ABSTRACT: The system consists of a streamlined multivar vehicle and a complementary rail guideway. The vehicle is an elongated train of one or more cars of unizted tubular construction, having tapered nose and tail portions. The cars are supported on wheeled trucks, the wheels extending from the sides of the body in a manner that the body is effectively suspended between the supporting wheels to provide a low vehicle center of gravity. The guideway includes a ferrocement rail-supporting base structure having relatively high rigidity and a shroud defining, with the base structure, a continuous enclosure for the vehicle. An induction motor propulsion system includes primary windings mounted on the vehicle coacting with a secondary conducting plate secured to the guideway.
VEHICLE-ENCLOSED RAILWAY TRANSPORTATION SYSTEM

The invention relates to a high-speed rail transportation system; and particularly such a system which is adapted for the movement of passengers.

It is well recognized that there is a need for high-speed ground transportation systems for the movement of passengers, particularly in areas of high population density. Such a system is needed to complement existing modes of transportation including: commuter rail service; bus transportation, which is particularly adapted for intermediate-distance or long-distance service with frequent intermediate stops; and air transportation which is particularly adapted for long-distance service. While air transportation is adapted to and is employed for intermediate-distance service, it suffers the disadvantage that the door-to-terminal time at each end of the trip detracts from the attractiveness of the relatively short elapsed time from terminal to terminal. An ancillary problem created by this type of air transportation service is the increasing traffic and resultant aircraft congestion in the high-density population areas, which result in delays of takeoffs and landings at the terminals. There is clearly a need then for a ground transportation system which would function to transport passengers from city to city and which would approach air transportation service in convenience, in comfort, and in total elapsed time from door to door or from city to city.

Present railroad service is not capable of achieving this desired result; partially because of railway vehicle design and partially because of existing guideway design.

A primary object of this invention is to provide a surface rail transportation system including a vehicle which is capable of speeds in excess of 200 m.p.h. Another object of this invention is to provide such a rail transportation system which is adapted to utilize existing railroad right-of-way. A further object of this invention is to provide such a rail transportation system which provides greatly improved passenger comfort over existing modes of rail transportation. A still further object of this invention is to provide a rail transportation system for accommodating vehicle speeds in excess of 200 m.p.h. with excellent passenger safety.

A system for accomplishing these objects includes an elongated streamlined vehicle having nose and tail portions of gradually diminishing section, rail-engaging supporting wheels extending from the sides of the vehicle body whereby the body is effectively suspended between the wheels to produce a vehicle center of gravity adjacent to or below the wheel axes, a guideway including a rigid base structure supporting and maintaining the rail in an accurate horizontal relationship to and accommodating the suspended vehicle body; and a cover secured to the base structure and defining therewith a continuous enclosure for the rails and vehicle.

DRAWINGS

The invention is illustrated, by way of example, in the attached drawings in which:

FIG. 1 is a side elevation view of a multcar train, with the guideway being shown in section;

FIG. 2 is a fragmentary plan view of the forward end of the lead car of the train of FIG. 1;

FIG. 3 is a transverse sectional view through the passenger compartment of a car, and a transverse sectional view of the guideway for the train;

FIG. 4 is a partially diagrammatic transverse sectional view taken through the truck compartment of a car illustrating the attitude control system of the invention;

FIG. 5 is a partially diagrammatic transverse sectional view taken through the truck compartment of a car illustrating the attitude control system when the car body is tilted with respect to the rails;

FIG. 6 is a diagrammatic illustration of a control valve for the attitude control;

FIG. 7 is a fragmentary detail view illustrating the rail mounting; and

FIG. 8 is a fragmentary side elevation view of the guideway shroud.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The ground transportation system shown in the above drawings, and to be described, consists in the combination of a vehicle and a guideway having features complementary to each other to produce a desired functional system. This system is designed for high-speed passenger service. While the vehicle is illustrated and referred to as a multcar train, it will be appreciated that the features of the invention may be embodied as well in a single car.

Referring to FIG. 1, there is shown a train consisting of a lead car 10, and intermediate cars 11, and a trailer car 12, the latter two cars being shown fragmentally.

The train, regardless of the number of cars coupled together, is designed to produce a continuous smooth-walled envelope, for aerodynamic reasons, to reduce the drag as much as possible. The overall shape of the envelope is seen from a consideration of FIGS. 1, 2, and 3. Except for the leading and trailing end portions, the cars are of uniform cross section and the cross-sectional shape of the car bodies is designed for functional use being generally square with smooth rounded corners. Where the adjacent cars are coupled together, the bodies are designed to provide minimum interruption of the smooth-walled envelope.

The train end portions are reduced in cross section to produce a streamlined effect to deflect the air at the leading end of the train and to reduce drag at the trailing end. These end portions are defined by what may be referred to as beveled nose 13 on the lead and trailer cars. As best seen in FIGS. 1 and 2, the beveled nose of the lead car 10 diminishes from the uniform cross section portion of a relatively narrow horizontal, leading edge 14. As best seen in FIG. 1, the bottom wall of the beveled nose is defined by a continuation of the car bottom wall, while the upper wall 15 is inclined downwardly from the upper wall of the car uniform portion of the leading edge 14. The sidewalls 16 of the beveled nose merge symmetrically toward each other, as best seen in FIG. 2, and diminish horizontally to define the leading edge 14 which may, for example, have a width about one-third the maximum width of the vehicle.

The vehicle contemplated by the present invention is a vehicle which would have a capability of maintaining an average speed of 200 m.p.h.; and, therefore, should attain a maximum speed in excess of 220 m.p.h. To provide for a mass attack for deflecting the air at the leading end of the vehicle in this speed range, it has been calculated that a desired ratio of the length of the diminishing vehicle end portion or beveled nose 13, to the effective diameter of the uniform cross section portion of the vehicle should be at least 2.5 to 1. For a vehicle which is essentially rectangular in cross section, this ratio should be applied to the length of the beveled nose in relation to the major transverse axis of the uniform body portion. For operation at substantially higher speeds, this ratio should be correspondingly increased.

The particular above-described design of the beveled nose 13 for the train lead car serves several important functions. First, since the nose portion bottom wall remains low, being a continuation of the vehicle bottom wall, more of the air is deflected upward which is an advantage with respect to the guideway to be described. Additionally and importantly, this design tends to hold the vehicle down on the rails to provide good tracking of the truck wheels with the rails. Furthermore, the aerodynamic design is very significant from the standpoint of reducing horsepower requirements to drive the vehicle.

The beveled nose 13 for the trailer car is identical to that for the lead car 10. While, ideally, a beveled nose design for a trailer car might differ from that of a lead car, it is desirable to have a gradually reducing section to eliminate the high drag effect of a vehicle having a blunt trailing end. Preferably, however, a multcar train of the type described herein should be
bidirectional so that it will be unnecessary to turn the train around at the terminals. Accordingly, the train may be made up of lead and trail cars which are identical, facing the opposite directions, and each having a control cabin or operator compartment in the beveled nose 13 to operate the train in either direction.

Each car of the above-described multicar train is supported on a pair of rails by two trucks 18 which are mounted to rotate about a vertical axis relative to the body; each truck carrying four flanged rail-engaging wheels. As seen in the figures, the wheels are rotated about horizontal axes passing through the body; the trucks and the associated suspension system each occupying truck compartments which, in effect, isolate other car compartments from each other. Referring to FIG. 1, the passenger compartment is preferably located intermediate the two truck compartments; and in FIG. 1 there are illustrated two passenger-loading doors 19 for the passenger compartment of the lead car 10. The beveled nose 13 of the lead car 10 preferably encloses an operator compartment for the operator of the train; and FIG. 1 illustrates forward-facing windows 20 and an entry door 21 for the operator compartment. The compartment at the end of the car opposite from the operator compartment is isolated from the passenger compartment by the intervening truck compartment; and may be used as a baggage compartment, a baggage door 22 being shown in FIG. 1. The truck car 12 has the same compartmental arrangement as the lead car 10; and the intercar or added car would have generally the same compartmental arrangement, with an additional baggage compartment being provided in lieu of an operator compartment.

For passenger service, the vehicle cars should be constructed to be of minimum weight in relation to functional requirements; and would preferably consist of a structure wherein the body itself defines a tubular structure element with subframe elements in the area of the truck compartments to accommodate the suspension structure.

As shown in FIG. 3, the passenger compartment may include four longitudinal rows of seats 23, which may be individual airline-type seats, two rows of seats being located on each side of a center aisle. FIG. 3 particularly illustrates the relation of the passenger compartment floor and seats in relation to the axes of the truck wheels. The compartment floor is, of course, much lower than the wheel axes, from which it will be seen that the major portion of the payload is carried at or below these axes to maintain the center of gravity of the vehicle either below or only slightly above the wheel axes. The compartment illustrates racks, and also illustrates longitudinal passages 25 for service conduits and cables. Preferably, each car passenger compartment would define a self-contained passenger unit, including snackbar and restrooms, the unit being adapted for "hostess service" in the manner of commercial aircraft.

FIGS. 4 and 5 are diagrammatic transverse sectional views taken through a truck compartment to illustrate the suspension system for the cars and the "automatic attitude control" to provide maximum passenger comfort. This automatic attitude control serves to roll the car body into a turn commensurate with vehicle speed, tending to produce a coordinated turn in the manner of an airplane. As illustrated in these figures, a car truck 18 includes a frame structure or bolster 27 which supports the several axles 28 for the rail-engaging wheels 29, and a center plate 30 which is the bearing member permitting the pivoting of a truck about a vertical axis relative to the car body. The truck may consist of two axles 28 which extend entirely through the car body and which are nonrotatably secured to the bolster 27; and the ends of the axles would define journals coating with wheel bearings to permit independent rotation of the wheels 29 at the opposite ends of the axles. Alternatively, the four wheels 29 of the truck may be nonrotatably fixed to four respective axles 28 which rotate independently relative to the truck. With either arrangement, each of the wheels 29 rotates independently of the other wheels.

The wheels themselves are flanged wheels, in a manner of conventional railroad car wheels; however, the load bearing surfaces which engage the tops of the rails are cylindrical surfaces, as distinguished from the frustoconical load-bearing surfaces of the conventional rail wheels. There is no spring suspension in the above-described truck structure; and the attitude of the above-described truck components always remains the same relative to the guideway rails. The wheels are spaced relative to the rails to essentially eliminate any side-to-side oscillations of the trucks relative to the rails; and in this respect the transverse distance between the outer surfaces of the wheel flanges is of the order of one-half inch less than the distance between the confronting faces of the wheel-engaging portions of the rails.

The car body is supported on the above-described truck by means of a body bolster 31 and associated center plate 32, which coacts with the truck center plate 30 to define the pivotal bearing surfaces between the body and truck. The cushion suspension between the body and truck, for passenger comfort, is provided by variable pressure fluid suspension bellows 33 and 34 which are mounted on the body bolster 31 and support the body structure itself through subframe members 35. As suggested in FIGS. 4 and 5, for each truck at least one bellows is provided on opposite sides of the longitudinal centerline to provide the "automatic attitude control" to be described. It will be noted that the body bolster 31 is so mounted that it can rotate about an axis which is relative to the car body but that it must be movable vertically relative to the subframe members 35; and suitable stabilizing members, not shown, must be provided for this purpose. While the vehicle guideway to be described is designed to provide minimum undulation in a vertical direction, the bellows 33 and 34 will provide a cushion suspension to reduce the effect of such undulations as may occur. The operating fluid for this system may be air or other suitable compressible fluid.

Additionally, this fluid suspension system is designed to rotate the car body, about a longitudinal axis of the car, relative to the trucks; and the automatic attitude control provides this rotation in response to the centrifugal and gravitational forces acting on the car.

For ideal passenger comfort in a rail-guided vehicle of this type described, or for any type of vehicle, the guideway or roadbed should be banked on the curves in relation to the expected speed of the vehicle negotiating the curves. If the speed of the vehicle is perfectly coordinated with the degree of bank of the roadbed, the resultant forces will have the effect of urging the passenger car body downward into his seat and there will be no sway-effecting forces. If, however, the vehicle speed is not perfectly coordinated with the inclination of the roadbed, there will be sidewise forces acting on the passengers.

The same effect of passenger comfort may be achieved if the vehicle body may be rotated about its horizontal longitudinal axis in relation to its supporting wheels, whereby the vehicle body may be banked independently of the degree of bank of the roadbed; and a mechanism for achieving this is shown particularly in FIGS. 4 and 5 of the drawings. This system includes the variable bellows 33 and 34 which are disposed, respectively, on opposite sides of the longitudinal axis of the car, the control valves 36 and 37 for controlling the fluid pressure in the respective bellows 33 and 34, and the pendulum 38 by means of which the control valves 36 and 37 are actuated to either increase or decrease the fluid pressure in the respective bellows in response to the forces which are acting on the passengers.

The sensing mechanism for this system is a weight mass which may, for example, take the form of the pendulum 38 which is suspended from the car body to swing in a transverse horizontal plane. The manner in which the pendulum is suspended, the form and weight of the pendulum, and the point of suspension relative to the car body are calculated so that the pendulum will react to the centrifugal and gravitational forces in a manner to simulate the reaction of seated passengers in the passenger compartment. Referring to FIGS.
4 and 5, each of the valves 36 and 37 includes a respective valve plunger 39 and 40 which shifts longitudinally in a suitable bore to alternately connect the bellows chamber with a supply of pressurized fluid or with a vent. The plungers 39 and 40 are connected to the pendulum 38 by respective links 41 and 42, so that the valve plungers are shifted in response to swinging movement of the pendulum.

FIG. 6 is a diagrammatic illustration of the valve 37, with its associated plunger 40 in actuating link 42. The valve plunger serves to selectively connect a valve passage 43 which communicates with the bellows chamber by means of a suitable conduit, a passage 44 which is communicated with a source of pressurized fluid which is maintained, of course, at a pressure higher than that normally required within the bellows chamber, and a passage 45 which communicates with atmosphere to define a vent passage. These passages open to the bore in which the valve plunger 40 reciprocates, and the passages are communicated with each other through an annular groove 46 in the valve plunger, for example.

In the position of the plunger 40 illustrated in FIG. 6, the annular groove 46 is positioned in a neutral position between the ports defined by the passages opening into the plunger bore, so that the bellows chamber is isolated from supply fluid and from atmosphere. Accordingly, the associated bellows will maintain a fixed attitude between the body bolster 31 and the subframe element 35. It will be seen that when the plunger is shifted slightly to the right, as viewed in FIG. 6, the bellows passage 43 is communicated with the supply passage 44 to permit the flow of pressurized fluid into the bellows chamber to increase the distance between the bolster 31 and frame member 35 thereby raising the right side of the car body relative to the truck as viewed in FIGS. 4 and 5. When the plunger 39 is shifted to the left, the communication between the passages 43 and 44 is broken and the passage 43 is communicated with the vent passage 45, whereby the pressure in the bellows chamber will be permitted to reduce to effect a lowering of this side of the car body relative to the truck.

Now referring particularly to FIG. 4, the car body is illustrated on a horizontal or unbanked roadbed; and it is assumed that the vehicle has been traveling on a tangent or straight track and has just entered a left-hand curve considering movement of the vehicle into the paper as viewed in FIG. 4. Since the vehicle has been traveling on a tangent track, the car is level in the sense that the horizontal axis of the body is parallel to the horizontal axis of the track. As the car has just moved into the curve, the pendulum 38 has just responded to the centrifugal force and has swung to the right an amount indicated by the angle a, which is the angle between the vertical axis of the track and the longitudinal axis of the pendulum. This movement of the pendulum actuates both of the valves 36 and 37, the plunger 39 of the valve 36 being shifted to the right to communicate the respective bellows passage with the vent passage to decrease the pressure in the bellows 33; and the plunger 40 of the valve 37 being shifted to the right to communicate the respective bellows passage with the supply passage to increase the pressure in the bellows 34.

The car body then begins to rotate counterclockwise relative to the truck, as seen in FIG. 5. This rotation of the body relative to the truck will be gradual and will continue until the valve plungers are returned to the neutral position, as illustrated in FIG. 6. This condition will occur when the horizontal axis of the car body has been rotated through the angle a relative to a horizontal plane parallel to the truck axis or to the rails. In this condition, the vertical axis of the car body either coincides with or is parallel to the longitudinal axis of the pendulum. The attitude of the cars will stabilize relative to the truck, and remain so until such time as the centrifugal and gravity forces acting on the pendulum.

In this manner, the car body is automatically rotated relative to the truck to align the vertical axis of the body with the longitudinal axis of the pendulum. Should the speed of the vehicle be too great, in relation to the bank of the roadbed, the vehicle body will compensate in the manner above described.

Conversely, should the vehicle speed be too small in relation to the bank of the roadbed, the pendulum 38 would swing relative to the vertical axis of the body, so that the predominant influence of gravity forces to correct the car attitude for the bank condition. This condition would occur when the vehicle, as viewed in FIG. 5, rolls out of the curved track onto tangent track and the only force acting on the pendulum would be gravity which would effect swinging of the pendulum to align itself in a vertical plane normal to the truck axis. The car body will then be rotated in a clockwise direction to the relative attitude shown in FIG. 4.

The guideway for the above-described train will now be described with particular reference to FIG. 3. The roadbed or support 49 for the guideway base structure is constructed in accordance with standard roadbed practices, consisting of compacted, controlled drainage fill or ballast. Because of the high speed at which the above-described train will operate, it is essential that the rails be supported on a base structure which will provide a high degree of accuracy, both with response to the plane of the load-bearing surfaces and the distances between the rails. Accordingly, the rails should be supported on a base structure which has a much higher section modulus than, or is much stiffer than, the conventional structure consisting of rails spiked to transverse wooden ties.

As seen in FIG. 3, a preferred base structure is in the form of a continuous ferrocement strip 50 which spans the distance between the rails 51 to provide high dimensional integrity. This space structure is accurate in section, defining relatively favorably sections at the outer edges thereof, where the rails are supported on the base structure and having a relatively thinner connecting portion between the rib portions which defines a trough between the rails to accommodate the lower portion of the vehicle body. This base structure 50 is laid directly on the above-described conventional compacted roadbed 49, and could be constructed as a site-cast reinforced concrete or as precast reinforced or prestressed concrete sections joined together on site by means of suitable control joints. The rails 51 are standard consisting, for example, of standard 140 ft. lengths joined together by conventional welding techniques. The rails 51 may be secured to the base structure 50 in any suitable manner to provide the desired rigidity of mounting. As suggested in FIG. 7, the rails may be secured to the base by means of bolts or studs 52 suitably embedded in the concrete base structure at the time of casting, the rails being anchored to the bolts by means of conventional plates 53 and nuts. Because of the elimination of conventional wooden ties, which form a shock-absorbing mounting, some means must be provided for isolating the rails from the body and its wheel load. A resilient cushion device may take the form of a strip of resilient material, fabricated of neoprene, for example, which would lie on the base 50 and upon which the rail 51 is supported.

The base structure 50 also provides support for a cover or shroud 56 which defines, with the base structure 50, a continuous enclosure for the train. Such an enclosure is particularly desirable from the standpoint of safety in view of the speed at which the train is intended to operate. One aspect of the safety function is to eliminate the possibility of animals, fowl or debris from entering the guideway and interfering with the safe movement of the train. Another aspect of safety is to provide for all weather operation, particularly eliminating the effects of drifting snow and precipitation.

One form of shroud for the guideway is particularly illustrated in FIGS. 3 and 7, consisting of arcuate segments 57 and 58 joined end to end along the length of the guideway. As seen in the figures, the segments are fabricated two different sizes as represented by the segments 57 and 58, respectively, and joined alternately. As best seen in FIG. 5, the segments have substantially the same configuration except for a different curvature at the top. This provides vertical gaps 69 between each of the adjacent connecting higher and higher segments, 57 and 58 respectively, which define vents for the guideway enclosure. These vents 59 are preferably covered with a suitable
The shroud segments may be fabricated, for example, from cold-rolled galvanized steel which might be corrugated to provide desired rigidity. Such segments could be readily fabricated to the desired shape, offsite, and transported to site for rapid installation. These segments are secured to the base structure 50 by means of brackets, or other suitable means, and may be joined together by bolting, for example. Alternatively, the shroud segments 57 and 58 may be fabricated in the form of ferrocement shells, which again may be prefabricated in the desired shape and transported to site.

For reasons of economy in fabrication, construction and maintenance, the size of the shroud should be maintained as small as possible. A limiting factor is that the cross-sectional area of the enclosure defined by the shroud and the base structure 50 should be sufficiently large in relation to the cross-sectional area of the vehicle body to permit the smooth flow of air within the enclosure past the vehicle body as the train moves through the enclosure. The effects would be particularly adverse if the velocity of the air were permitted to approach the speed of sound. For the contemplated speeds of the above-described vehicle in excess of 220 m.p.h., the ratio of the enclosure cross section to the vehicle cross section should be a minimum of 2 to 1. For higher vehicle speeds, this ratio should be correspondingly increased.

A propulsion system for the above-described vehicle is preferably independent of the supporting wheels 29 because of the difficulty in obtaining driving traction between wheels and rails at the speeds contemplated for this system. One suitable form of propulsion system is that of a linear induction motor shown diagrammatically in FIGS. 3, 4, and 5. Such a linear induction motor includes primary cores or windings suitably supported from the vehicle and coacting with a secondary conducting plate 63 fixed to the guideway base structure 50. As best seen in FIG. 3, the secondary conducting plate 63 may be in the form of a continuous rail or beam having the shape of an inverted T, in cross section, which is secured to the guideway base structure in any suitable manner. The primary cores 62 must be supported on the body to maintain the necessary space relationship with the conducting plate 63. In this respect, the primary cores are necessarily mounted on the truck structure as opposed to the body structure; and in FIGS. 4 and 5, the primary cores 62 are shown as being mounted on a suitable supporting plate 64 attached by means of brackets 65 to the truck bolster 27. The primary cores would be mounted to one or more trucks of a car, or of the train, as determined by the motor design and the power requirements. This type of propulsion system would require either an onboard source for generating electric power or would utilize utility-generated electric power from distribution means associated with the guideway.

Alternatively, a gas turbine type of propulsion system could be used with the vehicle of the type described.

There has been described a high-speed rail transportation system for the movement of passengers which is a feasible system in the sense that the contemplated speeds for the system are sufficient to complement and be compatible with other modes of passenger transportation. This described system is feasible from an economic standpoint for a number of reasons. One significant reason is that the guideway can be built largely on existing railroad right-of-way. On much of existing high-speed right-of-way, the sharpest curves are 2 curves; and the desired speeds for the described system can be maintained on this right-of-way. From the standpoint of construction and maintenance costs, the vehicle has a construction weight consistent with the functional requirements. With a lightweight passenger vehicle, the wheel loading may be of the order of 5,000 pounds as compared with present railway freight car wheel loadings of the order of 30,000 to 40,000 pounds. Since existing rail guideways are designed for both freight and passenger service, the guideways must accommodate the high freight loadings. Economy may be achieved, then, in designing a guideway limited for the relatively light loadings of high-speed passenger vehicles. With lighter loadings, it would be expected that maintenance cost for both vehicle and guideway would be reduced. Operating economics should be achieved because of the lightweight construction of the vehicle and of the vehicle streamlining. The streamlining or aerodynamic design has a substantial bearing upon the horsepower requirements to drive the vehicle.

The above-described system is feasible from the standpoint of service to the public because of the reasonable door-to-door or city-to-city elapsed time, in relation to other modes of transportation, and because of the degree of passenger comfort which is achieved.

Furthermore, the above-described system is feasible from the standpoint of safety. The vehicle is very stable because of the wide track suspension and low center of gravity design, along with the aerodynamic design to achieve geometric track alignment of the vehicle on the rails. In a vehicle as above described, the spacing of the rails may be of the order of 12 feet, for example, as compared with a spacing of 4 feet 8½ inches for standard track. The rigid rail-supporting structure achieves safety in terms of accurate dimensional control of the rails as well as providing smooth roadbed. The enclosed roadbed achieves safety from the standpoint of eliminating obstructions in the guideway to safe movement of the vehicle, and providing for all-weather operation, a factor effecting safety as well as maintenance of schedules.

What is claimed is:

1. A transportation system including a mobile vehicle and a guideway comprising:
   a. a plurality of vehicle body units interconnected to form a unitary elongated vehicle having a relatively uniform cross section intermediate its ends and a continuous relatively smooth-walled envelope, the body units adjacent the ends of said vehicle having end portions of gradually diminishing cross section,
   b. a plurality of trucks for supporting each of said body units on a pair of rails, said trucks including rail-engaging supporting wheels disposed on opposite sides of said body units for rotation about horizontal axes passing through said body units near the center of gravity thereof;
   c. a guideway comprising a rigid base structure having a spaced parallel supporting rails affixed thereto, said base structure being recessed between said rails to accommodate the lower portions of said vehicle body units; and
   d. cover means fixed to said base structure and defining therewith a continuous enclosure for said rails and said vehicle, said cover means having structural members of spaced vertically forming vents therebetween aligned to permit air displaced by said vehicle as it passes through said enclosure to exit and enter said enclosure.

2. A system as set forth in claim 1 wherein said cover means comprises a plurality of pairs of arcuate segments formed to different curvatures, each segment joined to an adjacent segment whereby the different curvatures of the adjacent ends define vents opening along the long axis of said enclosure.

3. A system as set forth in claim 1 wherein the upper and side walls of said vehicle envelope merge toward the lower rail thereof to define a vehicle end portion.

4. A system as set forth in claim 1 including cushion means interposed between said base structure and said rails.
5. A system as set forth in claim 1 including propulsion means for said vehicle comprising one or more linear induction motors having the primary windings thereof carried on one or more of said body units, and having a continuous secondary plate fixed to said guideway.

6. A system as set forth in claim 1 wherein said supporting wheels are flanged wheels having cylindrical load-bearing surfaces.

7. A system as set forth in Claim 6 wherein the transverse distance between the outer surfaces of said wheel flanges is slightly less than the distance between the inner edges of said pair of rails.

8. A system as set forth in claim 6 wherein the transverse distance between the outer surfaces of said wheel flanges is of the order of one-half inch less than the distances between the inner edges of said pair of rails.

9. A system as set forth in claim 1 including variable fluid suspension devices disposed on opposite sides of said body units for supporting said body units on said trucks; and means for controlling said oppositely disposed devices independently of each other.

10. A system as set forth in claim 9 wherein said control means is responsive to the centrifugal forces acting on the body units.

11. A system as set forth in claim 9 wherein said control means is responsive to both the gravitational and centrifugal forces acting on the body units.

12. A system as set forth in claim 9 wherein said control means comprises a first valve for alternatively communicating first suspension device with pressurized fluid or with vent means or isolating said device; a second valve for alternatively communicating a second oppositely disposed suspension device with pressurized air or with vent means, or for isolating said device;

a weight mass suspended from said body unit for relative swinging movement; and valve-actuating means coupling each of said valves to said weight mass.

13. A system as set forth in claim 12 wherein said weight mass is a pendulum; said pendulum maintaining both of said valves in said isolating position when said pendulum is aligned with the vertical axis of said body unit; and said pendulum means, in a nonaligned condition, simultaneously actuating one valve to fluid-supplying position and the other valve to fluid-venting position.

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