CLAIMS

1. A locking gimbal including:

a first object pivotally connectible to a support, and being pivotable about a first pivot axis, wherein the centre of gravity of the first object is spaced from the first pivot axis, and further wherein the first object defines a first reference axis passing through the first pivot axis and the centre of gravity of the first object;

a second object having a centre of gravity movable along an arc centred substantially at a second axis and defining a second reference axis passing through the second axis and the centre of gravity of the second object, the first and second objects being movable relative to one another between a first aligned condition, wherein the first and second reference axes are substantially aligned, and a second displaced condition, wherein the first and second reference axes are angularly displaced relative to one another;

a locking member fixed in position relative to the support; and

a locking formation for locking the first object wherein at least a portion of the locking formation, actuated by displacement between the first and second objects, is radially movable relative to the first pivot axis between engaged and disengaged positions, wherein, when:

(i) the first and second objects are in the first aligned condition, the locking formation is in the disengaged position in which the locking formation is spaced from the locking member, permitting rotation of the first object about the first pivot axis; and

(ii) the first and second objects are in the second displaced condition, the locking formation is in the engaged position in which the locking formation makes contact with the locking member and prevents rotation of the first object about the first pivot axis.

~~2.~~ A locking gimbal according to claim 1, wherein the first object is biased towards an in rest position in which a support surface of the first object is substantially level and/or ~~.~~

~~3. A locking gimbal according to claim 2, wherein the first object is biased toward the in rest position~~ in which the centre of gravity of the first object operatively comes to rest at a position underneath the pivot support, and further ~~.~~

~~4.~~2. ~~A locking gimbal according to claim 3,~~ wherein in the in rest position, the first reference axis is substantially upright, the first object being biased towards the in rest position under its own weight or under the weight of a first counterweight connected thereto by a first pendulum arm such that the first object acts as a first pendulum.

~~5.~~3. A locking gimbal according to any one of claims 1 ~~to 4~~, wherein the second object is movable along a track connected to the first object, the second object being capable of rolling or sliding along the track, and further wherein the track is arcuate~~.~~

~~6. A locking gimbal according to claim 5, wherein the track is arcuate.~~

~~7.~~ ~~A locking gimbal according to claim 5 or claim 6, wherein the track is arced~~ having a centre located substantially at the second axis, ~~and further wherein~~ the second axis being ~~is~~ substantially co-linear with the first pivot axis.

~~8.~~4. A locking gimbal according to claim 3~~5~~, wherein the locking formation is one or more formations on a locking arm pivotally mounted on the first object and pivotally movable relative thereto from the disengaged position into the engaged position by contact of the second object thereon in the second displaced condition.

~~9.~~5. A locking gimbal according to any one of claims 1 ~~to 4~~, wherein the second object is pivotally supported to act as a second pendulum, and the locking formation is a terminal end of one or more locking pins being movable between the engaged and disengaged positions wherein in the engaged position, the locking pin extends

such that the locking formation thereof comes into engagement with the locking member when the first and second objects are in the second displaced condition, and wherein in the disengaged position, the locking pin is retracted such that the locking formation thereof is spaced from the locking member when the first and second objects are in the first aligned condition.

~~10.~~6. A locking gimbal according to claim 5~~9~~, including one or more connectors for driving the locking pins between the respective disengaged and engaged positions, the connector being co-operative between the first object or the second object, and the locking pin such that when the first and second objects are in the first aligned position, the locking pin is forced by the connector into the retracted disengaged position, and when the first and second objects are in the second displaced position, the locking pin is forced by the connector into the extended engaged position.

~~11.~~ A locking gimbal according to claim 6~~10~~, wherein the locking pin is slidably mounted on the first object and the connector comprises first and second ends, each of the ends being pivotally connected to the locking pin and to the second object respectively, the locking pin being ~~.~~

~~12.~~7. ~~A locking gimbal according to claim 11, wherein the locking pin is slidably~~ mounted on the first object and slidable relative thereo ~~within guides such that~~ along an axis ~~along~~ which ~~the locking pin is slidable~~ remains substantially parallel with the first reference axis.

~~13.~~8. A locking gimbal according to claim 6~~10~~, wherein at least two locking pins are slidably mounted on the first or second object, each being capable of actuation by one of the respective connectors, the connectors each having first and second ends wherein the first ends thereof are pivotally connected to one of the respective locking pins and the second ends thereof being configured to co-operatively engage the first object thereby to transmit, on engagement between the first object and the respective second ends of the connectors in the first aligned and second displaced conditions, a corresponding force imparted onto the connectors by the first object to the locking pins such that the respective locking pin is driven towards

the retracted disengaged or extended engaged positions respectively, characterised in that the locking pins are mounted on the first or second object and slidable relative thereto along an axis which remains substantially parallel with the respective first or second reference axis.

14.9. A locking gimbal according to claim 610, wherein at least two locking pins are slidably mounted on the first or second object, and further wherein the connectors are a plurality of gears for driving the locking pins, the gears being co-operatively engagable with the first object thereby to transmit, on engagement between the first object and at least one of the gears in the first aligned or second displaced conditions, a corresponding force imparted on the gears by the first object to the locking pins such that the respective locking pin is driven into the retracted disengaged or extended engaged positions, characterised in that the locking pins are mounted on the first or second object and slidable relative thereto along an axis which remains substantially parallel with the respective first or second reference axis.

15. A locking gimbal according to claim 13 or claim 14, wherein the locking pins are slidably mounted on the first or second object within guides such that axes along which the locking pins are slidable remain substantially parallel with the respective first or second reference axis.

16. A locking gimbal according to any one of claims 9 to 15, wherein the second object is pivotally supported about the first pivot axis on the support, or about the second axis located on a secondary support, the second axis being a second pivot axis.

17. A locking gimbal according to claim 14, wherein the second object is pivotally supported on the first object and pivotable relative thereto about the second axis, the second axis being a second pivot axis spaced from the first pivot axis, and further wherein .

18.10. A locking gimbal according to claim 17, wherein the locking formation is a locking pin configured to ride between a cog formation on the second object and the locking member, the locking pin being capable of riding freely along the locking

member in the disengaged position when the first and second objects are in the first aligned condition, and of being captured between projections on the cog formation and the locking member in the engaged position when the first and second objects are in the second displaced condition, thereby to lock the first and second objects to the locking member and prevent rotation of the first object about the first pivot axis.

~~19.~~11. A locking gimbal according to claim 1~~4~~, wherein the second object is pivotally supported about the second axis to act as a second pendulum such that the second axis is a second pivot axis, and further wherein the locking formation is one or more formations on a locking arm, the locking arm being pivotally mounted on the first object and pivotable relative thereto about a third pivot axis, characterised in that the second object is pivotally supportable on a second support such that the first and second pivot axis are spaced relative to one another, or alternatively, the second object is pivotally supportable on the support on which the first object is pivotally supportable such that the first and second pivot axes are co-linear.~~.~~

~~20.~~ A locking gimbal according to claim 11~~9~~, including one or more connectors having first and second ends, the first end thereof being pivotally connected to a first connection point on the locking arm and a second end thereof being pivotally connected to a second connection point on the second object, wherein the first connection point and the third pivot axis lie on a primary plane and the second connection point and the second pivot axis lie on a secondary plane, the primary and secondary planes in use remaining substantially parallel throughout the range of pivotal movement of the first and second objects and further ~~.~~

~~21. A locking gimbal according to 20,~~ wherein the centre of gravity of the second object and the second pivot axis lie on a transverse plane being substantially perpendicular to the secondary plane, characterised in that ~~.~~

~~22.~~12. ~~A locking gimbal according to claim 19, claim 20 or claim 21, wherein~~ the second object is pivotally supportable on a second support such that the first and second pivot axis are spaced relative to one another, or alternatively, the second

object is pivotally supportable on the support on which the first object is pivotally supportable such that the first and second pivot axes are co-linear.

~~23.~~13. A locking gimbal according to any one of claims 1~~,9 to 22,~~ wherein the second object, acting as a second pendulum, comprises a second counterweight pivotally supported on a second pendulum arm.

~~24.~~14. A locking gimbal according to any one of claims ~~9 to 23~~5, wherein a first length, as measured between the first pivot axis and the centre of gravity of the first object, and a second length, as measured between the axis about which the second object is pivotally supported and the centre of gravity of the second object, are unequal such that a period of oscillation of the first object is different to a period of oscillation of the second object.

~~25.~~15. A locking gimbal according to any one of claims 2~~ to 24~~, wherein the centre of gravity of the first object and the first pivot axis lie on a plane being substantially perpendicular to the support surface of the first object.

~~26.~~16. A locking gimbal according to any one of claims 1~~ to 25~~, wherein the locking member is arcuate~~ed~~ with its centre substantially coinciding with the first pivot axis and having repeating projections spaced from one another circumferentially there along.

~~27.~~17. A locking gimbal according to claim 1~~2~~6, wherein the locking member is two or more spaced parallel locking members orientated relative to one another such that the projections on one of the locking members are staggered relative to the projections on the other locking members thereby increasing the engaging responsiveness of the locking formation on the locking member.

~~28.~~18. A locking gimbal according to claim 4 or ~~8 or any one of~~ claim 11~~s 19 to 27~~, wherein the locking formation is movably supported on the locking arm and movable relative thereto such that the locking formation engages the locking member in the engaged position and disengages the locking member in the disengaged position.

29.19. A locking gimbal according to claim 128, wherein the locking formation is movably supported on the locking arm and movable relative thereto such that the locking formation engages the locking member in the engaged position and disengages the locking member in the disengaged position, the locking formation being movably supported on a swivel pin on the locking formation or the locking arm, the swivel pin being captured within a swivel slot defined on the other of the locking formation or the locking arm, and further wherein the swivel pin and swivel slot enable the locking formation to swivel and slide relative to the locking arm, with the range of motion of the locking engagement member being limited by the length of the swivel slot and corresponding abutment formations capable of abutting one another in the engaged position.

30.20. A locking gimbal according to any one of claims 12 to 29, wherein the first pivot axis is one of two or more gimbal axes about which the first object is pivotally supported, the at least two gimbal axes being angularly offset relative to one another thereby to maintain the first object and/or the support surface thereof substantially level.

31. A locking gimbal according to claim 230, wherein the at least two gimbal axes being are angularly offset relative to one another by 90 degrees, and further .

32.21. A locking gimbal according to claim 31, wherein in the first aligned condition, the first and second reference axes are substantially co-planar and/or co-linear.

33. A gimbal object including a primary locking gimbal in accordance with any one of claims 1 to 32, and at least a second locking gimbal in accordance with any one of claims 1 to 32, wherein the first pivot axes of the respective primary and secondary locking gimbals are angularly offset relative to one another.

34. A gimbal object according to claim 33, wherein the first pivot axes of the respective primary and secondary locking gimbals are angularly offset relative to one another by about 90 degrees.

~~35. A locking gimbal substantially as herein described and illustrated.~~

~~36. A gimbal object substantially as herein described and illustrated.~~