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(54) **Multi-adjustable wheelchair with a closed frame and front-wheel attachment robust against impact**

(57) The invention relates to wheelchair (1) with a fixed non foldable frame (26), which forms attachment for front wheels (11) and rear wheels (1), and which includes a seat (27) where the frame (26) in connection to the attachment (2) for the rear wheels (10) includes two preferably parallel pipes (4,5), which end in an end bracket (6) and which in direction towards the front wheels (11) are connected by a coupling piece (7) and where the upper pipe (4) between the end bracket (6) and the coupling piece (7) forms attachment for the seat (27) and where the lower pipe (5) between the end bracket (6) and the coupling piece (7) forms attachment for an adjustable rear wheel suspension (9) and where the distance (12) between the pipes (4,5) is minimised and preferably less than the diameter of a pipe (4,5) more preferably smaller than 50 mm.

It is moreover a part of the invention that the frame (26) forms attachment for the front wheels (11) since the front wheel suspension (3) is integrated in the frame (26), which includes a preferably cylindrical axle (16) for fastening of a front wheel (11) where the axle (16) goes out from the front wheel suspension (3) through an opening hole (28), which is preferably oval and in which the axle's (16) placement in one plane can be adjusted in a stepless way.

With the invention it becomes possible to manufacture multi adjustable wheelchairs (1) with closed frames (26) and integrated impact robust front wheel suspension (3)

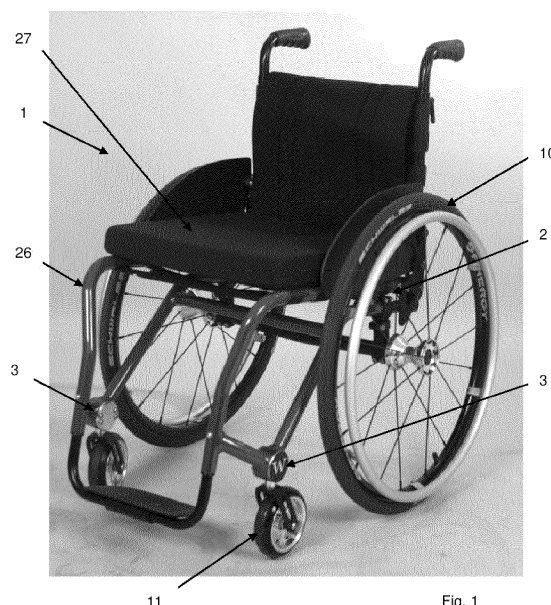


Fig. 1

Description

[0001] The invention relates to a wheelchair with a fixed non foldable frame, which forms attachment for front wheels and rear wheels, and which includes a seat.

[0002] It is known to manufacture wheelchairs, which around the rear wheels have two parallel frame pipes in a closed frame construction where the lower pipe is used for adjusting the wheel axle in the longitudinal direction.

[0003] The hitherto known constructions are often **characterized in that** the height of the rear wheels can be regulated by adjustment of, or on, a bracket, which is mounted between the highest and lowest pipe in the closed frame construction, which has the drawback that the frame construction gets a large height and thereby takes up much space when the frame without rear wheel is to be transported in and out of for example a car.

[0004] In several known constructions, it is often possible to shorten the pipes for mounting seat and back bracket for adjustment of the seat depth to a given wheelchair user, but these frame constructions are open with a joint pipe for mounting of seat and driving wheel bracket, which reduces the possibilities of adjustment for seat and wheels and lowers the stiffness of the construction.

[0005] It is moreover a drawback of the hitherto known constructions that front-wheel suspension, which is build into the frame of the wheelchair, are difficult to position correctly after the adjustment of the wheelchair to a specific user.

[0006] It is also a drawback that the hitherto known integrated front-wheel suspensions easily break if the wheelchair hits an obstacle, whereafter the wheelchair can not be used before it has been repaired, which can obviously be a significant nuisance for the user.

[0007] It is therefore an object of the invention to show a wheelchair without the above-mentioned drawbacks.

[0008] The object of the invention is achieved by a wheelchair of the in the introduction to claim 1 stated type, which is **characterized in that** the frame in connection with the attachment of the rear wheels includes two preferably vertical parallel pipes, which end in an end bracket, and which in the direction of the front wheels are connected by a coupling piece, and where the upper pipe between the end bracket and the coupling piece forms attachment for the seat, and where the lower pipe between the end bracket and the coupling piece forms attachment for an adjustable rear wheel suspension, and where the distance between the pipes is minimized, and preferably less than the diameter of a pipe, more preferably less than 50 mm.

[0009] In this way, it becomes possible to adjust the seat cover, and independent of the position of the rear wheel suspension, and it becomes possible to adjust the rear wheel suspensions freely in the longitudinal direction, and the seat height can be freely adjusted by adjustment of the rear wheel suspension in the area below the frame.

[0010] As stated in claim 2, it is furthermore a charac-

teristic of the invention that the frame forms attachment for the front wheels since the front wheel suspension is integrated in the frame, which includes a preferably cylindrical axle for attachment of a front wheel, where the axle extends from the front wheel suspension through an opening hole, which is preferably oval and in which the position of the axle in a plane can be adjusted in a stepless way.

[0011] The advantage is hereby achieved that the front wheel suspension can easily be adjusted and moved in the opening hole, which can reduce the risk of breakdown when the front wheels of the wheelchair hit an obstacle.

[0012] Further appropriate embodiments of the wheelchair are stated in claims 3 to 10.

[0013] The invention will now be explained more fully with reference to the drawings, on which:

Fig. 1 shows a preferred embodiment of a wheelchair manufactured according to the invention.

Fig. 2 shows a section of the wheelchair's frame in connection to the rear wheels.

Fig. 3 shows another section of the wheelchair's frame in connection to the rear wheels.

Fig. 4 shows a third section of the wheelchair's frame in connection to the rear wheels.

Fig. 5 shows a fourth section of a wheelchair's frame in connection to the rear wheels.

Fig. 6 shows, in a projection, a section of a front wheel suspension.

Fig. 7 shows, in another projection, a section of a front wheel suspension.

Fig. 8 shows, in a third projection, a section of a front wheel suspension.

Fig. 9 shows a sectional view of a front wheel suspension.

[0014] In fig. 1 is with 1 shown a wheelchair with a fixed non foldable frame 26, which forms attachment for front wheel 11 and rear wheel 10, and which includes a seat.

[0015] Fig. 2 and fig. 3 show a section of a wheelchair's 1 frame 26 near a rear wheel 10, where the frame 26 in connection to the attachment 2 to the rear wheels 10 includes two preferably vertical parallel pipes 4,5, which end in an end bracket 6, and which in the direction of the front wheels 11 are connected by a coupling piece 7, and wherein the upper pipe 4 between the end bracket 6 and the coupling piece 7 forms an attachment for the seat 27 and where the lower pipe 5 between the end bracket 6 and the coupling piece 7 forms an attachment for adjustable rear wheel suspension 9, and where the distance

12 between the pipes 4,5 is minimized, and preferably less than the diameter of a pipe 4,5, more preferably less than 50 mm.

[0016] In the shown preferred embodiment in fig. 2 and 3 of a wheelchair manufactured according to the invention, the coupling piece 7 is welded to the pipes 4,5.

[0017] It is furthermore seen that the rear wheel suspension 9 is fastened to the pipe 4 by an adjustable bracket 8.

[0018] The bracket 8 is fastened to the pipe 5 by friction created by fastening devices such as screws and the bracket 8 can be moved freely on the pipe 5 between the coupling piece 7 and the end bracket 6, which provides an optimum possibility of adjustment of the rear wheel suspension's horizontal placement.

[0019] As it will appear from for example figure 2, a height adjustable rear wheel suspension 9 goes out from the bracket 8, which can easily be adjusted by activation of fastening devices such as one or more screws or bolts, which provides an optimum possibility for adjusting the vertical placement of the rear wheel 10 in relation to the frame 26.

[0020] As it will appear from for example fig. 2 and fig. 5, the end bracket 6 is fastened to the pipes 4,5 with fastening devices such as screws or bolts.

[0021] It is hereby achieved that the pipes 4,5 can be cut off in the optimum length, which is exactly optimum for a specific wheelchair user, whereafter the end bracket 6 can simply be fastened whereby the frame 26 remains closed, also at the rear wheels 10.

[0022] In fig. 4 and fig. 5 is seen that the pipe forms attachment for a back bracket 14.

[0023] It is furthermore seen in fig. 5 that the rear wheel suspension 9 ends in a hollow shaft 15 to which a rear wheel 10 can be mounted.

[0024] Fig. 6, fig. 7 and fig. 8 show, depicted in different projections, a front wheel suspension 3, where the frame 26 forms attachment for the front wheels 11 since the front wheel suspension 3 is integrated in the frame 26, which includes a preferably cylindrical axle 16 for fastening of a front wheel 11, where the axle 16 goes out from the front wheel suspension 3 through an opening hole 28, which is preferably oval and in which the axle's 16 placement in one plane can be adjusted steplessly.

[0025] In fig. 7, the oval opening hole 28 is seen, which encloses the cylindrical axle 16, which can be moved in the area 17 between the axle's 16 exterior dimension and the inner dimension of the opening hole 28.

[0026] The axle 16, which forms attachment for the front wheel 11 via a wheel bracket 25, can be adjusted in the oval opening hole's 28 longitudinal axis.

[0027] The oval opening hole 28 limits the maximum angle of the axle 16 whereby it is ensured that the axle 16 can not be turned to an angle, which will make the wheelchair unstable.

[0028] The wheel suspension 3 is on two opposite side surfaces shielded by cover plates 3.1,3.2.

[0029] In a preferred embodiment, the axle 16 can be

adjusted steplessly in the opening hole 28 and fastened by friction from activation of fastening devices 19 such as screws or bolts, which can squeeze together the axle 16 between items, of which the end plate 3.2 consists one of the items.

[0030] The suspension hereby becomes protected against fracture from the friction in the fastening of the adjustment mechanism.

[0031] It is a part of the invention that the front wheel suspension 3 can be provided with visual indicators for adjustment of the axle 16, which in an optimum position is adjusted such that its longitudinal axis is vertical.

[0032] In fig. 9 is seen a sectional picture of a preferred embodiment of the wheel suspension 3, where the axle has an end 21, which for example via a thread is connected with the wheel bracket 25, and which in the opposite end 22 is fastened by screwing together to a bolt 23 and where the axle 16 is also enclosed by ball bearings 24.

[0033] The wheel suspension 3 is, as it will appear from for example fig. 8, integrated in the frame 26 such that the wheel suspension's 3 exterior housing comprises a part of the frame 26.

Claims

1. Wheelchair (1) with a fixed non foldable frame (26), which forms attachment for front wheels (11) and rear wheels (10), and which includes a seat (27) **characterized in that** the frame (26) in connection with the attachment (2) of the rear wheels (10) includes two preferably vertical parallel pipes (4,5), which end in an end bracket (6), and which in the direction of the front wheels (11) are connected by a coupling piece (7), and where the upper pipe (4) between the end bracket (6) and the coupling piece (7) forms attachment for the seat (27), and where the lower pipe (5) between the end bracket (6) and the coupling piece (7) forms attachment for an adjustable rear wheel suspension (9), and where the distance (12) between the pipes (4,5) is minimized, and preferably less than the diameter of a pipe (4,5), more preferably less than 50 mm.
2. Wheelchair (1) according to claim 1 **characterized in that** the frame (26) forms attachment for the front wheels (11) since the front wheel suspension (3) is integrated in the frame (26), which includes a preferably cylindrical axle (16) for attachment of a front wheel (11), where the axle (16) extends from the front wheel suspension (3) through an opening hole (28), which is preferably oval and in which the position of the axle (16) in a plane can be adjusted in a stepless way.
3. Wheelchair (1) according to claim 1 or 2 **characterized in that** the axle's 16 placement can be adjusted

and fixed by activation of fastening devices (19) such as screws.

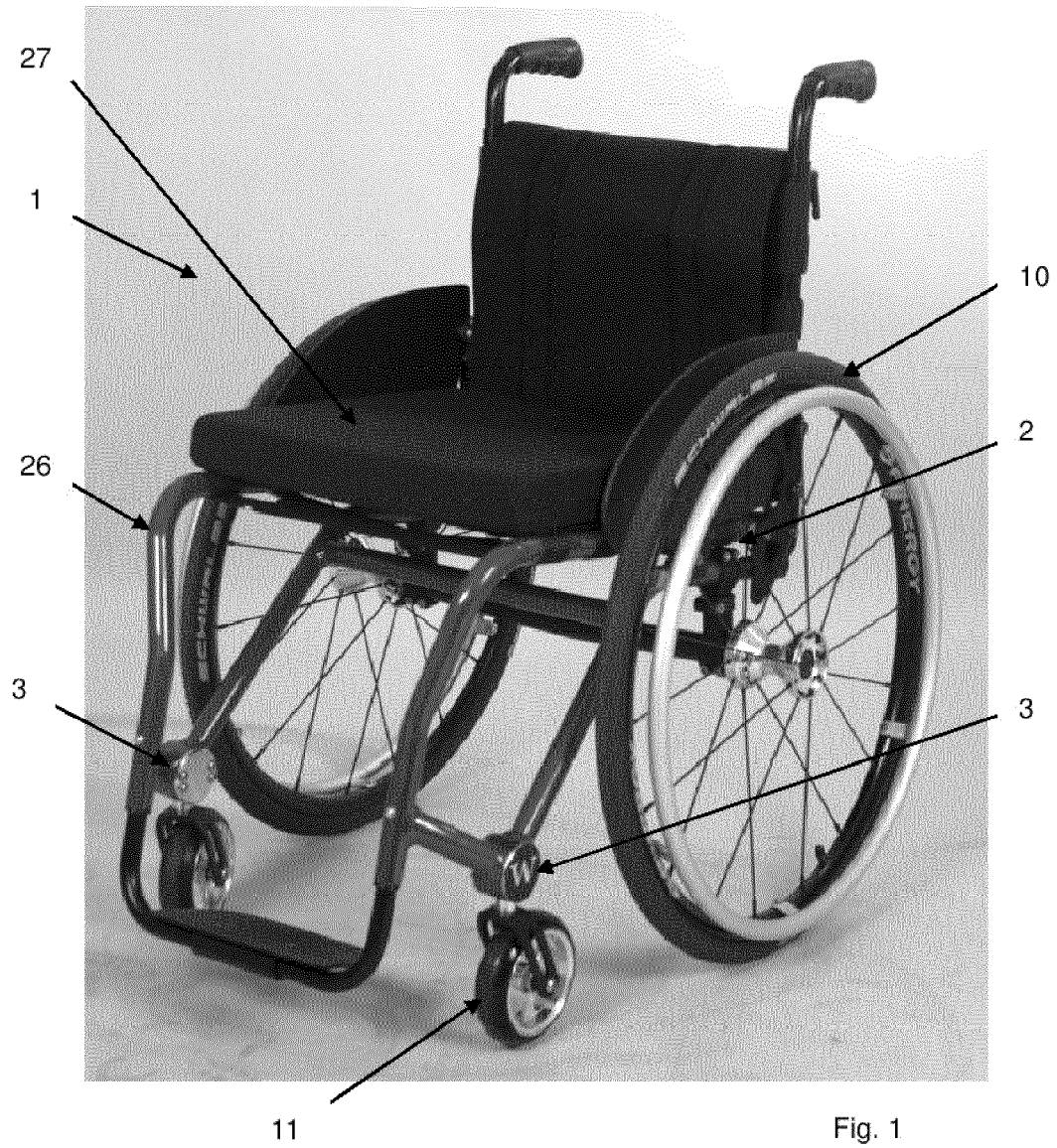
4. Wheelchair (1) according to one or more of claims 1 to 3 **characterized in that** the axle's (16) position after fastening is maintained by friction in the front wheel suspension (3). 5
5. Wheelchair (1) according to one or more of claims 1 to 4 **characterized in that** the front wheel suspension (3) can be provided with visual indicators for adjustment of the axle (16). 10
6. Wheelchair (1) according to one or more of claims 1 to 5 **characterized in that** the rear wheel suspension (9) is fastened to the pipe (4) by an adjustable bracket (8). 15
7. Wheelchair (1) according to one or more of claims 1 to 6 **characterized in that** the rear wheel suspension (9) can be height adjusted. 20
8. Wheelchair (1) according to one or more of claims 1 to 7 **characterized in that** the end bracket (6) is attached to the pipes (4,5) by fastening. 25
9. Wheelchair (1) according to one or more of claims 1 to 8 **characterized in that** the pipe (4) forms attachment to a back bracket (14). 30
10. Wheelchair (1) according to one or more of claims 1 to 9 **characterized in that** the wheelchair including the frame (26) and suspension including front wheel suspension (3) is fully or partially manufactured from light metal including aluminium. 35

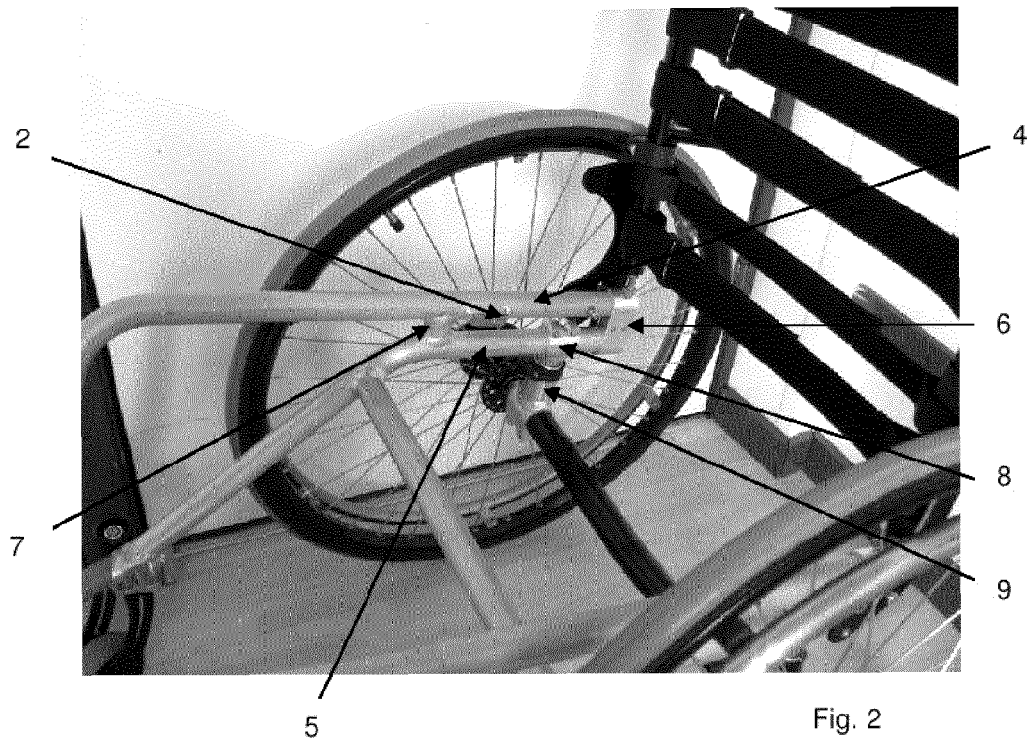
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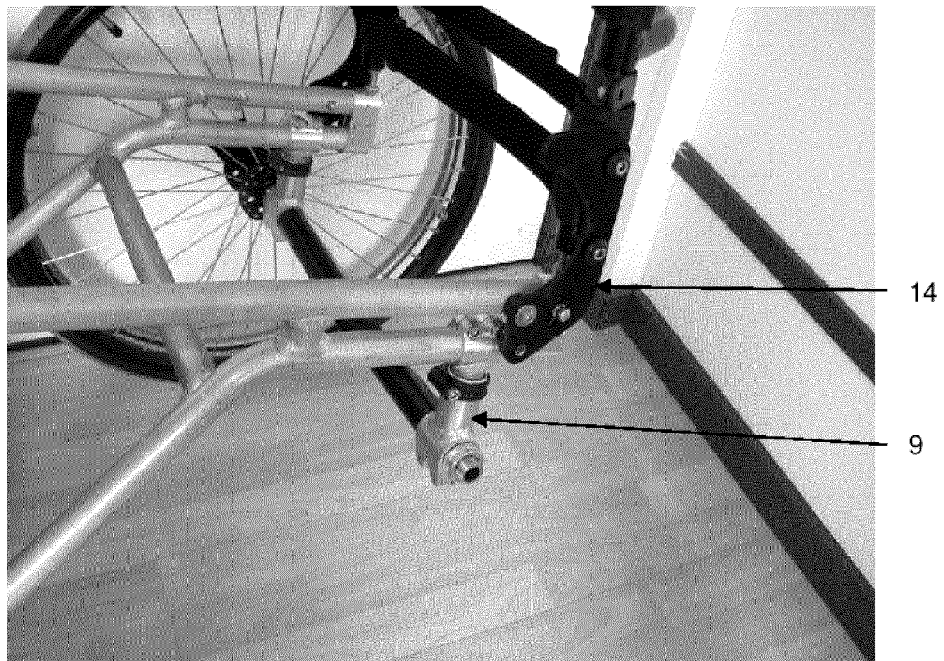
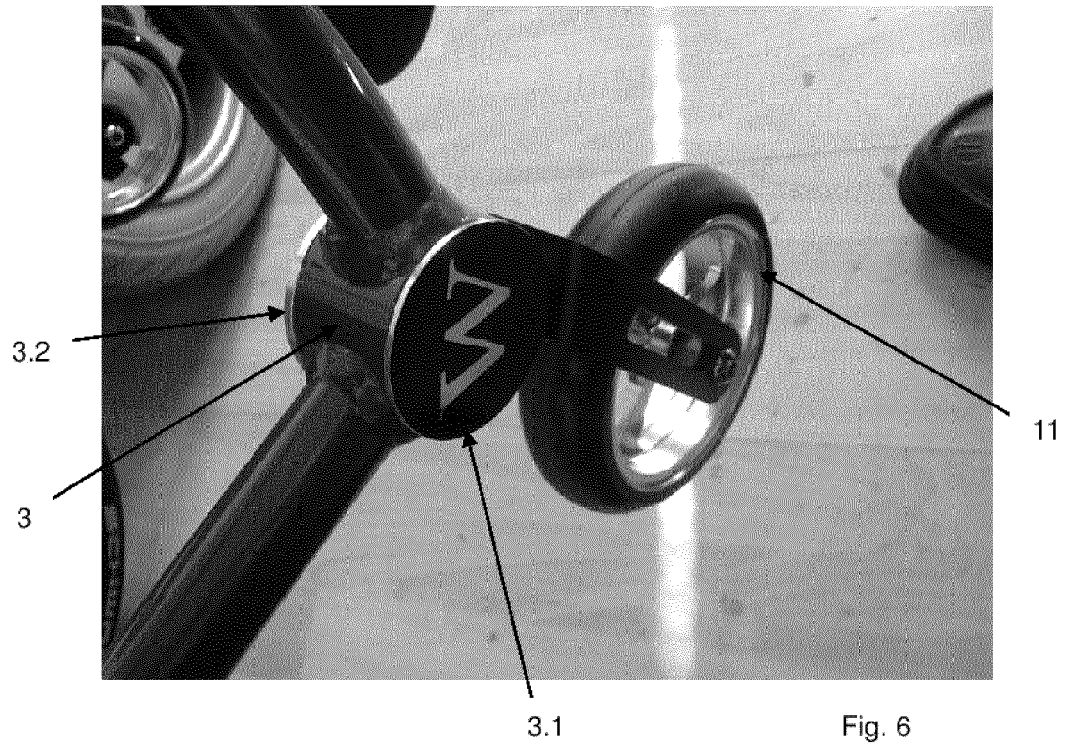


Fig. 4



Fig. 5



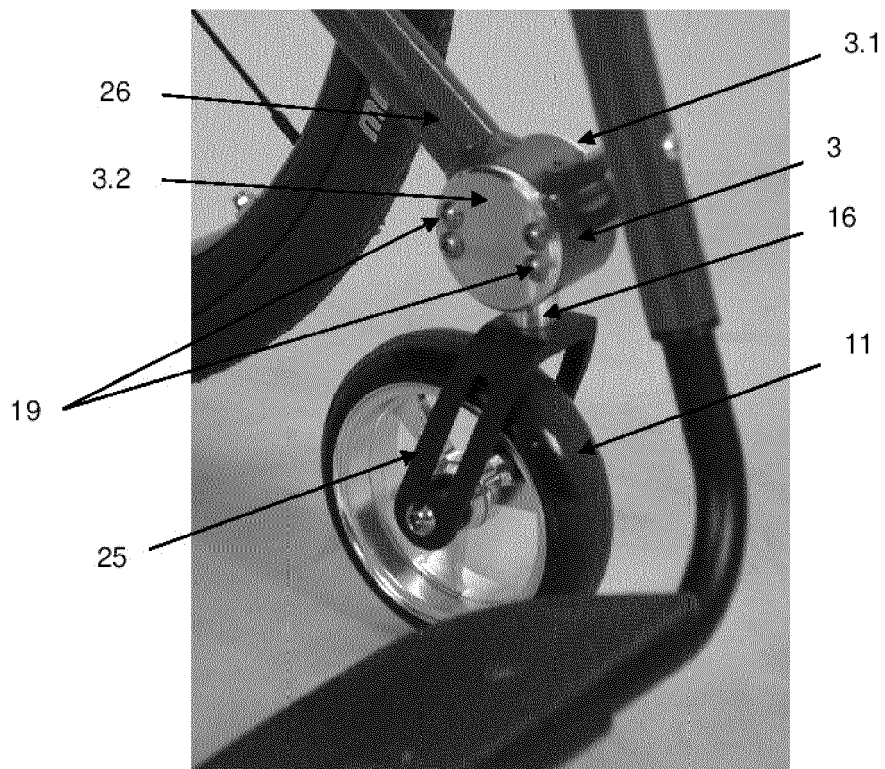


Fig. 8

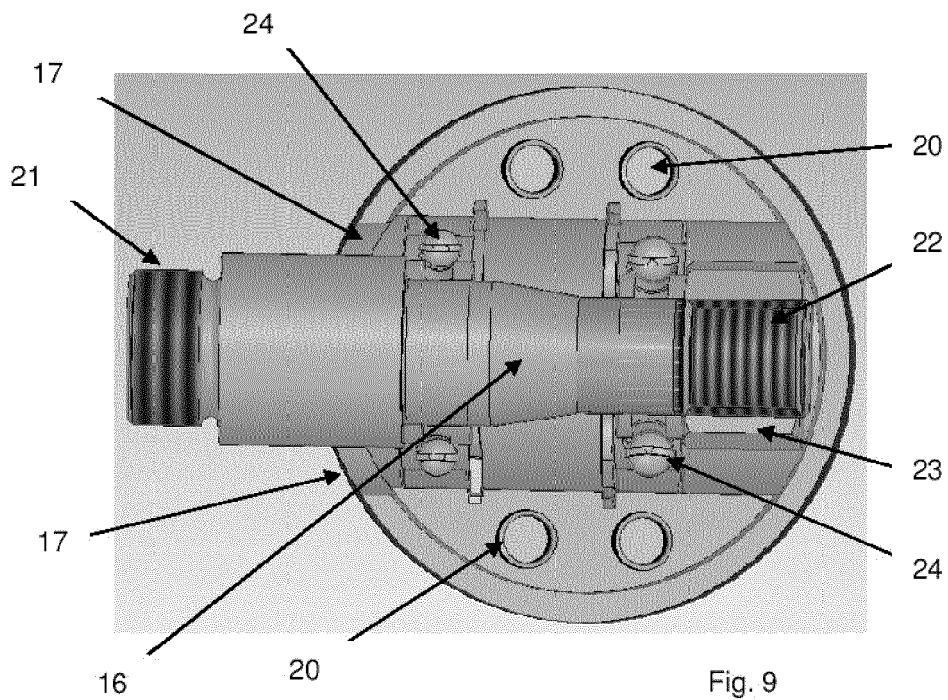


Fig. 9