United States Patent [19]

Johnson

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[54] **INERTIA SWITCHING**

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[73] Assignee: **Docutel Corporation,** Dallas, Tex.

[22] Filed: **Nov. 1, 1971**

[21] Appl. No.: **194,576**

Related U.S. Application Data

[63] Continuation of Ser. No. 7,675, Feb. 2, 1970, abandoned.

[52] **U.S. Cl.** ..... **104/130,** 105/215 R

[51] **Int. Cl.** **E01b 25/28**

[58] **Field of Search** ..... 104/88, 105, 96, 130; 105/215; 214/63; 246/359 X

[56] **References Cited**

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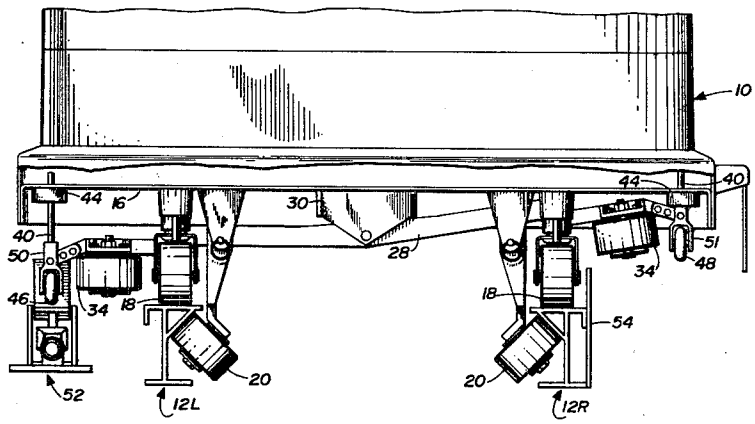
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[57] **ABSTRACT**

High speed switching of a track mounted moving vehicle from one direction to another is completed by a divert mechanism attached to the vehicle chassis. Four springs bias a divert arm of the divert mechanism into one of two stable positions. A cam wheel mounted to each side of the divert arm engages a divert ramp located alongside one rail of the track layout to switch the divert mechanism into a desired stable position. To change from one direction to another, the divert mechanism is switched into one of the stable positions and a divert wheel engages a divert plate that guides the vehicle into the desired direction. For fail-safe operation, a series of divert ramps are located around the track layout to direct the vehicle along a substantially straight path upon a power failure. These fail-safe divert ramps position the divert mechanism to a prearranged pattern.

18 Claims, 13 Drawing Figures



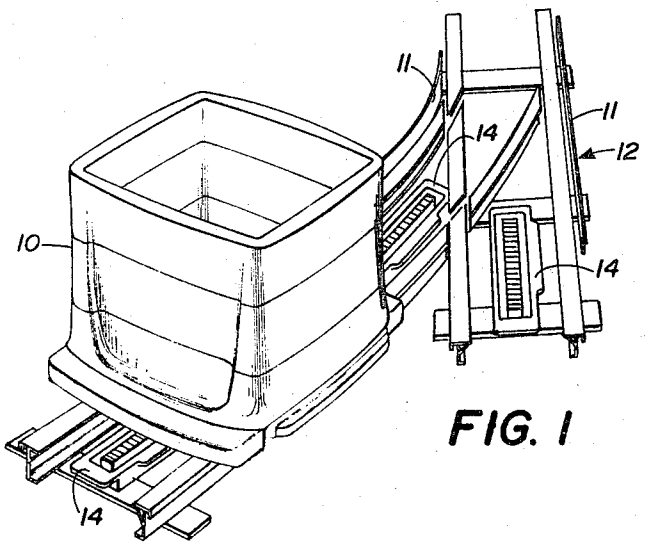


FIG. 1

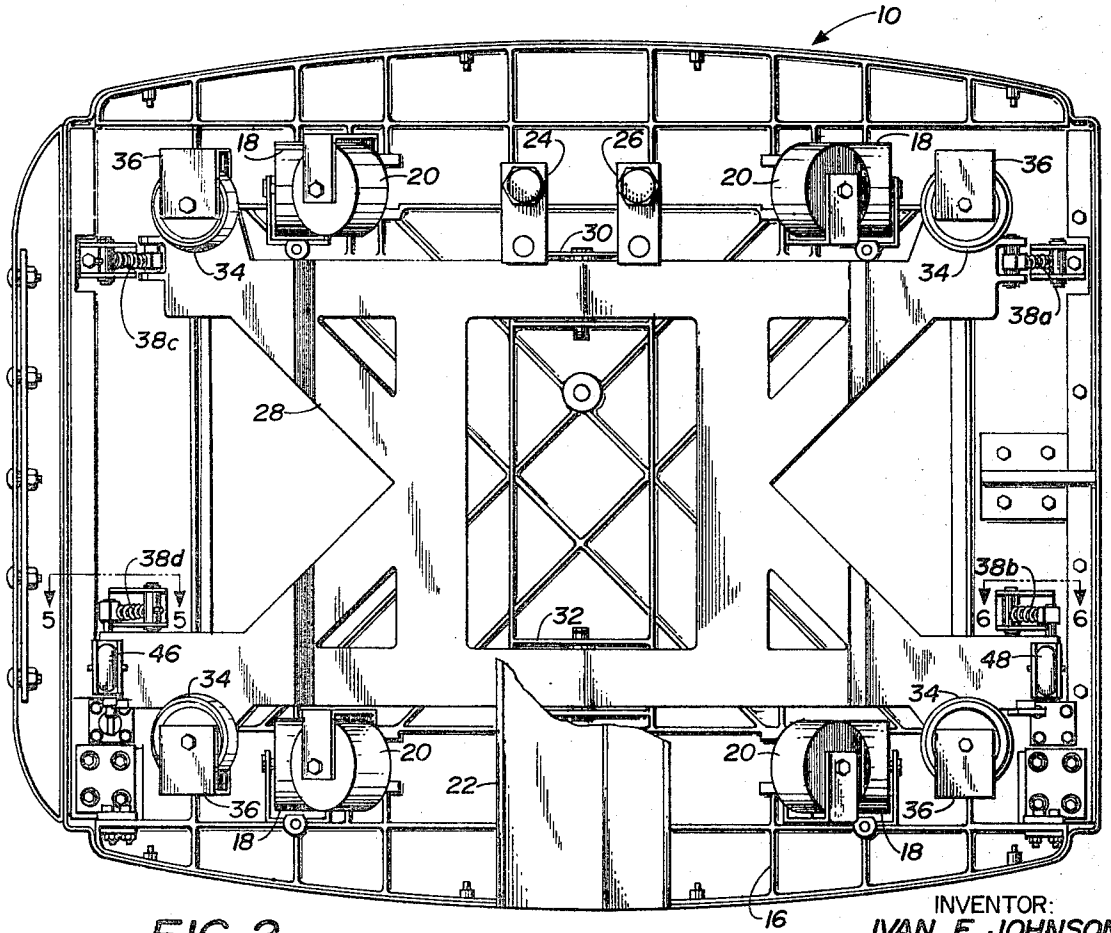


FIG. 2

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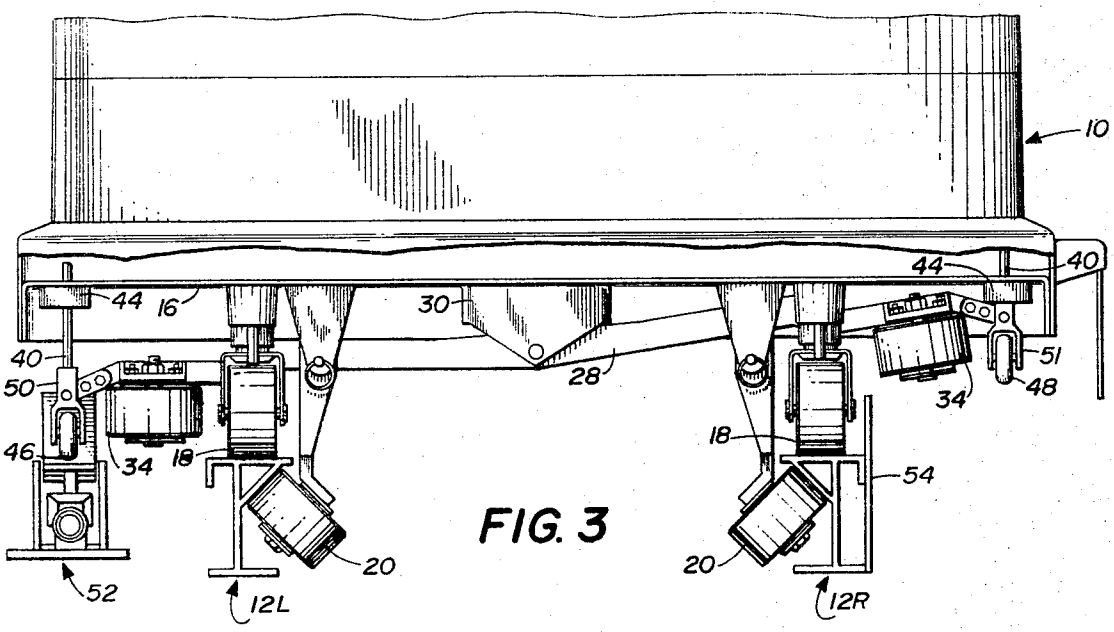


FIG. 3

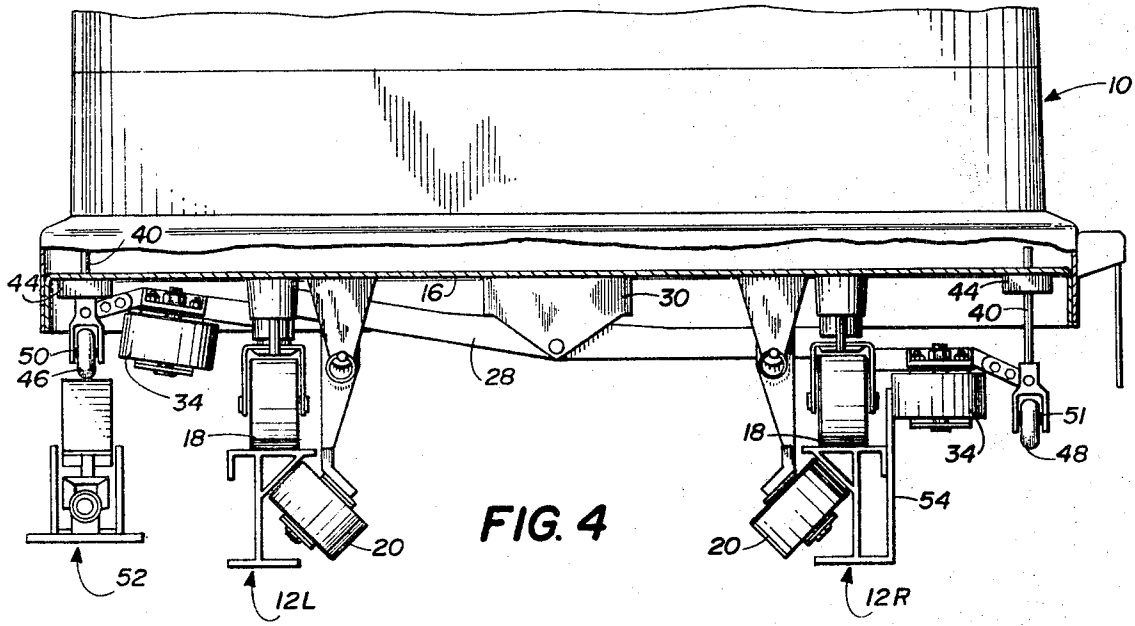


FIG. 4

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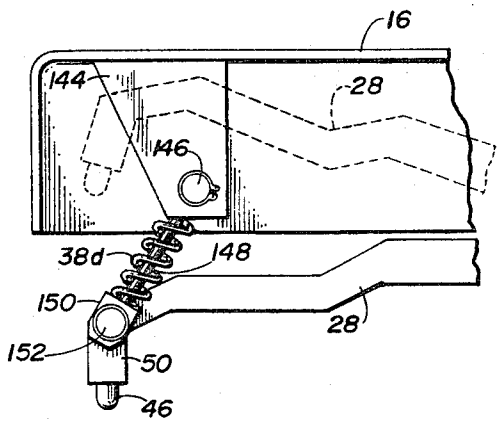


FIG. 5

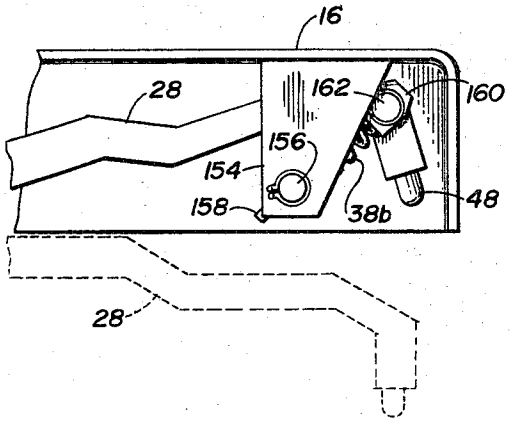


FIG. 6

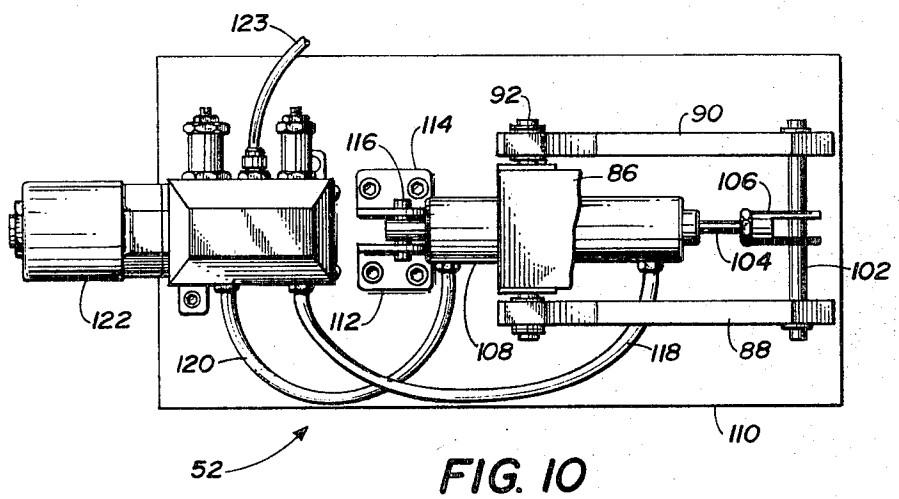


FIG. 10

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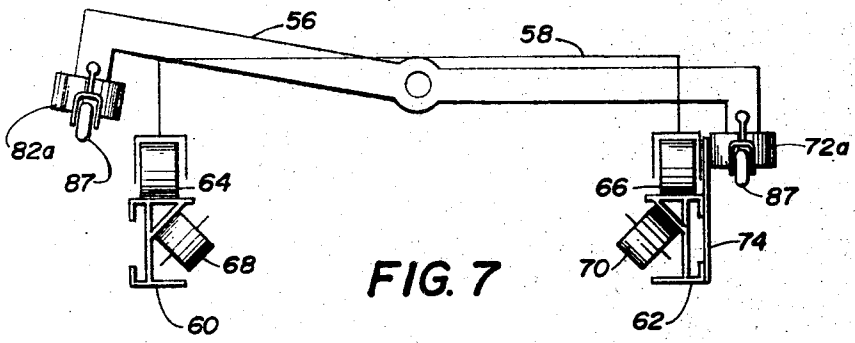


FIG. 7

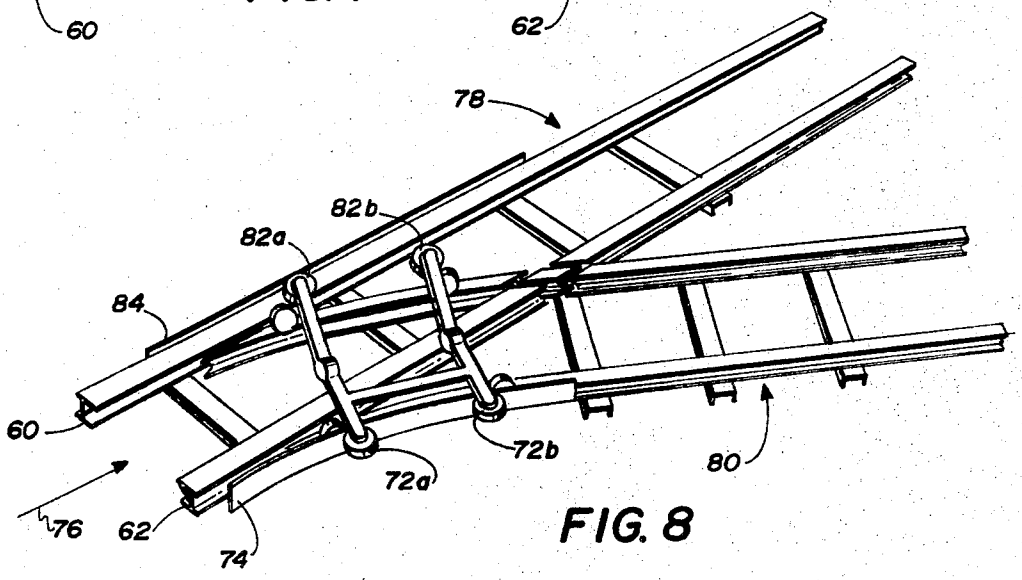


FIG. 8

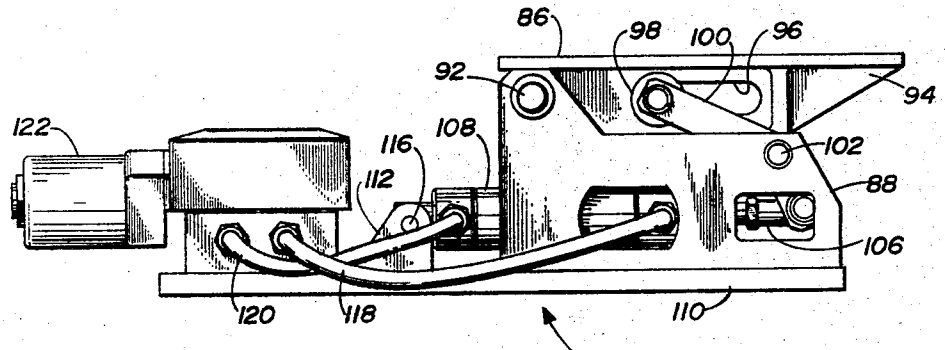


FIG. 9

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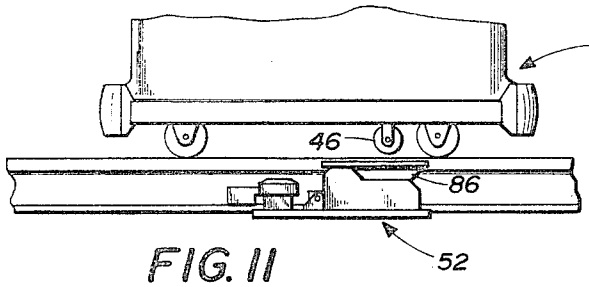


FIG. 11

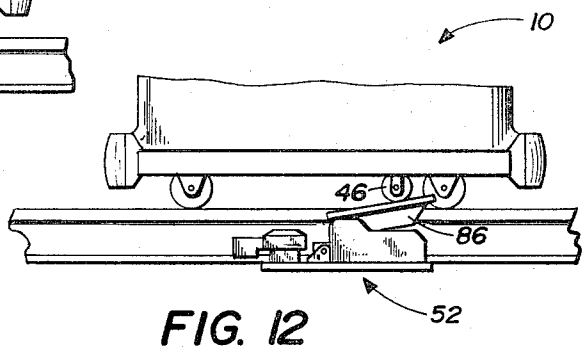


FIG. 12

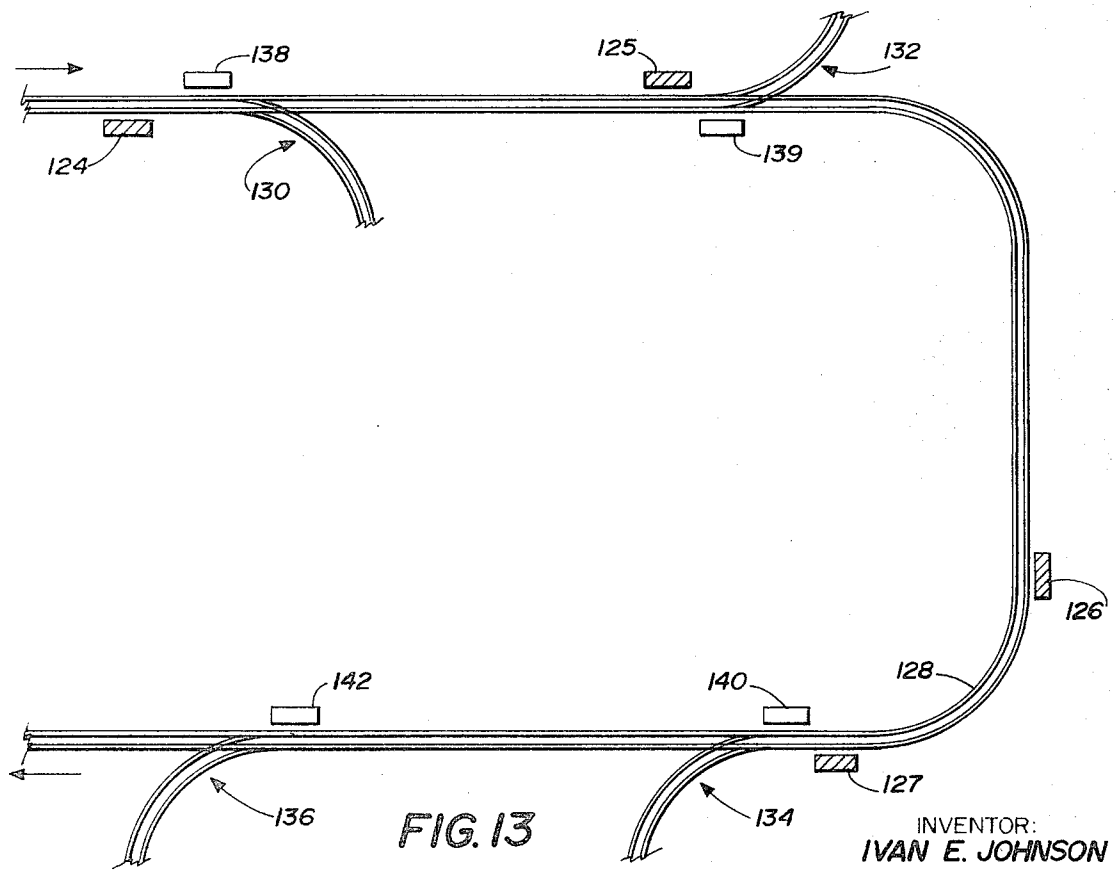


FIG. 13

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INERTIA SWITCHING

This is a continuation of application Ser. No. 7,675, filed Feb. 2, 1970 now abandoned.

This invention relates to vehicle guidance, and more particularly to inertia switching of a high speed, track mounted, vehicle.

Heretofore, to switch a high speed vehicle from movement along one direction to movement along a second direction, complicated and bulky moving-track arrangements were employed. In addition to the maintenance problems associated with these moving-track mechanisms, they are relatively slow-moving devices due to their size and weight. This seriously curtails the amount of traffic that can be carried by a track layout due to spacing requirements between vehicles to allow for movement of the switching mechanism. In addition to limiting the amount of traffic that can be carried on a track layout, the moving-track switching device necessitates careful vehicle surveillance to insure that a vehicle does not approach a change of direction location with the switch thrown in the wrong direction from the one desired.

An object of the present invention is to provide high speed switching of a moving vehicle. Another object of this invention is to provide a switching mechanism that uses vehicle inertia to change directions. Yet another object of this invention is to provide vehicle switching that minimizes interference with the flow of other vehicles around a track layout. Still another object of this invention is to provide a vehicle mounted switching mechanism. Yet another object of this invention is to provide fixed track switching of moving vehicles. A further object of this invention is to provide a fail-safe switching mechanism.

In accordance with the present invention, a wheeled vehicle is guided around a track layout having divert ramps and divert plates arranged at change of direction locations. A divert arm mounted to the undercarriage of the vehicle is pivotally mounted and has two stable positions. A pair of divert wheels are attached to opposite sides of the divert arm in a position to engage the divert plates when the divert arm is in one of its two stable positions. To change the divert arm from one stable position to the other, a cam wheel is also mounted to each side of the divert arm. This wheel is arranged to engage the divert ramps located around the track layout.

In a more specific embodiment of this invention, a vehicle supported on a two-rail track by means of load bearing caster wheels is guided around the track layout by movable divert ramps that engage a divert mechanism pivotally mounted to the undercarriage of the vehicle. At each change of direction location around the track layout, there is mounted a divert plate which engages a divert wheel as part of the divert mechanism. To change the direction of a moving vehicle at a change of direction location, the divert ramp at that location is activated to engage a cam wheel to switch the divert mechanism to the desired stable position. The desired stable position of the divert mechanism is that one which will cause the horizontal divert wheel to engage the divert plate at the change of direction location. For fail-safe operation, a series of fixed divert ramps are mounted at each change of direction location to switch the divert mechanism into the stable position that causes the vehicle to move along a straight path.

A more complete understanding of the invention and its advantages will be apparent from the specification and claims and from the accompanying drawings illustrative of the invention.

Referring to the drawings:

FIG. 1 is a pictorial of a baggage handling cart that is guided around a track layout by means of the divert mechanism of the present invention;

FIG. 2 is a bottom view of the cart illustrated in FIG. 1 showing the divert mechanism;

FIG. 3 is a front view of the cart of FIG. 1 partially cutaway to illustrate the divert mechanism in one of its two stable positions;

FIG. 4 is also a front view of the cart of FIG. 1 partially cutaway to illustrate the divert mechanism in a position to change the cart direction;

FIG. 5 is a view of one of the bias springs for the divert mechanism taken along the line 5—5 of FIG. 2;

FIG. 6 is a view of opposite bias spring for the divert mechanism taken along the line 6—6 of FIG. 2;

FIG. 7 is a schematic of the divert mechanism of the present invention;

FIG. 8 is a schematic of a track section showing the divert mechanism operation;

FIG. 9 is a side view of one form of a movable divert ramp;

FIG. 10 is a top view of the movable divert ramp of FIG. 9 with the ramp cutaway;

FIG. 11 is a side view of a cart passing a divert ramp location where the ramp is in a lowered position;

FIG. 12 is a side view of a cart passing a divert ramp location where the ramp has been actuated to a raised position; and

FIG. 13 is a simplified track layout having change of direction locations each with a movable divert ramp and a fixed divert ramp.

Referring to FIG. 1, there is shown a baggage handling cart 10 on a two-rail track layout 12. Motive power for the cart 10 is derived from linear induction motors 14 which are energized to provide forward thrust to the cart. Although only one cart is illustrated on the track layout 12, a complete system would include a number of the baggage handling carts. Each individual cart includes a slider plate (not shown) attached to the underside of the cart chassis. When the linear motor 14 is energized, it produces magnetic thrust, which when applied to the slider plate, provides forward movement to the cart 10.

To change the direction of travel of the cart 10 as it moves around the track layout 12, an inertia switching divert mechanism is mounted to the underside of the cart chassis. The switching mechanism is contained in the cart chassis instead of the track, so that no moving parts are required as part of the track. The only parts on the track layout 12 required for cart switching are the divert plates 11. This approach permits a single cart, moving at full speed, to be switched from the main line without interfering with the flow of the other carts.

Referring to FIG. 2, there is shown the underside of the chassis for the cart 10 including the inertia switching divert mechanism. The chassis 16 may be a unitary cast construction that includes various mounting locations for the apparatus for supporting and guiding the cart. Mounted directly to the chassis 16 are four load-

bearing caster wheels **18** which ride on top of the rails of the track **12.** Also mounted directly to the chassis **16** are four capture wheels **20** which engage an angle plate under each of the rails of the track **12.** In addition to the load-bearing and capture wheels, the slider plate **22,** shown partially cutaway, is also attached to the chassis **16.** The slider plate **22** is attached to the chassis by means of four slider mounting brackets, two of which (**24** and **26**) are shown attached by means of machine screws.

The divert mechanism itself includes a divert arm **28** pivotally mounted along a longitudinal center axis of the chassis **16** by means of support brackets **30** and **32.** Basically, the divert arm **28** has a rectangular outline with four divert wheels **34** located at the four corners of the rectangle. Each of the wheels **34** is attached to the divert arm **28** by means of wheel mounting brackets **36.** As best illustrated in FIGS. **3** and **4,** the divert wheels **34** are mounted on an axis substantially perpendicular to the plane of the divert arm at the point of attachment.

With the divert arm **28** mounted as illustrated and explained, it is free to pivot between the limits illustrated in FIGS. **3** and **4.** The two positions illustrated are defined as the two stable positions of the divert arm. To stabilize the divert arm into these two positions, four overcenter springs **38** are mounted to the chassis **16** at the four corners of the divert arm **28.** These four springs provide a snap action to the divert arm **28** as it pivots between its two stable positions.

Referring to FIGS. **5** and **6,** there is shown in detail the spring biasing mechanisms for the divert arm **28.** The solid line illustrates the divert arm in the position shown in FIG. **3** and the dotted line illustrates the position shown in FIG. **4.** In particular, there is shown the spring biasing mechanism for the overcenter spring **38***d* and the mechanism for the overcenter spring **38***b*. For the spring **38***d*, a spring hanger **144** attaches to the chassis **16** and an overcenter shaft **146** is rotatably mounted in the spring hanger. One end of the overcenter spring **38***d* is held in position by the overcenter shaft **146.** The shaft **146** includes a transverse aperture through which a rod **148** of a spring holder **150** is free to move. The holder **150** is coupled to the divert arm **28** by shaft **152.** A similar mechanism is provided for the overcenter spring **38***b*. A spring hanger **154** attaches to the chassis **16** and carries a pivot shaft **156.** Shaft **156** includes a transverse aperture through which a rod **158** of a holder **160** is free to move. The holder **160** attaches to the divert arm **28** by means of a shaft **162.** Spring **38***b* is positioned between the shaft **156** and the holder **160.**

In operation, as an upward force is exerted on a cam wheel **46,** the springs **38***b* and **38***d* are compressed as the rods **158** and **148** pass through the shafts **156** and **146,** respectively. The maximum compression of the springs **38***b* and **38***d* occurs when the respective shafts **158** and **148** are in a horizontal position. An upward force on the cam wheel **46** is required until this point.

After the holder **150** rotates to a position above the shaft **146** and the holder **160** rotates to a position below the shaft **156,** the stored energy of the compressed spring causes the arm **28** to pivot to the dotted line position. The two stable positions of the arm **28** are shown in FIGS. **5** and **6.** To switch the arm into the solid line position from the dotted line position, an upward force is exerted on a cam wheel **48** by a divert ramp. The action of the spring mechanisms is the same as described. It should be noted that four overcenter springs **38** are provided. The four springs tend to balance the forces exerted on the divert arm **28.**

To dampen the motion of the divert arm **28,** two dampers **44** are provided on each side of the arm, as shown in FIG. **3.** Damper shafts **40,** mounted to the divert arm **28,** pass through the dampers **44** and engage the dampers when the divert arm is raised in the position shown by the dotted lines of FIG. **5.**

As explained, the divert arm **28** snaps from one of its stable positions to the other by an upward force on the cam wheel **46** which is fixed to one side of the divert arm and snaps to its second stable position by an upward force exerted on the cam wheel **48** which is fixed to the opposite side of the arm. The cam wheel **46** is attached to the divert arm by means of a cam horn **50** and the cam wheel **48** is attached to the divert arm by means of a cam horn **51.**

The cam wheels **46** and **48** cause the divert arm **28** to snap between its two stable positions by engaging a divert ramp positioned alongside one rail of the track **12.** Referring again to FIG. **3** and assuming the cart **10** is moving into the plane of the paper, the cam wheel **46** approaches a divert ramp **52** which has been extended to engage the wheel. As the wheel engages the ramp **52,** an upward force is exerted to compress the springs **38***c* and **38***d* to cause the divert arm **28** to rotate to its second stable position, as illustrated in FIG. **4.** With the divert arm **28** in the position illustrated in FIG. **4,** the divert wheels **34** located on the right side of the cart **10** will engage a divert plate **54** attached to the rail **12R.** In this position, the divert wheel **34** will guide the cart **10** in the direction of the divert plate **54.**

The operation of divert mechanism is better understood by referring to the schematic diagrams of FIGS. **7** and **8.** A divert arm **56** is pivotally mounted to a chassis **58** along a longitudinal axis in a direction parallel to rails **60** and **62** of a track layout. The chassis **58** is supported on the rails **60** and **62** by caster wheels **64** and **66.** Note, the caster wheels are not flanged, but run on the flat upper surface of the supporting rails. Thus, the rails **60** and **62** do not actually guide a vehicle as in the case of a flanged wheel.

Also attached to the chassis **58** are capture wheels **68** and **70** which engage angular portions of the rails **60** and **62,** respectively. These capture wheels basically serve the same purpose as flanges in the usual construction of support wheels for a track mounted vehicle. They maintain the caster wheels **64** and **66** properly positioned on the rails **60** and **62.**

With the divert arm **56** in the position shown, a divert wheel **72***a* is in engagement with a divert plate **74** attached to the rail **62.** In this position, and with the vehicle moving in the direction of the arrow **76,** of FIG. **8,** the divert wheels **72***a* and **72***b* will pull the vehicle from the main track section **78** to the spur track section **80.** Note that with the wheels **72***a* and **72***b* in engagement with the divert plate **74,** the divert wheels **82***a* and **82***b*, attached to the left side of the divert arm **56,** will pass over the divert plate **84** attached to the left rail of the main track section **78.**

After the vehicle has passed the divert plate **74,** the divert arm **56** will remain in the stable position illustrated until the cam wheel **87** engages a divert ramp at some other location along the track layout.

If instead of approaching the track section of FIG. 8 with the divert arm 56 in the position shown, the divert arm was in its second bistable position, the divert wheels 82*a* and 82*b* would engage the divert plate 84. In this situation, the divert wheels 72*a* and 72*b* will pass over the divert plate 74 and the cart continues to move along the main track section 78. By employing the divert plate 84 at a change of direction location, the vehicle is positively guided in the desired direction.

A vehicle will move around a track layout changing directions where desired by means of the divert wheels engaging a divert plate. Whether a cart will move to the left or right depends on whether the right divert wheels or the left divert wheels are in the lower of the stable positions. If the right wheels are in the lower position, the cart will move to the right, and if the left divert wheels are in the lower position, the cart will move to the left. The direction of the diversion depends on the position of the divert arm which is controlled by divert ramps positioned alongside the track layout, as illustrated in FIG. 3.

Referring to FIGS. 9 and 10, there is shown a side view and top view of the divert ramp 52. A ramp 86 (partially cutaway in FIG. 10) is rotatably mounted to vertical side plates 88 and 90 by means of a shaft 92. The ramp 86 includes a depending web member 94 having an elongated slot 96 formed therein. A roller 98 is retained to move in the slot 96 at the end of a push arm 100. The push arm is rotatably supported by the side plates 88 and 90 on a shaft 102 and coupled to a push rod 104 by means of a clevis 106. The push rod 104 connects to a piston (not shown) as part of a double acting cylinder 108. Cylinder 108 is mounted to a base plate 110 by a shaft 116 supported by foot brackets 112 and 114. The entire structure of the side plates 88 and 90 and the ramp 86 are mounted to the base plate 110.

Air pressure for operating the cylinder 108 is supplied through flexible hoses 118 and 120 to the front and rear, respectively, of the cylinder. Control of the air pressure to the cylinder 108 is by means of a solenoid valve 122 mounted to the base plate 110 and selectively energized from a central control station (not shown) which may include a computer. The solenoid valve 122 connects to a source of air pressure through a tube 123.

In operation, the divert ramp of FIGS. 9 and 10 is located adjacent one rail of a track layout as illustrated by the divert ramp 52 in FIGS. 3 and 4. When the control station calls for the divert arm 28 to be switched from the position illustrated in FIG. 3 to that illustrated in FIG. 4, an energizing signal actuates the solenoid 122. Actuating the solenoid 122 opens a valve to connect a source of air pressure (not shown) to the front chamber of the cylinder 108 through the hose 118. This causes pressure to build up in the front chamber of the cylinder 108 to force the piston rod 104 into a fully retracted position. Retracting the piston rod 104 rotates the push arm 100 clockwise around the shaft 102 thereby causing the roller 98 to be forced up and forward in the elongated slot 96. The roller 98 rotates in an arc about the shaft 102 and thus raises the ramp 86 to an extended position, as illustrated in FIGS. 3 and 4. As the cam wheel 46 engages the extended ramp 86, it produces an upward force against the springs 38*c* and 38*d* to switch the divert arm 28 into the stable position illustrated in FIG. 4.

After the cart 10 has passed the location of the divert ramp 52, the solenoid 122 is de-energized from the central station thereby applying air pressure to the rear chamber of the cylinder 108 and venting the front chamber. This causes a pressure build-up in the rear chamber thereby pushing the platon rod 104 to its fully extended position. The ramp 86 is retracted to the position illustrated in FIG. 9 by action of the push arm 100 and the roller 98.

Referring to FIGS. 11 and 12, there is shown a side view of a cart 10 as it passes the divert ramp 52. When the solenoid valve 122 is de-energized, the ramp 52 will be in a retracted position as illustrated in FIG. 11. As the cart 10 moves past a retracted divert ramp, the cam wheel 46 passes over the ramp 86 and the divert arm 28 remains in one of its stable positions.

Upon receiving an energizing signal from the control station, the solenoid valve 122 applies air pressure to the cylinder 108 to raise the ramp 86 to the position illustrated in FIG. 12. As the cart 10 now approaches the divert ramp 52, the cam wheel 46 engages the ramp 86 and the divert arm 28 is rotated from one stable position to the other. If the divert arm 28 had been in its second stable position as it approached the divert ramp 52 of FIG. 12, the cam wheel 46 would clear the ramp 86. In this case the arm 28 would have been in the desired position and no switching was required.

In addition to positionable divert ramps, a track layout also includes fixed ramps for curve track sections and for fail-safe operation. Referring to FIG. 13, there is shown a simplified track layout including six change of direction locations. The divert ramps 124 through 127 are fixed ramps that always cause the divert arm 28 to rotate to one of the stable positions as a result of passing these ramps. Fixed ramp 126 is required to guide a vehicle around the curve 128. On the inside of each curve in the track layout, there is located a divert plate to guide the vehicle around the curve. Fixed ramps 124, 125 and 127 are for the purpose of fail-safe operation of the track system. Upon the occurrence of a malfunction in the system, such as a power failure, all the movable ramps are retracted and the fixed ramps set the divert arms of the various vehicles such that they would proceed along a straight path, where possible. For example, if a power failure occurs as a vehicle is approaching the change of direction location 130, the cam wheel on the right side of the vehicle engages the fixed ramp 124 to cause the divert wheels on the left side of the vehicle to be in the lower of two positions to engage a divert plate along the straight track section. As the vehicle continues to coast to the change of direction 132, the fixed ramp 125 engages the left cam wheel of the vehicle to cause the right divert wheels to engage a divert plate on the straight through track section. If the vehicle is still moving as it approaches the change of direction location 134, the left cam wheel of the vehicle will engage the fixed ramp 127 to cause the right divert wheel to engage a divert plate on the straight through track section. As the vehicle approaches the change of direction location 136, the divert wheel on the right side of the vehicle is positioned to engage the divert plate at the straight through track section and a fixed ramp is not required. Thus, when a change of direction location follows a change in the same direction, a fixed divert ramp is not required for the second location for fail-safe operation.

To divert a moving vehicle from a straight through direction at any of the change of direction locations, a positionable divert ramp is required. For the track layout of FIG. **13**, the divert ramps **138** through **142** are positionable. To change a moving vehicle from a straight through direction at any of the direction locations, the solenoid valve of the appropriate divert ramp is energized to cause the ramp to be extended, as illustrated in FIG. **12**.

While preferred embodiments of the invention have been described in detail herein, and shown in the accompanying drawings, it will be evident that various further modifications are possible.

What is claimed is:

1. Apparatus for guiding a wheeled vehicle around a track layout having divert ramps and divert plates arranged at change of direction locations, comprising:

a divert arm rotatably mounted to the undercarriage of said vehicle along a longitudinal axis thereof and having two stable positions,

divert means attached to one side of said divert arm in a position to engage a selected arrangement of said divert plates with the arm in one of the two stable positions,

second divert means attached to the opposite side of said divert arm in a position to engage another selected arrangement of said divert plates with the arm in the second of the two stable positions, and

actuating means attached to said divert arm to engage said divert ramps to rotate the divert arm to one of the bistable positions depending on the desired direction of the wheeled vehicle.

2. Apparatus for guiding a wheeled vehicle around a track layout as set forth in claim **1** including means for mechanically biasing said divert arm into the two stable positions thereof.

3. Apparatus for guiding a wheeled vehicle around a track layout having divert ramps and divert plates arranged at change of direction locations, comprising:

a divert arm mounted to the undercarriage of said vehicle and having two stable positions,

first divert means attached to one side of said divert arm in a position to engage said divert plates with the arm in one of the two stable positions,

second divert means attached to the opposite side of said divert arm in a position to engage said divert plates with the arm in the second of the two stable positions,

actuating means to engage said divert ramps to change said divert arm to one of the bistable positions depending on the desired direction of the wheeled vehicle, and

biasing means including at least one spring at each side of said divert arm for biasing said arm into the stable positions thereof.

4. Apparatus for guiding a wheeled vehicle around a track layout as set forth in claim **3** wherein said actuating means includes a cam mounted to said divert arm to force said arm from one stable position to the other when engaging one of said divert ramps.

5. In a transportation system wherein wheeled vehicles travel around a track layout having change of direction locations, the combination comprising:

a plurality of divert plates attached to said track, one of said plates positioned at each of the change of direction locations,

a plurality of divert ramps positioned adjacent said tracks, one of said ramps located preceding a divert plate at the change of direction locations,

a divert arm rotatably mounted to the undercarriage of each of said vehicles along a longitudinal axis thereof and having two stable positions,

first divert means attached to one end of said divert arm in a position to engage said divert plates with the arm in one of the two stable positions,

second divert means attached to the opposite end of said divert arm in a position to engage said divert plates with the arm in the second of the two stable positions, and

actuating means to engage said divert ramps to change the divert arm to one of the bistable positions depending on the desired direction of the wheeled vehicles.

6. In a transportation system as set forth in claim **5** wherein the plurality of divert ramps are divided into a fixed ramp group and an adjustable ramp group, the adjustable ramp group being positionable to engage said divert means upon being actuated by a control signal.

7. In a transportation system as set forth in claim **6** wherein each adjustable ramp includes means responsive to a control signal to extend a ramp to a divert position.

8. A transportation system wherein wheeled vehicles move around a track layout having change of direction locations, the combination comprising:

a plurality of divert plates attached to said track, one of said plates positioned at each of the change of direction locations,

a plurality of divert ramps positioned adjacent set tracks, one of said ramps located preceding a divert plate at the change in direction locations,

a divert arm rotatably mounted to the undercarriage of each of said vehicles along a longitudinal axis thereof and having two stable positions,

first divert means attached to one end of said divert arm in a position to engage said divert plates with the arm in one of the two stable positions,

second divert means attached to the opposite end of said divert arm in a position to engage said divert plates with the arm in the second and the two stable positions,

actuating means to engage said divert ramps to change the divert arm to one of the stable positions depending on the desired direction of the wheeled vehicle, and

a fail-safe ramp at each change of direction location where a vehicle may move in one of two directions, said fail-safe ramp engaging said actuating means to cause said vehicle to continue along a straight path on a failure of a control signal source.

9. Apparatus for guiding a wheeled vehicle around a track layout having divert ramps and divert plates arranged at change of direction locations, comprising:

a divert arm having an outline in the general shape of a rectangle and rotatably mounted to the undercarriage of said vehicle along a longitudinal axis thereof,

a divert wheel attached at each corner of the divert arm,

means for biasing said divert arm into one of two stable positions, and

actuator means mounted on each side of said divert arm, said actuator means positioned to engage said divert ramps to change the divert arm to one of the bistable positions depending upon the desired direction for the wheeled vehicle.

10. Apparatus for guiding a wheeled vehicle around a track layout as set forth in claim **9** wherein said biasing means includes at least one spring at each end of said divert arm.

11. Apparatus for guiding a wheeled vehicle around a track layout as set forth in claim **10** including damper means connected between said divert arm and the undercarriage of said vehicle to stabilize said divert arm as it rotates from one stable position to the other.

12. Apparatus for guiding a wheeled vehicle around a track layout having divert ramps and divert plates arranged at change of direction locations, comprising:

a first divert wheel having two stable positions at one side of the undercarriage of said vehicle in a position to engage said divert plates when in one of two stable positions,

a second divert wheel having two stable positions at the opposite end of the undercarriage of said vehicle from said first divert wheel in a position to engage said divert plates when in one of two stable positions,

support means for mounting said first and second divert wheels to the undercarriage of said vehicle and interconnect the movement of said wheels between the two stable positions thereof,

a first actuator carried by said support means on the side of the vehicle undercarriage as said first divert wheel and movable therewith between the two stable positions thereof, for engaging divert ramps of the track layout depending upon the desired direction of the wheeled vehicle, and

a second actuator carried by said support means on the side of the vehicle undercarriage as said second divert wheel and movable therewith between the two stable positions thereof, for engaging divert ramps of said track layout depending upon the desired direction of the wheeled vehicle.

13. Apparatus for guiding a wheeled vehicle around a track layout as set forth in claim **12** wherein:

said first actuator engages the divert ramps to change the second divert wheel into a divert plate engaging position, and

said second actuator engages the divert ramp to change the first divert wheel into a divert plate engaging position.

14. Apparatus for guiding a wheeled vehicle around a track layout as set forth in claim **12** wherein:

said first actuator extends from said support means in a direction away from the center of the vehicle undercarriage, and

said second actuator extends from said support means in a direction away from the center of the vehicle undercarriage.

15. In a transportation system including a track layout having change of direction locations, the combination comprising:

divert plates positioned around said track layout at each change of direction location,

a plurality of divert ramps positioned adjacent said tracks, one of said ramps located preceding a change of direction location, and

a wheeled vehicle including:

a. a first divert wheel having two stable positions at one side of the undercarriage of said vehicle in a position to engage said divert plates when in one of two stable positions,

b. a second divert wheel having two stable positions at the opposite side of the undercarriage of said vehicle from said first divert wheel in a position to engage said divert plates when in one of two stable positions,

c. support means for mounting said first and second divert wheels to the undercarriage of said vehicle and interconnect the movement thereof between the two stable positions,

d. a first actuator carried by said support means on the side of said undercarriage as said first divert wheel and movable therewith between the two stable positions thereof for engaging divert ramps of the track layout depending on the desired direction of the wheeled vehicle, and

e. a second actuator carried by said support means on the side of said undercarriage as said second divert wheel and movable therewith between the two stable positions thereof for engaging divert ramps of the track layout depending upon the desired direction of the wheeled vehicle.

16. In a transportation system as set forth in claim **15** including a fail-safe ramp at each change of direction location of the track layout where a vehicle may move in one of two directions, said fail-safe ramp selectively engaging said first actuator and said second actuator to cause the wheeled vehicle to continue along a straight path upon a failure of a control signal source.

17. In a transportation system as set forth in claim **15** wherein:

said first actuator of the wheeled vehicle engages said divert ramps to change the second divert wheel into a divert plate engaging position, and

said second actuator of the wheeled vehicle engages said divert ramps to change the first divert wheel into a divert plate engaging position.

18. In a transportation system as set forth in claim **15** wherein said divert ramps include means for actuating said ramp from a position of nonengagement with said first and second actuators to a position of engagement with said actuators.

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