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(71) Applicant(s):  
Fredrick Charles Brown  
105 St Albans Road, Sandridge, ST ALBANS,  
Hertfordshire, AL4 9LH, United Kingdom

(72) Inventor(s):  
Fredrick Charles Brown

(74) Agent and/or Address for Service:  
Dolleymores  
9 Rickmansworth Road, WATFORD, Herts, WD18 0JU,  
United Kingdom

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GB 1152424 A CN 103754094 B  
DE 010212623 A1 ES 002530441 A1  
JP 2002186649 A US 6139032 A  
US 4299407 A US 20150298764 A1  
JP 3185187  
KR1020130139470

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(54) Title of the Invention: **A vehicle**  
Abstract Title: **Vehicle with offset steering, adjustable suspension and standing space**

(57) A vehicle comprises a frame 2, wheels 3 supporting the frame 1, a seat for a user of the vehicle 1, a direction control device 9 to be operated by the user 35 seated on the vehicle 1, a footrest 7 arranged to support the seated users feet and a support ('tiller') 8 supporting the direction control device 9 in a position which is in front of the user when seated, wherein the footrest 7 is located forward of, or at the side of, the tiller 8 and the tiller 8 is offset to one side of the vehicle 1. This provides a vehicle which is particularly easy to access and permits the vehicle to be relatively stable by, the user's centre of mass being relatively centrally placed upon the vehicle 1. It also permits the user to adopt a beneficial posture on the vehicle. The invention may find particular application to mobility scooters and golf carts. Also claims is a vehicle having an open central portion (16, figure 5) such that a user (35, figure 7) may stand while within the envelope of the vehicle. Suspension adjustable to allow for the user's weight and/or to control ground clearance is also claimed.

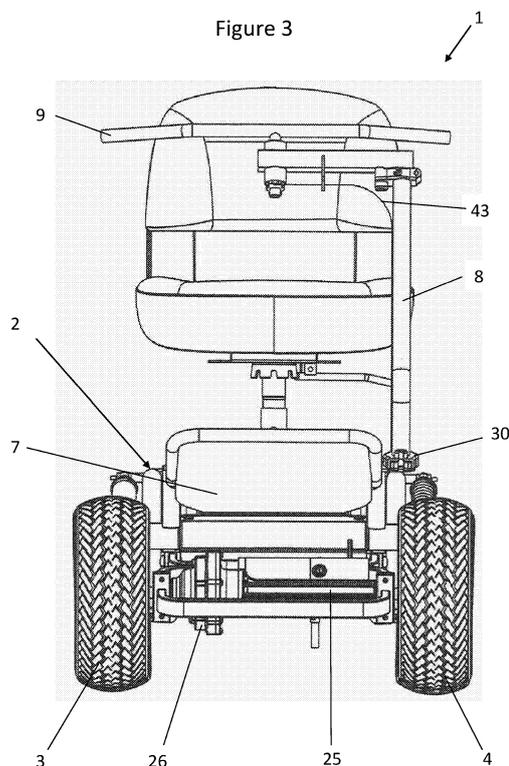




Figure 2

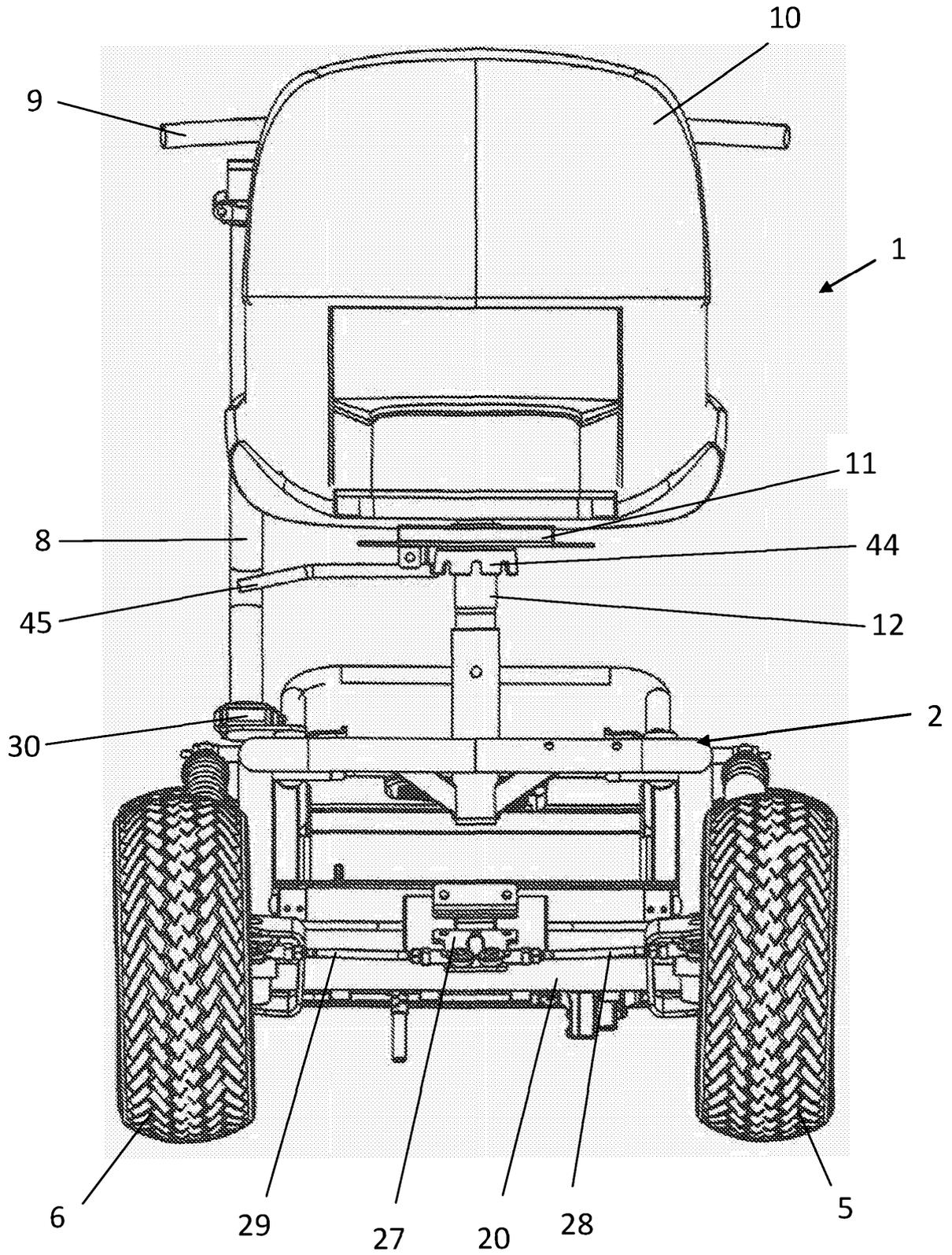


Figure 3

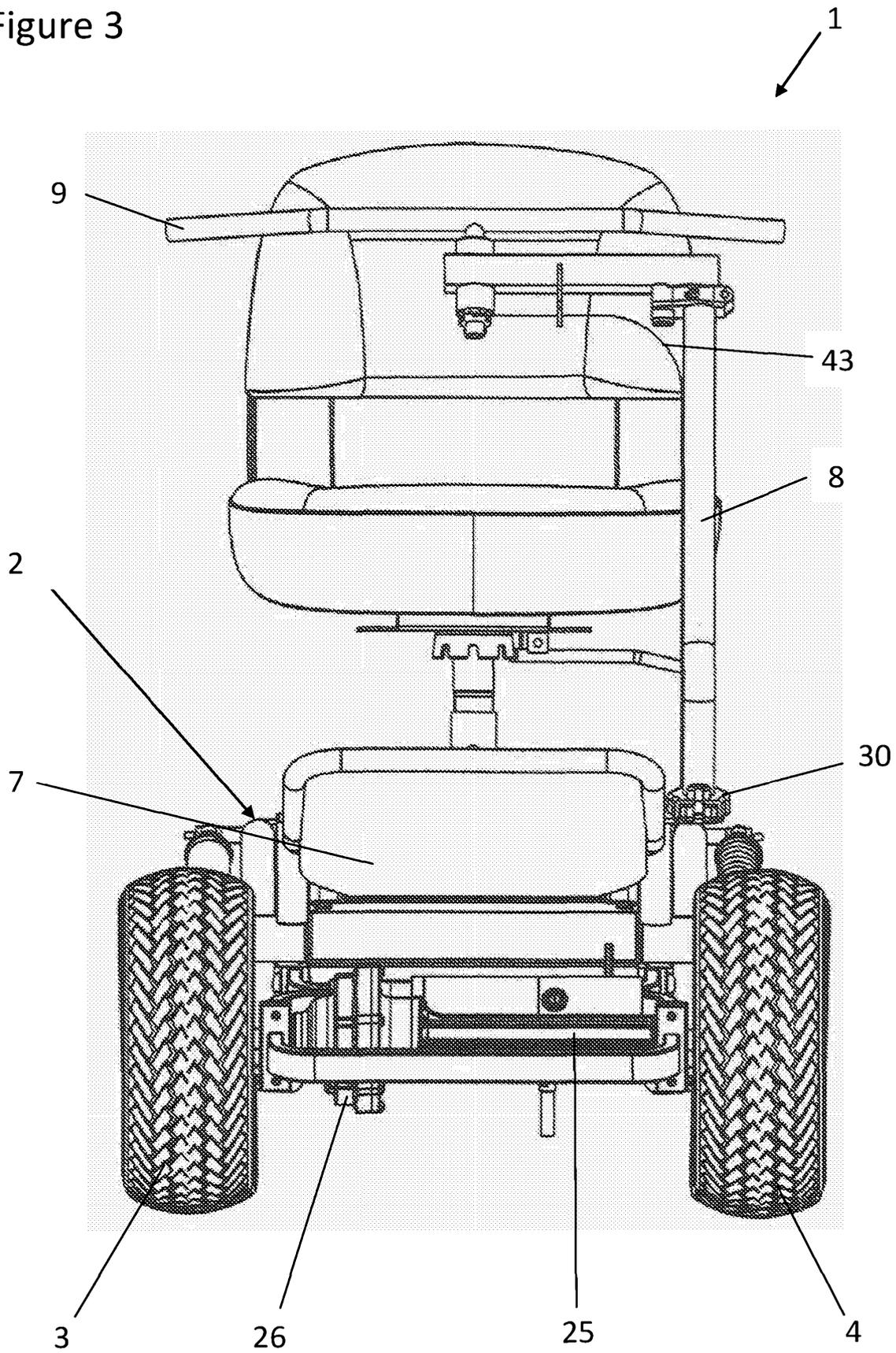


Figure 4

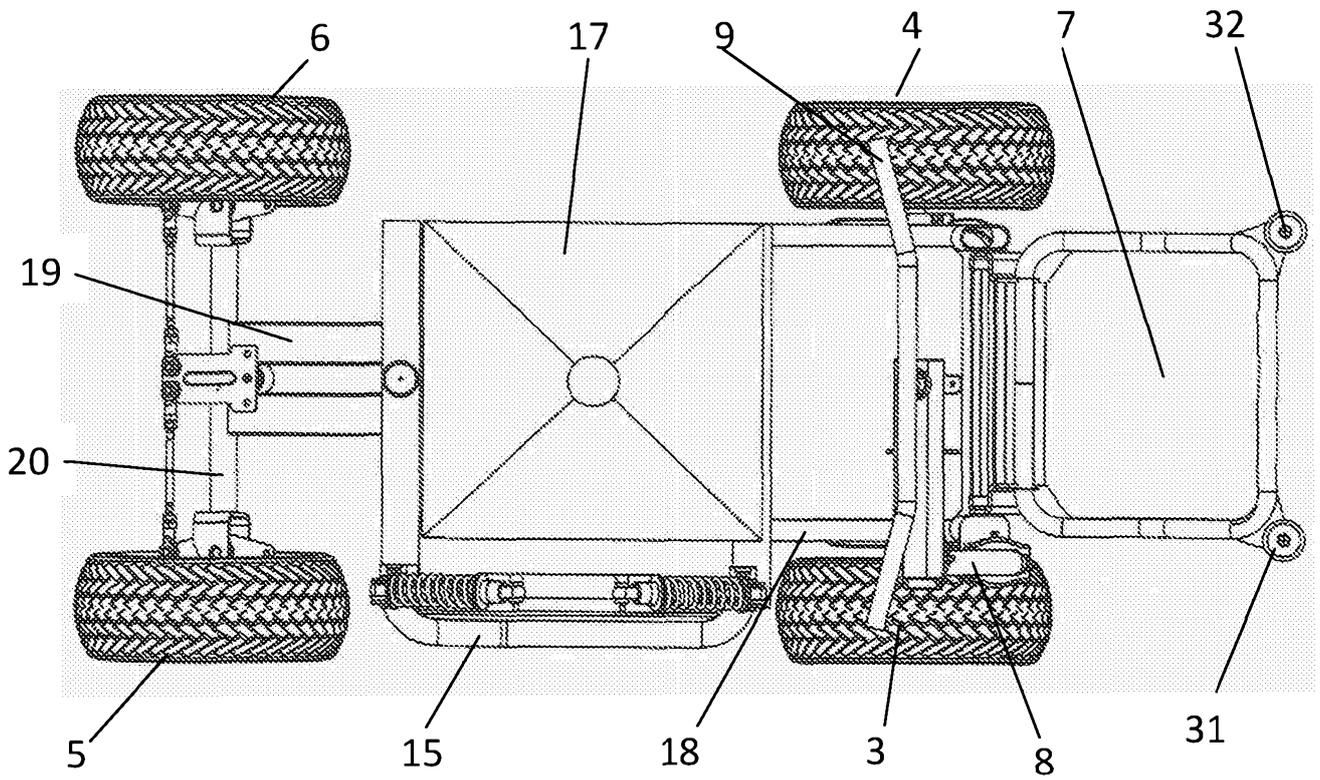


Figure 5

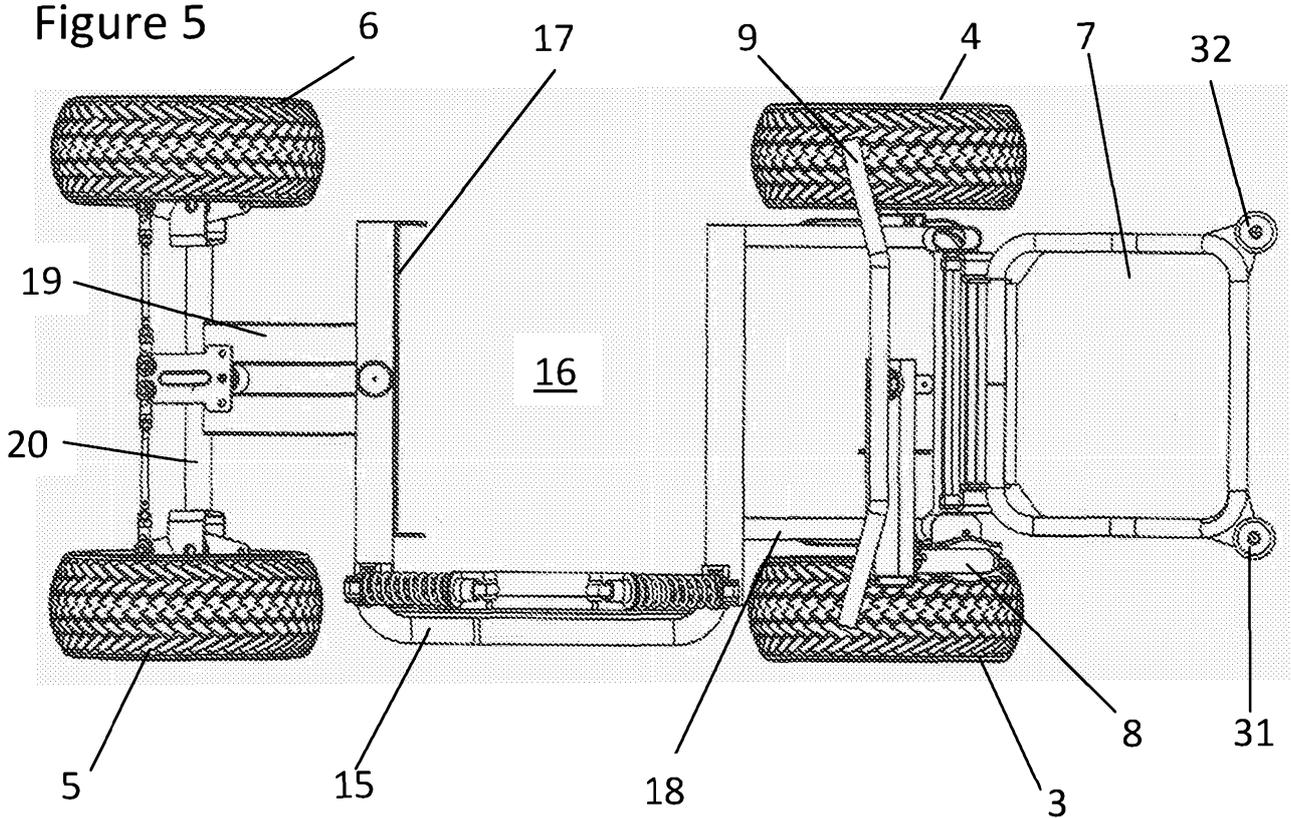


Figure 6

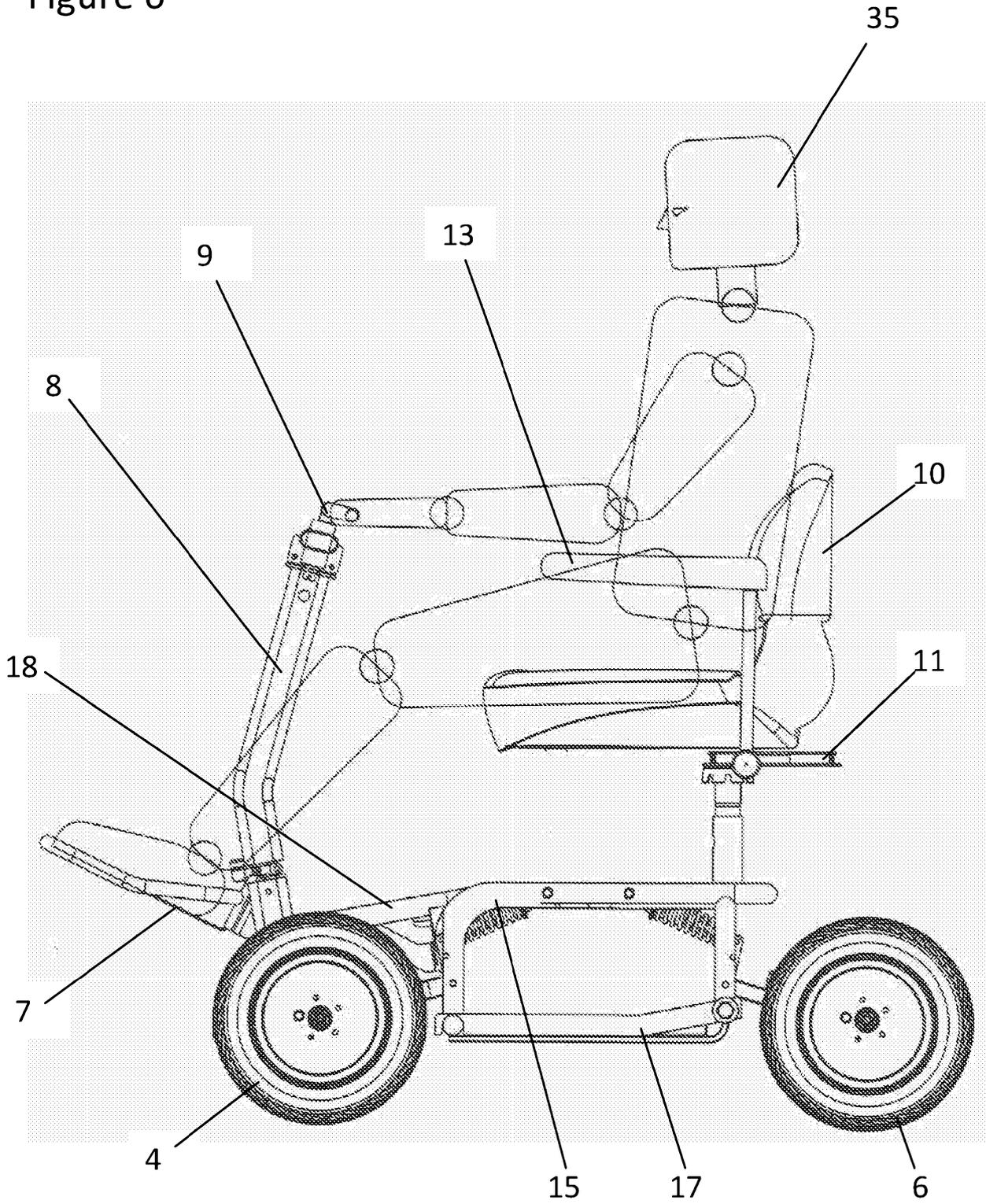


Figure 7

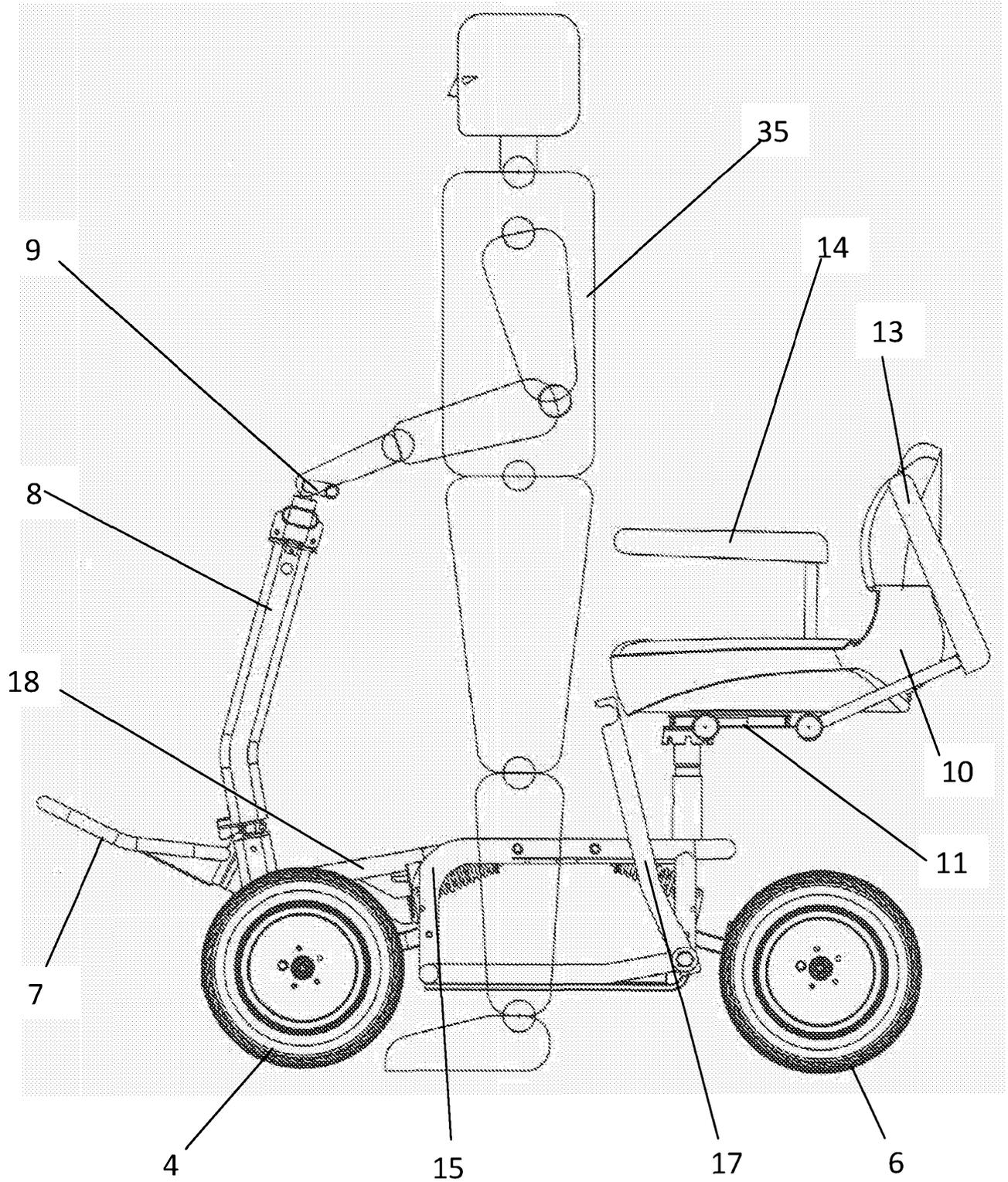


Figure 8

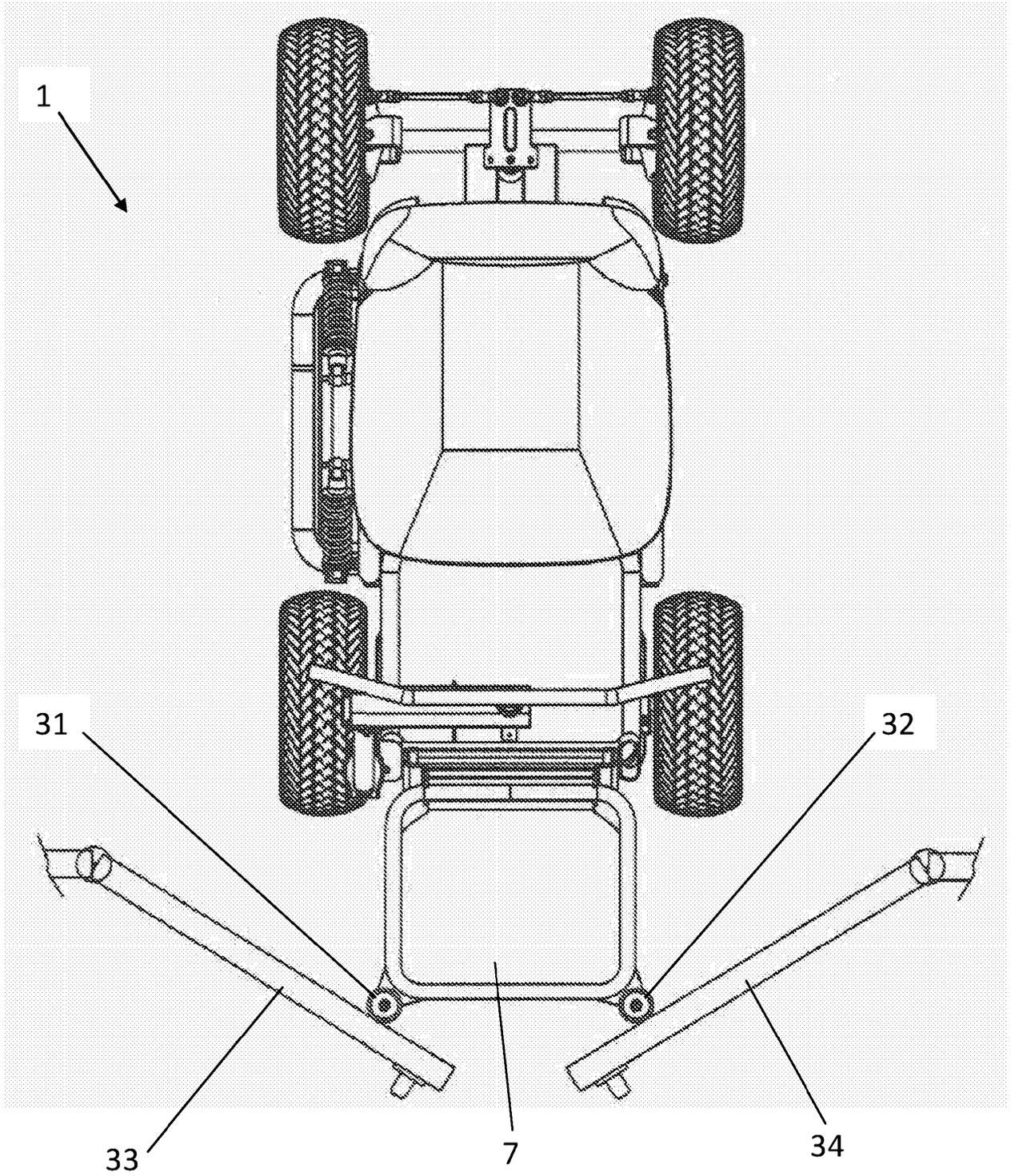


Figure 9

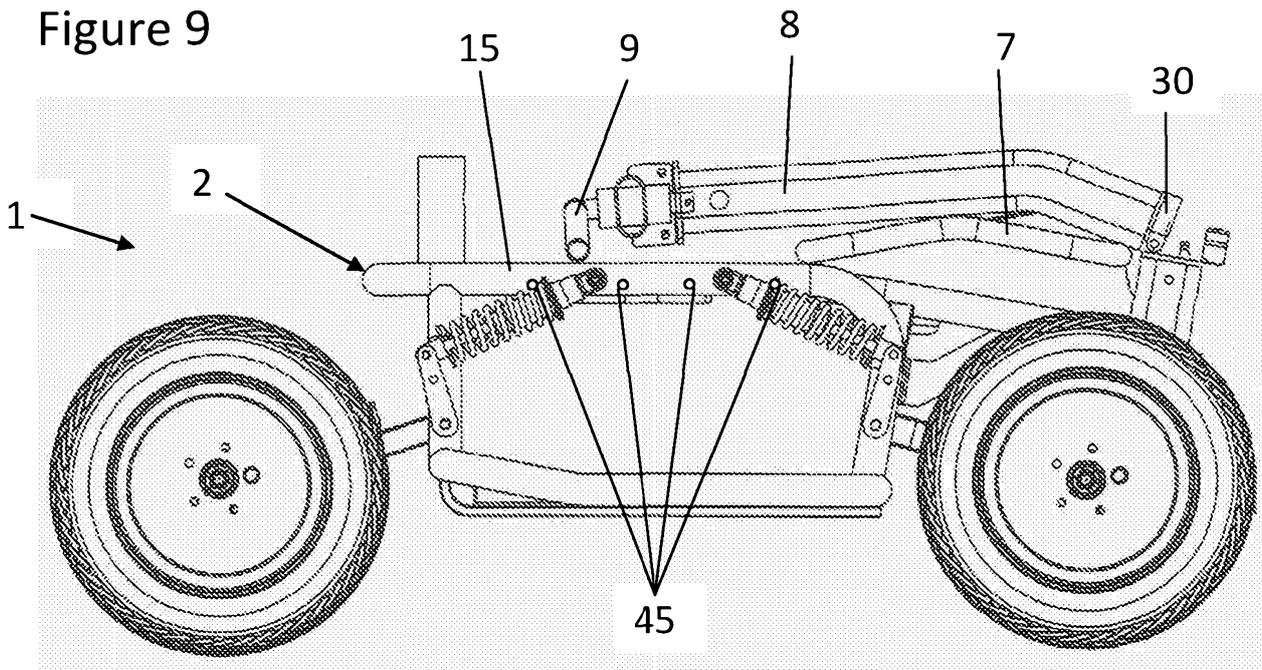
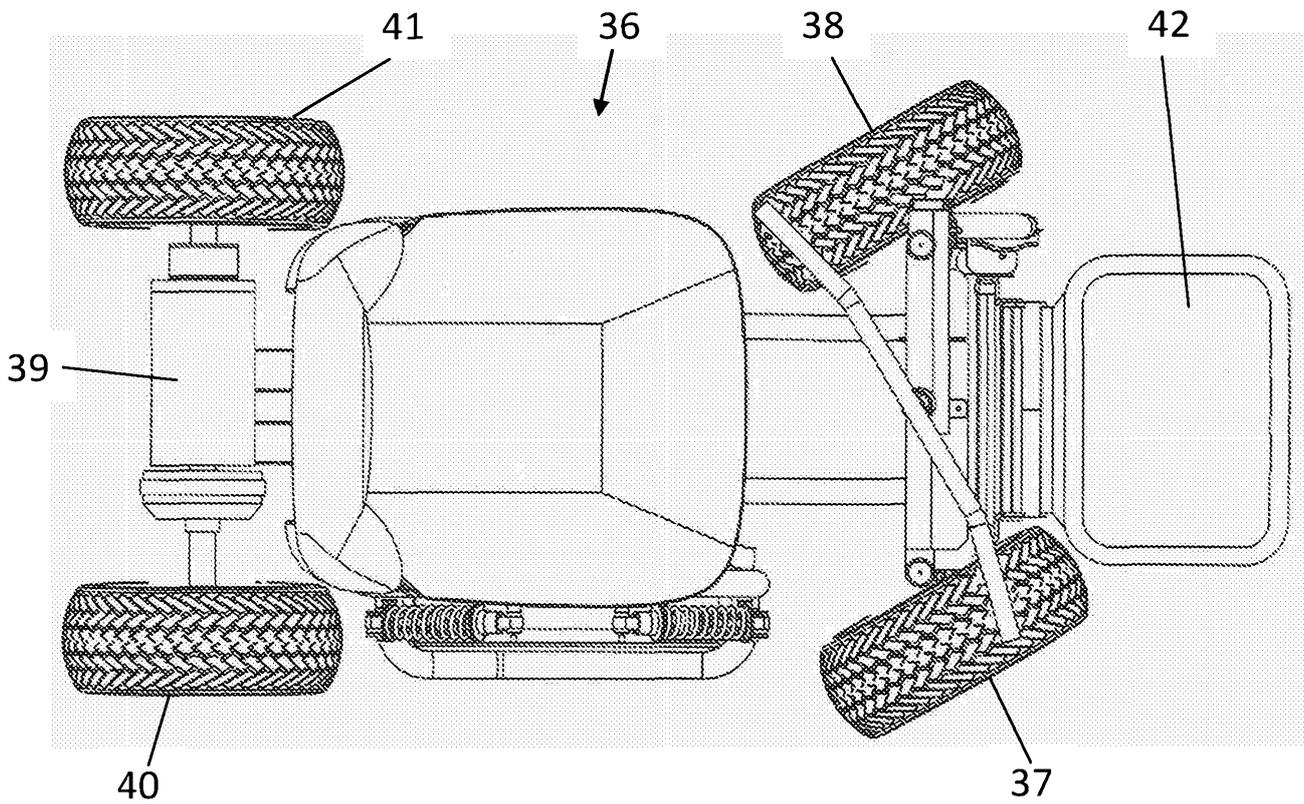


Figure 10



## A Vehicle

The present invention relates to a vehicle and particularly, but not exclusively, to mobility scooters and golf carts.

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The invention, as stated above, may be particularly applicable to mobility scooters and for that reason the invention is discussed below with reference to mobility scooters. However, the same considerations mentioned below in respect of mobility scooters will apply to some other types of vehicle and in particular to golf carts and other small compact vehicles, more particularly single seat vehicles.

10

Mobility scooters have been known for over thirty years, with the earlier scooters tending to be three wheel scooters and later scooters tending to be four wheel scooters.

15

The three wheel scooter and four wheel scooter each have their advantages and disadvantages, particularly when it comes to the three major considerations which need to be taken into account when designing such a scooter. These are the posture of the user, the stability of the scooter and the ease of access to the scooter (getting on and off the scooter).

20

Considering each in turn, posture is important because the person must be comfortable when seated. Generally three wheel scooters tend to be better for posture than four wheel scooters, for they permit a user to place their feet on either side of a single central front wheel. This tends to keep the user in a positive posture with their limbs outstretched in front of them. In contrast, with a four wheel scooter, the front wheels and any wheel guards, which must both accommodate the front wheels and the space swept by the front wheels when turning, together with the space occupied by the steering mechanism, normally means that the feet have to be placed behind the front wheel assembly, often in a space extending forward from immediately below a front edge of the seat, causing the user's posture to be "compressed". Furthermore, it is not desirable to raise the user so

25

30

that they may position their feet above the front wheels, for this raises the centre of gravity tending to destabilise the scooter, for such scooters have a relatively narrow track width to enable them to pass easily through conventional doorways.

5           A second consideration when designing a scooter is the stability of the scooter. Four wheel scooters tend to be more stable than three wheel scooters, particularly during cornering, due to the provision of a wheel on each corner of the scooter. In contrast, three wheel scooters can tend to tip during cornering, due to having only a single front wheel. This can be particularly problematic, as a disabled  
10 or older person may not be able to put their foot down in time, or with sufficient strength to avoid an accident. Furthermore, they may not tend to shift their weight on the scooter, for example when cornering, as a more able bodied person may do, possibly subconsciously.

15           A three wheel scooter may though have one advantage over a four wheel scooter. This is because, where the user's feet are placed either side of a single central front wheel, typically twenty five percent of the body weight is over the front wheel. This helps to keep the centre of mass of the scooter forward, which in turn helps with the problem of tipping over backwards on a steep slope, or possibly  
20 when mounting a curb. In contrast, with a four wheel scooter the user tends to have to sit fairly far back on the scooter, in order to be able to place their feet behind the front wheels, thus the centre of mass on a four wheel scooter tends to be significantly further towards the rear of the scooter than on a three wheel scooter and this can tend to cause the scooter to tip over on a steep slope or when  
25 mounting a curb.

The third consideration is ease of access to the scooter, the ability to easily get on and off the scooter. Both three and four wheel scooters tend to be relatively compact for reasons of cost, manoeuvrability and ease of transportation of the  
30 scooter (for example in the back of a user's car). This compact design normally requires a user to bend their limbs to a significant degree when getting on or off a

scooter, which can be particularly problematic where, because of an illness or age, bending of the limbs may be very uncomfortable.

To partly address this, some scooters have a swivel seat. The seat can then  
5 be positioned sideways, to permit a user to sit on the seat while still standing on the  
ground at the side of the scooter. The seat can then be rotated to a forward facing  
position where it is locked in place. This may partly address the issue for some  
people, particularly those with balance perception (inner ear degradation) and for  
people with difficulties in balance perception it is recommended that they have a  
10 scooter with a swivel seat. However with a swivel seat, in order to rotate the seat  
back into the forward facing driving position, a user will normally have to drag the  
seat around by using the strength in their arms, acting against some other part of  
the scooter, such as handlebars, which may be difficult for a frail or disabled  
person to do.

15

In addition to the above, there can be other disadvantages with swivel seats.  
For example, if the seat does not lock in the sideways position it may move away  
from the person if any force is applied to it, before the person can correctly position  
themselves on the seat, which could result in a fall. Also, if for any reason the seat  
20 does not lock in the straight ahead driving position, for example if the user does not  
rotate the seat sufficiently for it to obtain the straight ahead driving position, then  
during use, if the scooter changes direction, the seat will tend to retain its position,  
effectively turning in the opposite direction to the scooter and possibly throwing the  
user off. Also, swivel seats tend to have inbuilt tolerance, so that even when  
25 locked in the forward facing position, the seat can tend to rattle and more  
importantly provide a feeling of insecurity to the user.

30

A further problem arises if the scooter is not on level ground, for unless the  
scooter is level then it will be particularly difficult for the user to rotate the seat in a  
controlled manner.

It is an object of the present invention to provide an improved vehicle.

According to a first aspect of the present invention there is provided a vehicle comprising a frame, wheels supporting the frame, a seat for a user of the vehicle, a direction control device to be operated by the user seated on the vehicle, a footrest arranged to support a seated users feet and a tiller supporting the direction control device in a position which is in front of the user when seated, wherein the footrest is located forward of, or at the side of, the tiller and the tiller is offset to one side of the vehicle.

A vehicle in accordance with the first aspect of the invention, in having an offset tiller, enables a clear access path to be provided to the footrest for a user's feet and lower limbs. This may permit a user to sit on the seat and then swing their feet onto the foot rest, unimpeded by a central tiller, or to extend their feet forward from a position adjacent or slightly under the seat to an outstretched forward position. Particularly, in the case of a four wheel vehicle, the offset tiller may free up the space between the front wheels permitting the user to then place their feet on a footrest between the front wheels, or to extend their feet forward through a space between the front wheels to a footrest mounted in front of the front wheels. This may permit the footrest to be positioned relative to the seat, so that the knee joint is no less than  $105^\circ$  to the upper leg and the upper leg is no less than  $105^\circ$  to the body, avoiding the "compressed" posture often experienced by users of four wheel vehicles.

The tiller may be arranged to be folded substantially flat over the frame in a transport configuration, to assist in transporting the vehicle in the back of a car, for example. This may particularly be the case where the seat is also arranged to be easily detached from the frame of the vehicle.

The direction control device may typically be handlebars (in applications where the intended user has use of both their hands), or it could be in the form of a steering wheel or a steering wheel with a knob mounted on it to permit single

handed operation. However, it could alternatively be in the form of non-mechanical controls for operating a remote actuator.

5 Where handlebars or a steering wheel are used, it is preferable that these are connected by a linkage to a pair of steerable wheels and the linkage may for example be a cable, rod, electrical (actuator) or hydraulic linkage.

10 The seat may be arranged to rotate between a straight ahead position and a sideways position facing towards the side opposite to the tiller, to permit a user to sit on the seat when in the sideways position and subsequently rotate the seat to the straight ahead position and swing their feet onto the footrest.

15 A seat which may be rotated between a straight ahead position and a sideways position (a swivel seat) may be of particular advantage when used with the offset tiller, as it may enable a user to sit on the seat whilst standing on the ground at the side of the vehicle and then to rotate the seat to the straight ahead position. This may permit the user to swing their feet directly onto the footrest, without having to first bend their legs to permit at least one of their feet to pass a central tiller.

20

25 However, as previously mentioned, there may be disadvantages to some people in using a swivel seat and this can also be problematic where the vehicle is not on level ground. Here the seat may be difficult to rotate against gravitational forces, or the seat may swing violently, once released, under the action of gravitational forces.

30 In accordance with a second aspect of the invention, which may particularly be advantageously employed with a vehicle in accordance with the first aspect of the invention as well as with other types of vehicles, a frame of the vehicle has a central portion located between front and rear wheels of the vehicle, which central portion of the frame is open on one side so as to permit a user to walk unimpeded

into a central free space defined by the frame, to face forward and to sit on the forward facing seat whilst still having their feet in contact with the ground.

5 A vehicle in accordance with this aspect of the invention permits a user to walk unimpeded into the free central space and then to face forward before sitting on the seat. The advantage of this is that they may firmly stand on the ground and from there lower themselves onto the seat, obtaining the advantages previously described with respect to a swivel seat arrangement. However here the seat is already fixed in a forward facing driving position, thus avoiding the need for the  
10 user to subsequently swivel the seat and the disadvantages associated with this.

A further significant advantage of this arrangement is that, where the vehicle has handlebars, or similar, located on a tiller in front of the user, the user may hold onto this for support as they lower themselves onto the seat. This is particularly  
15 advantageous because both the handlebars and the seat are fixed in position on the vehicle and therefore are fixed relative to each other. Thus the seat will not move relative to the position of the handlebars and thus the handlebars provide a very substantial and rigid support as the user lowers themselves onto the seat. Similarly the handlebars may be used to assist and stabilise the user, when raising  
20 themselves from the seat onto their feet.

Once seated on the seat, the user may then raise their feet off the ground and place them forward onto a footrest or footrests. This may be particularly  
25 advantageous when employed with a vehicle having an offset tiller, for this may provide a space in front of the user for the user to raise their feet onto the footrest, which is preferably located in front of the central free space within the frame.

Advantageously the seat is arranged to be moved, so as not to obstruct a user walking into the central free space in the frame and to then subsequently be  
30 moved back to a driving position, where the seat and a user are at least partly positioned over the free space. This may be achieved for example by arranging for

the seat to be moved backwards and forwards or for the seat pan of the seat to be raised.

5 The advantage of such arrangements is that the seat in one arrangement may be arranged to be first set well back on the vehicle while the user walks into the free space, but once the user is on the seat, the seat may then be brought forward to the driving position, to bring the centre of mass of the user forward on the vehicle, permitting the wheel base of the vehicle to be relatively short whilst still maintaining stability, particularly against tipping over backwards. Alternatively the  
10 seat may be set well forward and the same advantage achieved by the raising and lowering the seat pan.

Where the seat moves backwards and forwards then preferably the vehicle further comprises a lever which is arranged to be moved between a first position,  
15 where the seat is moved forwards to a forward position and a second position where the seat is moved backward to an aft position. This provides a relatively easy mechanism which may be operated by the user, or an aid, to move the seat forward and backwards in a controlled manner.

20 The vehicle may further comprise a floor section which, in a first lowered position, covers the free space and which is arranged to be raised to a position that permits a user to access the free space. This floor section may be linked to the same lever that moves the seat forwards and backwards, so that the floor section will be raised as the seat is moved backwards and lowered as the seat is moved  
25 forwards. Alternatively, where the seat pan is arranged to be raised and lowered, the floor section may be linked to the seat pan so that it is raised and lowered with the seat pan. However, the floor section could be raised and lowered by a separate means.

30 The provision of the floor section to cover the free space is a safety feature, in case a user's feet may slip from the footrest whilst the vehicle is being operated. However, with the floor section in place, this space may also then be used for the

storage of shopping or other items, centrally on the vehicle and relatively close to the ground, which will act to stabilise the vehicle.

Preferably, where the vehicle has a lever for moving the seat backwards and forwards, the vehicle further comprises a pair of armrests, wherein the lever is in the form of one at least one of those armrests, such that raising an armrest causes the seat to move backwards to the aft position and lowering the armrest causes the seat to move forward to the forward position. This is convenient because it avoids the need for an extra lever and because the lowering of the armrest to the correct position will automatically ensure that the seat is in the correct position, where it may additionally be locked by a separate mechanism.

Where the vehicle has; an offset tiller without the open central portion of the frame; an open central portion of the frame without an offset tiller; or both an offset tiller and the open central portion in the frame, the vehicle may advantageously comprise two front wheels where the foot rest, in use, is located in front of the front wheels. This permits the centre of mass of the user to be located relatively forward on the vehicle, whilst still permitting the user to correctly position their legs and feet so that they avoid a "compressed" posture and whilst also keeping the wheel base relatively short, in order to maximise the manoeuvrability of the vehicle.

Preferably the footrest is substantially rectangular and has rollers or wheels located in its front corners to assist with the opening of doors.

The footrest may also be arranged to fold back in between, or over, the front wheels in a transport configuration, in order to shorten the overall length of the vehicle for transportation.

Preferably the vehicle further comprises a suspension system attached to the wheels of the vehicle, which suspension system is arranged to be adjusted in dependence on the weight of a user. This will permit the stiffness of the suspension to be adjusted so that it is set to an appropriate level for the user, a heavier user

requiring a stiffer setting than a lighter user, in order to minimise the risk of the suspension reaching the limit of its travel (in either direction) which may hinder kerb climbing at an angled approach. This may also help avoid a heavier user causing the vehicle to bottom out and become stranded on uneven terrain. It will also act to  
5 minimise general discomfort to the user during normal use, which may be particularly important for frail users, users that are in pain or who suffer from back complaints or arthritic joints.

The vehicle may additionally, or alternatively, have a suspension system  
10 attached to the wheels of the vehicle, which suspension system is arranged to be adjusted to alter the ground clearance of the vehicle. This will enable the ground clearance to be set to a minimum for on road use, to keep the centre of gravity as low as possible, in order to maximise stability, or it may be raised to avoid the vehicle grounding when used off road. The suspension may be raised in any  
15 conventional manner, for example where the vehicle has shock absorbers fitted, there may be several anchor points provided for at least one end of a shock absorbers, where the ride height of the vehicle will depend on the anchor points selected.

20 The present invention will now be described, by way of example only, with reference to a mobility scooter as illustrated in the accompanying figures of which:

Figure 1 is a side view of a mobility scooter in accordance with first and  
25 second aspects of the present invention;

25

Figure 2 is a rear view of the scooter of Figure 3;

Figure 3 is a front view of the scooter of Figures 1 and 2;

30 Figure 4 is a plan view of the scooter of Figures 1 to 3 with a floor section lowered and the seat removed for clarity;

Figure 5 corresponds to Figure 4 but shows the floor section raised;

Figure 6 is a left hand side view of the scooter shown in Figures 1 to 5, with a schematic representation of a user when in a seated driving position;

5

Figure 7 substantially corresponds to Figure 6, but shows the scooter with the seat in a rearward position and the floor section raised, with the schematic representation of a user now shown in a standing position for boarding or leaving the scooter;

10

Figure 8 is a plan view of the scooter of Figures 1 to 7, showing how rollers on the front of the footrest may be used to assist in opening doors;

Figure 9 is a side view of the scooter as shown in Figure 1, but in a transport configuration with the footrest folded inwardly above the front wheels, the tiller folded down and the seat removed.

With reference now to the side view of Figure 1, rear view of Figure 2, front view of Figure 3 and plan view of Figure 4 (showing the seat removed for clarity), a mobility scooter in accordance with the present invention is indicated generally as 1. This comprises a frame, indicated generally as 2, a pair of fixed front wheels 3 and 4 and a pair of steerable rear wheels 5 and 6.

To the front of the frame 2 is mounted a foot rest 7 and to the side of the frame 2, towards the front of the frame 2 is mounted a tiller 8, supporting handlebars 9 for steering the rear wheels 5 and 6.

On top of the frame 2 is mounted a seat 10, which seat 10 is on seat runners 11 mounted on a seat post 12, which seat post 12 is releasably mounted on the frame 2. Armrests 13 and 14 are also mounted to the seat runners 11 and raising and lowering the armrests 13 and 14 causes the seat 10 to move backwards and forwards on the seat runners 11.

The frame 2 comprises a central section 15 (as can be most clearly seen from Figure 5) which, in this embodiment, is open on the left hand side of the scooter, (in both Figures 4 and 5 the seat 10 is shown removed for clarity). This  
5 central section 15 of the frame 2 defines a central free space 16, which in Figure 4 is shown covered by a floor section 17, which floor section 17 is shown raised vertically in Figure 5.

A front section 18 of the frame 2 extends forward of the central section 15 of  
10 the frame 2 and it is to a side of this front section 18 that the offset tiller 8 is mounted. It is also to a front edge of this front section 18 of the frame 2 that the foot rest 7 is mounted, by being pivotally connected to the front edge, so that it may be lowered to the position shown in Figure 1 or raised and folded inward to the  
15 folded, stowed, configuration shown in Figure 9.

Pivotally mounted, for vertical movement, to the rear of the central section  
15 15 of the frame 2 is a rear suspension leg 19. This connects a rear cross member 20, on which the steerable wheels 5 and 6 are pivotally mounted, to the frame 2.

A lever mechanism 21 connects the rear suspension leg 19 to adjustable  
20 spring damper 22. The spring damper 22 may be adjusted, depending on the weight of an occupant, to ensure that during normal use the travel of the rear suspension leg 19 does not exceed that which can be accommodated by the spring damper 22, avoiding the suspension bottoming out or not flexing sufficiently,  
25 both of which may cause discomfort to a user 35 of the mobility scooter 1.

A similar arrangement is provided on the front of the scooter 1, with  
adjustable spring damper 23 being connected via lever mechanism 24 to a front  
axle 25 (see Figure 3), on which is mounted an electric motor 26 driving the front  
wheels 3 and 4.

30

The ground clearance of the scooter 1 may also be set by connecting the spring dampers 22 and 23 to an appropriate one of anchor points 45 provided in the frame 2.

5           The rear wheels are steered by a cable 43 (see Figure 3) connecting the handlebars 9 to a steering plate 27, to which the steerable rear wheels 5 and 6 are connected by respective track rods 28 and 29. However, an arrangement of shafts and cogs, or similar, could be used as an alternative to the cable 43.

10           The offset tiller 8 has a joint 30 towards its lower end, which may be released to permit the tiller to fold substantially flat over the top of the frame 2, when the seat 10 has been removed (as shown in Figure 9).

          A pair of rollers 31 and 32 are provided on the front corners of the front  
15 section 18 of the frame 2. These, as illustrated in Figure 8, may be used to assist with the opening of doors 33 and 34, but also act as bumpers and assist if the front corner of the scooter should come into glancing contact with a wall, or similar, minimising potential damage to not only the scooter but also the wall.

20           Referring now to Figures 6, this shows a schematic of a user 35 of the scooter 1, when in a driving position. Here the armrests 13 and 14 of the scooter 1 have been lowered, resulting in the seat 10 adopting a forward driving position on the seat runners 11, as shown, so that the centre of mass of the user 35 is towards a centre point of the central section 15 of the frame 2, well forward of the rear  
25 wheels 5 and 6. This makes the scooter 1 far less likely to tip over backwards when mounting an incline or mounting a curb. This also avoids the need for additional rearward extending safety wheels, or skids, employed on some scooters to prevent a scooter from tipping over backwards. This more central position of the centre of mass of the user 35 also enables a rear suspension to be employed, for such a  
30 rear suspension may, where the centre of mass of a user 35 is positioned further towards the rear of the scooter, tend to encourage a scooter to tip over backwards.

From Figure 6 it will be appreciated that the wheel base of the scooter 1 is slightly shorter than the length over which the user 35 extends when seated. This relatively short wheelbase maximises the manoeuvrability of the scooter 1, especially with the rear wheel steering, whilst permitting the user to be seated in a relatively comfortable posture, where the knee joint is extended to more than 105° relative to the upper leg and the upper leg is extended at more than 105° to the main body of the user 35. Also the front feet of the user 35 are inclined at a comfortable angle in front of the front wheels 3 and 4 of the scooter 1.

The posture of the user 35, as shown in Figure 6, is made possible as a result of the tiller 8 being offset, in this case to the right hand side of the scooter 1, providing space for the user 35 to freely extend their legs to the forward mounted foot rest 7 and providing a space to enable the user to swing their legs in an arc to the forward mounted footrest 7.

With the scooter illustrated in the present Figures, the runners 11 are provided to permit the seat 10 to move forwards and backwards which, in combination with the central section 15 of the frame 2 being open to one side, assists the user 35 in boarding or disembarking from the scooter 1, as will be described below with reference to Figure 7.

However, if in another embodiment the central section 15 of the frame 2 were not open to one side, it would be advantageous if the seat could swivel in a conventional manner. To illustrate this, although not necessary with this embodiment illustrated in the figures, the figures (particularly Figure 2 for example), show the seat runners 11 attached to the seat post 12 via a fitting 44. The fitting 44 permits the seat runners (and thus the seat 10) to pivot on the seat post 12. The seat is normally locked in the forward facing driving position by handle 45, which is biased to lock the seat in the forward facing driving position on the seat post 12. However raising the handle 45 permits the seat 10 to swivel sideways, to assist the user 35 boarding or disembarking from the scooter 1. Here, the offset tiller 8

permits the user 35 to then swing their feet onto or off the footrest 7, without having to unduly bend their legs.

Referring now to Figure 7, in the embodiment illustrated in the present  
5 figures, raising the armrest 13, to the position shown in Figure 7, causes the seat 10 to move backwards. This also causes the floor section 17 to be raised by a linkage, not shown in the figures. This permits the user 35, whilst still holding onto the handlebars 9, to place their feet on the ground in the central free space 16,  
10 defined by the central section of the frame 15 (see Figure 5), to raise themselves and obtain their balance. Once correctly balanced they may then turn and walk out of the open side of the central section 15 of the frame 2.

In order to board the scooter 1 the user 35 may walk into the free space, take hold of the handlebars 9, turn to face the front of the scooter 1 and then lower  
15 themselves onto the seat 10. They may then raise their legs forward towards the footrest 7, at the same time as bringing the armrest 13 forward, back to the position shown in Figure 6. This thus provides a particularly safe way for the user 35 to board the scooter 1, for they may hold the handlebars 9, which are fixed in position relative to the seat 10, as they sit on the seat 10, avoiding problems which may be  
20 encountered with a swivel seat, particularly when the scooter 1 is not on level ground. In an alternative embodiment, not illustrated, the seat pan of the seat 10 may be arranged to be raised and lowered for the same purpose, avoiding the need to slide the seat backwards and forwards. However, with such an arrangement it may be a little more difficult for the user to lower themselves onto  
25 the seat as the seat pan is lowered and to raise themselves off the seat as the seat pan is raised.

Referring now to Figure 8, as previously mentioned this shows how the rollers 31 and 32 permit the scooter 1 to pass through doors 33 and 34. As also  
30 previously mentioned, Figure 9 shows how the seat 10 may be removed from the frame 2, footrest 7 may be folded inwardly above the frame 2 and the tiller 8 may

be folded down as shown, in order to provide a particularly compact “stowed” configuration for assisting transport of the scooter 1.

A scooter 1 has been described with reference to Figures 1 and 9 which  
5 employs steerable rear wheels, but the concepts previously described of the offset tiller and a frame having a central section defining a central free space which is open to one side, may each be equally employed on a scooter 36, as shown in Figure 10, where the front wheels 37 and 38 are steerable and an electric motor 39 drives a pair of rear wheels 40 and 41. Of note here is that with the scooter 36  
10 illustrated in Figure 10, the arcs prescribed by the wheels 37 and 38, when being turned to full lock, do not restrict the space available for the footrest 42, for as in the previous embodiment the footrest is mounted forward of the front wheels 37 and 38. Thus the scooter shown in Figure 10, although having front wheel steering, offers all the same advantages obtained by having the offset tiller and the  
15 open sided central section of the frame, as have been described above with reference to Figures 1 to 9. Thus the previously described inventions are equally applicable to scooters having front or rear wheel steering.

Two embodiments of the present invention have been described by way of  
20 example only, with reference to Figures 1 to 9 and Figure 10. However, the invention is not limited to mobility scooters and it will also be apparent to a skilled person in this field that very many modifications to the embodiments illustrated may be made, without departing from the invention as defined by the following claims. Particularly the invention may be applicable to vehicles other than four wheel  
25 vehicles and the invention is equally applicable to vehicles with other types motors, or without motors.

## Claims

1. A vehicle comprising a frame, wheels supporting the frame, a seat for a user of the vehicle, a direction control device to be operated by the user seated on the vehicle, a footrest arranged to support a seated users feet and a tiller supporting the direction control device in a position which is in front of the user when seated, wherein the footrest is located forward of, or at the side of, the tiller and the tiller is offset to one side of the vehicle.
2. A vehicle as claimed in claim 1, wherein the tiller is mounted to the frame at or towards a side edge of the frame, to provide unimpeded access to the footrest for the users feet when approaching the footrest from the opposite side to which the tiller is mounted to the frame, or when approaching from the rear of the footrest.
3. A vehicle as claimed in any preceding claim wherein the tiller is arranged to fold substantially flat over the frame in a transport configuration.
4. A vehicle as claimed in any proceeding claim wherein the direction control device is in the form of a steering wheel or handlebars connected by a linkage to a front pair of steerable wheels or a rear pair of steerable wheels.
5. A vehicle as claimed in claim 4 wherein the direction control device is connected to the steerable wheels by a cable linkage.
6. A vehicle as claimed in any preceding claim wherein the seat may be rotated between a straight ahead position and a sideways position facing towards the side opposite to the tiller, to permit a user to sit on the seat when in the sideways position and subsequently rotate the seat to the straight ahead position and swing their feet onto the footrest.
7. A vehicle as claimed in any one of claims 1 to 5, wherein the frame has a central portion located between front and rear wheels of the vehicle, which central

portion of the frame is open on one side so as to permit a user to walk into a central free space defined by the frame, to face forward and to sit on the forward facing seat whilst still having their feet in contact with the ground on which the vehicle is standing.

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8. A vehicle as claimed in claim 7 wherein the footrest is located in front of the free space.

9. A vehicle as claimed in claim 7 or 8 wherein the seat is arranged to be moved so as not to obstruct a user walking into the free space and to subsequently move the seat back so as to position the seat and a user at least partly over the free space.

10. A vehicle as claimed in claim 9 wherein the seat is arranged to move backwards so as not to obstruct the free space and to then subsequently to be moved forwards to a driving position, the vehicle further comprising a lever which is arranged to be moved between a first position where the seat is moved forwards to a forward position and a second position where the seat is moved backward to an aft position.

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11. A vehicle as claimed in claim 10 further comprising a floor section which in a first lowered position covers the free space and in a raised position permits a user to access the free space, wherein the floor section is linked to the lever so that the floor section is raised as the seat is moved backwards and the floor section is lowered as the seat is moved forwards.

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12. A vehicle as claimed in claim 10 or 11, further comprising a pair of armrests, wherein the lever is in the form of one or more of those armrests, such that raising an armrest causes the seat to move backwards to the aft position and lowering the armrest causes the seat to move forward to the forward position.

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13. A vehicle comprising a frame, wheels supporting the frame, a forward facing seat for a user of the vehicle, a direction control device to be operated by the user seated on the vehicle and a footrest arranged to support a seated users feet, wherein the frame has a central portion located between front and rear wheels of the vehicle, which central portion of the frame is open on one side so as to permit a user to walk into a central free space defined by the frame, to face forward and to sit on the forward facing seat whilst still having their feet in contact with the ground on which the vehicle is standing.

14. A vehicle as claimed in claim 13 wherein the footrest is located in front of the free space.

15. A vehicle as claimed in claim 13 or 14 wherein the seat is arranged to be moved back so as not to obstruct a user walking into the free space and to subsequently move the seat forward so as to position the seat and a user substantially over the free space.

16. A vehicle as claimed in claim 15 further comprising a lever which is arranged to be moved between a first position where the seat is moved forwards to a forward position and a second position where the seat is moved backward to an aft position.

17. A vehicle as claimed in claim 16 further comprising a floor section which in a first lowered position covers the free space and in a raised position permits a user to access the free space, wherein the floor section is linked to the lever so that the floor section is raised as the seat is moved backwards and the floor section is lowered as the seat is moved forwards.

18. A vehicle as claimed in claim 16 or 17, further comprising a pair of armrests, wherein the lever is in the form of one or more of those armrests, such that raising an armrest causes the seat to move backwards to the aft position and lowering the armrest causes the seat to move forward to the forward position.

19. A vehicle as claimed in any preceding claim comprising two front wheels, wherein the footrest is in use located in front of the front wheels.
- 5 20. A vehicle as claimed in claim 19 wherein the footrest is substantially rectangular and has rollers or wheels located on its front corners to assist with the opening of doors.
21. A vehicle as claimed in claim 19 or 20 wherein the footrest is arranged to  
10 fold back in between or over the front wheels into a transport configuration.
22. A vehicle as claimed in any preceding claim further comprising a suspension system attached to the wheels of the vehicle, which suspension system is arranged to be adjusted in dependence on the weight of a user to ensure the weight of the  
15 user causes travel of the suspension during normal use without reaching the limits of that travel.
23. A vehicle as claimed in any preceding claim further comprising a suspension system attached to the wheels of the vehicle, which suspension system is arranged  
20 to be adjusted to alter the ground clearance of the vehicle.
24. A vehicle comprising a frame, wheels supporting the frame, a seat for a user of the vehicle, a direction control device to be operated by the user seated on the vehicle and a suspension system attached to the wheels of the vehicle, which  
25 suspension system is arranged to be adjusted dependent on the weight of a user to ensure the weight of the user causes travel of the suspension during normal use without reaching the limits of that travel.
25. A vehicle as claimed in any preceding claim in the form of a mobility  
30 scooter.
26. A vehicle as claimed in any preceding claim in the form of a golf cart.



**Application No:** GB1710481.1

**Examiner:** Mr Philip Osman

**Claims searched:** 1-12, 19-23, 25, 26

**Date of search:** 29 November 2017

**Patents Act 1977: Search Report under Section 17**

**Documents considered to be relevant:**

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1,2, 4, 19, 25	DE10212623 A1 (KARMA MEDICAL PRODUCTS) See English language abstract and figures
X	1,2, 19, 25	JP2002186649 A (SUZUKI) See English language abstract and figures
X	1,2, & 4	GB1152424 A (INTERNATIONAL HARVESTER) See figures
X	1, 2, 4, 5	US4299407 A (SIMSON) See abstract and figures
A	-	US6139032 A (HARTMAN) See abstract and figures

**Categories:**

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup> :

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Worldwide search of patent documents classified in the following areas of the IPC

A61G; B62D; B62K
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The following online and other databases have been used in the preparation of this search report

EPODOC, WPI, Full Text
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**International Classification:**

<b>Subclass</b>	<b>Subgroup</b>	<b>Valid From</b>
B62K	0005/007	01/01/2013
A61G	0005/04	01/01/2013
B62D	0001/12	01/01/2006





<b>Subclass</b>	<b>Subgroup</b>	<b>Valid From</b>
A61G	0005/04	01/01/2013
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