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(54) **Title:** FOOT PROPELLED VEHICLE

(57) **Abstract:** A foot propelled vehicle (1) comprises a front housing (5) in which a first rotatable sphere (10) is mounted by bearings (15, 16, 17) for rotation about a fixed transverse axis, and a rear housing (9) in which a second rotatable sphere (11) is mounted by bearings (18, 19, 20) for rotation about three orthogonal axes. The front housing is longitudinally spaced from and connected rigidly to the rear housing by means including an elongate connecting member (2). A seat (3) is provided by a depressed portion of the connecting member (2) between the front and rear housings and positioned so that a rider's feet can contact the ground to propel the vehicle. A handle (6) is mounted above the front housing (5) for the user to hold whilst riding the vehicle. Lateral stabilizers (12,13) may be provided, mounted on platforms (14) on either side of the vehicle. Steering is effected by the feet urging the vehicle in the required direction and / or by the rider shifting weight.



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Foot Propelled Vehicle

- 5 This invention relates to a foot propelled vehicle on which a child can sit and can propel the vehicle by engaging their feet along the floor.

10 In WO2010/116126 there is disclosed such a vehicle comprising: a front housing in which a front rotatable ground engaging sphere is mounted by means of bearings such that the front sphere can rotate about three orthogonal axes; a rear housing in which a rear rotatable ground engaging sphere is mounted by means of bearings such that the sphere can rotate about three orthogonal axes; a seat portion mounted on the rear housing; and a handle mounted on the front housing for the user to hold whilst riding the vehicle.

15 A problem with such an arrangement is that it can be unstable for small children to ride and steer, as both spheres have significant freedom of movement.

20 According to the present invention there is provided a foot propelled vehicle comprising a rear housing in which a rear sphere is mounted by bearings and a front housing in which a front sphere is mounted by bearings; wherein one of the front and rear spheres is mounted for rotation about three orthogonal axes, the front housing is longitudinally spaced from and connected rigidly to the rear housing by connecting means, a fixed transverse handle is mounted above the front housing
25 for the user to hold whilst riding the vehicle, and a seat is positioned such that a child can sit on the seat with the child's feet engaging the floor so as to propel the vehicle; characterised in that the other of the front and rear spheres is mounted for rotation about a single transverse axis.

30 Preferably, the seat is situated between the front and rear housings.

Preferably, said one of the front and rear spheres that is mounted for rotation about three orthogonal axes, is the rear sphere.

35 Preferably, the seat is positioned below the tops of the front and rear housings.

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Preferably, the connecting means comprises a connecting member which is connected to the top of the front housing, extends from the front housing to the rear housing and is connected to the top of the rear housing. Preferably, the seat portion
5 is defined by a depressed portion of the connecting member between the front housing and the rear housing. In a preferred embodiment the connecting member is in the form of a continuous, elongate member. In a preferred embodiment, both the front housing and the rear housing have exterior surfaces which are part-spherical. In such an arrangement, preferably the elongate member is curved upwardly to
10 follow the profile of the front housing, is then curved downwardly to define the seat, and is curved upwardly again to follow the profile of the rear housing

Preferably, the handle is mounted on the connecting member.

15 Preferably, on each side of the vehicle a platform extends between the front housing and the rear housing, below the level of the seat. These platforms can also comprise part of the connecting means.

Additional or alternative connecting portions may be employed to connect the front
20 and rear housings together.

Preferably, a first stabilising member is mounted on the platform on one side of the vehicle and a second stabilising member is mounted on the platform on the other side of the vehicle. Preferably the stabilising members are positioned in
25 longitudinal alignment with the seat. Preferably, the first and second stabilising members are removable from the vehicle.

In a vehicle in accordance with the invention, the front sphere behaves predictably, like a wheel. In a preferred embodiment, the rider no longer has to sit on the rear
30 housing as in WO2010/116126 but sits further forward, and preferably lower, to improve stability.

A vehicle in accordance with the invention is not steered in a conventional fashion in which the mounting for a wheel or the like is turned by, for example, handlebars
35 connected to a steering column. Such a conventional steering system is disclosed

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in BE 893233, where inflatable spheres are used as inexpensive replacements for wheels. In one embodiment both spheres are rotatable about fixed axles, as for conventional wheels, and in another embodiment both spheres mounted for rotation about multiple axes. In both embodiments, the steering system is the same as for a conventional bicycle, with a steering column connected to a housing for the front wheel, and handlebars which are manipulated to turn the steering column. In a vehicle in accordance with the present invention, on the other hand, the handle is fixed relative to the entire vehicle and the front and rear housings are connected rigidly, by which is meant that they cannot be rotated relative to each other in order to steer the vehicle. Instead, a child riding the vehicle pushes on the floor with the feet and / or shifts weight so that the vehicle moves in the required direction. The sphere that is mounted for rotation about three orthogonal axes does not simply rotate about a transverse, horizontal axis as the vehicle moves forwards and backwards, but can rotate about two other axes. The result is that the vehicle as a whole can be manoeuvred in any direction by translation in the ground-plane or rotation about a vertical axis. This makes the vehicle easy and fun to ride, although it requires a certain level of skill and balance from the operator to use effectively.

In accordance with the present invention, the use of one sphere which is mounted for rotation about multiple axes, and the use of a fixed axle for the other sphere, provides an advantage in terms of stability, whilst still permitting the vehicle to be steered without the use of a steering column rotated by handlebars.

The use of spheres rather than conventional wheels also means that the vehicle will not fall awkwardly either on top of or underneath a rider.

In a preferred embodiment, the vehicle is provided with a stabilising system comprising rotatable ground engaging member on the left hand side and the right hand side of the vehicle. In general these will be located between the centre of the front sphere and the centre of the rear sphere. These may be small wheels, casters or the like. The stabilisers may include rotating spheres arranged for rotation about three orthogonal axes. The stabilising system is preferably removable from the vehicle, and preferably can be re-attached as needed. Preferably, the vehicle has two principal ground engaging members only - the front and rear spheres - as well as the optional stabilising ground engaging members. Those stabilising members

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will generally be of significantly smaller size than the principal spheres. As noted above, the stabilisers can be mounted below platforms extending between the front and rear housings.

- 5 The vehicle may for example be constructed principally from plastics materials or any other suitable materials including wood, metals and composites.

An embodiment of the invention will now be described by way of example and with reference to the accompanying drawings in which:

10

Figure 1 is a perspective view of the vehicle from the front and one side;

Figure 2 is a perspective view of the vehicle from the front and the other side; and

15

Figure 3 is a partly cut away view of Figure 2.

20

Referring now to Figures 1 and 2 of the drawings in more detail, there is shown a vehicle 1 in accordance with the present invention, which is a modification of the vehicles described above. The vehicle comprises a continuous, longitudinal rigid support 2 which is curved in the downwards direction to provide a lowered seat portion 3. A front portion 4 of the support 2 is attached to a part-spherical front housing 5 and follows the exterior profile of the front housing. Attached to the support 2, over the front housing 5, is fixed, transverse handle 6 having a pair of support members 7. The support 2 also has a rear portion 8 which is connected to a part-spherical rear housing 9 and follows the exterior profile of the rear housing. In the front housing 5 a front sphere 10 is mounted for rotation about single, fixed transverse axis. In the rear housing 9 a rear sphere 11 is mounted for rotation about three orthogonal axes.

25

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A removable pair of stabilisers 12 containing rotating portions 13 are provided. The stabilisers are in the form of casters, which are attached to platforms 14 extending between the front housing and the rear housing. The casters are rotatable about vertical axes. The rotating portions 13 may be spheres rotatable about three orthogonal axes. The stabilisers 12 are provided in vertical alignment below the seat portion 3.

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The seat portion 3 is provided between the front housing 5 and the rear housing 6, in a lowered part of the support 2. This at a height where a rider, typically a young child, can touch the ground with both feet and can propel the vehicle using the feet.

5

With reference to Figure 3, the front sphere 10 is supported in housing 5 by bearings 15 at either side (one side only shown) for rotation about a fixed transverse axis only. Front and rear support rollers 16 and 17 are also provided for the sphere. The rear sphere 11 is supported in housing 9 by means of four top
10 bearings 18 and by front and rear support rollers 19 and 20 for rotation about three orthogonal axes. The provision of only one sphere which is rotatable about three orthogonal axes, with the other sphere rotatable about a fixed transverse axis, improves stability and ease of use by young riders.

15 The front and rear housings 5 and 9 are connected together rigidly so as to prevent relative pivotal motion about a vertical axis. Thus, there is no pivoting of either housing to provide steering. The vehicle is steered by using the feet which propel the vehicle and / or by shifting weight.

20 Thus, in the preferred embodiment there is provided a foot propelled vehicle 1 which comprises a front housing 5 in which a front rotatable sphere 10 is mounted by bearings 15, 16, 17 for rotation about a fixed transverse axis, and a rear housing 9 in which a rear rotatable sphere 11 is mounted by bearings 18, 19, 20 for rotation about three orthogonal axes. The front housing is longitudinally spaced from and
25 connected rigidly to the rear housing by means including an elongate connecting member 2. A seat 3 is provided by a depressed portion of the connecting member 2 between the front and rear housings and positioned so that a rider's feet can contact the ground to propel the vehicle. A handle 6 is mounted above the front housing) for the user to hold whilst riding the vehicle. Lateral stabilizers 12,13 may
30 be provided, mounted on platforms 14 on either side of the vehicle. Steering is effected by the feet urging the vehicle in the required direction and / or by the rider shifting weight.

CLAIMS

1. A foot propelled vehicle comprising a rear housing in which a rear sphere is mounted by bearings and a front housing in which a front sphere is mounted by bearings; wherein one of the front and rear spheres is mounted for rotation about three orthogonal axes, the front housing is longitudinally spaced from and connected rigidly to the rear housing by connecting means, a fixed transverse handle is mounted above the front housing for the user to hold whilst riding the vehicle, and a seat is positioned such that a child can sit on the seat with the child's feet engaging the floor so as to propel the vehicle; characterised in that the other of the front and rear spheres is mounted for rotation about a single transverse axis.
2. A vehicle as claimed in claim 1, wherein the seat is situated between the front and rear housings.
3. A vehicle as claimed in claim 1 or 2, wherein said one of the front and rear spheres that is mounted for rotation about three orthogonal axes is the rear sphere, and said other sphere that is mounted for rotation about a single transverse axis is the front sphere.
4. A vehicle as claimed in claim 1, 2 or 3, wherein the connecting means comprises a connecting member on which the seat is provided.
5. A vehicle as claimed in claim 4, wherein the connecting member is an elongate member which is connected to the top of the front housing, extends from the front housing to the rear housing, and is connected to the top of the rear housing; and the seat portion is defined by a depressed portion of the connecting member between the front housing and the rear housing.
6. A vehicle as claimed in claim 4 or 5 wherein the handle is mounted on the connecting member.
7. A vehicle as claimed in any preceding claim, wherein on each side of the vehicle a platform extends between the front housing and the rear housing, below the level of the seat.

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8. A vehicle as claimed in claim 7, wherein a first stabilising member is mounted to the platform on one side of the vehicle and a second stabilising member is mounted to the platform on the other side of the vehicle.

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9. A vehicle as claimed in claim 8 wherein the first stabilising member and the second stabilising member are in longitudinal alignment with the seat.

10. A vehicle as claimed in claim 8 or 9, wherein the first and second stabilising members are removable from the vehicle.

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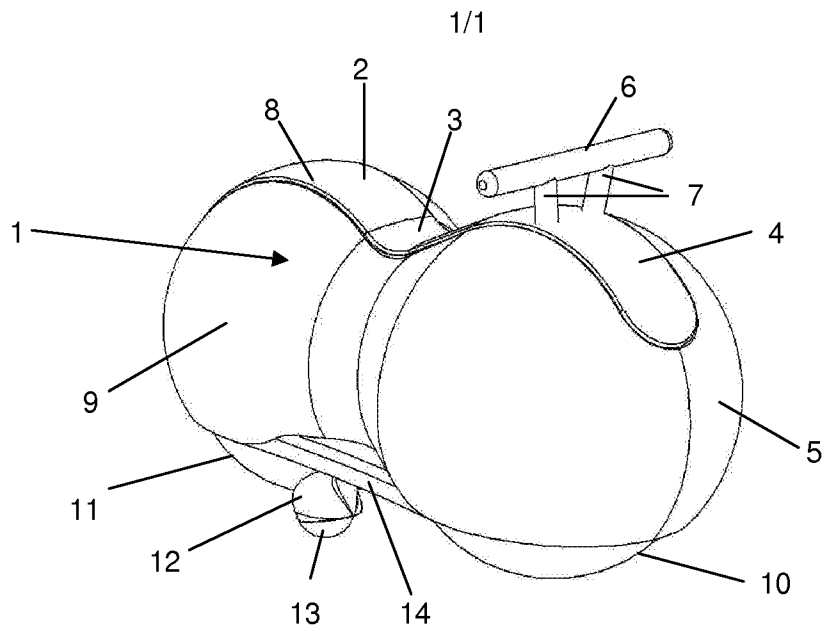


Figure 1

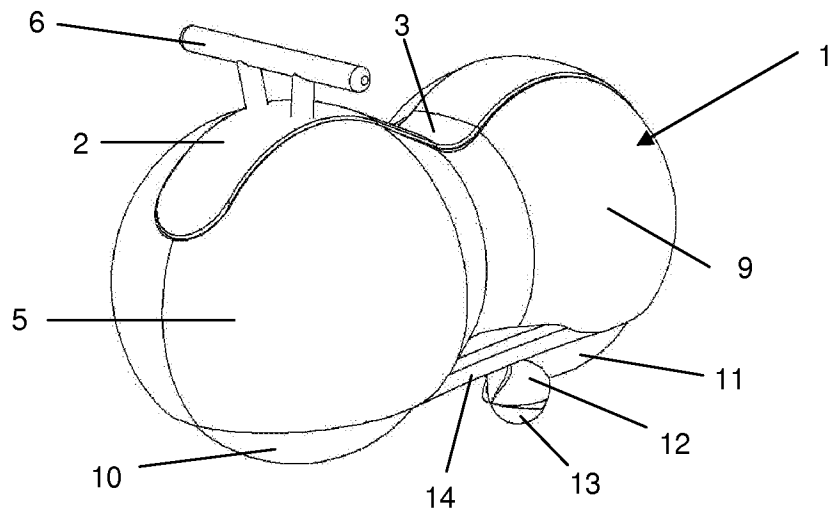


Figure 2

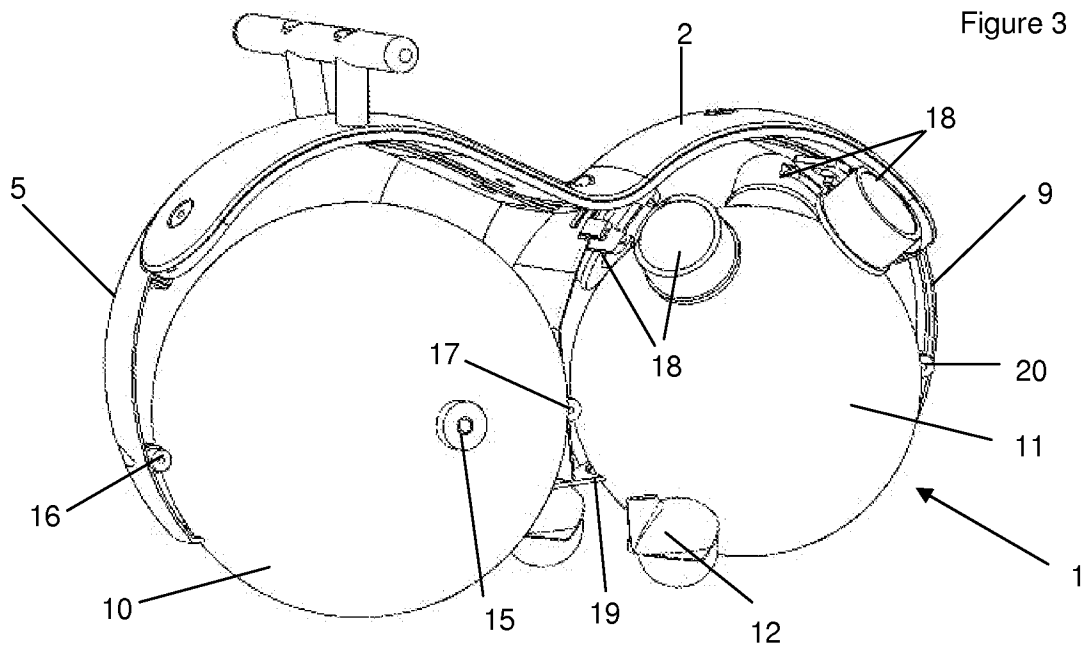


Figure 3