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(54) Title: WHEELED TRANSPORTATION DEVICE

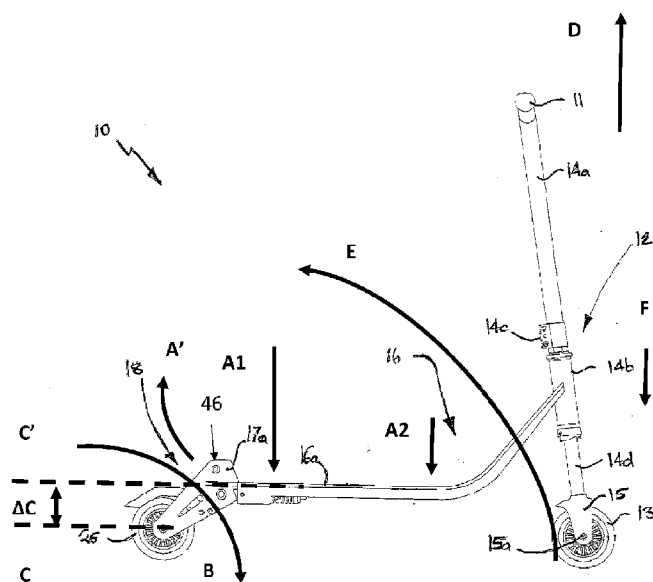


FIGURE 5B

(57) Abstract: A wheeled transportation device (10) comprising: a steering assembly; a deck (16) for supporting a rider thereon; a rear wheel assembly comprising an arm member (18) pivotally mounted to the deck (16) and at least one wheel (26) mounted on said arm member; and an energy storage system mounted to the deck so as to engage with the arm member of the rear wheel assembly; wherein, the energy storage system is configured to store a potential energy therein when the rear wheel assembly pivots away from the deck, and to release the stored potential energy upon activation by the rider to return the rear wheel assembly to a neutral position thereby generating a lifting force in the deck to assist the rider to perform a jump manoeuvre.

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WHEELED TRANSPORTATION DEVICE

FIELD OF INVENTION

[001] The present invention relates generally to a wheeled transportation device and, in particular, to a scooter having a vertical energy storage system to assist a user in performing a vertical jump.

BACKGROUND OF THE INVENTION

[002] A variety of wheeled transportation devices have been proposed to provide individuals with a means of transport as well as amusement over time. In the form of bicycles and scooters, such devices generally provide a means for enabling the user to propel the device using their own energy reserves, which for a bicycle typically includes pedals and gears, while for a scooter, the user typically propels the device by pushing themselves along.

[003] More recently, a variety of motorised means have been combined with such devices to generally provide an external propulsion means, depending upon the specific desire of the user.

[004] Notwithstanding this, there is considerable appeal among many users for a self-propelled device, such as a scooter, which provides a simple means for transport. Such appeal typically conveys a degree of freedom to the user, which in turn, provides the user with freedom of movement and the ability to perform tricks and other similar manoeuvres, requiring considerable skill and a degree of daring. In recent times, scooters have enjoyed a considerable degree of popularity for their ability to perform tricks and various aerial moves, other than being merely a means of transport.

[005] In this regard, a fundamental aspect in performing an aerial manoeuvre on a device, such as a scooter, is the ability for the user to launch the device into the air whilst riding the device. For this purpose, terrain has been developed to function as a launching ramp to enable a rider to become airborne to perform such a manoeuvre.

[006] However, there is also a desire for a rider to launch into the air whilst on a substantially horizontal surface, in much the same way as a skateboard rider is able to do. A particular problem with this is that some users of scooters are not skilled enough or

strong enough to facilitate upward manoeuvres very readily. It is therefore a need for an aid to facilitate such

[007] However a further aspect of that problem is that the same solution might not be suitable for all users. Therefore a problem exists in providing a solution which is adaptable or adjustable to be usable by a range of users and have a substantially increased effectiveness provided preferably to the whole range of possible users.

[008] In order to show the type of tricks or vertical manoeuvres that would wished to be possible on a scooter or other wheeled transportation vehicles such as a scooter, examples of tricks or vertical manoeuvres in the skateboard field are explained.

[009] For skateboards, the ability to become airborne, such as in the trick known as “an Ollie” named in 1978 after a 15 year old boy by the name of Alan "Ollie" Gelfand who invented the trick. This was a ramp based trick. In the coming years a skateboard rider, Rodney Mullen, applied the trick to flat land skateboarding.

[0010] The apparent lift whilst travelling along a horizontal surface is achieved through three distinct elements of physics being:

i. Newton’s second law of action and reaction between the force exerted down by the rider on the board and through the wheels to the ground and the countering force of the Earth back against the wheels to the board;

ii. The use of torque in that the force on the skateboard is constantly changing, both in magnitude as well as in direction. The force of gravity obviously isn’t changing, so the reason that these force arrows are shrinking and growing and tumbling around is that the skater is changing how their feet pushes and pulls against the board. By applying a variable force that changes both in strength and direction, they’re steering the board.

iii. the flexible nature of the deck of the skateboard in combination with the flexible wheels of the skateboard and the inherent shape or design of the deck.

[0011] In the hippie jump, a skateboarder rides along on a flat horizontal surface at a certain velocity and then at a take-off point jumps straight up without exerting any horizontal force

on the board. This allows flight through the air at the same horizontal velocity as the board. As a result, the board remains directly below the rider allowing the rider to land on top of the board at a landing location spaced from the take-off point. In this trick the skater must propel himself up by pushing vertically down with his legs. If he pushes on the board with even the slightest horizontal force the board will shoot out either in front of him or behind him. After the skateboarder jumps off the board, gravity takes over and he follows a parabolic arc as he flies through the air, before landing back on the board.

[0012] The physics behind this trick can be described by the equations of projectile motion, where only the vertical component of velocity changes, since gravity only acts in the vertical direction. The horizontal component of velocity of the skateboarder stays the same since there is no force acting on him in the horizontal direction. To make the jump more challenging, the skateboarder can do the jump over an obstacle.

[0013] In achieving an Ollie the steps generally comprise of:

- I. Initially before an Ollie the board is pushed down by the rider, pulled down by gravity and pushed up by the ground. The centre of mass of the skateboard is in the centre of the board. The sum of all the forces on the board is zero. There is no acceleration. The sum of all the torques, twisting forces, on the board is zero. There is no angular acceleration.
- II. The rider can begin the Ollie to launch into the air by pushing down on the skateboard. But there is an uneven push of the back foot to the front foot. There is a large upward force by the ground on the rear wheels. Gravity is pulling down on the skateboard. All of these forces together cause the skateboard to pivot about the rear wheels and therefore producing a torque or twisting force on the skateboard. The front of the skateboard rises and the centre of mass of the skateboard also begins to rise. The rear of the skateboard can collide with the ground.
- III. The rear wheel is no longer on the ground. The skateboard is only in contact with the ground at the rear of the board. There is a large upward force by the ground on the rear end of the skateboard. The skateboard is pivoting about this point of contact.
- IV. Then the skater's front foot is pushing down on the front of the board, creating an opposite torque and stopping the front of the board rapid upward rotation.

Instead by lifting the rear foot the rear of the board swings up around the pivot of the front foot as the front foot is pushed down.

V. Gravity is pulling down, the skater's front foot is pushing down. The skater has placed the rear foot back over the board and the board is accelerating downward and is becoming level. Therefore apparent lift has been achieved.

VI. Both feet of the skater press down on the board and engages the ground with the ground pushing up on both sets of wheels. Gravity continues to pull the board down. The board and skater rapidly stop their downward movement and resume moving across the ground at a constant speed.

[0014] However, for scooters, there is a requirement for the structure to have a degree of rigidity dictated by the requirement that the wheels of the scooter are mounted on defined axles and the steering assembly must pivot at the front of the device. Therefore there is a need to provide a scooter which provides the option of undertaking an Ollie manoeuvre.

[0015] An important element to distinguish is the use of resilient means and energy absorbing dashpots in order to change the resilient interaction of the ride of the board in a shock absorber manner. Such approaches are aimed at not providing a resilient feedback force and in particular not providing a resilient action but instead to provide a dampening effect by providing complex frequency overlapping of different wavelengths that come close to providing a linear flat ride.

[0016] Another area that needs to be understood is distinguished from the present approach is the complex interaction of resilient means that provide time spaced actions. For example having a first flexure and then after returning to steady or extreme flex allowing the secondary resilient means to act. These type of actions are more in the "fun" vehicles that provide exaggerated unusual ride actions.

[0017] Thus, there is a need to provide a scooter with an improved ability to harness energy to facilitate a vertical manoeuvre. There is also a need for a scooter to be adjustable for individual rider requirements.

[0018] The present invention seeks to provide a wheeled transportation device, which will overcome or substantially ameliorate at least one or more of the deficiencies of the prior art, or at least provide an alternative.

[0019] The above references to and descriptions of prior proposals or products are not intended to be, and are not to be construed as, statements or admissions of common general knowledge in the art. In particular, the above prior art discussion does not relate to what is commonly or well known by the person skilled in the art, but assists in the understanding of the inventive step of the present invention of which the identification of pertinent prior art proposals is but one part.

STATEMENT OF INVENTION

[0020] The invention according to one or more aspects is as defined in the independent claims. Some optional and/or preferred features of the invention are defined in the dependent claims.

[0021] Accordingly, in one aspect of the invention there is provided A wheeled transportation device comprising: a steering assembly; a deck for supporting a rider thereon; a rear wheel assembly comprising an arm member pivotally mounted to the deck and at least one wheel mounted on said arm member; and an energy storage system mounted to the deck so as to engage with the arm member of the rear wheel assembly; wherein, the energy storage system is configured to store a potential energy therein when the rear wheel assembly pivots away from the deck, and to release the stored potential energy upon activation by the rider to return the rear wheel assembly to a neutral position thereby generating a lifting force in the deck to assist the rider to perform a jump manoeuvre.

[0022] Preferably the steering assembly comprises a handle portion in association with at least one wheel, the handle portion being configured to control the orientation of the at least one wheel to steer the scooter when in use.

[0023] The steering assembly comprises at least one stem portion connecting the handle portion to the at least one wheel, the at least one stem portion being at least partially received within a tube portion.

[0024] Preferably a secondary energy storage system is provided within said tube portion to be in engagement with the at least one stem portion, the secondary energy storage system is configured to store a potential energy therein when the at least one stem portion is compressed into the tube portion, and to release the stored potential energy upon activation by the rider to generating a lifting force in the steering assembly to assist the rider to perform a jump manoeuvre.

[0025] Preferably the deck comprises a recess formed therein for receiving the rear wheel assembly. In one form the rear wheel assembly can extend from the recess to project beyond a rear end of the deck in a downward orientation.

[0026] Preferably the energy storage system is mounted to an underside of the deck.

5 [0027] In one form there is provided a wheeled transportation device comprising: a steering assembly having at least one wheel mounted on a first energy storage system; a deck for supporting a rider thereon; a rear wheel assembly comprising an arm member pivotally mounted to the deck and at least one wheel mounted on said arm member; and a second energy storage system mounted to the deck so as to engage with the arm member of the
10 rear wheel assembly; wherein, upon the rider applying a downward force to the steering assembly and the deck, both the first energy storage system and the second energy storage system are configured to store a potential energy therein such that upon the rider releasing the downward force both the first energy storage system and the second energy storage system release the stored potential energy thereby generating a lifting force in the deck to assist the
15 rider to perform a jump manoeuvre.

[0028] Preferably the wheeled transportation device comprises: a front wheel assembly supporting at least one front wheel, a deck for supporting a rider thereon, and a rear wheel assembly supporting at least one rear wheel; the rear wheel assembly pivotally mounted to the at least one rear wheel at a first pivot at the axis of the at least one rear wheel; the rear
20 wheel assembly adapted to be pivotally mounted to the rear of the deck at a second pivot, wherein the deck and the rear wheel assembly extend directly from the front wheel assembly to the at least one rear wheel; a resilient structure mounted at a rear end of the deck and connecting to the rear wheel assembly; wherein the resilient structure and first and second pivots allows the rider to resiliently deflect the deck and the rear wheel assembly around the
25 second pivot.

[0029] Preferably the resilient structure and the first and second pivot allows a rider to resiliently deflect the deck relative to the rear wheel assembly around the second pivot while allowing for simultaneous rotation of the deck around the first pivot.

[0030] Preferably the resilient structure and the second pivot allows a rider to resiliently
30 deflect the deck rotationally around the rear wheel assembly and allows for simultaneous rotation of the rear wheel assembly around the first pivot.

[0031] Preferably the resilient structure and the first and second pivots allows a rider to

resiliently deflect the deck rotationally around the rear wheel assembly around the second pivot while allowing for simultaneous rotation of the rear wheel assembly in an opposite direction around the first pivot.

[0032] The resilient structure can be mounted to the deck at a first end and to a mid-section of the rear wheel assembly at a second end and forms an energy storage means.

[0033] The energy storage means can be mounted between the deck and the rear wheel assembly, wherein the energy storage system is configured to store a potential energy therein when the rear wheel assembly is pivoted relative to the deck, and to release resiliently the stored potential energy, upon activation by the rider, to return the rear wheel assembly to the original non-deflected position thereby generating a lifting force in the deck to assist the rider to perform a jump manoeuvre.

[0034] The energy storage means can be mounted at one end in a rider protected position on an underside of the deck away from the rider.

[0035] Preferably the energy storage means is mounted at one end in a rider protected position in a channel on an underside of the deck away from the rider.

[0036] Preferably the energy storage means is mounted at one end in a rider protected position away from the rider on an underside of the rear wheel assembly.

[0037] Preferably the energy storage means is mounted at one end in a rider protected position away from the rider between parallel plates of the rear wheel assembly forming a fork connecting axially to either side of the rear wheel assembly.

[0038] Preferably the energy storage means is adjustable to allow resilience to be altered to match the weight or force applicable by the rider to allow the rider to resiliently deflect at least a portion of the first end of the deck relative to the adjacent front or the rear wheel assembly.

[0039] Preferably the energy storage means is adjustable to allow resilience to be altered such that the maximum deflection matches the maximum weight or force applicable by the rider to allow the rider to resiliently deflect the deck relative to the adjacent rear wheel assembly.

[0040] The energy storage means can be a module that has a range of alterable resilience.

[0041] Preferably the module of the energy storage means can be configured to be suitable for riders of the range of:

- Children aged 6 to 12;
- Teenagers 13 to 19; and
- Adults.

5 [0042] Preferably the module of the energy storage means can be configured to be suitable for riders of the range of:

- Under 30 kilograms;
- 30 to 60 kilograms;
- Over 60 kilograms.

10 [0043] The energy storage means can be a coil spring connected between the deck and the rear wheel assembly.

[0044] The energy storage means can in another form be a linear spring extending along the deck and substantially between the deck and the rear wheel assembly such that rotation of the rear wheel assembly causes linear resilient extension of the linear spring.

15 [0045] The energy storage means can in an even further form be a linear spring extending along the deck and substantially between the deck and the arm and the rotation of the arm member relative to the deck causes engagement of arm and secondary resilient rotational action against the arm deflection.

[0046] Preferably the energy storage means is adjustable by altering the rotation of the coil spring.

20 [0047] Preferably the energy storage means is adjustable by altering the linear extension of the linear spring.

[0048] Preferably the energy storage means is adjustable by altering the protrusion of the engaging part of the arm with the linear spring and thereby altering the secondary linear extension of the linear spring.

25 [0049] In one form of the wheeled transportation device, the front wheel assembly includes a steering assembly comprising a handle portion in association with the at least one front wheel, the handle portion being configured to control the orientation of the front to steer the wheeled transportation device when in use.

[0050] The front wheel assembly can include a secondary energy storage system.

[0051] Preferably the secondary energy storage system is configured to store a potential energy therein when the front wheel assembly is forced downwards against the at least one front wheel, and to release resiliently the stored potential energy, upon activation by the rider, to return the front wheel assembly to the original non-deflected position thereby generating a lifting force to assist the rider to perform a jump manoeuvre.

[0052] Preferably the secondary energy storage system is adjustable.

[0053] The wheeled transportation device can have the front wheel assembly including a steering assembly.

[0054] Preferably the steering assembly comprises at least one stem portion connecting the handle portion to the at least one front wheel, the at least one stem portion being at least partially received within a tube portion.

[0055] In one form of the wheeled transportation device a secondary energy storage system is provided within said tube portion to be in engagement with the at least one stem portion, the secondary energy storage system is configured to store a potential energy therein when the at least one stem portion is compressed into the tube portion, and to release the stored potential energy upon activation by the rider to generating a lifting force in the steering assembly to assist the rider to perform a jump manoeuvre.

[0056] Preferably the deck comprises a recess formed therein for receiving at least a portion of the rear wheel assembly for pivotal mounting at the second pivot. In use in a non-deflected position the rear wheel assembly extends from the recess to project beyond a rear end of the deck in a downward orientation to the at least one rear wheel.

[0057] Preferably the energy storage system is mounted to an underside of the deck.

[0058] Also in accordance with the invention in another form there is provided a wheeled transportation device comprising: a steering assembly having at least one wheel mounted on a first energy storage system; a deck for supporting a rider thereon; a rear wheel assembly comprising an arm member pivotally mounted to the deck and at least one wheel mounted on said arm member; and a second energy storage system mounted to the deck so as to engage with the arm member of the rear wheel assembly; wherein, upon the rider applying a downward force to the steering assembly and the deck, both the first energy storage system and the second energy storage system are configured to store a potential energy therein such that upon the rider releasing the downward force both the first energy storage system and the second energy storage system release the stored potential energy thereby generating a lifting

force in the deck to assist the rider to perform a jump manoeuvre.

[0059] Preferably the wheeled transportation device is a scooter.

[0060] The invention of the wheeled transportation device approaches a range of problems and provides a range of solution which provide a range of benefits including but not limited to the following range of benefits:

- i. Improvements in structure and assembly providing improved performance;
- ii. Improved aid in performing tricks or vertical manoeuvres;
- iii. Improvements in resilient means including better construction and better adaptability to give a greater effective resilient action that assists vertical manoeuvres;
- iv. Improvements in construction and type and use of resilient means to allow tuneability of the structure and assembly to the users weight or age to match better performance;
- v. Improvements in alterability to allow user to adjust resilient action as required to allow greater flexibility and greater adaptability;
- vi. Improvements in position of resilient means which clearly provides a difference in deck positions in use and allows user to step on various parts safely while maintaining effectiveness;
- vii. Improvements in configuration in order to increase safety to the user by enclosing features away from the user;
- viii. Improvements in combination of effects on the wheeled transportation device to give range of uses by the user.

[0061] It can be seen that the invention of wheeled transportation device provides the benefit of:

- a. Variation in use;
- b. Adaptability for individual customization of resilience means to match the user (or tuneability);
- c. Ready adaptability of modules for attachment;
- d. Safe operation as a toy item as usable by children;

[0062] Other benefits and uses will be understood by a person skilled in the art and are included within the scope of this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

5 [0063] The invention may be better understood from the following non-limiting description of preferred embodiments, in which:

[0064] Fig. 1 is a depiction of a side view of a scooter in accordance with an embodiment of the present invention;

[0065] Fig. 2 is top view of the scooter of Fig. 1 with the rear wheel assembly removed;

10 [0066] Fig. 3 is an underside view of the scooter of Fig. 1 with the rear wheel assembly removed;

[0067] Fig. 4 is an isolated view of the rear wheel assembly of the scooter of Fig.1; and

[0068] Figs. 5A and 5B are an enlarged view of a rear portion of the scooter of Fig. 1 depicting the manner in which the rear wheel assembly generates a potential force during use
15 in a simple manner or in a complex manner such as for an Ollie manoeuvre. .

DETAILED DESCRIPTION OF THE DRAWINGS

[0069] Preferred features of the present invention will now be described with particular reference to the accompanying drawings. However, it is to be understood that the features
20 illustrated in and described with reference to the drawings are not to be construed as limiting on the scope of the invention.

[0070] The present invention will be described below in relation to a conventional scooter design having two single wheels mounted at a front and rear region of the scooter. However, it will be appreciated that the present invention may be adapted for application to a variety of
25 different scooter arrangements having different wheel configurations, as well as to a variety of other wheeled devices, such as bicycles, skateboards and the like.

[0071] The wheeled transportation device in accordance with the invention can include a range of resilient means providing a range of effects provided by one or more of:

- i. Newton's second law of action and reaction between the force exerted down by the rider on the board and through the wheels to the ground and the countering force of the Earth back against the wheels to the board;
- 5 ii. The use of torque in that the force on the scooter is constantly changing, both in magnitude as well as in direction. The force of gravity obviously isn't changing, so the reason that these force arrows are shrinking and growing and tumbling around is that the skater is changing how their feet pushes and pulls against the board. By
10 applying a variable force that changes both in strength and direction, they're steering the board.
- iii. the flexible nature of the deck of the scooter in combination with the flexible wheels of the skateboard and the inherent shape or design of the deck;
- 15 iv. the lifting of the deck by the handle of the scooter when the rider is in a lifted vertical position due to one or more of the above effects.

[0072] Referring to Fig. 1, there is depicted a scooter 10 in accordance with an embodiment of the present invention. The scooter 10 generally comprises a steering assembly 12, a rear wheel assembly 18 and a deck 16 that connects the rear wheel assembly to the steering
20 assembly.

[0073] The steering assembly 12 generally comprises a handle portion 11 that extends transversely from the upper support stem 14a. The handle portion 11 is typically an elongate tube member having a pair of surfaces that are gripped by the hands of the rider and to steer the scooter in a conventional manner. The upper support stem 14a is typically mounted to
25 extend from the frame tube 14b and is adjustable in length so as to provide for the height of the steering assembly to be adjusted to suit riders of varying heights.

[0074] In this regard, a clamp member 14c is provided to facilitate locking of the upper support stem 14a with respect to the frame tube 14b to securely retain the upper support stem in position within the frame tube 14b. In such an arrangement, the upper support stem 14a
30 is restricted from vertical movement within the frame tube 14b but is able to rotate therein such that pivoting or steering motion applied by the rider to the handle portion 11 is

transferred through the upper support stem 14a to the wheel 13 to facilitate steering of the scooter 10.

[0075] As depicted, the wheel 13 is mounted within a bracket 15 so as to freely rotate about axis 15a. The bracket 15 is mounted to a lower support stem 14d which is also mounted within the frame tube 14b, to extend therefrom. Whilst not shown, the lower support stem 14d is rotationally coupled to the upper support stem 14a by an appropriate link such that the rotational motion applied to the upper support stem 14a through the handle 11 is transferred through the lower support stem 14d to the wheel 13 so as to control the direction in which the wheel 13 is orientated so as to steer the scooter.

[0076] In a preferred embodiment of the present invention, the lower support stem 14d is sprung loaded within the frame tube 14b and is able to compress into the frame tube 14b upon the application of a downward force by the rider. A compression spring arrangement may be provided within the frame tube 14b for this purpose, which is able to compress and store potential energy therein for later release. It will be appreciated that through releasing the potential energy stored within the compression spring arrangement of the frame tube 14b, the lower support stem 14d will be caused to be propelled from the frame tube 14 towards the ground surface, thereby generating a return upward force through the steering assembly 12, which may be used to perform a jump manoeuvre by the rider of the scooter. The manner in which this energy will be further harnessed by the rider of the scooter will be discussed in more detail below.

[0077] Referring to Figs. 1 and 2, a front end of the deck 16 is mounted to the frame tube 14b and extends angularly downward therefrom before it assumes a substantially horizontal trajectory 16a. The horizontal portion 16a is configured to support a rider thereon, typically in a standing position, and has a length sufficient for this purpose. Typically, the deck 16 is reinforced to accommodate riders of variable sizes and weights, as will be appreciated by those skilled in the art, and as such, is largely rigid with minimal flex present therein.

[0078] In Fig. 2, the rear wheel assembly 18 from the deck 16 is removed thereby showing a recess 17 located in the rear edge of the deck 16. The recess 17 is located in a central portion of the deck 16 and has a bracket 17a provided around the recess 17 which extends from an upper surface of the deck 16 as is depicted more clearly in Fig. 1. The recess 17 and the bracket 17a provide a means for mounting the rear wheel assembly 18 to the deck 16, in a manner that will be discussed in more detail below.

[0079] The underside of the deck 16 is depicted in Fig. 3. A channel 20 is formed in the underside of the deck 16 by a pair of spaced apart rail members 21 that extend the length of the deck 16 as shown. The rail members 21 are typically made from a metal material and function to reinforce the deck 16. Adjacent the recess 17 an energy storage system 30 is mounted within the channel 20, and securely positioned therein in the manner as shown. The energy storage system 30 is depicted as an arrangement having a compression spring 32 about a central shaft 33. The compression spring 32 is retained between a pair of end stoppers 34a and 34b with the central shaft 33 being fixed to the end stopper 34a and being able to pass through a recess in the end stopper 34b. The central shaft 33 has a free end 35 which extends into the recess 17 of the deck 16 as shown, for connection with the rear wheel assembly 18, in a manner as to be discussed in more detail below.

[0080] Referring to Fig. 4, the rear wheel assembly 18 is shown in isolation. The rear wheel assembly 18 generally comprises an arm member 40, having a pair of spaced apart plate members 41, 42 between which the rear wheel 25 is mounted. In this regard, the rear wheel 25 is mounted between the plate members 41, 42 at the distal ends thereof such that it is free to rotate about its central axis 25a.

[0081] A brake member 43 is also mounted between the plate members 41, 42 in the manner as shown, and is secured in position by securing means 44, in the form of a bolt and screw arrangement. The brake member 43 is in the form of a conventional brake system for a scooter and comprises a rigid arm portion that is pivotable about the securing means 44 to be pressed into contact with the wheel 25 by a rider of the scooter to physically contact the surface of the wheel 25 and slow or stop the wheel from moving. The rigid arm of the brake member 43 is biased into a position where it is located away from contact with the wheel 25 when not required, by way of a spring member 45 (partially obscured). It will be appreciated that other means for supplying a brake system may also be employed, whilst still falling within the spirit of the present invention.

[0082] Each of the plate members 41, 42 of the arm member 40 have a first pair of upper holes 46 formed therein, to facilitate securing of the arm between the bracket 17a of the deck 16. The upper holes are configured to align with a pair of holes provided in the bracket 17a so as to enable a bolt or similar attachment means to be employed to secure the arm member 40 within the recess 17 of the deck 16, as is shown in Fig. 1. When positioned in this manner, the arm member 40 extends in a substantially 45° angle behind and in a downward direction from the rear edge of the deck 16. In this position, the arm member 40 is able to

pivot about this point of connection to enable the creation of energy within the energy storage system 30, as will be discussed in more detail below.

[0083] As is shown in Fig. 4, a second pair of lower holes 48 is also formed in the arm member 40. The lower holes provide a means for attaching the arm member 40 to the free end 35 of the central shaft 33 of the energy storage system 30, when the arm member is mounted within the recess 17 of the deck. The free end 35 of the central shaft 33 has a recess formed therein which aligns with the holes 48 to enable a bolt to be received therein such that the arm member 40 is also securely attached to the central shaft 33 of the energy storage system 30 during use.'

[0084] It will be appreciated that when the rear wheel assembly 18 is mounted to the deck in the manner as described above, the rear wheel 25 supports the rear of the scooter 10 and is able to pivot away from the rear of the deck 16 when a downward force is applied by the rider at the rear of the deck 16. Such a force will have the effect of bringing the underside of the deck closer to the ground surface and generating a bias force in the energy storage system 30, which is biased to return the rear wheel assembly to its neutral position.

[0085] The manner in which this is achieved is shown in more detail in Figs. 5A and 5B.

[0086] In the simple depiction of Fig 5A, initially the height of the deck 16 when the wheel is ground engaging is C' while the radius of the wheel 25 is C. Therefore the relative heights ΔC is at a maximum. A rider applies a downward force A to the rear portion of the deck 16. This force A causes the rear wheel assembly 18 to pivot around the connection 46 to the deck 16 in the direction of arrow A'. This in effect results in rotation of the rear wheel assembly 18 relative to the central axis 25a of the rear wheel 25 in the direction of B and the "stretching out" of the deck 16 and the rear wheel assembly 18. In this way the relative height ΔC of the deck 16 to central axis 25a of the rear wheel 25 is decreased.

[0087] As well as jumping up against the scooter, the rider obtains a resilient bonus. As the arm member 40 of the rear wheel assembly pivots in the direction of arrow A', the central shaft 33 of the energy storage system 30 located on the underside of the deck 16 is also caused to move in the direction of arrow A''. Such movement of the central shaft causes the end stopper 34a to compress the spring 32, thereby generating energy within the energy storage system 30, with the potential energy being stored within the spring 32.

[0088] In order to perform a jumping manoeuvre, the rider will release the downward force A on the deck 16 by jumping up, which in turn, releases the potential energy stored within the

spring 32 of the energy storage system 30. This energy causes the arm member 40 to return to its unbiased position where the arm moves toward the ground surface by rotating in the opposite directions to A' and B relative to their respective axis 46, 25a, causing the relative height ΔC of the deck 16 to central axis 25a of the rear wheel 25 to be increased and effect the deck 16 to rise above the ground surface. The rider is then able to utilise this shift in energy momentum in the jumping manoeuvre.

[0089] It can be seen that the resilient means is in a protected position under the deck 16 and under a covering element of the rear wheel assembly 18. In this way the user is protected and can even stand on the connection of the deck 16 and under a covering element of the rear wheel assembly 18 to effect the resilient deflection.

[0090] It can also be understood that the linear spring extending around the central shaft 33 of the energy storage system 30 can be orientated in other ways. It even can be mounted in a vertical manner as long as cooperating between the deck 16 and the rear wheel assembly 18 to provide a resilient rebound.

[0091] An important element though is that it is that the central shaft 33 is not connected at both ends providing a shock absorber effect. Instead it is directing the spring 32 in a free manner to allow resilient rebound. It can be understood that further variability in resilience can be achieved by alteration of resilience of the spring 33 or by alteration of the run of the spring. Therefore the neutral position in use may differ to the neutral position of the extension of the spring not in use.

[0092] As discussed previously, by also providing an energy storage system in the front of the scooter, namely through the implementation of a compression spring in association with the lower support stem 14d, the rider may utilise both energy storage systems to assist in the jumping manoeuvre. This can provide improved energy transfer into a vertical jump without the need to generate a flex force in the deck structure which is difficult to perform in a rigid scooter configuration and which requires experience to perform.

[0093] It will be appreciated that the energy storage system 30 as depicted in the present invention can be simply and effectively altered or varied in accordance with the rider's specific requirements. This can be achieved by altering the spring stiffness characteristics as well as the length of the central shaft 33.

[0094] The scooter of the present invention can be simply used by a rider to generate a jumping force within the device and to release the force as required to facilitate a jump. This

can be achieved without the need to cause the deck of the scooter to flex and will not compromise the structural integrity of the overall scooter.

[0095] In the more complex depiction of Fig 5B, initially the height of the deck 16 when the wheel is ground engaging is C' while the radius of the wheel 25 is C. Therefore the relative heights ΔC is at a maximum.

[0096] However in this case there is a force A1 applied by the rider to the rear portion of the deck 16 while also applying a lesser downward force A2 to the front portion of the deck 16. This force A causes the rear wheel assembly 18 to pivot around the connection 46 to the deck 16 in the direction of arrow A'. This in effect results in rotation of the rear wheel assembly 18 relative to the central axis 25a of the rear wheel 25 in the direction of B and the "stretching out" of the deck 16 and the rear wheel assembly 18. In this way the relative height ΔC of the deck 16 to central axis 25a of the rear wheel 25 is decreased.

[0097] As well as jumping up against the scooter, the rider obtains a resilient bonus and as well can include a torsional rotational bonus.

[0098] Like in the simple action, as the arm member 40 of the rear wheel assembly 18 pivots in the direction of arrow A', the central shaft 33 of the energy storage system 30 located on the underside of the deck 16 is also caused to move in the direction of arrow A''. Such movement of the central shaft causes the end stopper 34a to compress the spring 32, thereby generating energy within the energy storage system 30, with the potential energy being stored within the spring 32.

[0099] However while the rear wheel assembly 18 pivots around 46 in the direction of arrow A', the deck can be made to rotate in the opposite direction around 46 in the direction of arrow E. This can be supplemented by downward force F on second resilient means and/or by lifting force D by the rider on the handle 11. The result is a rotational movement of the deck 16 with the front of the deck higher than the rear of the deck.

[00100] In order to continue the jumping manoeuvre, the rider will jump up against A1 to release the downward force A1 on the deck 16, which in turn, releases the potential energy stored within the spring 32 of the energy storage system 30. This energy causes the arm member 40 to return to its unbiased position where the arm moves toward the ground surface by rotating in the opposite directions to A' and B relative to their respective axis 46, 25a, causing the relative height ΔC of the deck 16 to central axis 25a of the rear wheel 25 to be

increased and effect the deck 16 to rise above the ground surface. The rider is then able to utilise this shift in energy momentum in the jumping manoeuvre.

[00101] However in this arrangement the rider has a front foot on front part of the deck 16 which is in the air and the jumping at the rear and the resilient rebound at the rear then
5 cause rotation around the rider's front foot on the front of the deck 16.

[00102] In this way the rider has used the multiple resilient means and other relative elements of the wheeled transportation device in a complex manner to effect an improved jumping manoeuvre with assistance from the novel and inventive configuration of the elements of the wheeled transportation device.

10 [00103] As discussed previously, by also providing an energy storage system in the front of the scooter, namely through the implementation of a compression spring in association with the lower support stem 14d, the rider may utilise both energy storage systems to assist in the jumping manoeuvre. This can provide improved energy transfer into a vertical jump without the need to generate a flex force in the deck structure which is
15 difficult to perform in a rigid scooter configuration and which requires experience to perform.

[00104] It will be appreciated that the energy storage system 30 as depicted in the present invention can be simply and effectively altered or varied in accordance with the rider's specific requirements. This can be achieved by altering the spring stiffness characteristics as well as the length of the central shaft 33.

20 INTERPRETATION

[00105] Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present
25 invention. Thus, appearances of the phrases "in one embodiment" or "in an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment, but may. Furthermore, the particular features, structures or characteristics may be combined in any suitable manner, as would be apparent to one of ordinary skill in the art from this disclosure, in one or more embodiments.

30 [00106] Similarly it should be appreciated that in the above description of example embodiments of the invention, various features of the invention are sometimes grouped

together in a single embodiment, figure, or description thereof for the purpose of streamlining the disclosure and aiding in the understanding of one or more of the various inventive aspects. This method of disclosure, however, is not to be interpreted as reflecting an intention that the claimed invention requires more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed embodiment. Thus, the claims following the Detailed Description of Specific Embodiments are hereby expressly incorporated into this Detailed Description of Specific Embodiments, with each claim standing on its own as a separate embodiment of this invention.

[00107] Furthermore, while some embodiments described herein include some but not other features included in other embodiments, combinations of features of different embodiments are meant to be within the scope of the invention, and form different embodiments, as would be understood by those in the art. For example, in the following claims, any of the claimed embodiments can be used in any combination.

[00108] Throughout the specification and claims the word "comprise" and its derivatives are intended to have an inclusive rather than exclusive meaning unless the contrary is expressly stated or the context requires otherwise. That is, the word "comprise" and its derivatives will be taken to indicate the inclusion of not only the listed components, steps or features that it directly references, but also other components, steps or features not specifically listed, unless the contrary is expressly stated or the context requires otherwise.

[00109] In describing the preferred embodiment of the invention illustrated in the drawings, specific terminology will be resorted to for the sake of clarity. However, the invention is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar technical purpose. Terms such as "forward", "rearward", "radially", "peripherally", "upwardly", "downwardly", and the like are used as words of convenience to provide reference points and are not to be construed as limiting terms.

[00110] Orientational terms used in the specification and claims such as vertical, horizontal, top, bottom, upper and lower are to be interpreted as relational and are based on the premise that the component, item, article, apparatus, device or instrument will usually be considered in a particular orientation, typically with the scooter uppermost.

[00111] It will be appreciated by those skilled in the art that many modifications and variations may be made to the methods of the invention described herein without departing from the spirit and scope of the invention.

[00112] The invention can be described in terms of what are believed to be the preferred embodiments of the invention, those skilled in the art will recognize that other and further modifications may be made thereto without departing from the spirit of the invention, and it is intended to claim all such changes and modifications as fall within the scope of the invention

10 INDUSTRIAL APPLICABILITY

[00113] It is apparent from the above, that the arrangements described are applicable to the wheeled vehicle, entertainment and toy industries.

Claims:

1. A wheeled transportation device comprising:

a steering assembly;

a deck for supporting a rider thereon;

5 a rear wheel assembly comprising an arm member pivotally mounted to the deck and at least one wheel mounted on said arm member; and

an energy storage system mounted to the deck so as to engage with the arm member of the rear wheel assembly;

10 wherein, the energy storage system is configured to store a potential energy therein when the rear wheel assembly pivots away from the deck, and to release the stored potential energy upon activation by the rider to return the rear wheel assembly to a neutral position thereby generating a lifting force in the deck to assist the rider to perform a jump manoeuvre.

15 2. A wheeled transportation device according to claim 1, wherein the steering assembly comprises a handle portion in association with at least one wheel, the handle portion being configured to control the orientation of the at least one wheel to steer the scooter when in use.

20 3. A wheeled transportation device according to claim 2, wherein the steering assembly comprises at least one stem portion connecting the handle portion to the at least one wheel, the at least one stem portion being at least partially received within a tube portion.

25 4. A wheeled transportation device according to claim 3, wherein a secondary energy storage system is provided within said tube portion to be in engagement with the at least one stem portion, the secondary energy storage system is configured to store a potential energy therein when the at least one stem portion is compressed into the tube portion, and to release the stored potential energy upon activation by the rider to generating a lifting force in the steering assembly to assist the rider to perform a jump manoeuvre.

5. A wheeled transportation device according to claim 1, wherein the deck comprises a recess formed therein for receiving the rear wheel assembly.

30 6. A wheeled transportation device according to claim 5, wherein the rear wheel

assembly extends from the recess to project beyond a rear end of the deck in a downward orientation.

7. A wheeled transportation device according to claim 6, wherein the energy storage system is mounted to an underside of the deck.

5 8. A wheeled transportation device according to any one of the preceding claims comprising:

a steering assembly having at least one wheel mounted on a first energy storage system;

a deck for supporting a rider thereon;

10 a rear wheel assembly comprising an arm member pivotally mounted to the deck and at least one wheel mounted on said arm member; and

a second energy storage system mounted to the deck so as to engage with the arm member of the rear wheel assembly;

15 wherein, upon the rider applying a downward force to the steering assembly and the deck, both the first energy storage system and the second energy storage system are configured to store a potential energy therein such that upon the rider releasing the downward force both the first energy storage system and the second energy storage system release the stored potential energy thereby generating a lifting force in the deck to assist the rider to perform a jump manoeuvre.

20 9. A wheeled transportation device according to any one of claims 1 to 6 comprising:

a. a front wheel assembly supporting at least one front wheel, a deck for supporting a rider thereon, and a rear wheel assembly supporting at least one rear wheel;

25 b. the rear wheel assembly pivotally mounted to the at least one rear wheel at a first pivot at the axis of the at least one rear wheel;

c. the rear wheel assembly adapted to be pivotally mounted to the rear of the deck at a second pivot, wherein the deck and the rear wheel assembly extend directly from the front wheel assembly to the at least one rear wheel;

30 d. a resilient structure mounted at a rear end of the deck and connecting to the rear wheel assembly;

wherein the resilient structure and first and second pivots allows the rider to resiliently deflect the deck and the rear wheel assembly around the second pivot.

10. A wheeled transportation device according to claim 9, wherein the resilient structure and the first and second pivot allows a rider to resiliently deflect the deck relative to the rear wheel assembly around the second pivot while allowing for simultaneous rotation of the deck around the first pivot.

11. A wheeled transportation device according to claim 9, wherein the resilient structure and the second pivot allows a rider to resiliently deflect the deck rotationally around the rear wheel assembly and allows for simultaneous rotation of the rear wheel assembly around the first pivot.

12. A wheeled transportation device according to claim 9, wherein the resilient structure and the first and second pivots allows a rider to resiliently deflect the deck rotationally around the rear wheel assembly around the second pivot while allowing for simultaneous rotation of the rear wheel assembly in an opposite direction around the first pivot.

13. A wheeled transportation device according to any one of the preceding claims, wherein the resilient structure is mounted to the deck at a first end and to a mid-section of the rear wheel assembly at a second end and forms an energy storage means.

14. A wheeled transportation device according to claim 13, wherein the energy storage means is mounted between the deck and the rear wheel assembly, wherein the energy storage system is configured to store a potential energy therein when the rear wheel assembly is pivoted relative to the deck, and to release resiliently the stored potential energy, upon activation by the rider, to return the rear wheel assembly to the original non-deflected position thereby generating a lifting force in the deck to assist the rider to perform a jump manoeuvre.

15. A wheeled transportation device according to claim 13 or 14, wherein the energy storage means is mounted at one end in a rider protected position on an underside of the deck away from the rider.

16. A wheeled transportation device according to claim 13, 14 or 15, wherein the energy storage means is mounted at one end in a rider protected position in a channel on an underside of the deck away from the rider.

17. A wheeled transportation device according to claim 13, 14 or 15, wherein the energy

storage means is mounted at one end in a rider protected position away from the rider on an underside of the rear wheel assembly.

18. A wheeled transportation device according to claim 13, 14 or 15, wherein the energy storage means is mounted at one end in a rider protected position away from the rider between parallel plates of the rear wheel assembly forming a fork connecting axially to either side of the rear wheel assembly.

19. A wheeled transportation device according to claim 13, 14 or 15, wherein the energy storage means is adjustable to allow resilience to be altered to match the weight or force applicable by the rider to allow the rider to resiliently deflect at least a portion of the first end of the deck relative to the adjacent front or the rear wheel assembly.

20. A wheeled transportation device according to claim 13, 14 or 15, wherein the energy storage means is adjustable to allow resilience to be altered such that the maximum deflection matches the maximum weight or force applicable by the rider to allow the rider to resiliently deflect the deck relative to the adjacent rear wheel assembly.

21. A wheeled transportation device according to any one of claims 13 to 20, wherein the energy storage means is a module that has a range of alterable resilience.

22. A wheeled transportation device according to claim 21, wherein the module of the energy storage means can be configured to be suitable for riders of the range of:

- a. Children aged 6 to 12;
- b. Teenagers 13 to 19; and
- c. Adults.

23. A wheeled transportation device according to claim 21, wherein the module of the energy storage means can be configured to be suitable for riders of the range of:

- a. Under 30 kilograms;
- b. 30 to 60 kilograms;
- c. Over 60 kilograms.

24. A wheeled transportation device according to any one of claims 13 to 20, wherein the energy storage means is a coil spring connected between the deck and the rear wheel assembly.

25. A wheeled transportation device according to any one of claims 13 to 20, wherein the energy storage means is a linear spring extending along the deck and substantially between the deck and the rear wheel assembly such that rotation of the rear wheel assembly causes linear resilient extension of the linear spring.
- 5 26. A wheeled transportation device according to any one of claims 13 to 20, wherein the energy storage means is a linear spring extending along the deck and substantially between the deck and the arm and the rotation of the arm member relative to the deck causes engagement of arm and secondary resilient rotational action against the arm deflection.
27. A wheeled transportation device according to claim 24, wherein the energy storage
10 means is adjustable by altering the rotation of the coil spring.
28. A wheeled transportation device according to claim 25, wherein the energy storage means is adjustable by altering the linear extension of the linear spring.
29. A wheeled transportation device according to claim 26, wherein the energy storage means is adjustable by altering the protrusion of the engaging part of the arm with the linear
15 spring and thereby altering the secondary linear extension of the linear spring.
30. A wheeled transportation device according to an one of the preceding claims, wherein the front wheel assembly includes a steering assembly comprising a handle portion in association with the at least one front wheel, the handle portion being configured to control the orientation of the front to steer the wheeled transportation device when in use.
- 20 31. A wheeled transportation device according to any one of the preceding claims, wherein the front wheel assembly includes a secondary energy storage system.
32. A wheeled transportation device according to claim 31 wherein the secondary energy storage system is configured to store a potential energy therein when the front wheel assembly is forced downwards against the at least one front wheel, and to release resiliently
25 the stored potential energy, upon activation by the rider, to return the front wheel assembly to the original non-deflected position thereby generating a lifting force to assist the rider to perform a jump manoeuvre.
33. A wheeled transportation device according to claim 31 or 32 wherein the secondary energy storage system is adjustable.
- 30 34. A wheeled transportation device according to any one of the preceding claims, wherein the front wheel assembly includes a steering assembly.

35. A wheeled transportation device according to claim 34, wherein the steering assembly comprises at least one stem portion connecting the handle portion to the at least one front wheel, the at least one stem portion being at least partially received within a tube portion.

36. A wheeled transportation device according to claim 34 or 35, wherein a secondary energy storage system is provided within said tube portion to be in engagement with the at least one stem portion, the secondary energy storage system is configured to store a potential energy therein when the at least one stem portion is compressed into the tube portion, and to release the stored potential energy upon activation by the rider to generating a lifting force in the steering assembly to assist the rider to perform a jump manoeuvre.

37. A wheeled transportation device according to any one of the preceding claims, wherein the deck comprises a recess formed therein for receiving at least a portion of the rear wheel assembly for pivotal mounting at the second pivot.

38. A wheeled transportation device according to claim 37, wherein in use in a non-deflected position the rear wheel assembly extends from the recess to project beyond a rear end of the deck in a downward orientation to the at least one rear wheel.

39. A wheeled transportation device according to any one of the preceding claims, wherein the energy storage system is mounted to an underside of the deck.

40. A wheeled transportation device comprising:

a. a steering assembly having at least one wheel mounted on a first resilient energy system;

b. a deck for supporting a rider thereon;

c. a rear wheel assembly comprising an arm member pivotally mounted to the deck and to at least one wheel mounted on said arm member; and

d. a second resilient energy storage system mounted to the deck in a protected position away from the rider and so as to engage with the arm member of the rear wheel assembly and including adjustability to alter the available resilience of the second resilient energy storage system;

wherein, upon the rider applying a downward force to the steering assembly and the deck, both the first energy storage system and the second energy storage system are configured to store a potential energy therein such that upon the rider releasing the downward force both the first energy storage system and the second energy storage system release the stored

potential energy thereby generating a lifting force in the deck to assist the rider to perform a jump manoeuvre.

41. A wheeled transportation device according to any one of the preceding claims, wherein the device is a scooter.

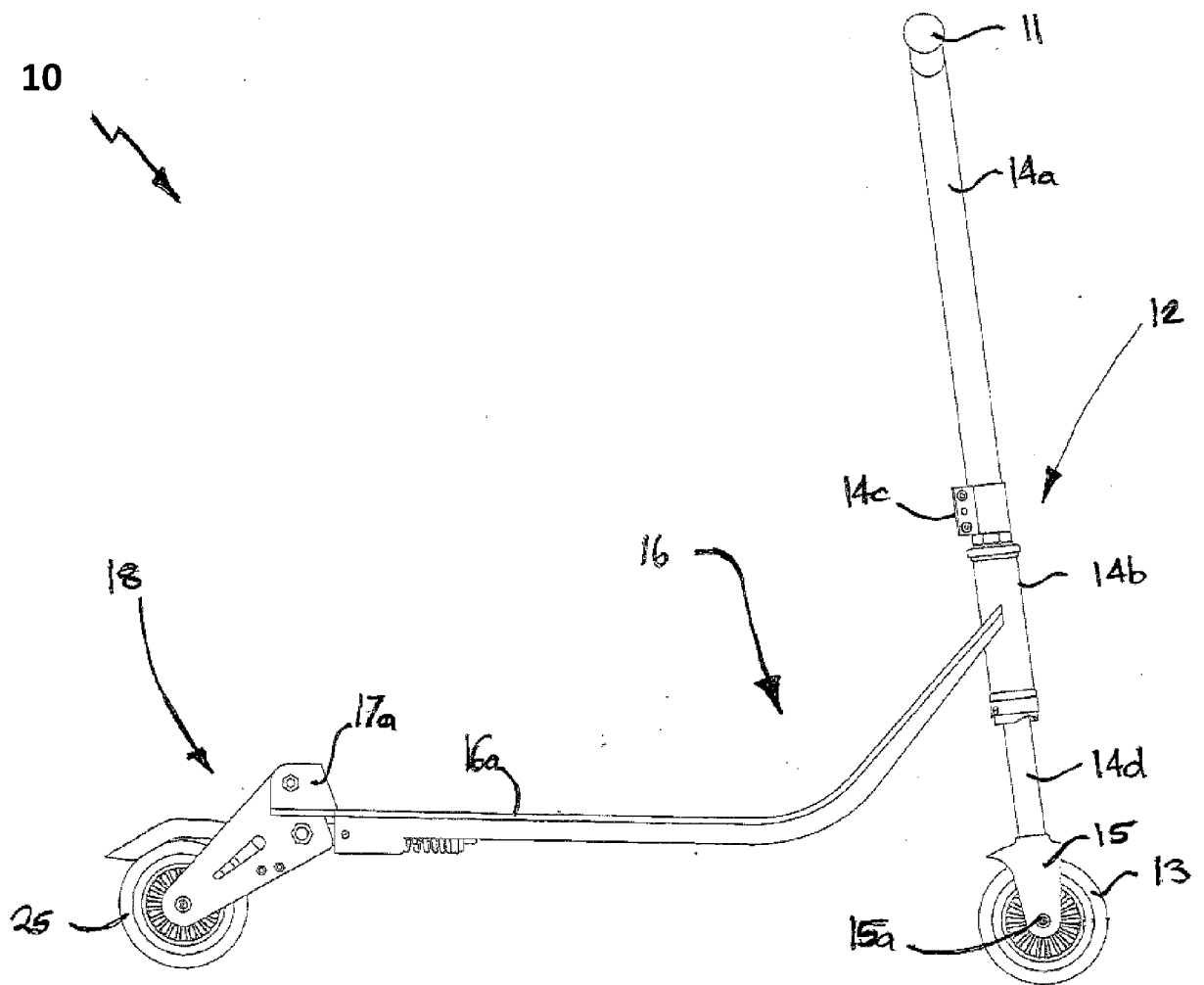
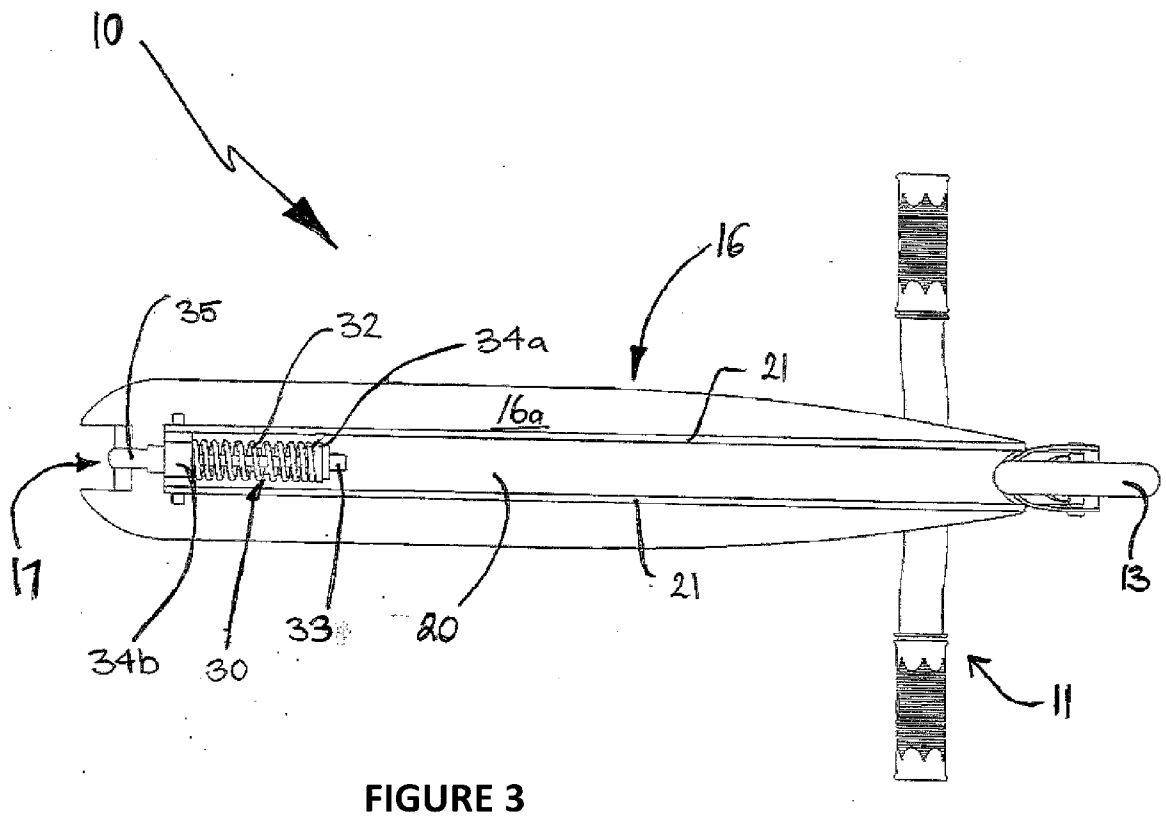
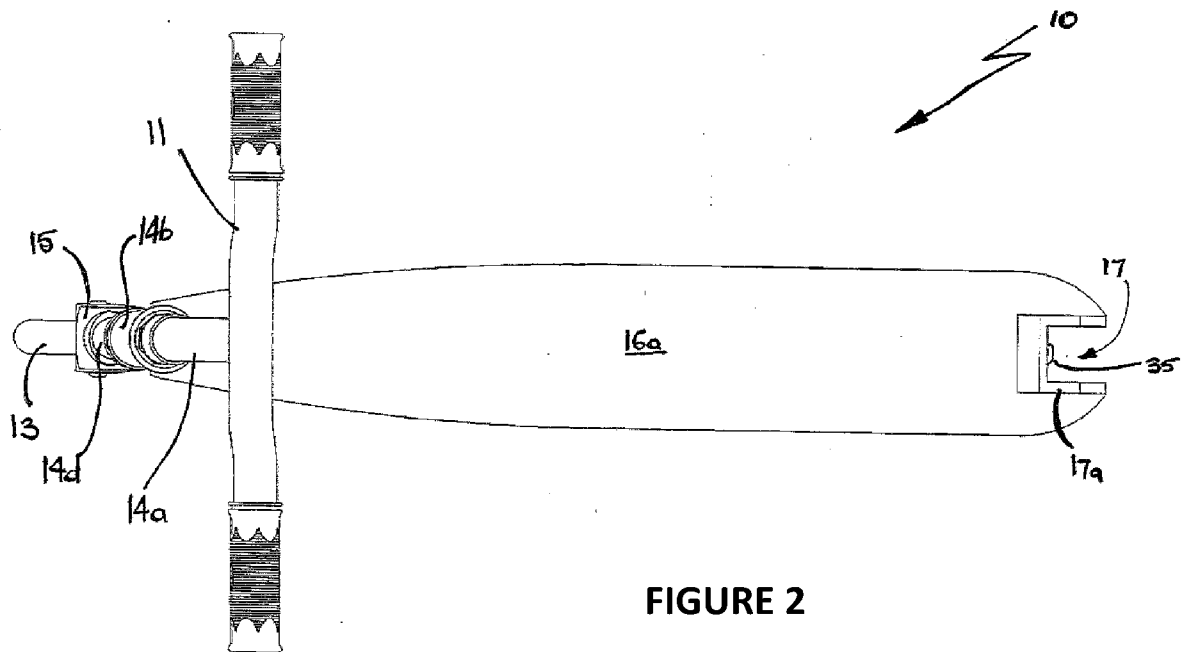


FIGURE 1



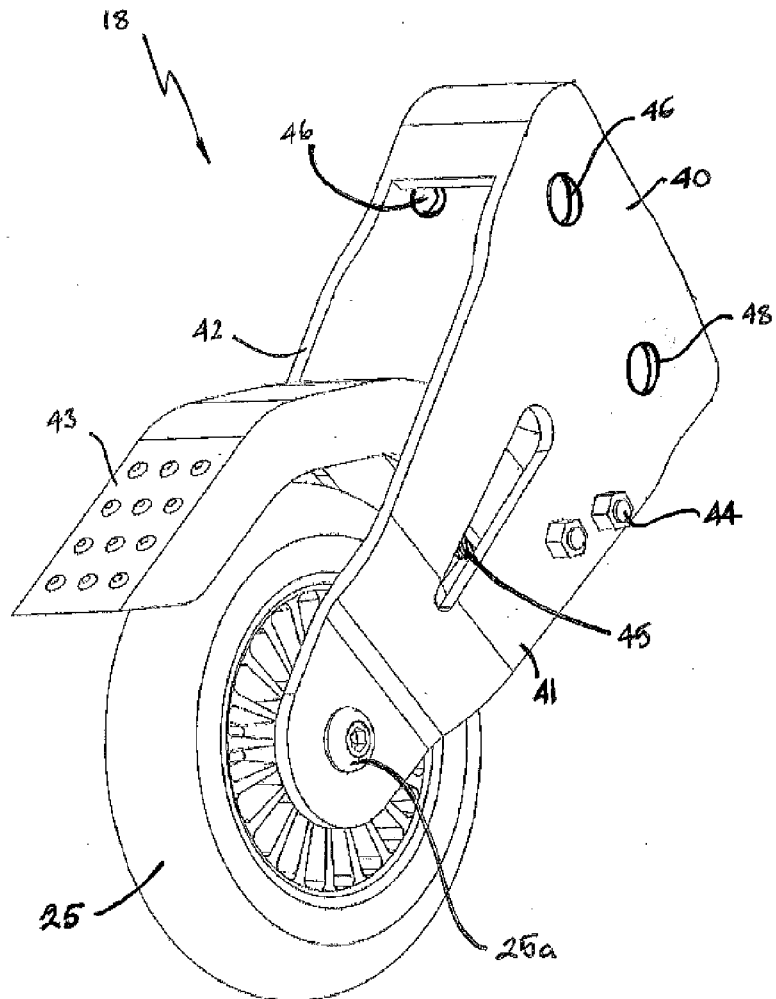


FIGURE 4

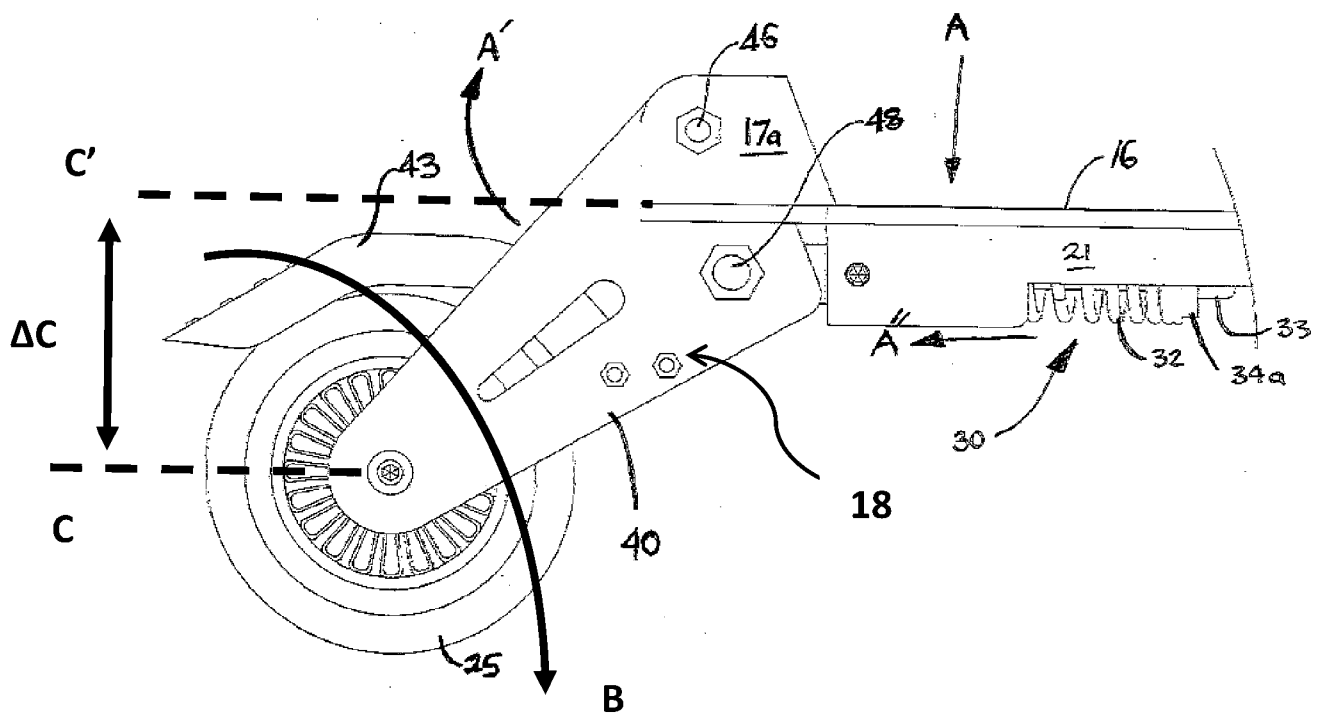


FIGURE 5A

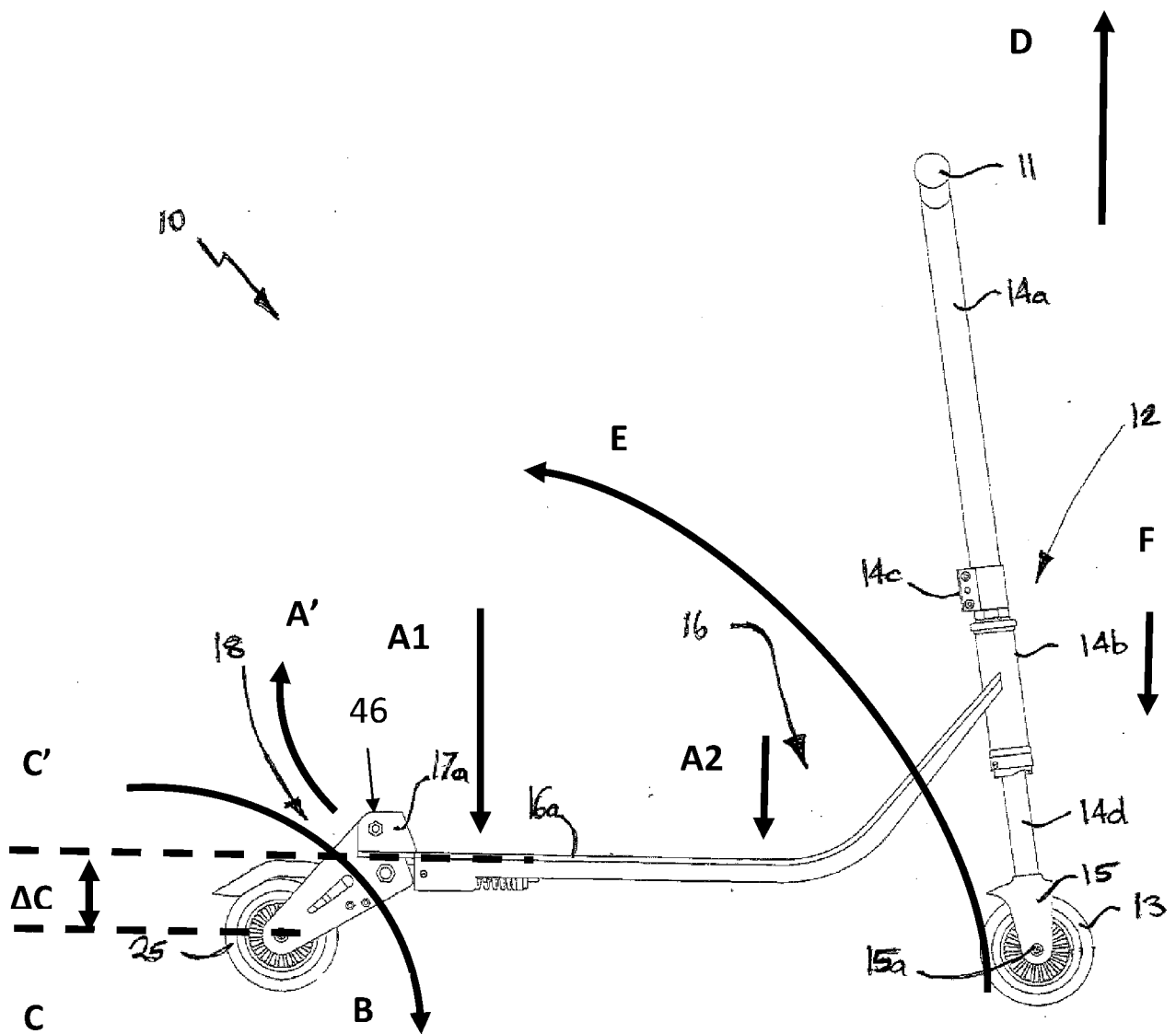


FIGURE 5B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2015/000330

A. CLASSIFICATION OF SUBJECT MATTER

B62M 1/10 (2010.01) B62K 3/00 (2006.01)

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)

EPODOC, WPIAP, TXTE: IPC/CPC = B62M1/10, B62K3/002, B62K3, B62K21, B62K25, B62K2201, A63H17/22, A63H17/25; Keywords = SCOOTER, COASTER, ENERGY, POWER, POTENTIAL, MECHANICAL, STORE, CAPTURE, REAR WHEEL, DUAL, TWO, SECOND, JUMP, AEROBATIC and similar terms.

GOOGLE PATENTS: Keywords as above.

ESPACENET & AUSPAT: Applicant's/Inventors' names searches; Keywords as above.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

☒ 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	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 21 July 2015	Date of mailing of the international search report 21 July 2015
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustalia.gov.au	Authorised officer Phu Nguyen AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832771

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/AU2015/000330
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/0300082 A1 (SWINNEY et al.) 14 November 2013 Abstract; figures 1-9; paragraphs 2, 6-8, 21-28	1-41
A	US 6406042 B1 (TSAI) 18 June 2002	
A	US 2013/0320648 A1 (ECKERT et al.) 05 December 2013	
A	US 2002/0067018 A1 (SHAW) 06 June 2002	
A	US 2011/0241302 A1 (LOVLEY, II et al.) 06 October 2011	

Form PCT/ISA/210 (fifth sheet) (July 2009)

INTERNATIONAL SEARCH REPORT Information on patent family members		International application No. PCT/AU2015/000330	
This Annex lists known 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/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
US 2013/0300082 A1	14 November 2013	US 2013300082 A1	14 Nov 2013
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		US 8632084 B2	21 Jan 2014
		US 2014131967 A1	15 May 2014
		US 2014131968 A1	15 May 2014
End of Annex			
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001. Form PCT/ISA/210 (Family Annex)(July 2009)			