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(54) Skateboard

(57) The invention relates to a board (1) capable of movement in a certain direction (A), comprising at least one pair of wheels (10) and a first and second footboard (2, 3) being positioned one behind the other substantially in said direction and capable of a rotation (R) relative to each other around an axis of rotation (L) which extends substantially in said direction. The first wheel of said pair is provided under said first footboard and a second wheel of said pair is provided under said second footboard. At least one of said pair of wheels is arranged such that, in use on a surface (S), relative rotation of said first and second footboard positions said wheel to induce motion of said board with at least a motion component in the direction (A) of said axis by interaction of said at least one wheel with said surface.

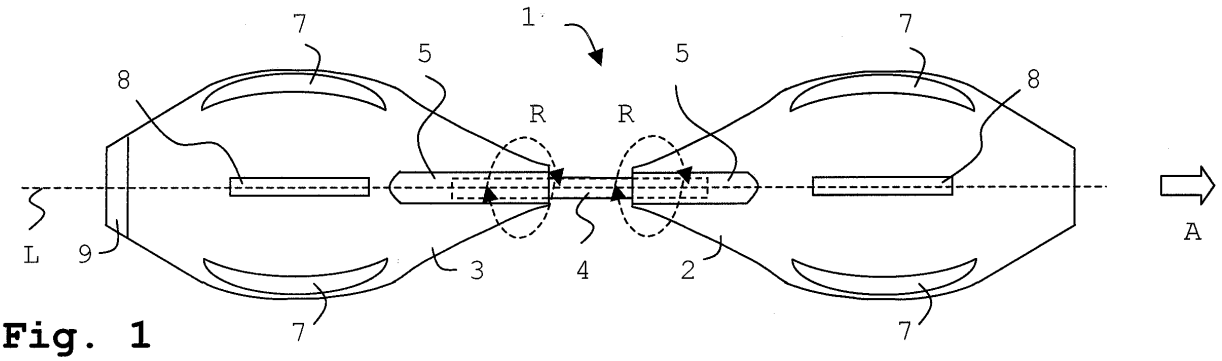

Fig. 1

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Description

[0001] The invention relates to a board comprising at least one pair of wheels for motion of said board. More specifically, the invention relates to a board wherein locomotion of said board is achieved by foot manipulation of the board instead of the surface on which the wheels roll.

[0002] WO 99/47218 discloses a locomotive means for preferably one person comprising a chassis, wheels which are held on said chassis, and a standing surface which is supported by the chassis and which is provided for the person. The standing surface is constructed by a footboard which lies on a cylinder in an approximately cross-wise manner in relation to the longitudinal axis thereof. The cylinder is held on the chassis such that it can rotate around the longitudinal axis. The footboard or the cylinder interacts by an interaction means with at least one wheel which initiates a rotation of the wheel. Locomotion is made possible by the weight transfers of a person using the locomotive means.

[0003] The prior art board is disadvantageous in that the interaction means to transfer rotation of the cylinder to rotation of the wheels is complex.

[0004] It is an object of the present invention to provide a board which allows locomotion by foot manipulation in a less complex manner.

[0005] This object is accomplished by a board capable of movement in a certain direction, comprising at least one pair of wheels and a first and second footboard being positioned one behind the other substantially in said direction and capable of a rotation relative to each other around an axis of rotation which extends substantially in said direction, wherein a first wheel of said pair is provided under said first footboard and a second wheel of said pair is provided under said second footboard and wherein at least one of said pair of wheels is arranged such that, in use on a surface, relative rotation of said first and second footboard positions said wheel to induce motion of said board with at least a motion component in the direction of said axis by interaction of said at least one wheel with said surface.

[0006] In contrast with the prior art, the locomotion of the skateboard or board is induced by the interaction with the at least one wheel with the surface as a result of the orientation of this wheel with respect to this surface. The present board is only adapted to bring the wheels in the position wherein this interaction may take place and omits an interaction means to transfer rotation of the footplate to a driving force for the wheels. Preferably, at least one of said wheels is rotationally connected to the respective footboard in such a manner that a rotation of said respective footboard induces a rotation of said wheel towards a position wherein a wheel axle crosses said axis non-perpendicularly. Accordingly, the board or locomotive means according to the present invention allows locomotion by foot-manipulation of the board in a less complex manner.

[0007] The embodiments of the invention as defined in claims 3-5 define mounting mechanisms for the at least one wheel to assume the wheel positioning mentioned above. The embodiment defined in claim 3 provides the additional advantage of the wheel or wheels assuming a stable position before a user places the wheels on the surface.

[0008] The embodiments of the invention as defined in claims 6-8 provide advantageous embodiments for an interconnector between the first and second footboard. In particular, the torsion spring enables a substantially coplanar orientation of the first and second footboard before the board is used. The first and second portion of the interconnector that are arranged to rotate with respect to each other provides the possibility to propel the board by rotation of the first footboard and second footboard in cooperation with the suitably oriented wheel or wheels. The first and second rotation limitation means are safety measures and may avoid excessive forces on parts of the interconnector, such as the torsion spring. The invention also relates to the interconnector of claims 6-8 as such.

[0009] The embodiments of the invention as defined in claims 9-11 has the advantage of better control of the respective footboards by the user. Basically the user should be able to rotate the first and second footboard relative to each other to induce forward motion of the board, but more spectacular moves with the board are facilitated as well by these embodiments.

[0010] The embodiment of the invention as defined in claim 12 allows easy, preferably single-handed, transport of the board by the user.

[0011] The embodiment of the invention as defined in claim 13 provides a rigid first and/or second footboard allowing better control of the board.

[0012] The embodiment of the invention as defined in claim 14 provides the advantage that both the first and second footboard can be manufactured in the same way, preferably by using the same mould in a casting process. It should be acknowledged that the final footboards may be different in certain details as a result of different processing of the first and second footboard after casting.

[0013] The invention also relates to a board comprising a first footboard and a second footboard, interconnected with said first footboard, wherein said first footboard and second footboard each have only one wheel for motion of said board. Such a two-wheel board presents a challenge to experienced boarders.

[0014] It should be noted that the embodiments, or aspects thereof, can be combined or applied individually.

[0015] The invention will be further illustrated with reference to the attached drawings, which schematically show a preferred embodiment according to the invention. It will be understood that the invention is not in any way restricted to this specific and preferred embodiment.

[0016] In the drawings:

Fig. 1 shows a schematic top-view of a board ac-

cording to an embodiment of the invention;

Fig. 2 shows a schematic side view of the board of Fig. 1;

Figs. 3A-3C show schematic illustrations of an interconnector of the board of Fig. 1, and

Figs. 4A-4F illustrate the locomotion of a board for several wheel orientations according to embodiments of the invention.

[0017] Figs. 1 and 2 display schematic illustration of a locomotive means or board 1 capable of movement in a direction A in top view and side view respectively. The board 1 comprises a first footboard 2 for a first foot of a user and a second footboard 3 for a second foot of a user positioned one behind the other in the direction A of movement. It should be appreciated that such boards 1 typically do not follow a path in a straight direction A, but make all types of motion.

[0018] The first footboard 2 and second footboard 3 are capable of being rotated with respect to each other. In the present embodiment, the footboards 2, 3 are coupled by an interconnector 4 defined along an axis L between the first footboard 2 and second footboard 3 that allows rotation R of the first footboard 2 and second footboard 3 relative to each other around the axis L. The interconnector 4 is partly accommodated and fixated in a tubular section 5 of the first footboard 2 and second footboard 3. The tubular section has openings 6 to receive fastening elements (not shown) to fixate the interconnector 4.

[0019] The first and second footboard 2, 3 each comprise upstanding edges 7 defined along a portion of the circumference of both boards. Further, the first and second footboard 2, 3 have a foot strap 8 adapted to receive the respective feet of a user of the board 1. Also a kick edge 9 is provided. The upper surfaces of the first and second footboard on which the feet of a user rest during use provide for enhanced grip, e.g. by applying grip tape on these surfaces. These measures each individually and in combination facilitate manipulation of the board 1 by the feet of the user.

[0020] The first footboard 2 and second footboard 3 preferably comprise plastic as a main component. The shape of the first and second footboard 2, 3 preferably have a large degree of similarity, allowing said first and second footboard to be manufactured in a single mould. It is noted that different post-processing of the first and second footboard 2, 3 may result in a difference in final shape between the first footboard 2 and second footboard 3, such as the kick edge 9. The footboards 2, 3 narrow towards the interconnector 4 to allow a user to grab the board 1 with a single hand. The internal structure of each of the footboards 2, 3 may be a matrix (not shown) of e.g. plastic to obtain rigid footboards 2, 3 that allow better manipulation of the board 1.

[0021] In contrast to conventional skateboards, the board 1 according to an embodiment of the invention allows locomotion of the board 1 with only a single pair of wheels 10, wherein one wheel 10 is provided under the first footboard 2 and the other wheel 10 is provided under the second footboard 3 by wheel mounting structures 11. The arrangement of the wheels 10 in combination with the footboards 2, 3 capable of rotating with respect to each other by foot manipulation of these footboards 2, 3 by a user, makes the board 1 propel into the direction of the arrow A on the surface S. The manipulation also allows the user to maintain his balance. The wheels 10 may be castor wheels. The motion of the board 1 is explained with reference to Figs. 4A-4F in further detail.

[0022] Figs. 2 and 3A-3C schematically illustrate an embodiment of the interconnector 4 in planar projection allowing the respective rotation of the footboards 2, 3 around the axis L.

[0023] The interconnector 4 comprises a housing 20, e.g. a hollow outer tube, provided with elongated openings 21. An insert 23 comprises a first portion 24 and a second portion 25 that are capable to rotate with respect to each other by an intermediate element 26. The intermediate element 26 may comprise a spring element, such as a torsion spring. The torsion spring 26 is arranged such that the surfaces of the first footboard 2 and second footboard 23 are substantially coplanar when the board is in a rest position. The portions 24, 25 each have a pin 27 adapted to fit into the elongated openings 21 of the tube 20. Each of the portions 24, 25 further has a protruded section 28, 29 that each contain holes 30. These holes 30 are positioned such that the holes 30 are aligned with the openings 6 in the footboard 2, 3. Finally, fixation pins 31 are provided at each end of the insert 23.

[0024] The insert 23 is accommodated in the tube 20, e.g. by press fit or interference fit, such that the protruded section 28, 29 extend outwardly from the tube 20. The portions 24, 25 can rotate within the housing 20.

[0025] In operation, the interconnector 4 couples the first footboard 2 and the second footboard 3. To this end, the interconnector 4 is inserted into the tubular section 5 in both footboards 2, 3 and fixated by inserting fastening elements in the openings 6 and holes 30 of the insert 23. The fixation pins 31 are received by internal structures 32 that prevent the portions 24, 25 to rotate within the first footboard 2 and second footboard 3 respectively. Accordingly, if a user manipulates these footboards 2, 3 by rotating them with respect to each other, the first portion 24 is forced to rotate with respect to the second portion 25. This is allowed since the first and second portion 24, 25 are capable of rotating within the housing 20 and are connected by a torsion spring 26. As a safety measure, rotation of the first portion 24 and second portion 25 is limited by the stop function provided by the sliding pin 27 within the elongated opening 21 of the housing 20. These rotation limitation means 21, 27 further prevent excessive forces being exerted on the torsion spring 26.

[0026] Figs. 4A-4F provide some details on the operation of the board 1 according to an embodiment of the invention. Although the direction of motion is represented

as a linear movement in the direction A, it should be acknowledged that a board according to an embodiment of the invention typically makes a swinging movement with a motion component in the direction of the arrow A.

[0027] In use on the surface S, at least one of the wheels 10 is arranged such that relative rotation of the first footboard 2 and second footboard 3 induces motion of the board 1 with at least a motion component in the direction of the axis L by interaction of the wheel 10 with the surface S.

[0028] To accomplish this effect, the wheel 10 may be capable to assume a position or orientation wherein an axle 40 of the wheel 10 crosses the direction A of the board non-perpendicularly by an angle α. This is illustrated in Fig. 4A, wherein the wheel 10 and axis L are projected in the plane of the surface S. Motion in the direction of the arrow A requires an overall force component F_A perpendicularly to the axle 40 of the wheel 10 that is rotationally connected to a footboard 2,3. This force component F_A is obtained from a force F resulting from the rotation of the footboard 2, 3 in combination with a suitable position of the wheel 10, as will be further described with reference to Figs. 4B-4E. Besides the force component F_A, the force F has another component F_P, perpendicular to F_A, that is counterbalanced by the force F_{11} of the wheel mounting structure 11. The locomotive process of the board 1 can be compared with ice-skating.

[0029] Fig. 4B shows a footboard 2, wherein a wheel 10 is mounted by a wheel mounting structure 11 comprising a vertical rotation axle 41 and wherein said wheel axle (40) is offset from the vertical rotation axle 41 by an off-axis element 42. The off-axis element 42 positions the wheel axle 40 of the wheel 10 away from a centre line D (dash-dotted line in Fig. 4B) of the rotation axle 41. The wheel mounting structure 11 allows rotation of the wheel 10 in a plane parallel to the footboard 2. This can be accomplished by the rotation axle 41 allowing rotation of the footboard 2 with respect to the axle 41 or rotation of the off-axis element 42 with respect to the rotation axle 41.

[0030] On rotation R of the footboard 2 as a result of manipulation of a user, the wheel 10 becomes oriented as in Fig. 4C which displays a rear view. Consequently a contact force F_c develops that can be resolved into a component into a first force component F_1 and a second force component F_2 as indicated in Fig. 4C. The force component F_2 induces rotation of the wheel 10 around the center line D, such that the orientation of the wheel 10 as shown in Fig. 4A is obtained that allows the board 1to propel with a motion component in the direction A.

[0031] An equivalent dynamic behavior can be obtained by the embodiment depicted in Figs. 4D and 4E. Again a wheel 10 is provided under a footboard 2 by a wheel mounting structure 11 that comprises a non-vertical rotation axle 50 in a vertical plane through said direction. The non-vertical rotation axle 50 intersects the wheel axle 40. Rotation R of the second board 2 again generates a force component F_2 that induces rotation around the centre line D to arrive at the situation displayed in Fig. 4A. The non-vertical rotation axle 50 provides the advantage that the wheels 10 are always in the correct position before usage of the board 1.

[0032] Fig. 4F illustrates a castor wheel 10 employed for the board 1 depicted in Figs. 1 and 2. A non-vertical rotation axle 60 extending in a vertical plane through the direction A. The wheel axle 40 is offset from the rotation axle 60 by an off-axis element 61.

[0033] In general, motion of the board 1 with a component in the direction of the arrow A according to an embodiment of the invention involves rotation R of a footboard 2, 3 to induce a force component F_2 which induces the appropriate position of the wheel 10 as depicted in Fig. 4A. The arrangement of the wheel 10 under the footboard 2, 3 is such that a moment can be created around the centre line D of the rotation axle 41, 50, 60.

[0034] It should be acknowledged that the present invention is not limited to the above-described embodiments. The gist of the invention is to provide a first and second footboard that by mutual manipulation in combination with a suitable orientation of the wheels can be propelled by a user. The interconnector 4 that allows respective rotation of the footboards 2, 3 may e.g. be integrated with these footboards 2,3. The interconnector 4 may also be a single spring element coupling the footboards 2, 3. Moreover, in an embodiment of the invention only one of the wheels 10 may be swiveling while one or more other wheels are rigidly fixed under e.g. the rear footboard 3.

Claims

1. A board (1) capable of movement in a certain direction (A), comprising at least one pair of wheels (10) and a first and second footboard (2, 3) being positioned one behind the other substantially in said direction and capable of a rotation (R) relative to each other around an axis of rotation (L) which extends substantially in said direction, wherein a first wheel of said pair is provided under said first footboard and a second wheel of said pair is provided under said second footboard and wherein at least one of said pair of wheels is arranged such that, in use on a surface (S), relative rotation of said first and second footboard positions said wheel to induce motion of said board with at least a motion component in the direction (A) of said axis by interaction of said at least one wheel with said surface.

2. The board (1) according to claim 1, wherein at least one of said wheels (10) is rotationally connected to the respective footboard (2,3) in such a manner that a rotation (R) of said respective footboard induces a rotation of said wheel towards a position wherein a wheel axle (40) crosses said axis (L) non-perpendicularly.

3. The board (1) according to claim 2, wherein at least one of said wheels (10) comprises a non-vertical rotation axle (50) in a vertical plane through said direction (A) and wherein said rotation axle intersects said wheel axle (40).

4. The board (1) according to claim 2, wherein at least one of said wheels comprises a vertical rotation axle (41) and wherein said wheel axle (40) is offset from said vertical rotation axle.

5. The board (1) according to claim 2, wherein at least one of said wheels comprises a non-vertical rotation axle (60) extending in a vertical plane through said direction (A) and wherein the wheel axle (40) is offset from said rotation axle.

6. The board (1) according to one or more of the preceding claims, wherein said first footboard (2) and second footboard (3) are connected by an interconnector (4) comprising at least a first portion (24) mountable to said first board (2) and a second portion (25) mountable to said second board (3), wherein said first portion and second portion are arranged to rotate with respect to each other.

7. The board (1) according to claim 6, wherein said interconnector (4) further comprises a tube (20) with first rotation limitation means (21) to accommodate said first and second portion (25, 25) and wherein at least one of said first and second portion comprises second rotation limitation means (27) adapted to interact with said first rotation limitation means to limit respective rotation of said first and second footboard (2, 3).

8. The board (1) according to one or more of the preceding claims, wherein said first footboard (2) and second footboard (3) are connected by an interconnector (4) comprising a spring element (26), such as a torsion spring.

9. The board (1) according to one or more of the preceding claims, wherein at least one of said first and second footboard (2, 3) comprises upstanding edges (6) along at least a portion of the circumference of said first or second footboard.

10. The board (1) according to one or more of the preceding claims, wherein at least one of said first and second footboard (2, 3) comprises a foot strap (7).

11. The board (1) according to one or more of the preceding claims, wherein at least one of said first and second footboard (2, 3) comprises an enhanced grip surface.

12. The board (1) according to one or more of the preceding claims, wherein said board is shaped to grab said board with one hand at or near said interconnector (4).

13. The board (1) according to one or more of the preceding claims, wherein at least one of said first and second footboard (2, 3) comprise an internal matrix structure.

14. The board (1) according to one or more of the preceding claims, wherein said first footboard and said second footboard have a similar shape.

15. A board (1) comprising a first footboard (2) and a second footboard (3), interconnected with said first footboard, wherein said first footboard and second footboard each have only one wheel (10) for motion of said board.

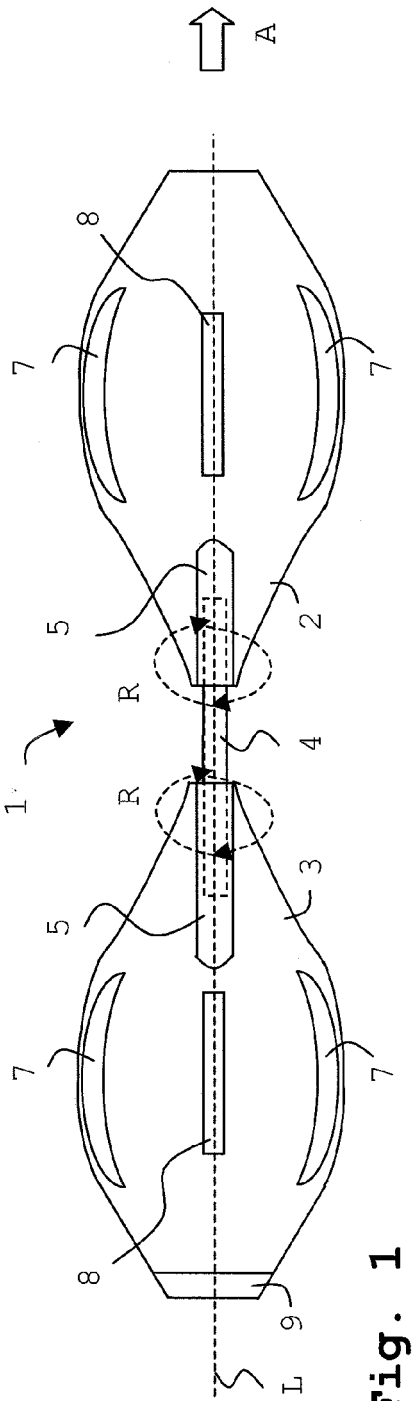

Fig. 1

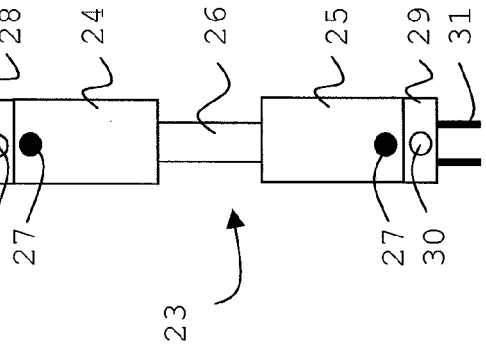

Fig. 3C

Fig. 3B

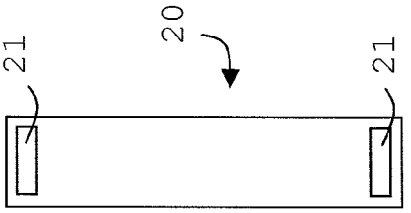

Fig. 3A

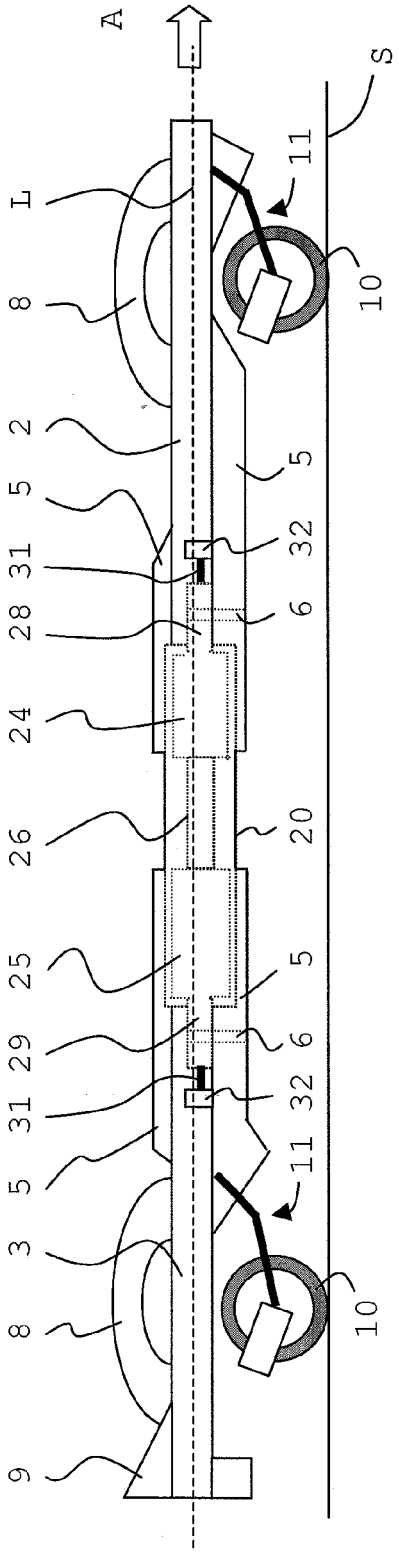
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Fig. 2

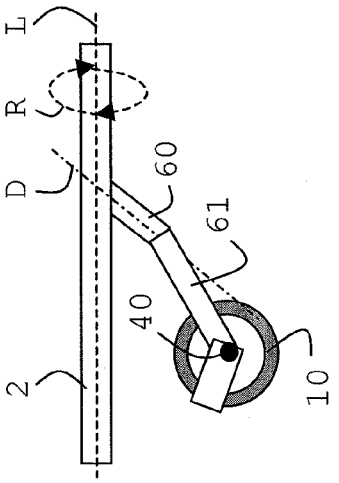
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Fig. 4F

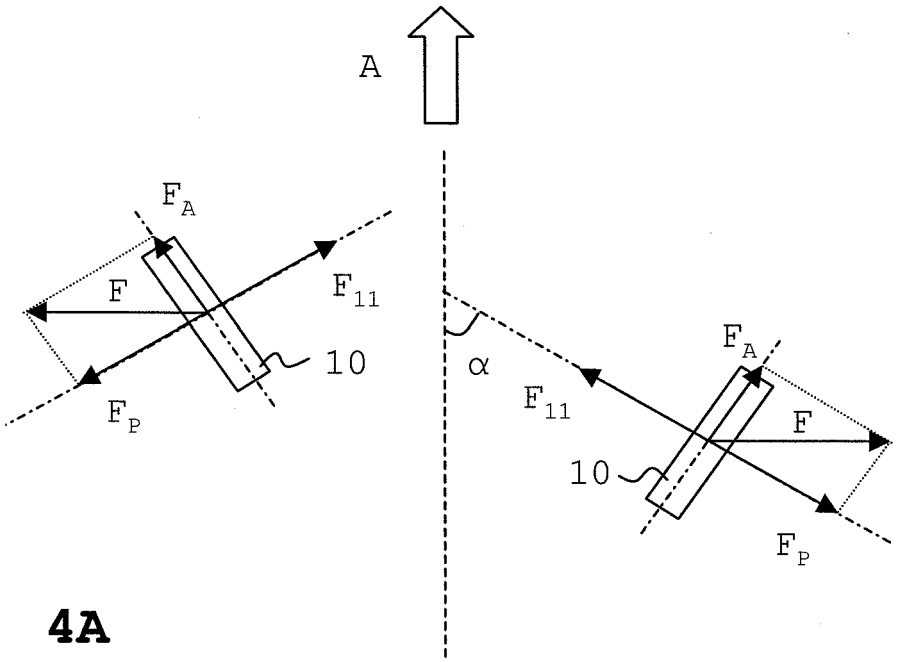

Fig. 4A

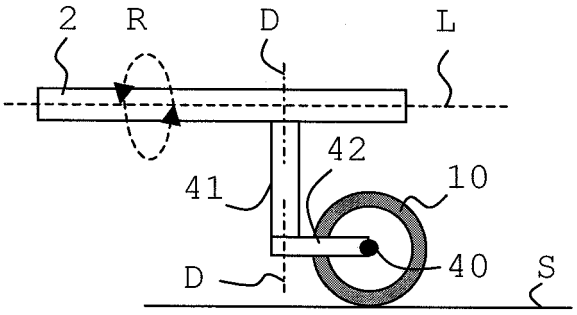

Fig. 4B

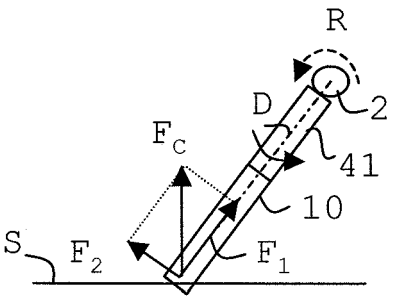

Fig. 4C

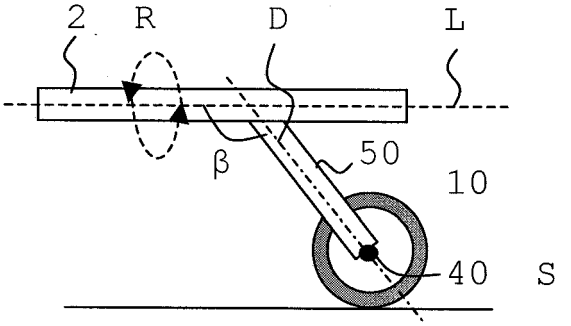

Fig. 4D

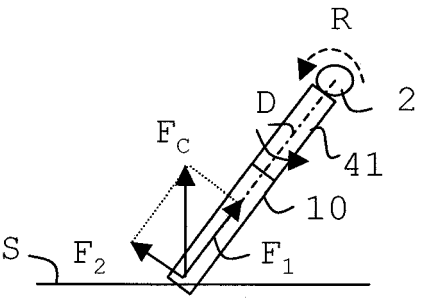

Fig. 4E

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 10 0089

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X A	WO 2004/105901 A (YOON, SE-HEUNG) 9 December 2004 (2004-12-09) * page 8, line 6 - page 22, line 18; figures 1,5,7,11 *	1,2,4-9, 12,14,15 10,11,13	A63C17/12 A63C17/01
X A	US 4 076 267 A (LIPSCOMB ET AL) 28 February 1978 (1978-02-28) * column 2, line 1 - column 3, line 24; figures 1,5 *	1,2,4,5, 8,9, 12-14 3,10,11, 15	
X	US 4 082 306 A (SHELDON ET AL) 4 April 1978 (1978-04-04) * figures 1,2 *	1,2,5,6, 9,13,14	
X	FR 2 845 612 A (S 3 S) 16 April 2004 (2004-04-16) * figures 3,4 *	1,6,9, 12-14	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

A63C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	23 May 2005	Murer, M

CATEGORY OF CITED DOCUMENTS

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23-05-2005

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