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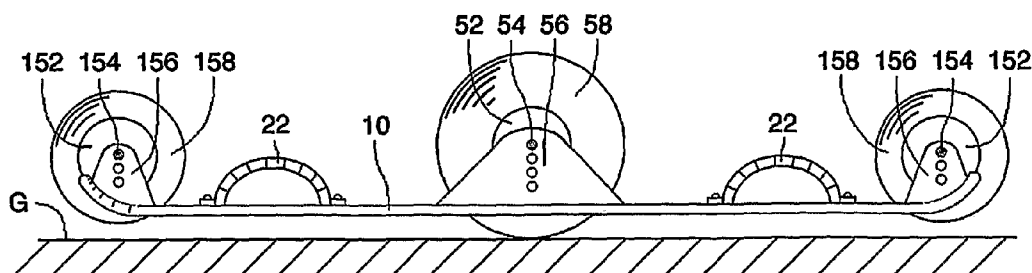
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(54) Title: ALL TERRAIN SPORTS CONVEYANCE



(57) Abstract: An all terrain sports conveyance able to traverse a wide variety of terrains, including, but not limited to, dirt, grass, sand, and water, where control and agility on all terrains is similar. The conveyance is particularly suited to use with traction such as that provided by a kite or vehicle. When ridden on land, a central wheel provides a pivot upon which the rider and conveyance can rotate and tilt, providing a high degree of agility and maneuverability. The conveyance may incorporate the use of the base, edges, or additional wheels as control surfaces for steering, braking and directional stability. Embodiments of the invention specification can be optimised for amphibious use, for planing over water in the manner of a kiteboard or surfboard, for traversing sand in the manner of a sandboard, or for directional stability at high speed on land in the manner of an in-line roller skate.

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Description

ALL TERRAIN SPORTS CONVEYANCE

Technical Field

- [1] This invention relates to the field of sports conveyances, especially those wherein the user stands on a longitudinally elongated conveyance. Such conveyances are popularly used on a variety of surfaces such as, but not limited to, water, snow, ice, sand, grass, dirt, concrete, or asphalt, and may be propelled on water by a wave, downhill by gravity, or by traction such as, but not limited to, that provided by a sail, kite, boat, or car. Sports involving such conveyances include, but are not limited to, snowboarding, skateboarding, mountainboarding, surfing, windsurfing, wakeboarding, kitesurfing (on water), kiteboarding (on land), and snowkiting (on snow or ice).

Background Art

- [2] Sports conveyances may include snowboards, skateboards, mountainboards, surfboards, sailboards, wakeboards, kiteboards (for use with kites on water) and landboards (for use with kites on land). Such conveyances are typically specialised for use on few types, and usually only one type, of terrain. Such conveyances suited to water use with traction include kiteboards, wakeboards and surfboards. Such conveyances suited to land use with traction include mountainboards.

Disclosure of Invention

Technical Problem

- [3] Existing sports conveyances are typically specialised for use on few types, and usually only one type, of terrain. Additionally, the control of land conveyances, for example, is typically quite different to the control of water conveyances, such that a very different skillset and an additional conveyance is typically required for a rider to operate such conveyances on, for example, land then water, or vice versa.
- [4] Wheeled land conveyances that use skateboard-style tilt trucks, such as skateboards and mountainboards, typically experience significant directional instability, commonly known as speed wobble, when travelling at speed. Such conveyances typically feature 3 or 4 wheels in contact with the ground so as to provide wheel-supported static stability. This can limit the agility and maneuverability of such conveyances, and makes their control very different to that of the unwheeled sports conveyances of the kind used, for example, on water, snow, or ice, whose control employs the edges and surface of a board. Said wheeled land conveyances cannot usually pivot on the spot, and typically require forwards motion to turn. For example, to compensate for a sudden increase in the components of traction that are not in the direction of travel of such a wheeled conveyance, the rider may need to immediately lift all wheels, or all but one wheel, off the ground, such that direction may be changed rapidly. This maneuver requires the user to rapidly and substantially shift their centre of gravity; hence it is difficult to learn and execute, and is fraught with the danger of loss of

balance. Further, many such wheeled conveyances do not incorporate methods for controlling speed.

Technical Solution

- [5] A sports conveyance in accordance with this invention specification comprises a deck or frame or board (the deck) providing a top surface upon which a user may stand and having a centrally, or substantially centrally, located wheel (the central wheel). Said central wheel rotatably mounted on an axle, said axle affixed to said deck such that a portion of said central wheel protrudes through said deck below the dominant plane of said deck so as to contact the terrain, said protrusion being defined as the maximal perpendicular distance achieved by any part of the wheel or tyre below the dominant plane of said deck. The rider normally stands on the deck, with feet abreast the central wheel, the line connecting the rider's feet substantially perpendicular to the rotational axis of the central wheel.
- [6] The conveyance may advantageously incorporate additional wheels that protrude below the dominant plane of the deck to an equal or lesser extent to that of the central wheel when ridden on planar ground, so as to provide maneuverability, control and stability, conveyance friction reduction in the direction of central wheel rolling motion, and/or friction enhancement in the directions perpendicular, or not aligned with, the direction of said central wheel roll. Said additional wheels may include those rotatably mounted on axles affixed to the conveyance, said additional wheels either protruding through the deck, or attached to the edge of the deck such that additional deck cavities are not required. Said wheels may be mounted to the deck in-line with the central wheel, in the manner of an in-line roller skate. Alternatively, said wheels may be mounted such that they are not aligned in the direction of the central wheel, such that they may provide a steering angle when contacting the terrain in addition to the terrain contact of the central wheel.
- [7] When ridden on land, the rider can predominantly balance upon the region of terrain contact at the central wheel, such that the central wheel supports the largest component of the rider's weight, so that the conveyance and rider can pivot about said central region of terrain contact, thus providing a high degree of agility and maneuverability. The rider can transfer their weight to an additional wheel, or additional wheels, to provide directional stability and control, or so as to follow the steering angle provided by said additional wheels in combination with the central wheel. Embodiments of the conveyance that incorporate terrain contact of the base and/or edges of the deck can be steered, braked, and generally maneuvered by the rider shifting their weight so as to control the pressure (hence friction) on the segment of the deck's edge or base in contact with the ground, or so that the conveyance follows the sidecut of the deck's edge in the manner of a snowboard. Base and edge contact with the terrain can induce a braking moment that can be used to turn and/or slow the conveyance and rider. At higher speed, in-line wheeled embodiments of the invention can be steered by

tilting the deck without base/edge contact with the terrain. In such embodiments, the conveyance turns in the manner of an in-line roller skate. When powered by traction, such as that provided by a kite, the central wheel also provides a fulcrum that can be used to generate and control turning moments by shifting the point of transfer of the traction force ahead or astern of said fulcrum, in a manner known from sports conveyances of this kind used on water, which employ keels, centreboards, or fins and a traction fulcrum, such as a sailboard.

[8] When used on water, embodiments of the conveyance that incorporate a planing surface operate in the manner of a kiteboard, wakeboard, surfboard, or other planing conveyances. In said embodiments, the wheels may advantageously be mounted along the centreline of the deck, to increase the amount of usable planing surface, and so that the edges of the deck may advantageously remain unobstructed in order that the conveyance can be edged into water in the manner of a kiteboard, wakeboard, surfboard, or other water planing conveyance, or in the manner of a snowboard on snow.

[9] Accordingly, the deck may advantageously incorporate features known from the design of snowboards, surfboards, kiteboards and/or other sports conveyances: up-turned front and rear ends to help clear terrain, and a combination of camber, flex, and sidecut to improve shock absorption, steering, and handling of the conveyance. The deck may advantageously be constructed from a durable, light-weight material of appropriate stiffness, such as, but not limited to, laminates of wood, graphite, fibreglass, carbon fibre, and epoxy resin, in the manner employed in the construction of snowboards, skateboards, kiteboards, and/or other conveyances. Deck stiffness may be adjusted by the use of stiffening materials and/or fixtures affixed to the deck and/or brackets and/or axles, or by incorporating a convex deck cross-section. The deck's longitudinal edges may advantageously be turned up, thickened, otherwise formed, and/or additionally strengthened against abrasion, for instance with metal fittings. The underside of the deck may advantageously be protected against abrasion by the use of fixed or replaceable layers or pads of deck-protecting and/or friction-reducing materials and/or mechanisms, such as, but not limited to, polyurethane, metals, nylon, teflon and/or rollers. Such attachments may advantageously be shaped to contribute to the control of the conveyance, for example, where they include straight or curved rails or trenches placed parallel to the side-cut of the deck. They may cover any part of, or all of, the underside of the deck. Foot straps, bindings, anti-skid footpads, and/or other means may be mounted on the top surface of the deck to help grip and/or secure a rider's feet or footwear against the conveyance, and/or to dampen, and/or absorb stresses induced by terrain impacts, reducing the transfer of such stresses to the rider, and allowing improved transfer of control.

[10] Any wheels may advantageously be equipped with a pneumatic inner-tube and/or tyre for shock absorption on rough terrain or due to impact loads, and may advan-

tageously be of different sizes, including different wheel diameters and widths. Wheels may advantageously have a profile that concentrates contact with the ground to a small region, and/or a tread pattern that enhances conveyance performance. When rotating, any wheel may advantageously provide directional stability through the gyroscopic effect. Any wheel may advantageously incorporate steering mechanisms, other than skateboard-type tilt-turn trucks, and other than scooter-type hand controlled steering mechanisms.

- [11] In order to tune the conveyance configuration for a particular terrain, or according to user preference, the axle height above the deck of all, or selected, wheels may advantageously be altered by the use of brackets, and/or other mechanisms, that permit raising or lowering of all, or selected, wheels, such that wheel protrusion below the deck may be adjusted, and/or such that the protrusion of the central wheel may be adjusted relative to the other wheels, and/or deck, such that the desired terrain-clearance and/or conveyance agility may be achieved. Said axle height adjustment mechanisms may advantageously incorporate suspension, and/or may incorporate discrete, continuous, or otherwise variable travel. Said axle height adjustment mechanisms may advantageously incorporate a quick release mechanism, such as that often used on bicycle axles. Guards may advantageously be placed over the wheel and/or brackets and/or other components to prevent debris from being ejected by the wheels through the wheel cavities, and/or to protect the rider from conveyance components, including the rotating wheels. Steering mechanisms may advantageously be incorporated at any of the wheels, to further assist turning.

Advantageous Effects

- [12] It is an advantageous effect of this invention to provide a sports conveyance that can be used and controlled in similar manner on a wide variety of smooth and/or rough surfaces, including, but not limited to, water, snow, ice, sand, grass, dirt, concrete, and asphalt. It is another advantageous effect of this invention to provide a sports conveyance that combines agility and maneuverability with directional stability. It is another advantageous effect of this invention to provide a sports conveyance that can be controlled, on a variety of smooth and rough terrains, in a manner similar to that of a surfboard, wakeboard, or snowboard, by allowing the surface and edges of the deck to be brought into contact with the terrain, whereby said edges and surface act as planing and/or control surfaces. It is another advantageous effect of this invention to reduce the complexity and/or production cost of, and/or increase robustness of, such conveyances, especially with respect to the steering and braking mechanisms of such conveyances, primarily by, but not limited to, reducing the complexity and/or number of moving parts of said mechanisms and/or conveyance. It is another advantageous effect of this invention to reduce stress and strain endured by wheels and axles of such conveyances, due to impact and load stresses, by transferring such stress away from the wheels and axles. It is another advantageous effect of this invention that the

conveyance can transition between use on a variety of terrains; most notable is the amphibious capability of the invention. Another advantageous effect of this invention is its ability to traverse a variety of land terrains by a combination of rolling and/or sliding. Another advantageous effect of this invention is its ability to pivot on the spot. Another advantageous effect of this invention is its stability at high speeds.

Description of Drawings

[13] Embodiments of the conveyance specification, shown in the accompanying figures, may comprise of a deck 10 providing a top surface upon which a user may stand and having a centrally located opening 12, a central wheel hub 52 and tyre 58 rotatably mounted on an axle 54, and adjustable brackets 56 affixing axle 54 to deck 10 above opening 12, such that a portion of said central wheel protrudes through opening 12 below the plane of the deck 10 so as to contact the ground G. The deck 10 may have up-turned front and rear ends to help clear low obstacles on the ground G. Foot straps 22 may be provided to help secure a user's feet against deck 10. Additional wheels may incorporate hubs 152 and tyres 158, and may be rotatably mounted on axles 154 affixed by brackets 156 at the front and rear ends of the deck 10. Said additional wheels may protrude through additional openings 112 below the lowest point in the plane of the deck 10. When Ridden, the protrusion of said additional wheels is less than or equal to that of said central wheel, so that said central wheel protrudes below the joint convex hull of deck 10 and said additional wheels. Thus the conveyance, when ridden and properly balanced on planar ground G, can pivot upon the region of contact with the ground G provided by said central wheel.

[14] The invention may be better understood with reference to the illustrations of embodiments of the invention, wherein :-

[15] Figure 1 is a top view of an embodiment of a sports conveyance according to this invention specification;

[16] Figure 2 is a top view of an embodiment of a sports conveyance according to this invention specification;

[17] Figure 3 is a top view of an embodiment of a sports conveyance according to this invention specification;

[18] Figure 4 is a side view of embodiments of the sports conveyance according to this invention specification corresponding to the top views in figures 1, 2 and 3 (not to scale).

[19] The embodiments of the invention depicted in the accompanying figures are to be interpreted as illustrative examples of the invention specification only, and not as a strictly limiting set of embodiments of the invention specification.

Best Modes

[20] Modes if the invention can be specialised for a variety of intended usages. Modes of the invention described herein are to be interpreted as examples of tuned modes of the invention only, rather than a strictly limiting set of best modes for the invention. For

example, the invention can be tuned for best use as an amphibious conveyance, or as a conveyance where stability at speed is desired, or other.

[21] **Amphibious Usage:** Where intended for use on land and water, such as at a beach, the conveyance may advantageously be configured in a manner similar to that depicted in Figure 1. A large deck surface may enable planing on water, thin in-line wheels may allow use on land while reducing drag in water; snowboard-style longitudinal edge shaping may permit snowboard-like control on land; pneumatic tyres and height adjustable wheel fixtures may permit further user tuning of the responsiveness of the conveyance; up-turned deck ends may enhance terrain traversal; and adjustable footstraps and deck grip may serve to secure a rider's feet to the conveyance.

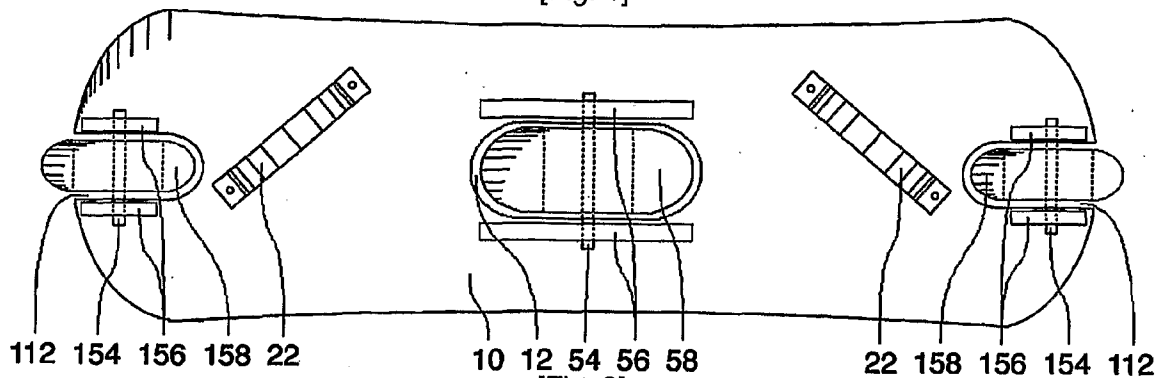
[22] **Stability At Speed Usage:** Where intended primarily for use at speed on land, the conveyance may advantageously be configured in a manner similar to that depicted in Figure 2. Wide wheels, and reduced deck area surrounding said wheels may provide a greater amount of tilt before the longitudinal edges of the conveyance may touch the terrain, such that carve-type turns that require a high degree of conveyance tilt may be better executed. The additional wheel mass may enhance stability provided by the gyroscopic effect, while the barrel-shaped centre wheel may permit pivoting on the spot, as described previously, for turning. Pneumatic tyres and height adjustable wheel fixtures may permit further user tuning of the responsiveness of the conveyance. Adjustable footstraps and deck grip may help to secure a rider's feet to the conveyance.

Claims

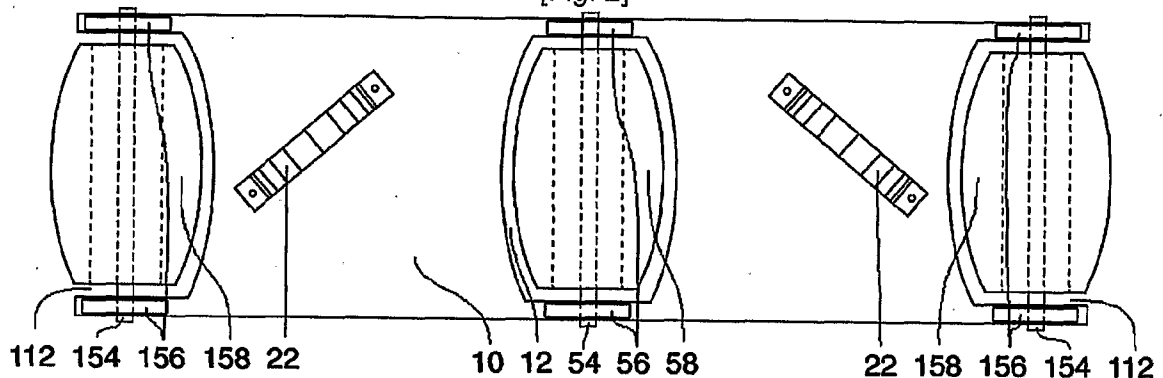
- [1] An all terrain sports conveyance comprising a surface upon which a rider may stand, and a substantially central wheel rotatably mounted on an axle, said axle affixed to said standing surface such that said wheel is positioned substantially between the feet of a rider, such that a portion of said central wheel protrudes below the dominant plane of said standing surface so as to contact the terrain, said contact providing a pivot upon which the conveyance can rotate and/or tilt; and not incorporating skateboard-type tilt-turn trucks, and not incorporating scooter-type hand controlled steering mechanisms.
- [2] An all terrain sports conveyance as claimed in claim 1 wherein additional wheels are rotatably mounted on axles affixed to said conveyance, such that they protrude below the underside of the standing surface of said conveyance, to an equal or lesser extent than the central wheel when ridden.
- [3] A sports conveyance according to any claims 1 and 2 wherein the underside of the standing surface may be used as a planing surface, such that the conveyance may additionally operate on water and/or snow, and/or ice, and/or sand,, and/or other terrains, in the manner of a kiteboard, wakeboard, surfboard, snowboard, sandboard, or other planing or sliding conveyance.
- [4] A sports conveyance according to any claims 1 or 2 wherein one or more steering mechanisms are incorporated to alter the orientation of one or more wheels with respect to the conveyance.
- [5] A sports conveyance according to any claims 1 or 2 wherein one or more braking mechanisms are incorporated at one or more wheels.
- [6] A sports conveyance according to any claims 1 or 2 wherein guards are incorporated to protect the rider and/or conveyance components.
- [7] A sports conveyance according to any claims 1, 2 or 3 wherein abrasion-resistant material or materials are affixed to the underside of the conveyance.
- [8] A sports conveyance according to any claims 1, 2, or 3 wherein lubricants or other friction-reducing materials or mechanisms, including, but not limited to, teflon, polyurethane, wax, and rollers, are affixed to, applied to, or otherwise present at the underside of the conveyance.
- [9] A sports conveyance as claimed in any claims 1, 2 or 3 wherein the planing surface and/or standing surface incorporates rocker up-turn at one or both ends, in the manner of a snowboard, kiteboard or surfboard.
- [10] A sports conveyance as claimed in any claims 1, 2 or 3 wherein the planing surface and/or standing surface cross section is convex, or partially convex, and/or such that the surface is structurally stiffened.
- [11] A sports conveyance according to any claims 1, 2 or 3 wherein the longitudinal edges of said conveyance are shaped to assist steering and/or control, for example, in the manner of a snowboard or surfboard.

- [12] A sports conveyance according to any claims 1,2 or 3 wherein the underside of the conveyance incorporates forms and/or materials advantageous to steering and control of the conveyance, such as, but not limited to, ridges, troughs, rollers and wheels.
- [13] A sports conveyance according to any claims 1 and 2 wherein the protrusion of any wheel, or wheels, below the standing surface may be adjusted.
- [14] A sports conveyance according to any claims 1 and 2 wherein at least one wheels is equipped with a pneumatic tyre or inner tube.
- [15] A sports conveyance according to any claims 1 and 2 wherein means are provided to help secure a user's feet or footwear against the conveyance.
- [16] A sports conveyance as claimed in claim 15 wherein said means include foot straps.
- [17] A sports conveyance as claimed in claim 15 wherein said means include bindings, such as those used in skiing, snowboarding, or wakeboarding.
- [18] A sports conveyance according to any claims 15, 16 or 17 wherein said means include anti-skid and/or cushioning material or materials.
- [19] A sports conveyance substantially as herein before described with reference to figures 1, 2, 3 and 4.

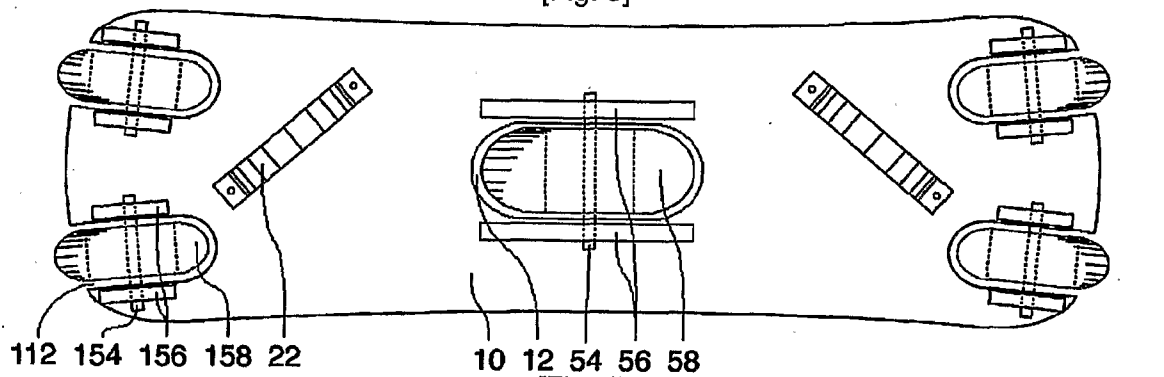
[Fig. 1]



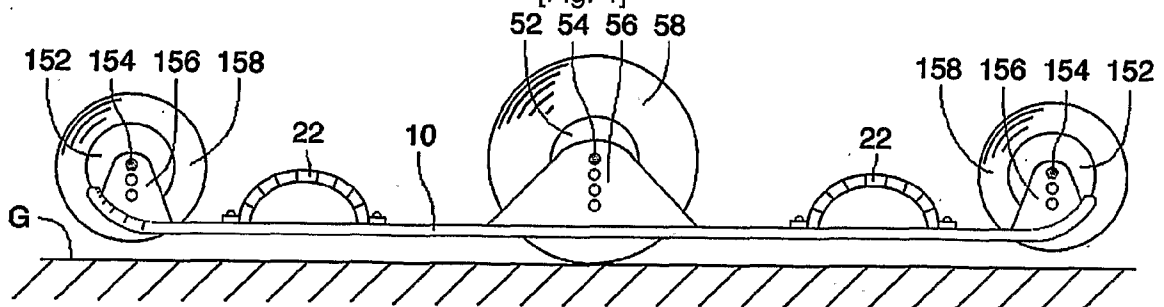
[Fig. 2]



[Fig. 3]



[Fig. 4]



INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI (IPC: A63C 17/- ; KEYWORDS: skate+, +board, wheel, roller, centr+, center+)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 1995/027541 A (BONZANIGO) 10 October 1995 See figures.	1 to 19
X	WO 2002/026334 A1 (BOUVET) 4 April 2002 See figures.	1 to 19
X	WO 2004/030774 A1 (BOUVET) 15 April 2004 See figures.	1 to 19
X	WO 2004/098730 A1 (GOMEZ AVILA) 18 November 2004 See figures.	1 to 19



Further documents are listed in the continuation of Box C



See patent family annex

* Special categories of cited documents:
 "A" document defining the general state of the art which is not considered to be of particular relevance
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 "O" document referring to an oral disclosure, use, exhibition or other means
 "P" document published prior to the international filing date but later than the priority date claimed

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2006/001634

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2407780 A (RAMSAY) 11 May 2005 See figures.	1 to 19
X	US 3512798 A (SIEGEL) 19 May 1970 See figures	1 to 19
X	US 3630540 A (SMITH) 28 December 1971 See figures	1 to 19
X	US 4106786 A (TALBOTT) 15 August 1978 See figures.	1 to 19
X	US 4795181 A (ARMSTRONG) 3 January 1989 See figures.	1 to 19
X	US 2003/0107199 A1 (DeSCHINKEL) 12 June 2003 See figures.	1 to 19

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2006/001634

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
WO	9527541	AU	18090/95		
WO	0226334	EP	1333895		
WO	2004030774	AU	2003286205	EP	1545725
		US	2006012141	FR	2845009
WO	2004098730	ES	2221795		
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US	3630540				
US	4106786				
US	4795181				
US	2003107199	CA	2413648		
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.					
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