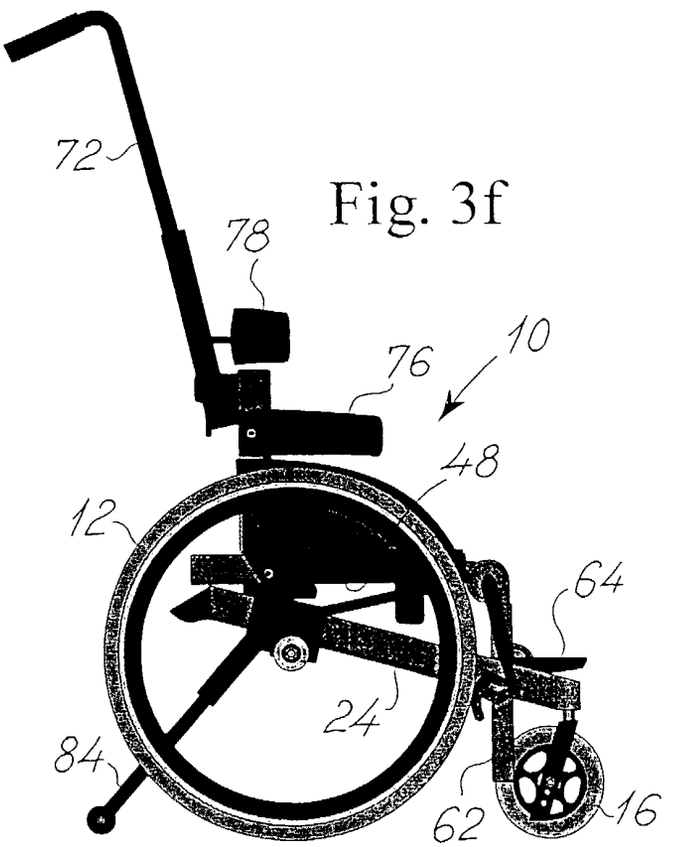

Fig. 3h

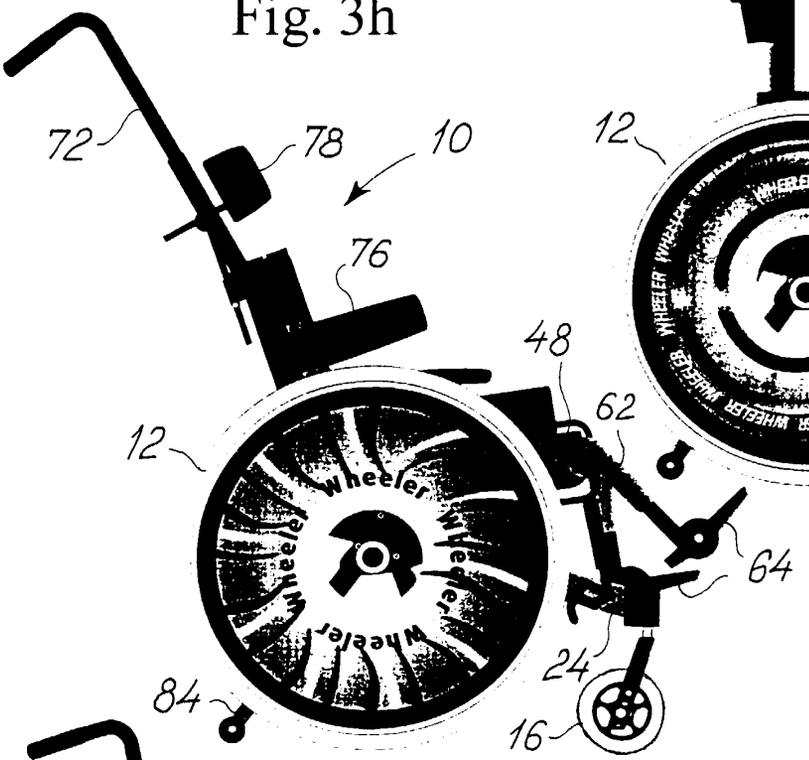

Fig. 3j

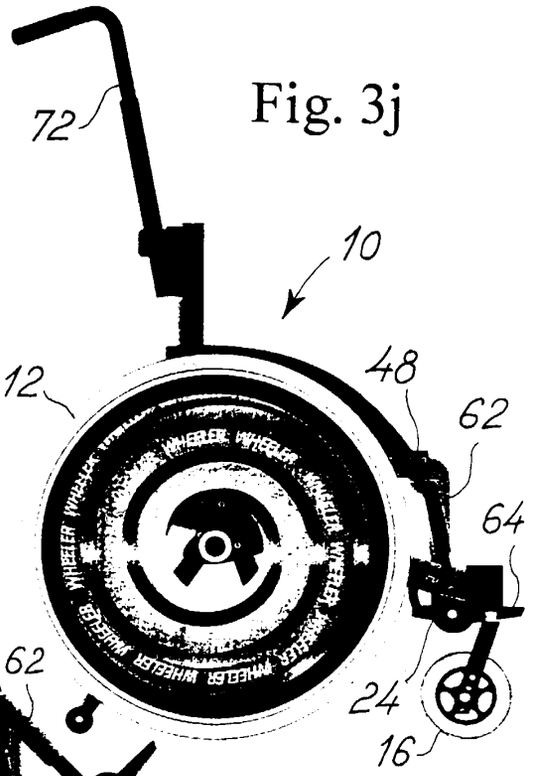

Fig. 3i

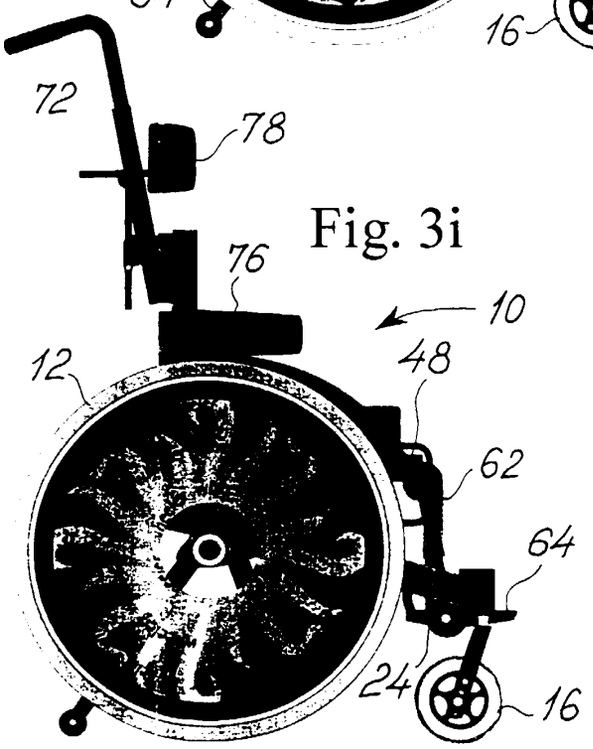

Fig. 3k

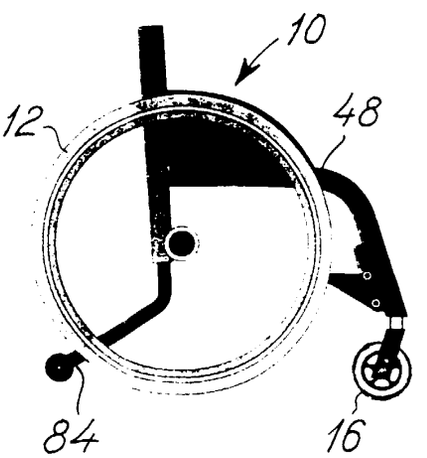

Fig. 4a

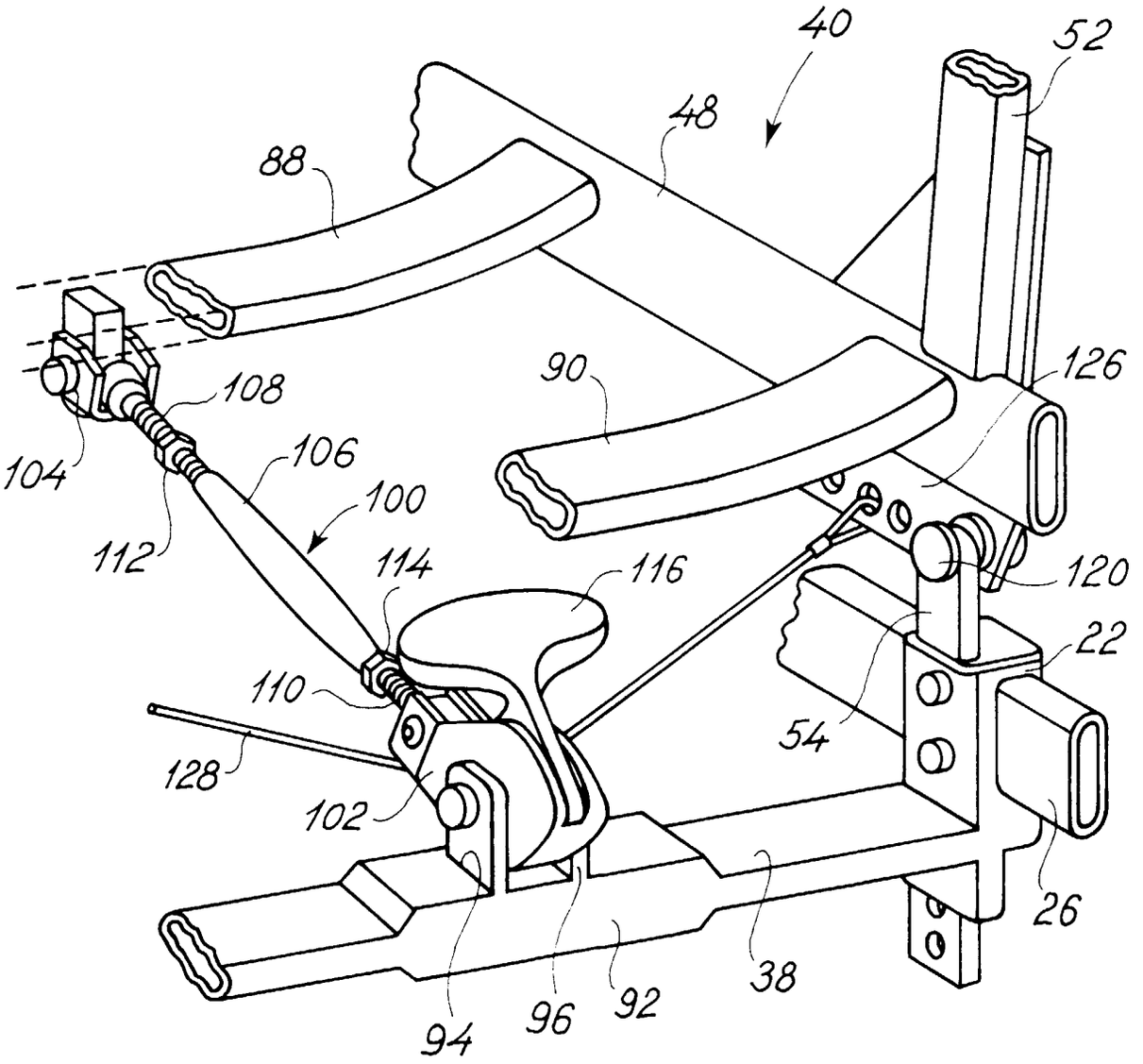
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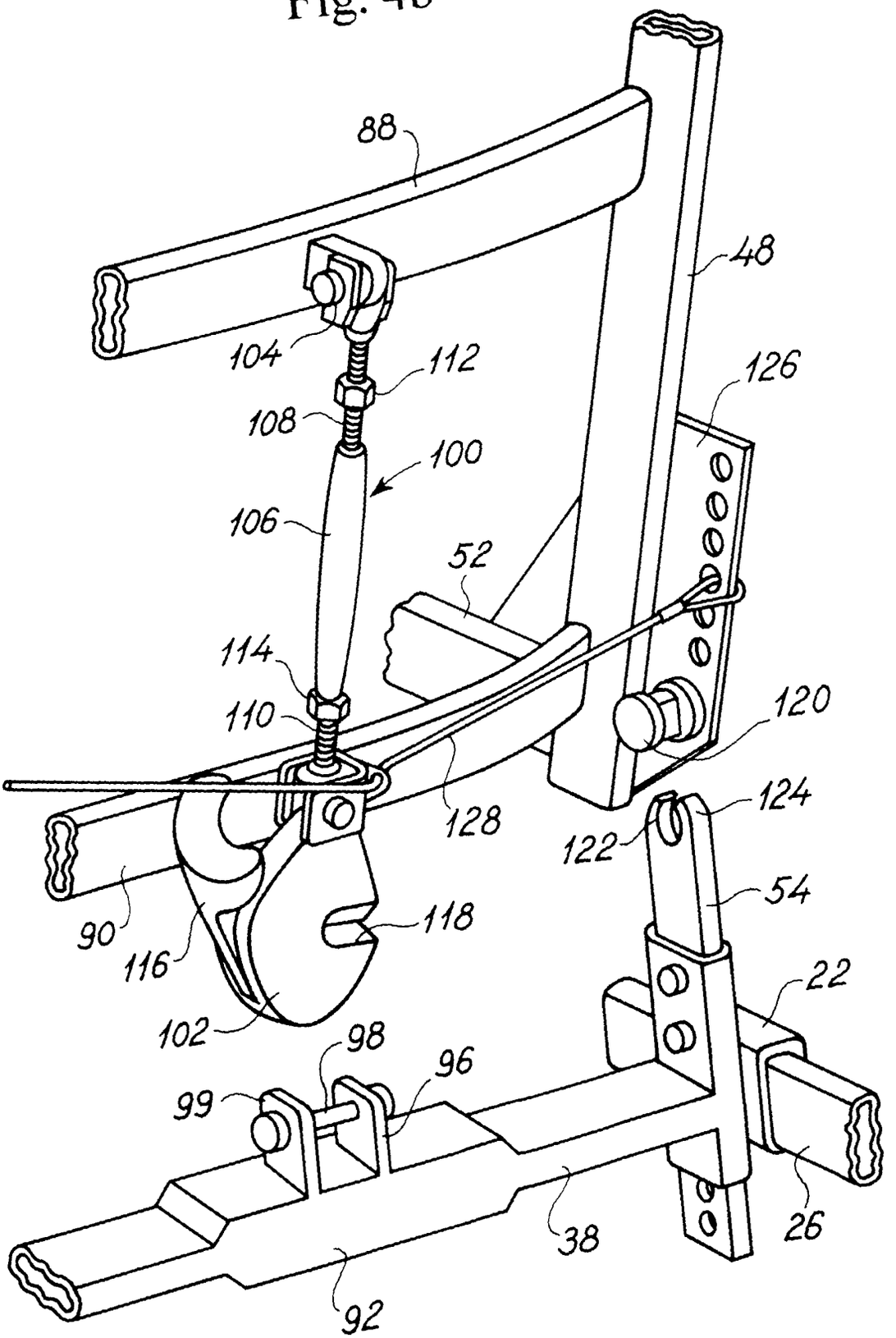
Fig. 4b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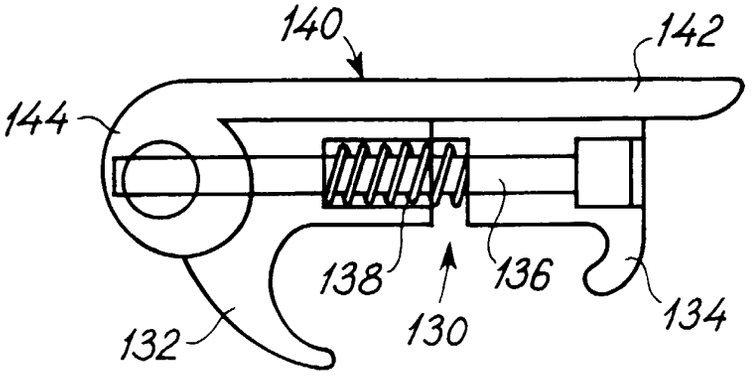

Fig. 5a

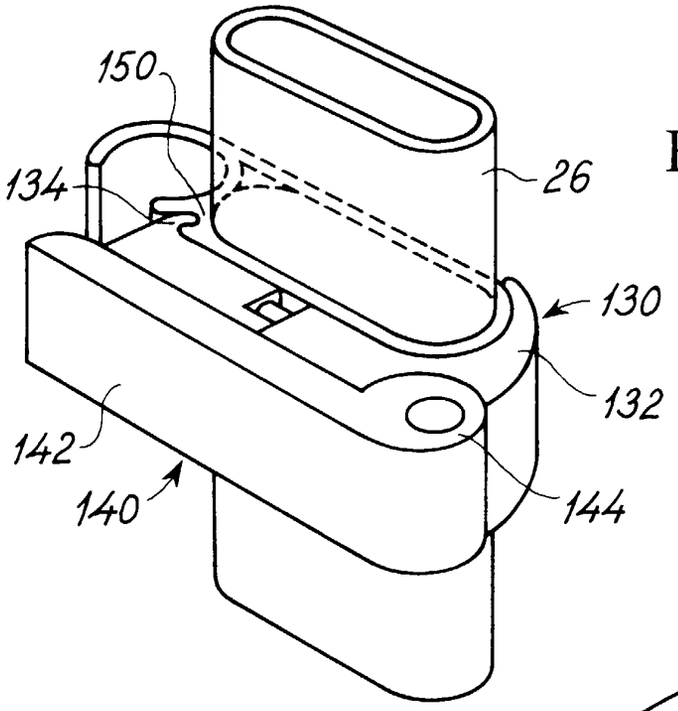

Fig. 5b

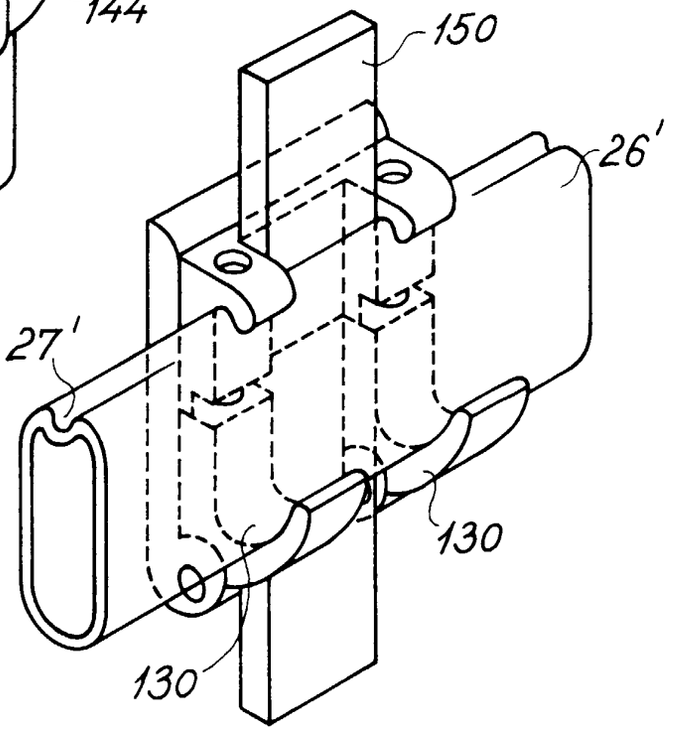

Fig. 5c

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EUROPEAN SEARCH REPORT

Application Number
EP 99 61 0064

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The present search report has been drawn up for all claims

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THE HAGUE	9 March 2000	Baert, F

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