**Claims**

1.

A biwheel having:

a pair of spaced ground engageable main wheels disposed relatively parallel to each other to suspend a cockpit between them, said cockpit capable of accommodating a payload,

a power transmission arranged to apply torque to each wheel to propel the biwheel over the ground;

each wheel is supported at and torque is applied to each wheel solely at its rim, thereby obviating any rim support extending between the axis and the rim so that access to the cockpit can readily be achieved through the space inside the wheel rim

each main wheel is supported by a plurality of suspension assemblies disposed spaced around the circumference of each main wheel to act between the inside of a rim of the wheel and the cockpit,

each suspension assembly comprises a spring supporting at least one of an idler wheel or a drive wheel to absorb a shock applied to the main wheel via motion between the main wheel and cockpit characterised in that the spring is a leaf spring.

2.

A biwheel according claim 1 wherein the cockpit comprises:

a plurality of circumferentially spaced mountings comprising flanges or blocks, and said leaf springs are secured one each to said mountings;

a bracket is secured to the cockpit and circumferentially spaced from the mounting, and a removable bump stop is mounted in the bracket to span between the bracket and the leaf spring.

3.

A biwheel according to claim 1 or claim 2 wherein the leaf spring comprises an arcuate leaf spring secured so that each free end of each leaf spring extends substantially circumferentially.

4.

A biwheel according to claim 3 wherein the leaf spring is supported as a cantilever with one end secured to the cockpit and the other supporting the drive wheel or idler wheel.

5.

A biwheel according to any one of the preceding claims wherein the leaf spring is mounted medially to the cockpit and either or each of an idler wheel and drive wheel mounted to each end to engage the inside of the main wheel rim.

6.

A biwheel according to any one of the preceding claims wherein each idler wheel is configured to engage the sides of the wheel rim and not the inner top of the wheel rim and each drive wheel engages the inner axially facing surface of the wheel rim and not the sides, the sides of the rim being treated to reduce friction and the top of the wheel rim being treated to increase traction with the drive wheel.

7.

A biwheel according to any one of the preceding claims wherein each main wheel is cambered at a camber angle of less than 90° to normal to a flat ground surface.

8.

A biwheel according to claim 7 wherein the camber angle is between 89.5° and 85° .

9.

A biwheel according to any one of the preceding claims having three or more suspension assemblies, wherein the majority of the suspension assemblies are disposed below a central axis of the biwheel.

10.

A biwheel according to any one of the preceding claims wherein each suspension assembly supporting a drive wheel is mounted below the axis of the main wheels.

11.

A biwheel according to any one of the preceding claims wherein torque is applied to each drive wheel by an electric motor.

12.

A biwheel according to claim 11 wherein the electric motor is integrated into each drive wheel associated with each wheel.

13.

A biwheel according to any one of claims 1 to 11 wherein the electric motor is mounted in a transmission tunnel.

14.

A biwheel according to claim 11 or 12 wherein the torque is controlled by a digital controller according to an algorithm responsive to a sensor sensitive to the attitude of the cockpit to maintain the cockpit at a substantially constant pitch angle.

15.

A biwheel according to one of claims 11 to 14 having an accumulator system mounted in the cockpit to store and distribute electric charge to each electric motor wherein the accumulator system comprises a fixed battery and a removable battery whereby a discharged removable battery can be readily removed for charging and replaced with a charged battery.

16.

A biwheel according to claim 15 wherein the cockpit includes a canopy panel supporting a solar panel array, said solar panel array disposed to deliver charge to at least one of the fixed and removable batteries.

17.

A biwheel according to any one of claims 1 to 15 wherein the cockpit includes a canopy panel comprising an integrated solar panel array, said solar panel array disposed to deliver charge to at least one of the fixed and removable batteries.

18.

A biwheel according to any one of the preceding claims wherein each main wheel rim comprises an ovalized tubular, cross section with a convex interior surface and a concave exterior surface.

19.

A biwheel according to claim 18 wherein a solid tyre is formed onto the concave exterior surface of the rim.

20.

A biwheel according to any one of the preceding claims wherein the cockpit includes at least two seats to accommodate a driver and a passenger disposed abreast or staggered abreast.

21.

A biwheel according to claim 20 having an floor moulding, wherein luggage space is formed into the floor moulding under each seat.

22.

A biwheel according to claim 20 or 21 wherein a storage compartment is formed in the floor moulding located behind each seat provides a luggage space for a large suitcase and said seats are displaceably mounted to provide access to the storage compartment.

23.

A biwheel according to any one of the preceding claims wherein a brake is associated one each with each drive wheel to apply a braking torque to each main wheel via the drive wheel.

24.

A biwheel according to claim 23 wherein a brake assembly is integrated with the drive wheel and motor assembly inside the rim.

25.

A biwheel according to claim 11 wherein an unequal torque is applied to each drive wheel in response to control signals from the digital controller emitted in response to movement of a joystick from a neutral position in order to steer the biwheel away from a straight line movement.

26.

A biwheel according to claim 24 or 25 wherein a braking torque can be applied to each drive wheel brake in response to operation of a brake lever arranged to be operable by one hand, in either of equal amounts or unequal amounts.

27.

A biwheel according to any one of the preceding claims having a rear jockey wheel deployed to be normally ground engaging and limit rearward pitching of the cockpit.

28.

A biwheel according to any one of the preceding claims having a front jockey wheel mounted on an articulating assembly responsive to a manually operable actuator inside the cockpit whereby the front jockey wheel is normally elevated and spaced above the ground and can be lowered and latched to engage the ground.

29.

A biwheel according to claim 27 or 28 wherein a brake is provided in each jockey wheel, said brake being manually operable from a latchable control in the cockpit to discouraging movement of the biwheel.

30.

A biwheel according to any one of claims 19 to 29 having a manual propulsion system in addition to the electric motor propulsion to augment each electric motor.

31.

A biwheel according to claim 30 wherein manual propulsion is provided from pedals disposed so that thrust applied via the foot of a driver or passenger to the pedal is transmitted via a manual propulsion transmission system to apply an equal torque to each drive wheel.

32.

A biwheel according to claim 31 wherein each pedal converts a linear thrust to a torque via a treadle mechanism.

33.

A biwheel according to claim 32 wherein a treadle assembly is associated with the driver occupied seat at least and each said treadle assembly includes a left pedal and a right pedal linked via respective left and right treadle linkage mechanisms to a common treadle drive shaft, wherein the phase angle between the left and right linkage mechanisms is not 0° or 180° in order to prevent the linkage from coming to rest in a locked out condition or applying a reverse torque.

34.

A biwheel according to claim 33 wherein a treadle assembly is associated with each driver and passenger chair of the biwheel.

35.

A biwheel according to claim 33 or 34 wherein each treadle drive shaft can couple to a common front sprocket in the manual propulsion system.

36.

A biwheel according to claim 35 wherein the front sprocket transmits torque to a double freewheel differential by way of an automatically operable gear box, said differential coupling each of two half shaft assemblies into the manual propulsion transmission system, whereby each drive wheel is coupled into the manual transmission system.

37.

A biwheel according to any one of claims 34 to 36 wherein each treadle drive shaft couples to a treadle belt pulley via a freewheel.

38.

A biwheel according to claim 37 wherein each passenger treadle assembly is uncoupled from the treadle belt pulley unless thrust is applied to the pedals of the driver treadle assembly.

39.

A biwheel according to any one of claims 35 to 38 wherein the control system is responsive to:

torque applied to the drivers pedals, and

the joystick being in a neutral position

to apply assist torque to each motor to stabilise the pitch of the cockpit and drive the biwheel in a forwards direction.

40.

A biwheel according to claim 16 and 39 wherein the control system is responsive to:

the speed of the biwheel being sensed from a sensor to be substantially zero and

the movement of the joystick from neutral to a position to the left or right of neutral

to apply an equal and opposite torque from the motors to each drive wheel in order to turn on the spot.

41.

A biwheel according to claim 16 and 40 wherein the control system is responsive to pressing a button on the joystick and pulling back to reverse.