United States Patent

Mouritzen

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[45] **June 13, 1972**

[54] TRANSPORTATION SYSTEM

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[73] Assignee: **Geoscience Limited**

[22] Filed: **May 18, 1970**

[21] Appl. No.: **37,978**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 717,610, April 1, 1968, abandoned.

[52] **U.S. Cl.**.....**104/118,** 104/89, 104/138, 104/156, 105/141, 105/148, 180/22

[51] **Int. Cl.**.....**B61b 13/04**

[58] **Field of Search**.....104/134, 138, 118–120, 104/139, 135, 140–148, 155, 156, 158; 280/80, 64; 180/22; 105/141, 148, 153

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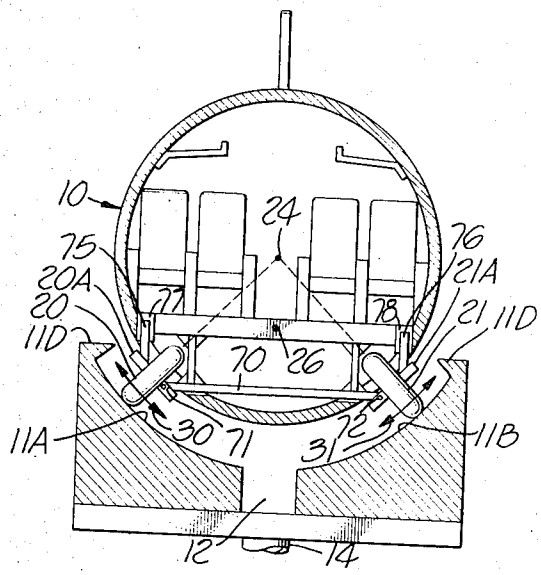
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Assistant Examiner—Richard A. Bertsch
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[57] **ABSTRACT**

A transportation system uses a curved trackway in the nature of a trough and a special vehicle having wheels engaging the trough such that in making turns the wheels may move such that the center of gravity may be displaced to compensate for centrifugal forces. Aerodynamic wings may be on the vehicle to develop lift forces and take weight off the wheels and the vehicle may be contoured to the shape of the trough to provide an air cushion between the vehicle and track at high speeds. The wheels may be extended so that the vehicle may also travel over level terrain.

7 Claims, 6 Drawing Figures



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SHEET 1 OF 2

FIG. 1.

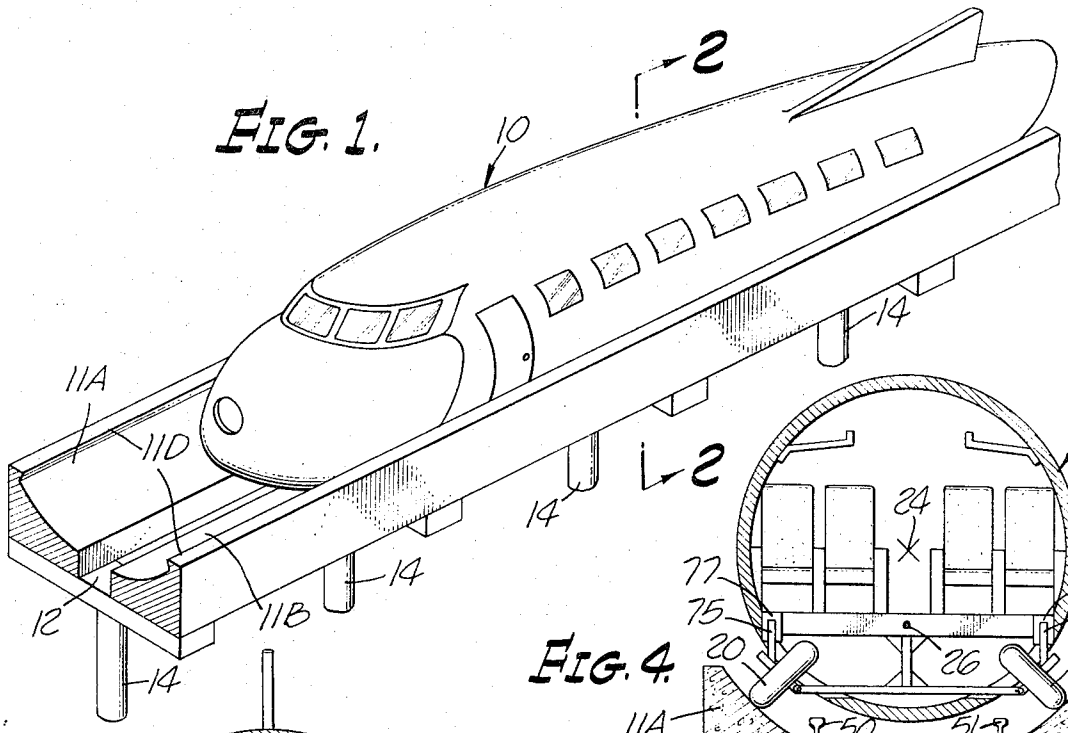


FIG. 4.

FIG. 2.

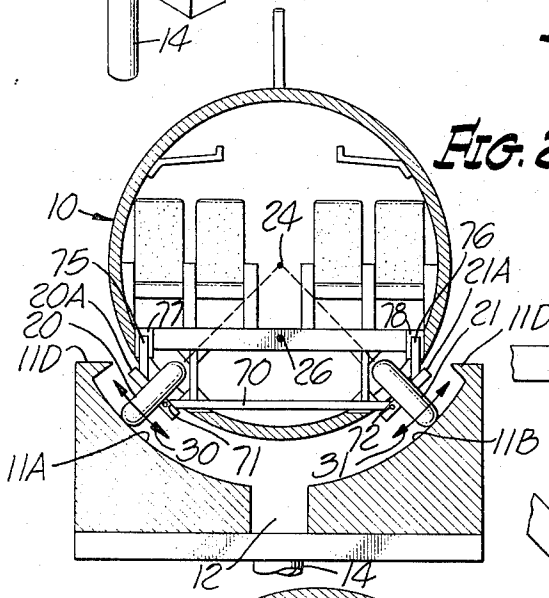
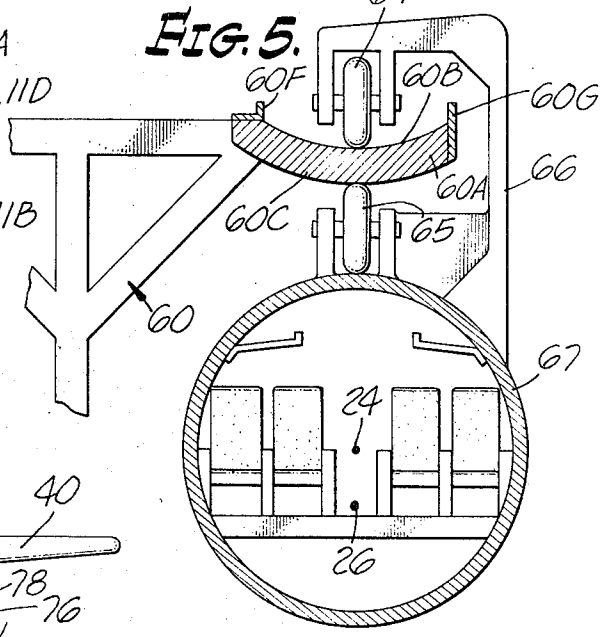


FIG. 5.



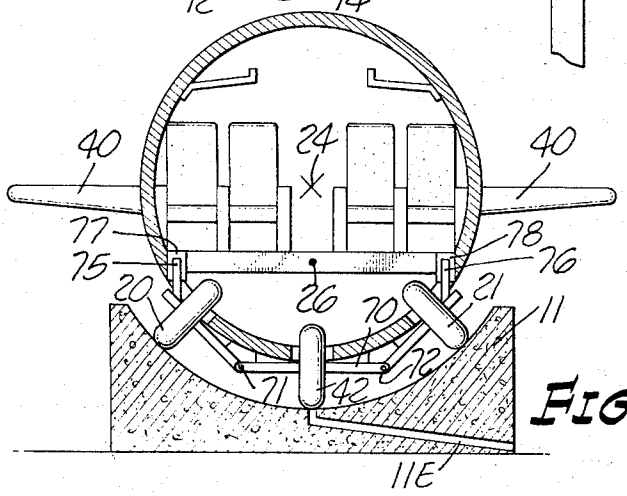


FIG. 3.

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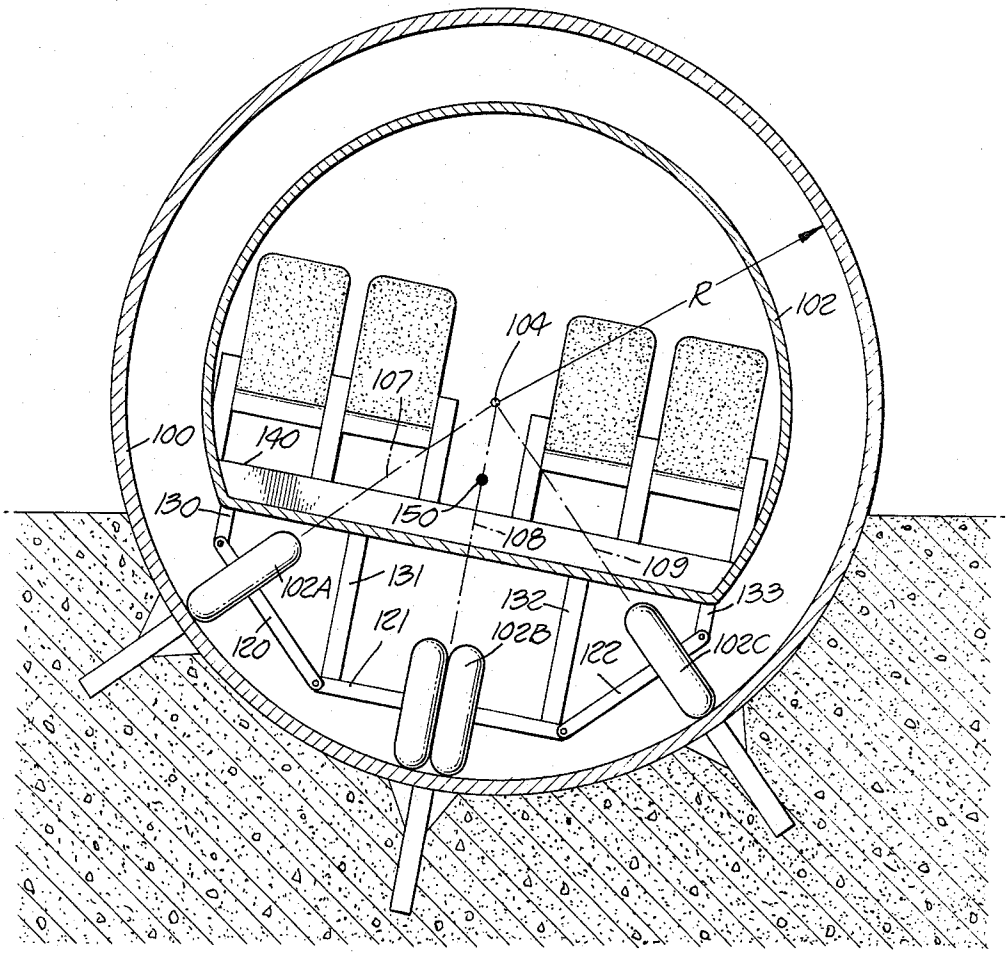


FIG. 6.

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TRANSPORTATION SYSTEM

The present application is a continuation in part of my pending U. S. application, Ser. No. 717,610 filed Apr. 1, 1968, now abandoned.

The present invention relates to improved transportation systems.

An object of the present invention is to provide a rapid transit system using to advantage a curved track.

A specific object of the present invention is that the rapid transit system may use existing right of ways, and passenger facilities of airports, railroads and bus lines as well as existing roads.

Another specific object of the present invention is that the rapid transit system may be used simultaneously with existing railroads.

Another specific object of the present invention is to provide improved means and techniques whereby an improved rapid transit system results.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. This invention itself, both as to its organization and manner of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a perspective view illustrating a system embodying features of the present invention.

FIG. 2 is a section taken along lines 2—2 of FIG. 1.

FIG. 3 is a view like FIG. 2 but of a modified form of the invention.

FIG. 4 is a view like FIG. 2 but of another modified form of the invention.

FIG. 5 illustrates still another form of the present invention.

FIG. 6 illustrates another form of the present invention.

In FIG. 1, the streamlined generally tubular shaped vehicle **10** is guided for movement on a curved track which bears the entire weight of the vehicle and its cargo and/or passengers and may comprise a single section or two sections **11A, 11B**, as illustrated, separated by a small trench **12** if desired.

These tracks **11A, 11B** may be of concrete and may be secured in the ground or form a part of a trestle supported by a series of posts **14**. In some instances the track may be in the form of a tube forming a tunnel or bridge through which the vehicle **10** travels.

The vehicle **10** is generally of conventional construction except that the pairs of wheels comprising, for example, the wheels **20** and **21** have their planes of rotation intersecting at a central point **24** within the vehicle which is above the center of gravity point **26** of the vehicle.

The curvature or surface of the track sections **11A, 11B** is such that it corresponds substantially to the arc of a circle drawn with the point **24** as a center. The plane of rotation of such wheels **20, 21** remains substantially perpendicular to a tangent on such arc drawn at the point of intersection of the wheel with the track and thus when the vehicle travels around curved lengths of the track the vehicle may ride up and down the track sections **11A, 11B** as indicated by the curved arrows **30, 31** to allow the center of gravity point **26** to rotate about the center point **24** such that equilibrium conditions may be automatically established with respect to centrifugal forces developed on such vehicle in its travel around such curved lengths of track. In other words, when the vehicle is driving in a turn, it will automatically rise on the curved track in such a way that the angle between the vehicle center line and the vertical gravity vector or component results in a force balance of the gravity and centrifugal forces on the vehicle.

If desirable to operate at lower wheel loadings at high speeds, the vehicle can be furnished with aerodynamic wings **40** as indicated in FIG. **3** to create a lift preferably up to but not equal to or larger than the vehicle weight.

Also, the upper portion of each track **11A, 11B** may be formed with an inwardly extending rail member **11D** as a safety measure for retention of the vehicle in its trough so formed under all conditions.

An additional wheel **42**, in addition to and intermediate each wheel pair **20, 21** may be added and in such case the track **11** may be a solid mass formed with spaced water drain channels **11E**.

Advantages of the present invention also involve the considerations that it can use existing passenger facilities of airports, railroads and bus lines and indeed may be located around existing railroad tracks **50, 51** as seen in FIG. **4** wherein the track sections **11A, 11B** are anchored adjacent to ends of the conventional railroad ties **52** upon which railroad tracks **50, 51** are laid. The railroads can then be used simultaneously for both conventional trains and the curved track vehicle **10**.

Another form of the invention involves the hanging monorail construction shown in FIG. **5** wherein the end of the supporting structure **60** is formed with a curved track **60** A having an upper concave surface **60** B and a lower concave surface **60** C engaged respectively by individual ones of a plurality of wheel pairs **64, 65** rotatably supported on a corresponding framework **66** extending upwardly from the cabin portion of vehicle **67**. In this case, the planes of rotation of wheels **64, 65** not only intersect but are coextensive and correspond generally to the vertical axis of the vehicle. The track **60A** is curved as previously to allow automatic positioning of the center of gravity in turns to compensate for centrifugal forces.

The vehicle **67** of FIG. **5** may be provided with aerodynamic wings as illustrated at **40** in FIG. **3** and excessive lift forces are then controlled by the wheel **65** engaging surface **60** C. In some cases the track **60** A need have only the curved surface **60** B and the wheel **65** may be eliminated. The track **60** B may be provided with side rails **60** F, **60** G to assure retention under all conditions. Another feature of the invention is that the vehicles of FIGS. **1- 4** may be used for transport on conventional flat road surfaces in which case the axis of rotation of the wheel pairs **20, 21** are made coextensive. For these purposes one end of each of the axles **20** A, **21** A of wheels **20, 21** are pivoted on a support **70** at **71** and **72** respectively, the other ends of such axles **20** A, **21** A being connected respectively to the piston **75, 76** of hydraulic rams **77, 78**.

Thus the position of these hydraulic pistons **75, 76** may be adjusted to adapt the wheels **20, 21** for travel in the curved trackway as described above or on level ground.

In FIG. **6** the track **100** on which the vehicle **102** travels in a tube that completely surrounds the vehicle **102**.

This tube has an inner wall of radius R measured, of course, from the center point **104**.

The vehicle **102** is uniquely related to the geometry of this tube **100** in that the planes of rotation of the vehicle wheels intersect at a common point which is the center point **104** of the tube. This is indicated by the dotted lines **107, 108**, and **109** representative of the planes of rotation of these wheels.

The wheels **102** A, **102** B, and **102** C are fixed for that purpose for rotation on corresponding wheel axles **120, 121, 122** which are rigidly supported on the vehicle chassis **125** by the series of streets **130, 131, 132**, and **133**.

The vehicle in its movement in straight sections of the tube track **100** has the plane of rotation of the center wheel **102** B extending vertically, and the vehicle floor is horizontal. In travel in curved sections of the tube, there is a shifting of the vehicle in response to centrifugal forces. The center of gravity **15–0** of the vehicle is below the tube center **104**. The shifting of the center of gravity is such that there is a balance between centrifugal and gravity forces corresponding to a self-banking position.

Advantages of this FIG. **6** system involves safety, weather protection, placement underground, and in some cases stacking in the sense that one such tube may be positioned above another like tube track.

While the particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects.

I claim:

1. A transportation system including a concave trackway forming generally a trough, a vehicle having wheels engaging said trough and movable laterally of said trackway to permit said vehicle to shift its center of gravity and compensate for centrifugal forces, said trough having a width substantially equal to the largest lateral dimension of the vehicle, said vehicle having said wheels rotating in planes which intersect at a point which is the center of curvature of the trackway within the vehicle, said trackway being of substantially constant curvature along that portion of its surface engaged by said wheels, said point of intersection being above the center of gravity of the vehicle.

2. A system as set forth in claim 1 in which means are provided to reorient said wheels such that the vehicle may also travel over level terrain.

3. A system as set forth in claim 1 in which a third wheel is disposed between said wheels and has its plane of rotation in a substantially vertical plane.

4. A system as set forth in claim 1 including aerodynamic wings on said vehicle.

5. A system as set forth in claim 1 in which said trough is above the passenger compartment of the vehicle.

6. A system as set forth in claim 1 in which said wheels have their planes of rotation extending through a central point of said vehicle.

7. A system as set forth in claim 1 in which the trackway is a tube.

* * * * *