

[54] **VEHICLE AND SYSTEM INCORPORATING SAID VEHICLE**

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[52] U.S. Cl. **104/88, 107/172 BT**

[51] Int. Cl. **B61 13/02, B65g 17/12**

[58] Field of Search..... **104/172 BT, 88; 105/1 A**

[56] **References Cited**

UNITED STATES PATENTS

3,603,263 9/1971 De Oliveira..... 104/88

3,618,530 11/1971 Swartz 104/172 BT X

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[57] **ABSTRACT**

A two vehicle has a tow pin which extends into a guide slot which is intersected by shunt slots. A change-over means on the floor automatically raises one selector pin on the vehicle while the vehicle is moving along the guide slot and lowers another selector pin so as to change the designation of the vehicle represented by a particular shunt slot.

13 Claims, 12 Drawing Figures

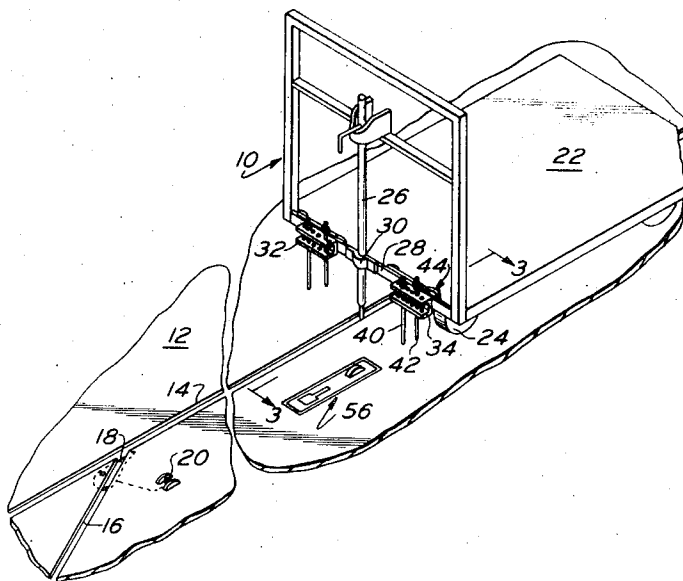


FIG. 12

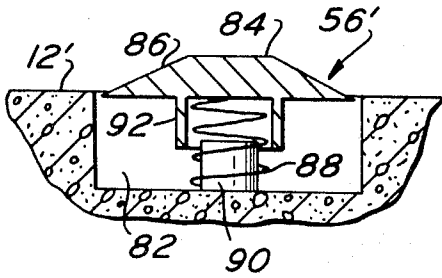


FIG. 1

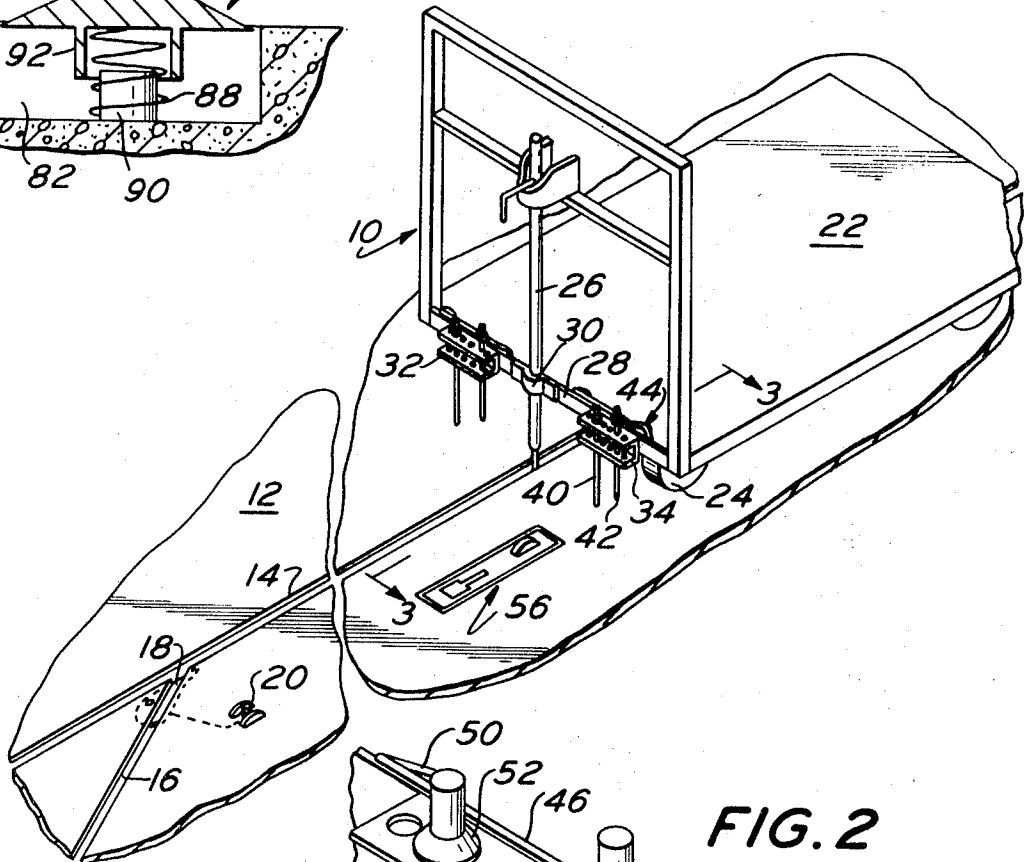
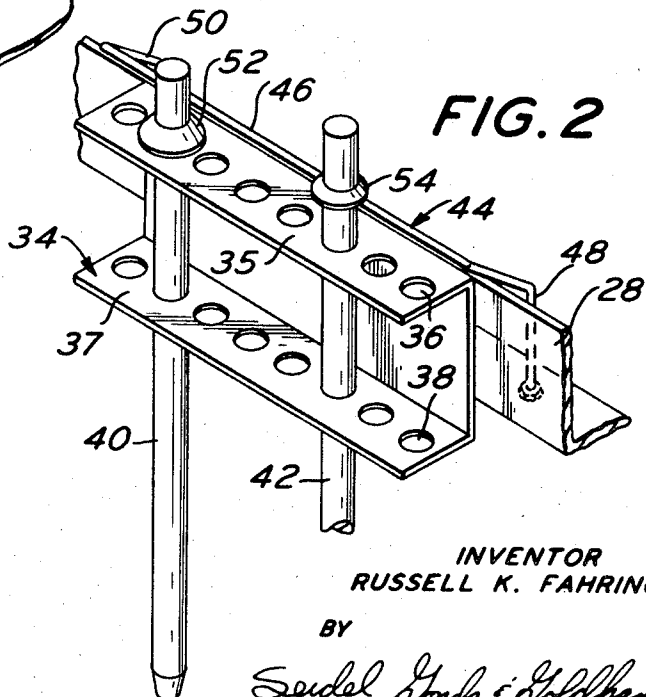


FIG. 2

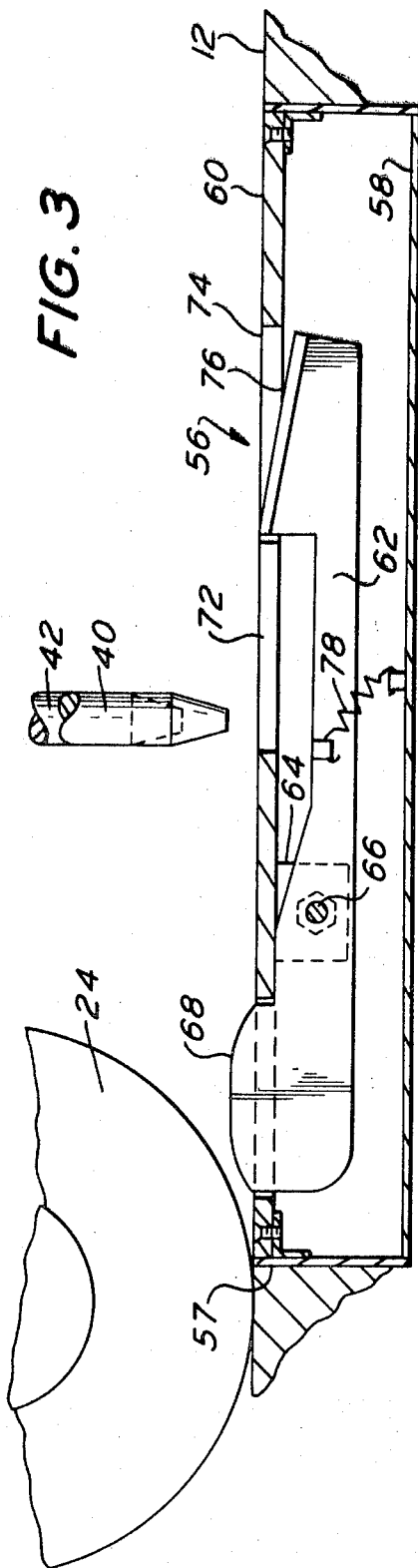
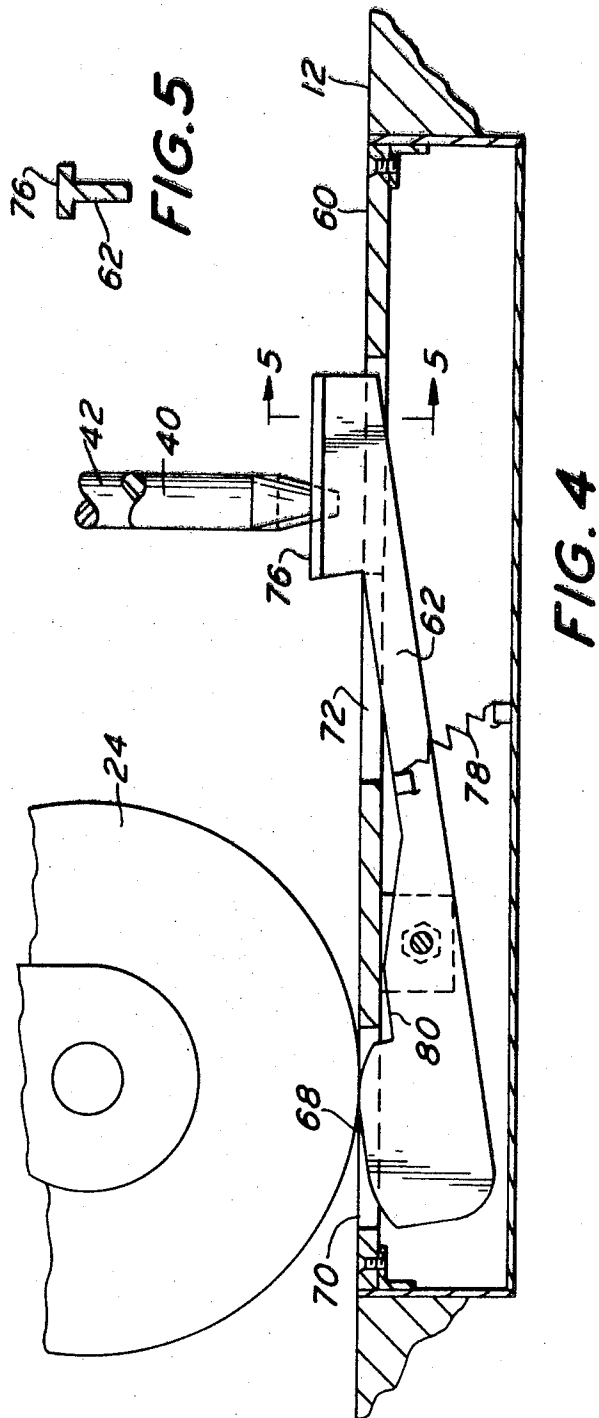


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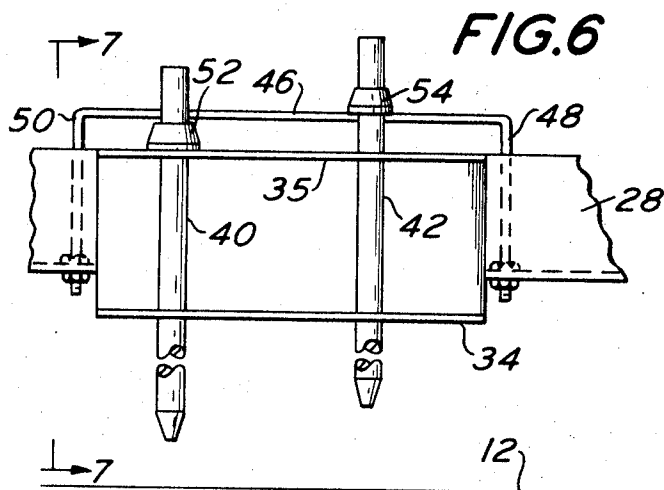
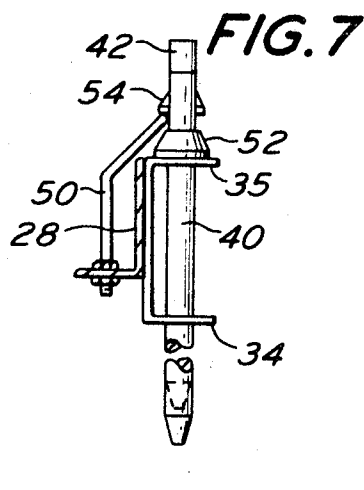
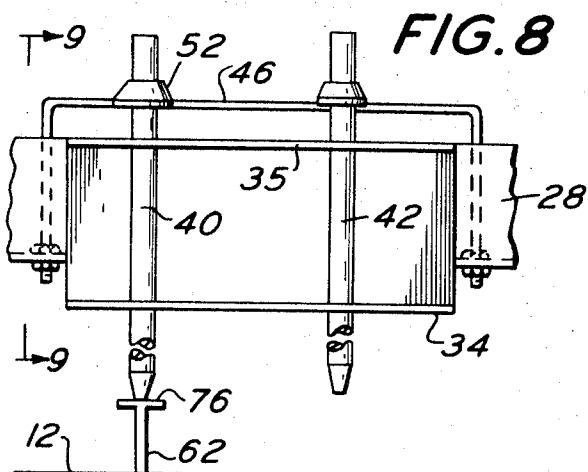
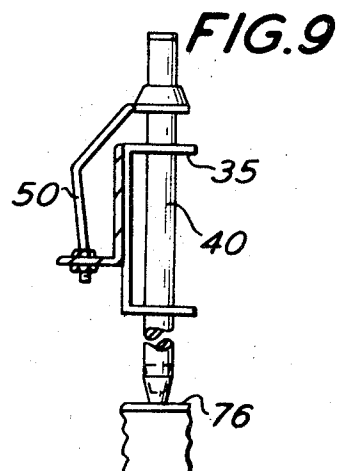
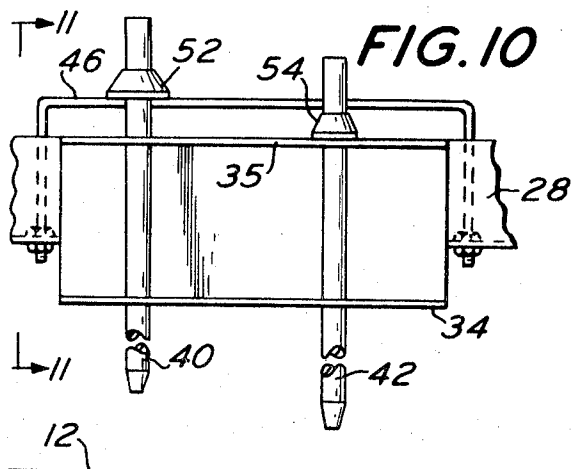
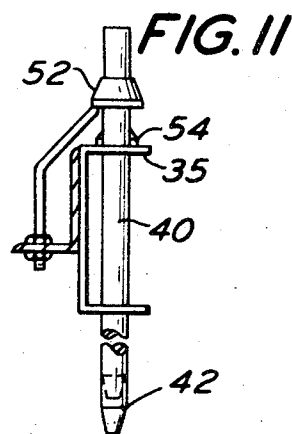
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VEHICLE AND SYSTEM INCORPORATING SAID VEHICLE

This invention is directed to a tow vehicle mounted for movement along a guide path having one or more selector pins automatically convertible from an inoperative position to an operative position whereby the destination of the vehicle will be changed while the vehicle is moving.

Devices for changing the destination of a tow vehicle while it is moving are known. For example, see U. S. Pat. No. 3,200,767 and pending U. S. Pat. application Ser. No. 847,524 filed on July 28, 1969, now U.S. Pat. No. 3,603,263. The devices disclosed in said patent and said patent application are fairly expensive and provide for a wide variety of selectivity as to the destination of the vehicle. The devices in said patent and patent application are too expensive and impractical for systems wherein the selectable alternatives are very few in number. Thus, where it is desired to dispatch a vehicle to a first station and thereafter have the vehicle automatically dispatched to a second destination, the devices in said patent and patent application are too expensive and involve substantial installation time. This invention overcomes said disadvantages in a novel manner.

The present invention for purposes of illustration is being disclosed in connection with a tow system wherein the guide path is a slot in a reference surface such as the floor. A typical example of how this invention may be used is as follows: A vehicle is dispatched to a first destination such as a paint spray booth at which location the vehicle will be caused to stop for a predetermined period of time. During that period of time, an article on the vehicle may be sprayed. After the predetermined period of time, the vehicle will be permitted to continue on its way along the guide path. Thereafter, the selector pin which caused the vehicle to be dispatched to the first destination will automatically be rendered inoperative. Simultaneously, a second selector pin will automatically be rendered operative. The second selector pin will cause the vehicle to be directed to a second destination such as a drying station.

The vehicle of the present invention has thereon a means for enabling the vehicle to follow the guide path. On the vehicle, there is a first selector pin biased to an operative position and a second selector pin retained in an inoperative position by a control means on the vehicle. The control means releases the second pin so that it may be biased to an operative position in response to movement of the first selector pin from its operative position to an inoperative position. The force for causing the first pin to move from its operative position to its inoperative position is provided by a shunt slot change means which may be referred to as a diverter means.

There is disclosed herein two embodiments of the diverter means. In one embodiment, the diverter means is a pivotable lever arm responsive to a wheel on the vehicle. This diverter means causes a surface to cam the first selector pin upwardly from its operative position to its inoperative position. In the other embodiment, the diverter means is also a movable cam surface. In the second embodiment of the diverter means, the cam surface is mounted for movement in an upright direction so that it can easily be run over by a vehicle but would not move when subjected to the forces involved in contact with a selector pin.

It is an object of the present invention to provide a vehicle having novel means for changing the destination of the vehicle along a guide path.

It is another object of the present invention to provide a vehicle and/or system which permits an operator to program the vehicle for two or more successive destinations at the same time.

It is another object of the present invention to provide a vehicle having destination changing means which is simple, reliable, and inexpensive.

It is another object of the present invention to provide a system wherein a vehicle programmed to travel to one destination is thereafter automatically programmed to travel to another destination by reversing the position of a pair of selector pins on the vehicle.

Other objects will appear hereinafter.

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIG. 1 is a perspective view of a vehicle in accordance with the present invention mounted for movement along a guide path.

FIG. 2 is an enlarged perspective view of the selector rack and selector pins on one side of the vehicle shown in FIG. 1, but on an enlarged scale.

FIG. 3 is a sectional view taken along the line 3—3 in FIG. 1.

FIG. 4 is a view similar to FIG. 3, but showing the components in an activated position.

FIG. 5 is a sectional view taken along the line 5—5 in FIG. 4.

FIG. 6 is a partial front elevation view of the vehicle showing the selector pins programmed for a first destination.

FIG. 7 is a sectional view taken along the line 7—7 in FIG. 6.

FIG. 8 is a view similar to FIG. 6, but showing the selector pins being changed from the position shown in FIG. 6.

FIG. 9 is a sectional view taken along the line 9—9 in FIG. 8.

FIG. 10 is a view similar to FIG. 6, but showing the selector pins programmed for a second destination.

FIG. 11 is a sectional view taken along the line 11—11 in FIG. 10.

FIG. 12 is a sectional view of a second diverter means.

Referring to the drawing in detail, wherein like numerals indicate like elements, there is shown in FIG. 1 a vehicle in accordance with the present invention designated generally as 10 for use in a system which involves a reference surface such as floor 12. The reference surface 12 includes a guide path such as a main guide slot 14 having shunt slots 16 intersecting slot 14 at spaced points therealong. The shunt slots may extend to either side of the main slot 14.

The intersection of slots 14 and 16 is controlled by a switch means 18. Switch means 18 normally permits the vehicle 10 to continue along the main guide slot 14. The switch means 18 is provided with an actuator means 20 whereby the vehicle may be diverted from movement along the slot 14 to movement along the slot 16. The actuator means 20 is responsive to a selector pin on the vehicle 10 and per se forms no part of the present invention. For example, the actuator means 20

may be of the type disclosed in U. S. Pat. No. 3,481,281.

The vehicle 10 includes a base 22 mounted on wheels 24. The base 22 supports an upright tow pin 26. The tow pin 26 is supported for movement in an upright direction so that it may have an operative position as shown in FIG. 1 wherein it extends downwardly into the guide slot 14. The tow pin 26 is guided for upright movement by extending through a collar 30 on a brace-like angle member 28 having a horizontal leg secured to the base 22.

The member 28 has secured thereto selector racks 32 and 34 on opposite sides of the tow pin 26. The selector racks and their respective pins are identical. Accordingly, only selector rack 34 and selector pins thereon will be described in detail.

As shown more clearly in FIG. 2, the selector rack 34 is a channel-shaped member having a horizontal top flange 35 and a horizontal bottom flange 37. Each of the flanges 35 and 37 is provided with sets of aligned holes. Thus, hole 36 on flange 35 is aligned with hole 38 on flange 37. Each set of aligned holes is adapted to receive a selector pin.

The rack 34 is provided with a selector pin 40 in an operative position and a selector pin 42 in an inoperative position. Selector pin 40 is programmed to cause the vehicle 10 to be dispatched to a first destination. After the vehicle 10 leaves the first destination, the respective positions of the selector pins 40 and 42 will be reversed so that selector pin 42 may cause the vehicle 10 to be dispatched to a second destination such as the shunt slot 16.

A control means 44 is provided for retaining the selector pin 42 in an inoperative position without interfering with the selector pin 40 which is gravity biased to an operative position. The control means 44 includes a horizontal retainer 46 having legs 48 and 50 at its ends. Each of the legs is angled downwardly and rearwardly and then terminates in an upright portion secured to the angle member 28. The retainer 46 and its legs are made from a spring type metal so that it may flex rearwardly in a manner to be described hereinafter.

The selector pin 40 is provided with an annular projection 52 which is tapered downwardly and outwardly. Selector pin 42 is provided with a similar projection 54. The projections 52 and 54 are adjacent the upper end of the selector pin but spaced from the upper end so as to provide a handle portion facilitating grasping and manual manipulation of the selector pins. The projection 52 is larger than the projection 54.

A shunt slot change means or diverter means 56 is provided in the reference surface 12. As shown more clearly in FIGS. 3 and 4, the diverter means 56 includes a housing 58 installed in a recess 57 in the reference surface 12. The housing 58 is provided with a cover removably attached thereto and flush with the floor or reference surface 12.

A lever arm 62 is pivotably supported for rotation about pin 66. Pin 66 is supported by ears 64 (only one shown). The ears 64 depend from the lower surface of the cover 60. Thus, the lever arm 62 is movable as a unit with the cover and access is had thereto merely by removing the cover 60.

At one end, the lever arm 62 is provided with a cam projection 68 which is normally biased to a position as shown in FIG. 3 where it projects above the plane of

the cover 60. Cover 60 is provided with a slot 70 to facilitate the projection 68 extending therethrough.

The cover 60 is provided with contiguous slots 72 and 74. Slot 72 permits a portion of the arm 62 to extend therethrough while slot 74 permits a cam surface 76 to extend therethrough. See FIG. 4. Cam surface 76 is at the opposite end of lever arm 62 from the projection 68. The distance between projection 68 and cam surface 76 corresponds to the distance between wheel 24 and the selector pin 40.

The arm 62 is biased to the position shown in FIG. 3 by means of a spring 78. Adjacent the projection 68, the lever arm 62 is provided with a limit stop 80 which engages the bottom surface on the cover 60 under the influence of the spring 78. When the wheel 24 rides over the projection 68, the lever arm 62 pivots to the position shown in FIG. 4 so that the cam surface 76 may raise the selector pin 40 from an operative position to an inoperative elevated position.

In FIG. 12, there is illustrated a second embodiment of the diverter means designated generally as 56'. In this embodiment, there is provided a cam projection 84 having a cam surface 86 mounted in a recess 82 in the floor 12'. The cam projection 84 is provided with a circular collar 92 surrounding a pin 90. A spring 88 biases the cam projection 84 away from the pin 90.

The cam surface 86 is adapted to cause the selector pin 40 to move upwardly from its operative position to its inoperative position. The forces exerted on the cam projection 84 by contact with the selector pin 40 are insufficient to compress the spring 48. However, if the cam projection 84 is run over by a wheel of a vehicle such as a fork lift truck, sufficient forces will be imparted so as to enable the cam projection 84 to move downwardly into the recess 82 and thereby avoid any rigid projections on the floor which would constitute a safety hazard.

The present invention may be utilized as follows:

The vehicle may be programmed as illustrated in FIG. 1 whereby pin 40 is in an operative position and pin 42 is in an inoperative position to cause the vehicle 10 to be dispatched to a first destination. Also, let it be assumed that shunt slot 16 represents a second destination to which it is desired to have the vehicle 10 dispatched but only after the vehicle has gone to the first destination.

The diverter means 56 will be located along the guide path between the first destination and shunt slot 16. As the vehicle 10 approaches the diverter means 56, the selector pins 42 and 44 are in the position as shown in FIGS. 6 and 7. In FIGS. 6 and 7, the projection 52 rests on the flange 35 while the projection 54 on pin 42 is retained in an elevated position by the retainer 46.

When the wheel 24 runs over the projection 68 as shown in FIG. 4, the lever arm 62 pivots, thereby causing the cam surface 76 to move upwardly and raise the selector pin 40. As the selector pin 40 moves upwardly, projection 52 cams the retainer 46 rearwardly. See FIGS. 8 and 9.

Since the retainer 46 and its legs are made of spring metal, they may flex rearwardly due to the camming action of projection 52. Since projection 52 is larger than the projection 54 located on pin 42, the selector pin 42 will be permitted to descend under the effect of a gravity bias to the position shown in FIG. 10 while the retainer 46 snaps back and engages the bottom surface on the projection 52. Thus, the retainer 46 will then re-

tain selector pin 40 in an inoperative position as shown in FIG. 10 while permitting the selector pin 42 to move to an operative position.

The selector pin 42 is now in a position wherein its lowermost end may trip the actuator means 20 to shift the switch means 18 to a position wherein it blocks the main slot 14 and permits the tow pin 26 to be cammed sideways into the shunt slot 16. In a system having a large number of shunt slots, it may be necessary to utilize an actuator means 20 on opposite sides of the guide slot 14 so that a selector pin 42 on each of the racks 32 and 34 must simultaneously trip actuator means 20 in order to move the switch means 18.

The diverter means 56 requires the selector pins to be supported in a transverse row spaced from the contact area between the wheel 24 and the reference surface 12 by a specific distance. The specific distance corresponds to the distance between the projection 68 and the cam surface 76 on the arm 62. When using the diverter means 56', no such specific distance relationship is required. It will be appreciated that the wheel 24 is substantially wider than the width of projection 68.

Thus, it will be seen that the present invention includes a vehicle having simple, reliable and inexpensive structure to facilitate reversing the position of a pair of selector pins while the vehicle is moving so as to change the destination of the vehicle in a manner which is automatic, whereby no further settings are required by an operator after the vehicle has been dispatched to the first station or destination.

While the selector racks 32 and 34 are illustrated with only a pair of selector pins on each rack, a larger number of selector pins may be utilized with each selector pin having a progressively smaller projection.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. A vehicle comprising a base mounted on wheels, means supported by said base for cooperation with a guide path along which the base will follow, first and second selector pins on said base, said first selector pin having an operative position for cooperation with a means for changing the destination of the base while the base is moving along said path, control means for retaining said second selector pin in an inoperative position without interfering with the first selector pin which is biased to an operative position, said control means retaining said first selector pin in an inoperative position in response to movement of said first selector pin beyond a predetermined elevation while simultaneously allowing said second selector pin to be biased from its inoperative position to an operative position.

2. A vehicle in accordance with claim 1 wherein said control means is a spring-biased retainer, a projection on each selector pin, said retainer engaging one of said projections, the projection on said first pin being larger than the projection on the second pin.

3. A vehicle in accordance with claim 2 wherein said retainer has a central portion perpendicular to the longitudinal axes of said pins.

4. A vehicle in accordance with claim 2 wherein the projections on said pins are annular tapered flanges adjacent the upper end of said pins.

5. A vehicle comprising a base mounted on wheels, a tow pin supported by said base, said tow pin being mounted so that in one position it extends downwardly below the wheels so that it may enter a guide slot, first and second selector pins supported by said base at different distances from said tow pin, selector pin control means on said base, said control means retaining said second pin in an inoperative position wherein its lower end is above the lower end of said first pin when the latter is in an operative position, said control means being constructed and arranged to allow the second pin to descend from its inoperative position in response to upward movement of said first pin beyond a predetermined elevation.

6. A vehicle in accordance with claim 5 wherein said control means is spring-biased in a direction perpendicular to the longitudinal axes of said pins, each pin having a projection adjacent its upper end with the projection on the first pin being larger than the projection on the second pin, said retainer cooperating with the projection on one of said pins to retain the pin in an inoperative position.

7. A vehicle in accordance with claim 6 wherein said retainer has a central portion extending parallel to but at an elevation above a rack, said rack supporting said pins in their operative position, and said retainer being made of spring metal.

8. A vehicle in accordance with claim 6 wherein the projections on said pins are annular and have their upper surface tapered downwardly and outwardly, each projection having a shoulder on its bottom surface under which the retainer may extend.

9. A tow vehicle system comprising a reference surface having a main guide slot intersected therealong by discrete shunt slots, switch means controlling the intersections of said main guide slot with said shunt slots, a discrete actuator device for controlling each switch means, a vehicle having a tow pin extending into said main guide slot, said vehicle having first and second selector pins at different distances from said guide slot, each selector pin when in an operative position being adapted to control a different one of said actuator means, selector pin control means on said vehicle retaining said second pin in an inoperative position without interfering with the first pin biased to an operative position, said control means retaining said first pin in an inoperative position in response to movement of said first pin beyond a predetermined elevation while simultaneously allowing the second pin to be biased from said inoperative position to an operative position, and a diverter means supported by said reference surface along said main guide slot for moving said first pin from its operative position to its inoperative position.

10. A system in accordance with claim 9 wherein said diverter means is a movable cam surface spaced from the main guide slot by a distance corresponding to the distance from the main guide slot to the first pin.

11. A system in accordance with claim 10 wherein said cam surface is mounted for up and down movement.

12. A system in accordance with claim 10 wherein said cam surface is pivotably supported by said reference surface for pivotable movement about an axis perpendicular to the main guide slot.

13. A system in accordance with claim 12 wherein said diverter means includes a pivotably mounted arm, a wheel engaging projection on one end of said arm, and said cam surface being on the other end of said arm, the distance between said wheel engaging projection and said cam surface corresponding to the distance between the axis of a front wheel on said vehicle and the first selector pin.

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