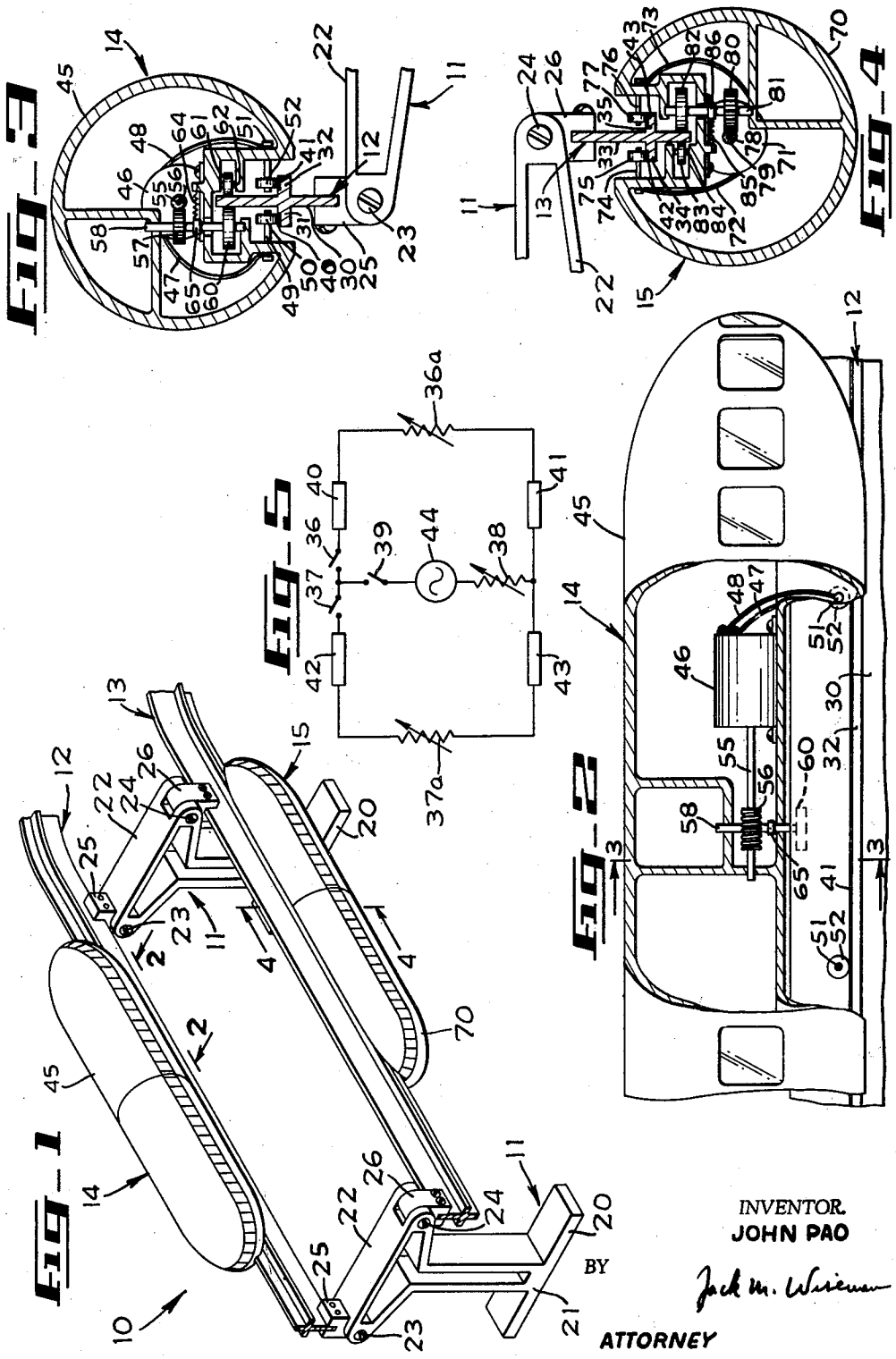
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TOY MONORAIL TRAIN SYSTEM

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TOY MONORAIL TRAIN SYSTEM

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The present invention relates in general to toys and more particularly to a toy monorail train system.

An object of the present invention is to provide an improved over-running toy monorail train system.

Another object of the present invention is to provide an improved under-running toy monorail train system.

Another object of the present invention is to provide a toy monorail train system having both over-running and under-running trains.

Another object of the present invention is to provide a toy monorail train system wherein a support structure is adapted for supporting both over-running and under-running trains.

Other and further objects and advantages of the present invention will be apparent to one skilled in the art from the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a fragmentary perspective view of the toy monorail train system embodying the present invention.

FIG. 2 is an enlarged fragmentary side elevational view with a portion thereof cut away of an over-running monorail train taken substantially along line 2—2 of FIG. 1.

FIG. 3 is a vertical sectional view taken substantially along line 3—3 of FIG. 2.

FIG. 4 is an enlarged vertical sectional view taken substantially along line 4—4 of FIG. 1.

FIG. 5 is a schematic diagram of an electrical circuit employed in the monorail train system of the present invention.

Illustrated in FIG. 1 is the toy monorail train system 10 of the present invention, which comprises a plurality of spaced, track support structures 11. Each track support structure 11 has a configuration similar to an I-beam and rests on a supporting surface, such as a table or a floor.

Attached to the support structure 11 is an endless, upper monorail 12 and an endless, lower monorail 13. The monorail 12 defines an endless, closed path over which an over-running train 14 travels and the monorail 13 defines an endless, closed path under which an under-running train 15 travels. A sufficient number of track support structures 11 are provided to support complete and endless upper and lower monorails 12 and 13. From FIG. 1 it is to be observed that the monorails 12 and 13 are not only spaced apart vertically, but are also spaced apart transversely so that the operation of the over-running and under-running trains 14 and 15 will not interfere with one another. In the preferred embodiment, the trains 14 and 15 travel in separate, spaced, parallel paths.

Each support structure 11 includes a foot or base 20 (FIG. 1) that rests on a supporting surface. A vertical or upright member 21 extends upwardly from the base 20. Integrally formed with the upright member 21 and extending parallel with the base 20 is a transverse support member 22. At each end of the transverse member 22 are formed spaced ears with suitable openings for receiving respectively suitable bolts 23 and 24. The bolt 23 is arranged to fixedly secure an upright bracket 25 to the transverse member 22 and the bolt 24 supports a depending bracket 26 for attachment to the transverse member 22.

Secured to the brackets 25 of the support structures 11 by suitable nuts and bolts is the endless, upper monorail 12 and secured to the brackets 26 of the support structures 11 by suitable nuts and bolts is the endless,

lower monorail 13. As shown in FIG. 3, the monorail 12 comprises a vertically positioned web 30 and horizontally disposed flanges 31 and 32 that project from opposite sides of the web 30. It is the lower portion of the web 30 that is secured to the brackets 25. In FIG. 4, it is shown that the monorail 13 comprises a vertically positioned web 33 and horizontally disposed flanges 34 and 35 which project from opposite sides of the web 33. It is the upper portion of the web 33 that is secured to the brackets 26.

Fixed to the flange 31, but electrically insulated therefrom, is an electrical conductor or bus strip 40 and fixed to the flange 32, but electrically insulated therefrom, is an electrical conductor or bus strip 41. In a similar manner, fixed to the flange 34, but electrically insulated therefrom, is an electrical conductor or bus strip 42 and fixed to the flange 35, but electrically insulated therefrom, is an electrical conductor or bus strip 43.

A suitable source of electrical power is connected to the conductors 40—43. For example, if a battery is electrically connected to the conductors 40—43, the positive terminal thereof may be connected to the conductors 40 and 42, and the negative terminal may be connected to the conductors 41 and 43. In case alternating current is employed, such as a source of power 44 (FIG. 5), one side of the line may be connected to the conductors 40 and 42, and the other side of the line may be connected to the conductors 41 and 43. In either event, a conventional on and off switch 39 may be used to control the flow of current to the conductors 40—43. When alternating current is desired, a conventional transformer and rheostat, such as rheostat 38 in FIG. 5, may be used in a conventional manner for controlling the voltage on and the current flow in the conductors 40—43. Individual on and off switches 36 and 37 may be provided for the over-running train 14 and the under-running train 15, respectively, as well as individual rheostats 36*a* and 37*a*. It is also within the contemplation of the present invention that a separate supply of electrical power may be provided for the conductors 40 and 41, and a separate supply of electrical power may be provided for the conductors 42 and 43.

The over-running train 14 (FIGS. 1–3) includes a substantially cylindrical or tubular frame 45 with each end thereof terminating in a parabolic configuration. It may be considered that the tubular frame 45 is divided into two like parts with similar components and devices located in each half thereof which operate in a similar manner. Thus, only one half of the train 14 will be described in detail. Mounted on the train frame 45 is an electrical motor 46. While the preferred embodiment of the present invention employs an electrical motor, the train 14 could employ a wind-up spring coil in lieu thereof, in which event no electrical energy is supplied to the conductors 40 and 41.

Connected to the motor 46 are insulated electrical conductors 47 and 48. The conductor 47 is connected to a shaft 49, which has an electrical contact wheel 50 mounted thereon. The shaft 49 is suitably insulated from the frame 45. Through this arrangement the motor 46 is connected to one side of the source of electrical power 44 over a path including the conductor 40, the wheel 50, the shaft 49 and the conductor 47. In a similar manner, the conductor 48 is connected to a shaft 51, which has an electrical contact wheel mounted thereon. The shaft 51 is suitably insulated from the frame 45. Through this arrangement, the motor 46 is connected to the other side of the source of electrical power 44 over a path including the conductor 41, the wheel 52, the shaft 51 and the conductor 48. Thus, the motor 46 is energized by means of the wheels 50 and 52 contacting the conductors 40 and 41, respectively, that are fixed to the monorail 12.

The wheels 50 and 52, which are supported by the monorail 12, also serve to support the straddling frame 45 for movement relative to the monorail 12.

Projecting from the motor 46 is a horizontally disposed drive shaft 55 (FIGS. 2 and 3). Energization of the motor 46 causes the drive shaft 55 to rotate. Fixed to the drive shaft 55 for rotation therewith is a worm gear 56. Disposed in meshing engagement with the worm gear 56 is a gear 57 (FIG. 3). The gear 57 is fixed to a vertical shaft 58 for imparting a rotary movement thereto. The shaft 58 is suitably journalled in the frame 45 for rotating movement relative thereto. Mounted on the lower portion of the vertical shaft 58 is a drive wheel 60 that rotates about a vertical axis. As shown in FIG. 3, the shaft 58 is supported for rotation by the centrally located flanges of the frame 45. The horizontally disposed drive wheel 60 rotates about the axis of the vertical shaft 58 and is arranged so that the vertically disposed peripheral surface thereof frictionally engages the vertical web 30 of the monorail 12.

Positioned in horizontal alignment with the drive wheel 60 is a horizontally disposed guide wheel 61 that freely rotates about a vertically disposed shaft 62. The shaft 62 is supported by centrally located flanges of the frame 45. As shown in FIG. 3, the wheel 61 rotates about a vertical axis of the shaft 62 and has its peripheral surface in continuous engagement with the vertical web 30 of the monorail 12. However, the guide wheel 61 engages a side of the web 30 that is opposite to the side of the web 30 which is engaged by the drive wheel 60.

For urging the drive wheel 60 into continuous engagement with the vertical web 30 of the monorail 12, a horizontally disposed spring 64 is provided. The spring 64 has one end thereof anchored to the frame 45 and has the other end thereof connected to a sleeve 65, which surrounds the shaft 58.

The under-running train 15 (FIGS. 1 and 4) includes a substantially cylindrical or tubular frame 70 with each end thereof terminating in a parabolic configuration. It may be considered that the tubular frame 70 is divided into two like parts with similar components and devices located in each half thereof. Thus, only one half of the train 15 will be described in detail. Mounted on the train frame 70 is an electrical motor 71. The electrical motor 71 is fixed by nuts and bolts to a centrally located flange of the frame 70. While the preferred embodiment of the present invention employs an electrical motor, the train 15 could employ a wind-up spring coil in lieu thereof, in which event no electrical energy is supplied to the conductors 42 and 43.

Connected to the motor 71 are insulated electrical conductors 72 and 73. The conductor 72 is connected to a shaft 74, which has an electrical contact wheel 75 mounted thereon. The shaft 74 is suitably insulated from the frame 70. Through this arrangement, the motor 71 is connected to one side of the source of electrical power 44 over a path including the conductor 42, the wheel 75, the shaft 74 and the conductor 72. In a similar manner, the conductor 73 is connected to a shaft 76, which has an electrical contact wheel 77 mounted thereon. The shaft 76 is suitably insulated from the frame 70. Through this arrangement, the motor 71 is connected to the other side of the source of electrical power 44 over a path including the conductor 43, the wheel 77, the shaft 76 and the conductor 73. Thus, the motor 71 is energized by means of the wheels 75 and 77 contacting the conductors 42 and 43, respectively, that are fixed to the monorail 13. The wheels 75 and 77, which are supported by the monorail 13, also serve to support the depending frame 70 through the shafts 74 and 76, respectively.

Projecting from the motor 71 is a horizontally disposed drive shaft 78. Energization of the motor 71 causes the drive shaft 78 to rotate. Fixed to the drive shaft 78 for rotation therewith is a worm gear 79. Disposed in meshing engagement with the worm gear 79 is a gear 80. The gear 80 is fixed to the lower portion of a vertical shaft 81 for imparting a rotary movement thereto. The shaft 81 is suitably journalled in the frame 70 for rotating movement relative thereto. Mounted on the upper portion of the vertical shaft 81 is a drive wheel 82 that rotates about a vertical axis. As shown in FIG. 4, the shaft 81 is supported for rotation by the centrally located flanges of the frame 70. The horizontally disposed drive wheel 82 rotates about the axis of the vertical shaft 81 and is arranged so that the vertically disposed peripheral surface thereof frictionally engages the vertical web 33 of the monorail 13.

Positioned in horizontal alignment with the drive wheel 82 is a horizontally disposed guide wheel 83 that freely rotates about a vertically disposed shaft 84. The shaft 84 is supported by centrally located flanges of the frame 70. As shown in FIG. 4, the guide wheel 83 rotates about a vertical axis of the shaft 82 and has its peripheral surface in continuous engagement with the vertical web 33 of the monorail 13. However, the wheel 83 engages an opposite side of the web 33 than that engaged by the drive wheel 82.

For urging the drive wheel 82 into continuous engagement with the vertical web 33 of the monorail 13, a horizontally disposed spring 85 is provided. The spring 85 has one end thereof anchored to the frame 70 and has the other end thereof connected to a sleeve 86, which surrounds the shaft 81.

In the operation of the toy monorail train system 10, electrical power is applied to the conductors 40 and 41 on the monorail 12 and to the conductors 42 and 43 on the monorail 13 by well-known arrangements such as the arrangement shown in FIG. 5. The application of electrical power to the conductors 40 and 41 and to the conductors 42 and 43 could be simultaneous or alternate depending upon the opening and closing of the switches 36 and 37.

Electrical power applied to the conductors 40 and 41 energizes the motor 46 over the following path: conductor 47, shaft 49, wheel 50, conductor 40, source of power 44, conductor 41, wheel 52, shaft 51 and conductor 48. The energization of the motor 46 rotates the shaft 58, which, in turn, rotates the drive wheel 60. The rotation of the drive wheel 60 causes the train 14 to advance and travel on the monorail 12 and to move relative thereto.

The power applied to the conductors 42 and 43 energizes the motor 71 over the following path: conductor 72, shaft 74, wheel 75, conductor 42, source of power 44, conductor 43, wheel 77, shaft 76 and conductor 73. The rotation of the motor 71 rotates the shaft 78, which, in turn, rotates the drive wheel 82. The rotation of the drive wheel 82 causes the train 15 to advance and travel on the monorail 13 and to move relative thereto.

It is to be understood that modifications and variations of the embodiment of the invention disclosed herein may be resorted to without departing from the spirit of the invention and the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A toy monorail train system comprising a monorail having a vertically positioned web and a pair of horizontal flanges, a pair of electrical contacting means supported by said flanges for movement relative to said monorail, a toy train frame fixedly attached to said contacting means to be supported thereby for movement relative to said monorail, electrical conducting strips fixedly secured to said flanges and disposed between said flanges and said contacting means in engagement with said contacting means, means for supplying electrical power to said conducting strips, an electrical motor mounted on said train frame, means interconnecting said contacting means and said motor for energizing said motor, a shaft rotated in response to the energization of said motor, and a drive wheel fixed to said shaft for rotation therewith

and disposed in frictional engagement with said vertical web for moving said frame relative to said monorail.

2. A toy monorail train system comprising a monorail having a vertically positioned web and a pair of horizontal flanges, a pair of electrical contacting means supported by said flanges for movement relative to said monorail, a toy train frame fixedly attached to said contacting means to be supported thereby for movement relative to said monorail, electrical conducting strips fixedly secured to said flanges and disposed between said flanges and said contacting means in engagement with said contacting means, means for supplying electrical power to said conducting strips, an electrical motor mounted on said train frame, means interconnecting said contacting means and said motor for energizing said motor, a vertical shaft rotated in response to the energization of said motor, a drive wheel fixed to said vertical shaft for rotation therewith with its peripheral surface in frictional engagement with one side of said vertical web for moving said frame relative to said monorail, and guide means supported by said frame for engagement with the side of said web opposite from the side engaged by said drive wheel.

3. A toy monorail train system comprising a monorail having a vertically positioned web and a pair of horizontal flanges, a pair of electrical contacting means supported by said flanges for movement relative to said monorail, a toy train frame fixedly attached to said contacting means to be supported thereby for movement relative to said monorail, electrical conducting strips fixedly secured to said flanges and disposed between said flanges and said contacting means in engagement with said contacting means, means for supplying electrical power to said conducting strips, an electrical motor mounted on said train frame, means interconnecting said contacting means and said motor for energizing said motor, a vertical shaft rotated in response to the energization of said motor, a drive wheel fixed to said vertical shaft for rotation therewith with its peripheral surface in frictional engagement with one side of said vertical web for moving said frame relative to said monorail, guide means supported by said frame for engagement with the side of said web opposite from the side engaged by said drive wheel, and means interengaging said frame and said shaft for urging said drive wheel into continuous engagement with said web.

4. A toy monorail train sytem comprising a monorail having a vertically positioned web and a pair of horizontal flanges, a pair of wheels rotatable about horizontal axes supported by said flanges for movement relative to said monorail, horizontally disposed shafts having said wheels mounted thereon, a toy train frame attached to said shafts to be supported thereby for movement relative to said monorail, drive means mounted on said train frame, a vertically disposed shaft rotated in response to the operation of said drive means, and a drive wheel fixed to said vertical shaft for rotation therewith with its peripheral surface disposed in frictional engagement with said vertical web for moving said frame relative to said monorail.

5. A toy monorail train system comprising a monorail having a vertically positioned web and a pair of horizontal flanges, a pair of wheels rotatable about horizontal axes supported by said flanges for movement relative to said monorail, horizontally disposed shafts having said wheels mounted thereon, a toy train frame attached to said shafts to be supported thereby for movement relative to said monorail, drive means mounted on said train frame, a vertically disposed shaft rotated in response to the operation of said drive means, a drive wheel fixed to said vertical shaft for rotation therewith with its peripheral surface disposed in frictional engagement with one side of said vertical web for moving said frame relative to said monorail, and a guide wheel rotatable about a vertical axis supported by said frame for engagement with the side of said web opposite from the side engaged by said drive wheel.

6. A toy monorail train system comprising a monorail having a vertically positioned web and a pair of horizontal flanges, a pair of wheels rotatable about horizontal axes supported by said flanges for movement relative to said monorail, horizontally disposed shafts having said wheels mounted thereon, a toy train frame attached to said shafts to be supported thereby for movement relative to said monorail, drive means mounted on said train frame, a vertically disposed shaft rotated in response to the operation of said drive means, a drive wheel fixed to said vertical shaft for rotation therewith with its peripheral surface disposed in frictional engagement with one side of said vertical web for moving said frame relative to said monorail, a guide wheel rotatable about a vertical axis supported by said frame for engagement with the side of said web opposite from the side engaged by said drive wheel, and means interengaging said frame and said shaft for urging said drive wheel into continuous engagement with said web.

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