Accordingly, it would be desirable to provide an enhanced design for the robot wheel suspension mechanism to ensure both, perpendicular movement and no wheel off-set. This invention provides such a mechanism and system thereof.

SUMMARY OF INVENTION

The invention provides a suspension system for a land vehicle, the system comprises an axle for receiving a vehicle wheel, a bearing plate for supporting the axle and the associated wheel; a pair of spaced apart linear bearings located inside a box frame; wherein the bearing plate is guided to reciprocate in a plane containing the pair of spaced apart linear bearings, such that the axis of the axle during any such movement remains parallel to the axis of the axle prior to that movement; and a sliding guide linear bearing means located parallel to the pair of spaced apart linear bearings, wherein the sliding guide linear bearing means is provided to resist an axial thrust directable along the axis of the axle or the displaced axis of the axle. In addition, means are provided to damp the reciprocal movement of the axle. The axis can be common to a pair of axles which are constrained for movement in a similar manner and the damping means may comprise an adjustable gas spring. Such land vehicle is preferably but not limited to a robotic vehicle.

In one embodiment of the invention, the axle may include a first support means to facilitate its reciprocal movement such that the axle remains in the plane containing the axis of the axle and the axis of the axle during any such movement remains parallel to the axis of the axle prior to that movement. Preferably, the first support means comprises a bearing plate which is carried by a pair of spaced linear bearings and is connected to the damping means.

In another embodiment of the invention, the axle may include a second support means to absorb axial thrust during its reciprocal movement and to facilitate the reciprocal movement. Preferably, the second support means comprises a pair of spaced sliding guides with surfaces against which the bearing plate slides during reciprocal movement of the axle.

CLAIMS:

1. A suspension system for a land vehicle comprising:

an axle for receiving a wheel;

a bearing plate for supporting the axle and the associated wheel;

a pair of spaced apart linear bearings located inside a frame that is configured in a shape of a box;

wherein the bearing plate is guided to reciprocate in a plane containing the pair of spaced apart linear bearings when the wheel is displaced relative to a ground on which the land vehicle is operable to traverse, such that a displaced axis of the axle during wheel displacement is parallel to an axis of the axle prior to the wheel displacement as constrained by the bearing plate and the pair of spaced apart linear bearings and as supported by the box frame; and

a sliding guide linear bearing means located parallel to the pair of spaced apart linear bearings, wherein the sliding guide linear bearing means is provided to resist an axial thrust directable along the axis of the axle or the displaced axis of the axle.

2. The suspension system according to claim 1, wherein the sliding guide linear bearing means comprises first and second sliding guides extending vertically from a top to a bottom of the frame, the first and second sliding guides are located at opposing sides of the bearing plate.

3. The suspension system according to claim 1 or 2, further comprising:

a damping means to dampen the reciprocating displacement of both the axle and the wheel, wherein the damping means comprises an adjustable gas spring.

4. The suspension system according to claim 3, wherein the adjustable gas spring is connectable directly to the bearing plate and lies in the plane of reciprocation of the bearing plate.

5. The suspension system according to claim 3 or 4, wherein the adjustable gas spring provides a traction to the wheel according to adjustment of the gas spring.

6. The suspension system according to any one of claims 1-5, further comprising:

a second axle located opposite but in axial alignment with the axle, wherein the second axle and an associated wheel are also configured for reciprocating displacement in a plane containing an associated pair of spaced apart linear bearings.

7. A mobile vehicle with a suspension system, wherein the suspension system of the mobile vehicle comprises:

a bearing plate supporting both an axle and an associated wheel, with the bearing plate being constrained to reciprocate in a plane containing a pair of spaced apart linear bearing means located inside a box frame whilst the wheel is operable to traverse on a ground, so that error of odometry caused by wheel displacement is minimised during traverse of the mobile vehicle; and

a sliding guide linear bearing means located parallel to the pair of spaced apart linear bearing means, wherein the sliding guide linear bearing means is provided to resist an axial thrust directable along an axis of the axle or a displaced axis of the axle during wheel displacement.

8. The mobile vehicle according to claim 7, wherein the sliding guide linear bearing means comprises first and second sliding guides extending vertically from a top to a bottom of the frame, the first and second sliding guides are located at opposing sides of the bearing plate.

9. The mobile vehicle according to claim 7 or 8, wherein the suspension system of the mobile vehicle further comprises:

a damping means to dampen the reciprocating displacement of both the axle and the wheel, wherein the damping means comprises an adjustable gas spring.

10. The mobile vehicle according to claim 9, wherein the adjustable gas spring is connectable directly to the bearing plate and lies in the plane of reciprocation of the bearing plate.

11. The mobile vehicle according to claim 10, wherein the adjustable gas spring provides a traction to the wheel according to adjustment of the gas spring.

12. The mobile vehicle according to any one of claims 7-11, wherein the suspension system of the mobile vehicle further comprises:

a second axle located opposite but in axial alignment with the axle, wherein the second axle and an associated wheel are also configured for reciprocating displacement in a plane containing an associated pair of spaced apart linear bearing means.