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LINE SUSPENDED VEHICLE

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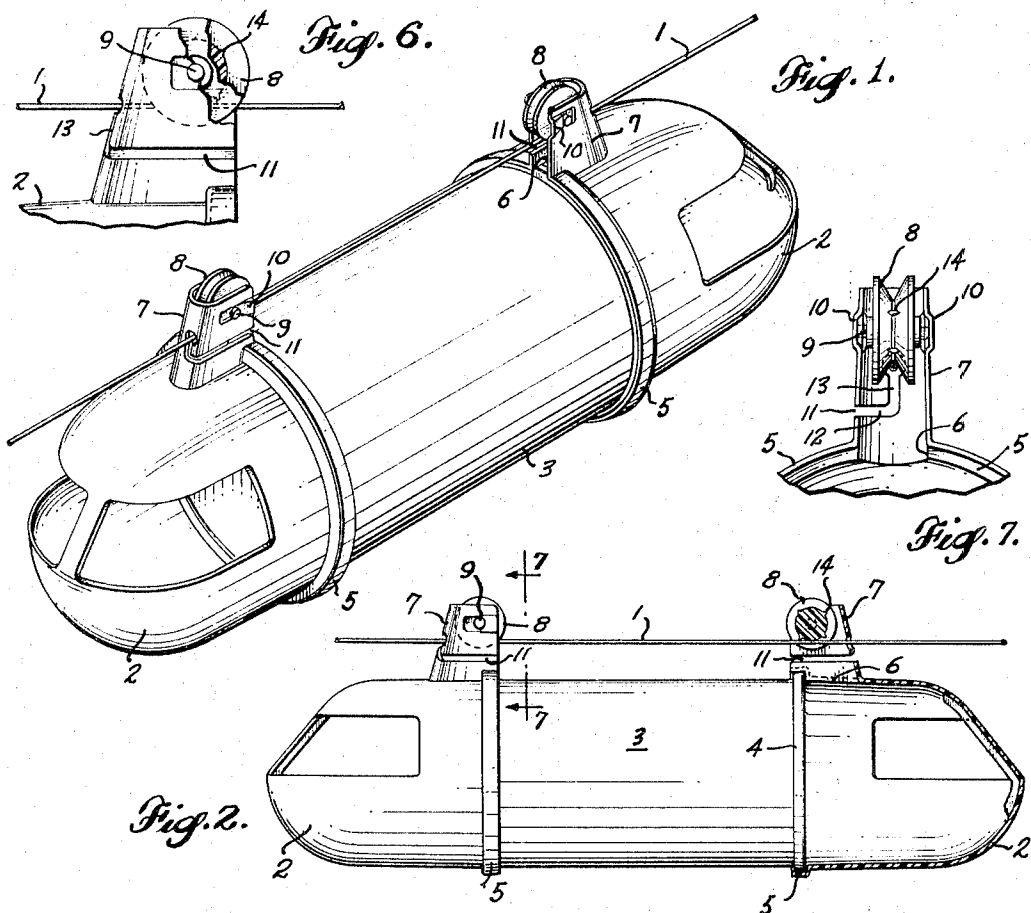
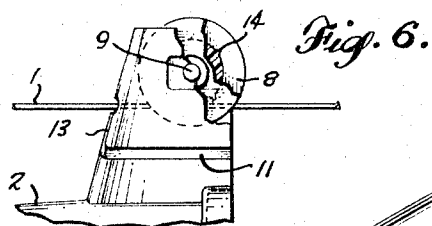


Fig. 2.

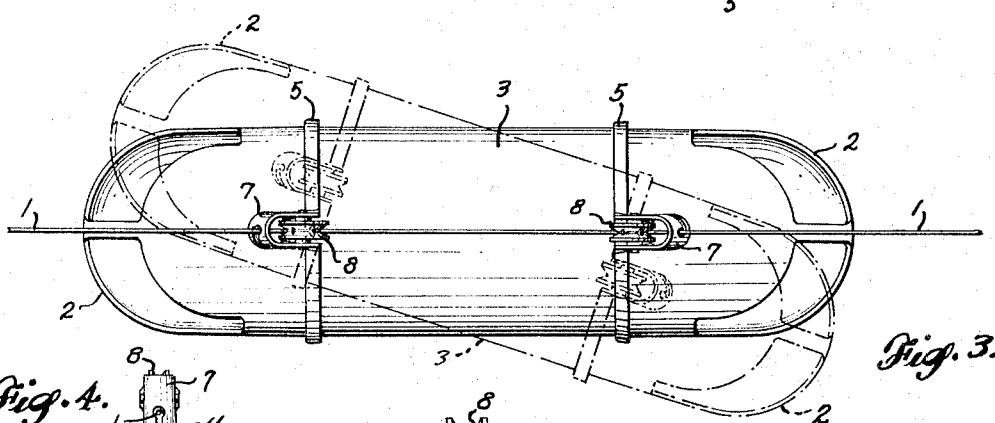


Fig. 3.

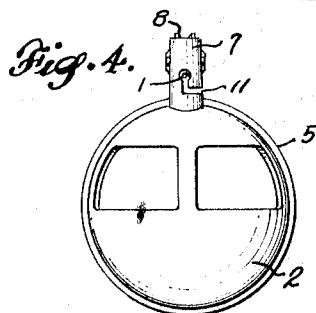


Fig. 4.

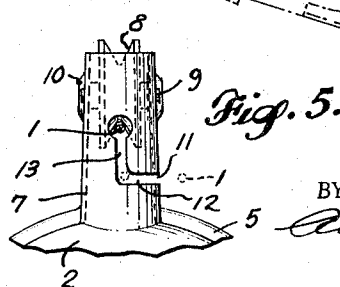


Fig. 5.

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LINE SUSPENDED VEHICLE

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This invention relates to a vehicle suspended from and capable of travelling along a generally horizontal line, which vehicle preferably is a monorail car toy but may be in the form of an airplane or some other type of vehicle.

A principal object of the invention is to provide a vehicle body which can be suspended from and travel along a line in the form of a toy which is light and inexpensive to construct and which, at the same time, is strong and rugged. A particular object is to enable such a car or similar vehicle body to be molded or otherwise fabricated from inexpensive plastic material, and preferably made in several parts which can be assembled quickly and easily.

It is an important object of the invention to provide mechanism for suspending the vehicle from a line, which mechanism is preferably formed integrally with the vehicle body and which is integrated with portions of such body in a way which will facilitate assembly of the body components and which will provide compact, strong body suspending structure.

Another important object of the invention is to provide suspension structure for the vehicle body which will enable a line to be engaged with, or disengaged from, the vehicle suspending structure quickly and easily, yet which will deter inadvertent derailment or disengagement of the vehicle-suspending wheels from the vehicle-supporting line.

A further object is to provide a construction for a suspended toy vehicle which will produce a distinct hum simulating the sound of a motor when the vehicle is coasting down a slightly inclined supporting line.

A vehicle capable of accomplishing the foregoing objects may include a sectional body which may be composed of two or three components, two of which components have supporting line-engaging mechanism in the form of upwardly-projecting pillars carrying rotating sheaves and having slots in the pillars affording access of a supporting line to each of the sheaves. Such access preferably is through slots in the pillars angled to prevent movement of the supporting line straight through the slot. Slots in two pillars are arranged so that the line must enter them from opposite sides of the vehicle which further deters disengagement of both sheaves inadvertently from the line simultaneously. The pillars may be of channel shape having one end coinciding with the margin of a deep notch in the end of a car body section which is open, so that it can be expanded somewhat in being assembled with the end of an adjacent body section.

FIGURE 1 is a top perspective of a representative toy monorail car body, FIGURE 2 is a side elevation of such car body with parts broken away, FIGURE 3 is a plan of such monorail car and FIGURE 4 is an end elevation of the car.

FIGURE 5 is an enlarged end elevation of a supporting pillar of the monorail car and FIGURE 6 is a side elevation of such pillar construction with parts broken away. FIGURE 7 is a section on line 7-7 of FIGURE 2 showing such pillar construction.

While the type of vehicle body suspended from the generally horizontal line 1 could be of different types, the vehicle body shown in FIGURES 1 to 4, inclusive, of the drawings is a toy monorail car. Also, while the vehicle body could be constructed as a single unit, the car body shown is composed of a plurality of sections includ-

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ing identical end sections 2 attached to opposite ends of a center section 3. Such center section is shown as being of cylindrical shape and each end section includes a rounded end portion which may be of generally hemispherical shape and a connecting portion which is of circular cross section corresponding to the cross section of the central section 3.

Each of the car body sections 2 and 3 preferably is of shell structure for lightness, but the circular cross section of the sections transversely of the length of the car provides a rigid construction. The body sections may be made of material of different types, such as sheet metal or sheet plastic, but an economical construction may utilize a conventional beverage sheet metal container for the central section 3 after its contents have been emptied, and the end sections 2 can be made of plastic material molded to fit the opposite ends of the central section 3.

It is important that the several sections of the body be secured together firmly when they are assembled, while at the same time their construction should enable the sections to be fitted together easily and quickly. Conventionally, a beverage can has on its opposite ends ribs 4 which can be engaged by the rim 5 of an end section or cap 2. Such rim portion should be formed to limit movement of the end section toward the central section, but should engage the rib 4 of the central section securely so as to prevent inadvertent separation of the central section from either of the two end sections. The end section rim is therefore shown in FIGURES 2 and 7 as being shouldered so that the shoulder 5' will be engaged by the end of the central section 3 to limit its movement into the open end of the end section and the rim portion will then have an outward offset which fits snugly around and grips the rib 4.

Snug engagement of the end section rim 5 with the central section rib 4 can be assured if the end sections 2 are made of rather soft resiliently stretchable elastic material, but it is preferred that the end sections 2 be made of reasonably stiff material which would be more difficult to flex into engagement with the central section end ribs 4. The circumferential expansibility of the end section rim 5 is improved by providing in one circumferential location a deep notch 6 in the portion of the end section adjacent to the central section 3, and which notch opens at the joining rim end of the end section. The width of such notch opening can be increased to increase the circumferential extent of the end section rim 5 without the material itself of such rim being stretched. It is also necessary to provide structure for supporting the vehicle body from the line 1 and, particularly if the central section 3 of the body is made of a conventional metal can, it is desirable for such body suspending structure to be provided on the end sections 2. Such structure is shown as including two pillars 7 projecting upward, respectively, from the end sections of the body and being of sheet material shell construction. Each of these pillars is of channel shape projecting substantially radially from its section and tapered away from the circumferential wall of the section. The flanges of these pillars are parallel in fore and aft planes and the connecting web side of each pillar forms the side of such pillar toward the adjacent end of the vehicle body.

The open side of each channel pillar faces the other pillar and is in substantially radial registry with the rim 5 of the section carrying the pillar. Moreover, such pillar is of a width between its flanges substantially equal to the width of the deep notch 6, the root portions of the pillar flanges are of a width approximately equal to the depth of the deep notch 6 longitudinally of the vehicle body and the root end of the pillar is substantially in registry with the edge of such deep notch. In fact, the pillar can be conveniently molded as an integral part of

a molded vehicle body end section 2 from plastic material which is quite stiff, but sufficiently yieldable to enable the free edges of the pillar channel flanges to be moved somewhat apart, as well as to enable the circumferential extent of the end section rim 5 to be expanded by spreading the opening of the deep notch 6.

A sheave 8 is received and secured in each of the channel-shaped pillars 7 for the purpose of engaging the supporting line 1 and suspending the vehicle body from it. Such sheave also may be molded of plastic material and may have an axle 9 formed integrally with it. The opposite side flanges of the channel-shaped pillars 7 are shown as having inwardly-facing grooves spaced from the root portions of the pillars and extending transversely of the lengths of the pillars which communicate with axle end-receiving apertures in the pillar flanges. Each sheave may thus be pushed toward the web of its pillar with its axle ends engaged in the oppositely-facing grooves 10, which will spread the pillar flanges progressively as the sheave is moved farther toward the web until the axle ends snap into the apertures provided for receiving them, so as to anchor the sheave in the channel. The sheave may be released from the pillar simply by manually spreading the channel flanges sufficiently to withdraw them from the ends of axle 9 so that the axle ends can be moved along the grooves 10 to the channel opening.

The pillars 7 are constructed so that the bight of the line 1 can be engaged quickly and easily with the sheaves 8 while deterring inadvertent disengagement of the line from the sheaves, and particularly from both sheaves simultaneously. Such engagement of the line bight with a sheave can be accomplished by providing a labyrinthine slot in each channel-shaped pillar 7, establishing communication between the exterior of such pillar and a passage centrally through the pillar transversely of its length and parallel to its flanges at a location spaced from the axis of axle 9 toward the root of the pillar a distance substantially equal to the minimum radius of the grooved sheave body. Such labyrinthine slot is shown in FIGURES 5, 6 and 7 as including three communicating portions; first, a fore and aft portion 11 in one flange of the pillar extending transversely of the pillar length, a second portion 12 in the web of the pillar extending from the slotted flange to the center of the web transversely of the length of the pillar and third, a portion 13 in the central portion of the web extending lengthwise of the pillar.

Thus, the labyrinthine slot 11, 12, 13 is of double-angled shape, including substantially a right angle between the slot portions 11 and 12, and substantially a right angle between the slot portions 12 and 13. The slot portion 11 is located in the pylon flange between the root portion of the pylon and the axle-retaining structure. The particular location of the slot portion 11, together with the minimum radius of the body of sheave 8, will determine the length of the slot portion 13 extending lengthwise of the pylon. Preferably the closed end of the slot portion 13 is enlarged to provide ample clearance between the end portion of the slot and the line passing through it, whereas it is preferred that the remainder of the slot be of a width only slightly greater than the diameter of the largest line which will be passed through the slot. Inadvertent escape of the line through the slot will thus be deterred, both by the shape of the slot and by its narrow width.

In order further to deter inadvertent escape of the line 1 from the labyrinthine grooves of both pillars 7 simultaneously, however violent the vehicle body may swing or bounce relative to the line 1, it is preferred that the slot portions 11 in the two pillars be located at opposite sides of the respective pillars, as shown in FIGURE 1. Consequently, the slots will be engaged with the bight of line 1 by movement of the vehicle body ends toward opposite sides of the line as would be effected by movement of the vehicle body from the broken-line position shown in

FIGURE 3 to the solid-line position. Moreover, if the line should accidentally become disengaged from the slot in one pillar such end of the vehicle body would drop downward so that the slot portion 11 would extend transversely of the line 1, which would make it extremely difficult for the line to escape from such slot portion. The slot portions 11 can be arranged conveniently at opposite sides of the pillars, respectively, by forming the two end sections 2 of identical construction, which also effects economy in the fabrication of the car body.

Despite the considerable length of the labyrinthine slot 11, 12, 13 and the disposition of such slot between the pulley axle and the root of the pillar, the pillar structure will be quite strong because of its deep channel shape. The depth of the channel forming the pillar can be virtually as great as desired in a fore-and-aft direction to provide as much strength as necessary. The structure of the pillar left intact after disregarding the flange in which the slot portion 11 is located, and that portion of the web in which the slot 12 is located, is of angle section so that it is quite rigid and will resist substantial bending forces which may be applied to the pillar. Moreover, the bending forces to which the pillar would be subjected transversely of the length of the line 1 and vehicle body would be minor because the body could swing freely around the axis of the line 1. The length of the channel web above the blind end of the slot portion 13 can be as long as necessary to provide adequate resistance to spreading of the channel flanges at opposite sides of the sheave 8. The slot does, however, facilitate the spreading of such flanges for the purpose of inserting and removing the sheave from its operative position mounted in the channel-shaped pillar. The pillar structure described enables it to be made of a unitary construction and may, if desired, be formed integrally with the body section 2, while adequately supporting both ends of the sheave axle and having adequate strength to transmit the weight of the vehicle body to such axle. Also, the blind end of the slot portion 13 being located substantially in alignment with a tangent to the bottom of the sheave groove tends to retain the line in its proper position engaged with the bottom of the sheave groove.

In FIGURES 2 and 7 the bottom of the sheave groove is shown as having small projections 14 spaced circumferentially of the sheave, four being shown in this instance. As the sheaves roll along the line 1 such projections will periodically depress the line or lift the vehicle body relative to the line abruptly, which produces an attractive vibration to the vehicle body and to the line and makes a pronounced hum simulating the sound of a motor driving the vehicle body along the line. No propulsive power is utilized for moving the vehicle body along the line, however, but travel of the body is accomplished by supporting the line in a slightly inclined position so that the force of gravity will move the vehicle body along the line. The line may be inclined alternately in opposite directions so that the car will run along the line first in one direction and then in the other, such reversal of travel being particularly appropriate because both ends of the car are alike.

While it is contemplated that the end sections 2 of the vehicle body can be marketed separately so that their rim portions 5 can simply be snapped onto the ribs 4 at the opposite ends of a conventional beverage can, the central section 3 could be merchandised with the end sections and made of similar material. Alternatively, the end sections 2 could be connected to a central section 3 by a construction other than a snap rim-to-rib engagement as described, and the body sections could be secured together permanently if desired.

We claim as our invention:

1. In a line-suspended vehicle, a line, an elongated body, two pillars spaced lengthwise of said body and projecting upwardly from it, each of said pillars having in the root portion thereof an angle slot having an upright

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portion of a width throughout its length at least as great as the thickness of said line, and such slots having portions joining said upright portions, respectively, at an angle with entrances thereto opening toward opposite sides of said body, respectively, through which said line may enter and move into said upright slot portions, respectively, and pulley means carried by said pillars positioned so that tangents to the lower portions of peripheries of the said pulley means are substantially in horizontal registry with portions of the slots.

2. In a line-suspended vehicle, a line, an elongated body, two channel-shaped pillars spaced lengthwise of said body and projecting upwardly from it, each of said pillars having in the root portion thereof an angle slot including a generally horizontal leg opening at the exterior of said pillar and an upright leg terminating in a blind end, said slot legs being of a width throughout their lengths at least as great as the thickness of said line, the horizontal legs of such slots opening toward opposite sides of said body, respectively, and the blind end portions of said slots being disposed at opposite sides of said pillars, respectively, and pulley means carried by said pillars positioned so that tangents to the lower portions of the peripheries of said pulley means are substantially in horizontal registry with the blind ends of the slots.

3. In a line-supported vehicle having a central section formed by a can, an end section shell of stiff material having a closed end, an open end adapted to receive therein an end of such can and having a stop shoulder engageable by such can end to limit its movement into the shell's open end and deep notch means opening at said shell's open end, extending from said shell's open end toward said shell's closed end to a location beyond said stop shoulder and the open end portion of said deep notch means being expandable to increase the effective circumferential girth

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of the shell's open end, a pillar of channel-shaped cross section projecting outward from said shell and including two substantially parallel flanges having edges adjacent to said shell joined, respectively, to the opposite edge portions of said notch means and a web outward of said shell joining corresponding edges of said flanges at the side of said pillar toward the closed end of said shell and joined to said shell at a location spaced from the shell's open end beyond said notch, and pulley means mounted in said pillar between said flanges.

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