

[72] Inventor **Roy J. Larson**
 909 Pembina St., Detroit Lakes, Minn.
 56501
 [21] Appl. No. **810,533**
 [22] Filed **Mar. 26, 1969**
 [45] Patented **July 6, 1971**

Primary Examiner—Arthur L. LaPoint
Assistant Examiner—George H. Libman
Attorney—Schroeder, Siegfried and Ryan

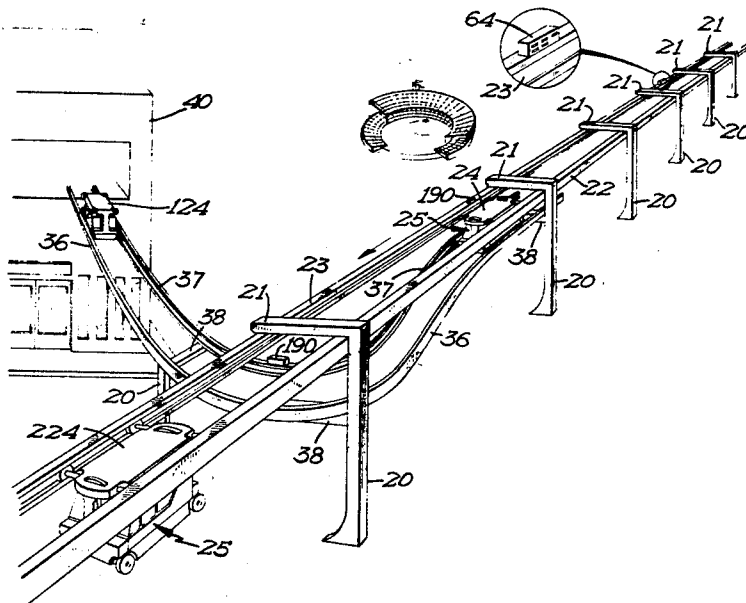
[54] **MASS TRANSIT SYSTEM**
 15 Claims, 13 Drawing Figs.

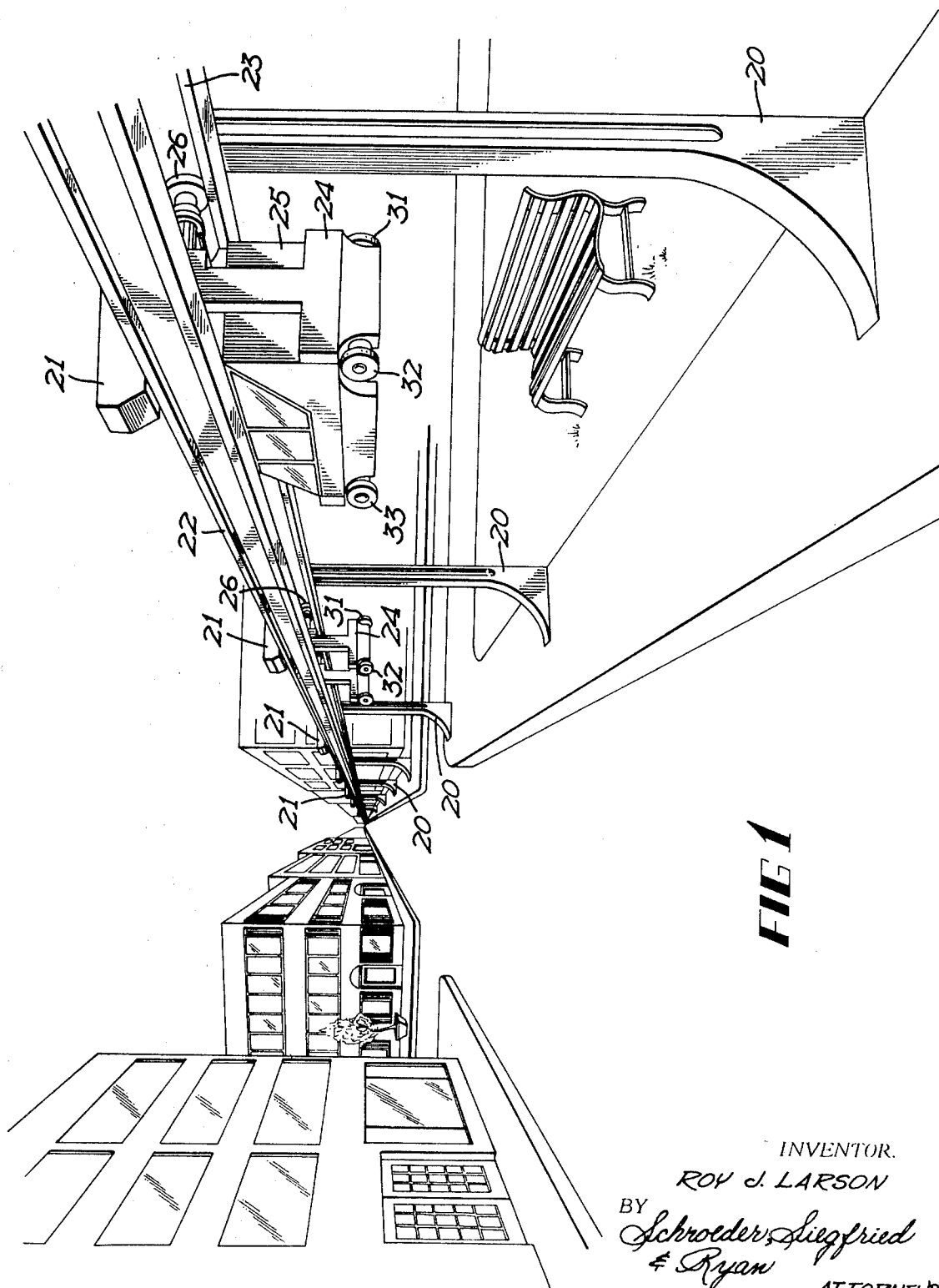
[52] U.S. Cl. **104/130,**
 104/88, 104/89, 104/125, 105/146
 [51] Int. Cl. **B61b 15/00**
 [50] Field of Search 104/88, 89,
 91, 1, 149, 96, 130; 105/146, 147

[56] **References Cited**
UNITED STATES PATENTS

3,051,096	8/1962	Walsh et al.	104/96 X
3,254,608	6/1966	Alden	104/149

ABSTRACT: A transportation system is disclosed having a plurality of support columns spatially disposed from each other and anchored to a supporting medium with a plurality of first transverse members, each of which is secured to one of a plurality of support columns and with a plurality of second transverse members secured to certain of the support columns adjacent each other defining a smooth vertical curve varying from the first transverse members and further including a first and second pair of rails adapted to support a load-bearing vehicle secured to the first and second transverse members respectively, and wherein the load-bearing vehicle has an upper and lower set of retractable wheels adapted to cooperatively engage the first and second pair of rails in operable relationship without switching any of the rails to facilitate changing the path of movement of the vehicle.





INVENTOR.
ROY J. LARSON
BY
*Schroeder, Siegfried
& Ryan*
ATTORNEYS

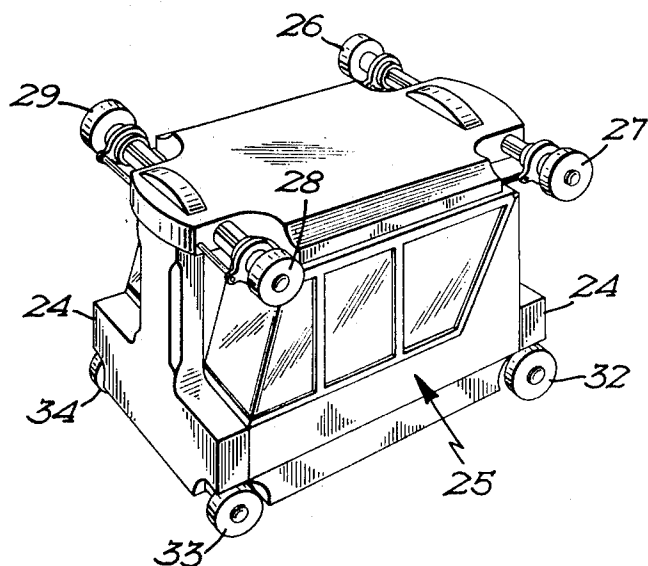
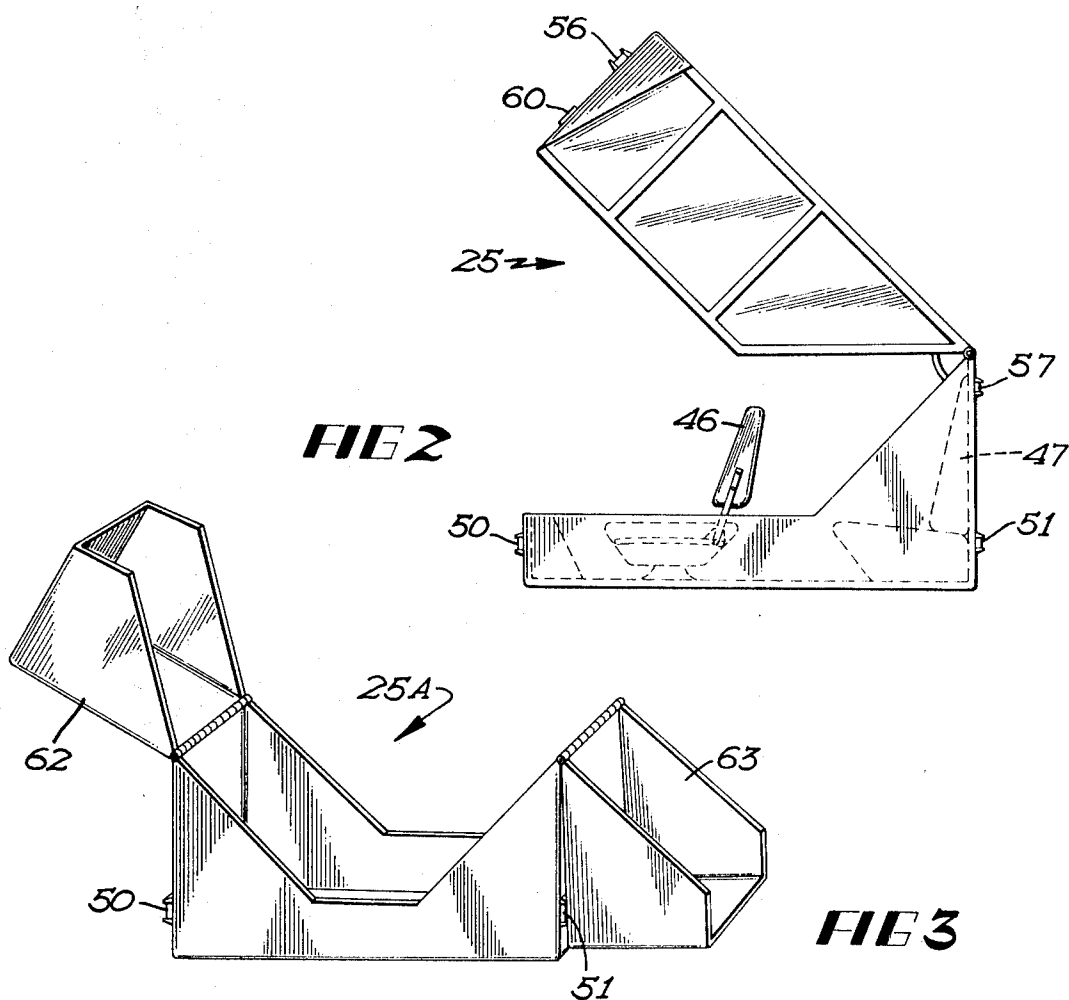


FIG 4

INVENTOR.
ROY J. LARSON
BY
*Schroder, Siegfried
& Ryan*
ATTORNEYS

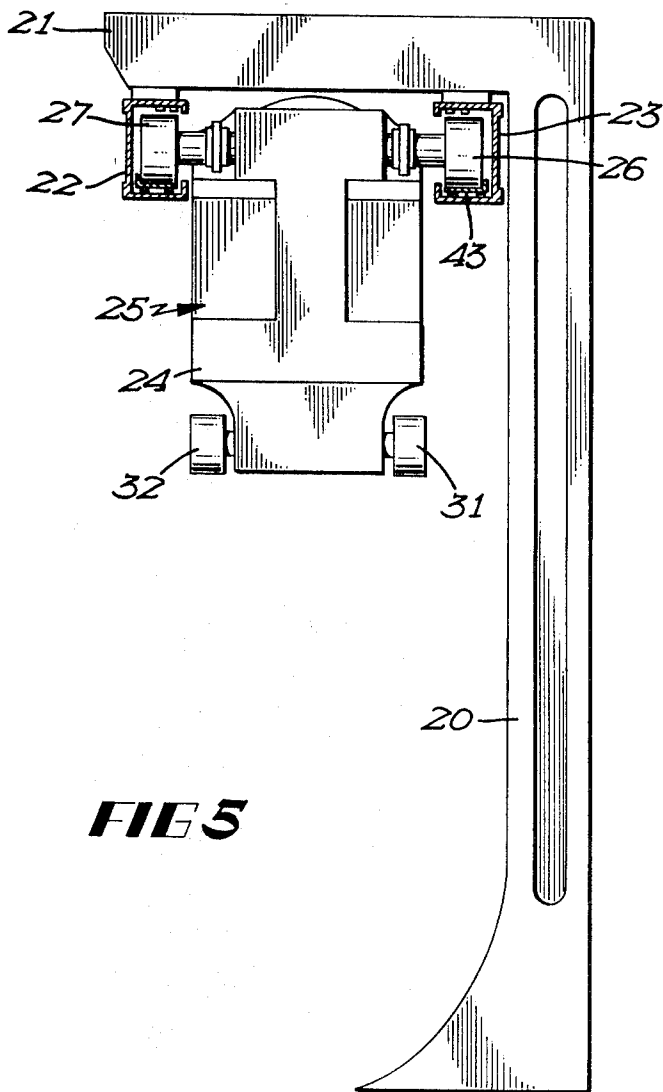


FIG 5

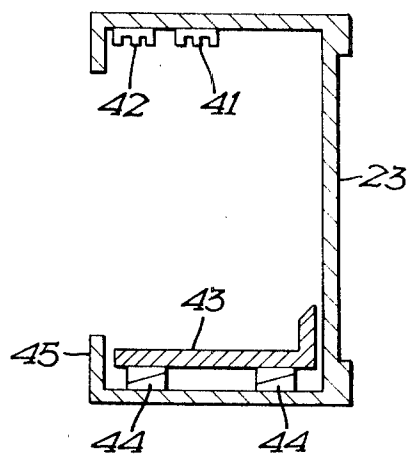


FIG 6

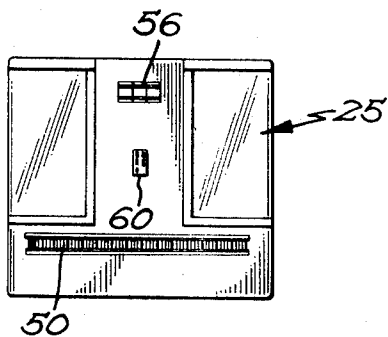


FIG 7

INVENTOR.
ROY J. LARSON
BY
*Schroeder, Siegfried
& Ryan*
ATTORNEYS

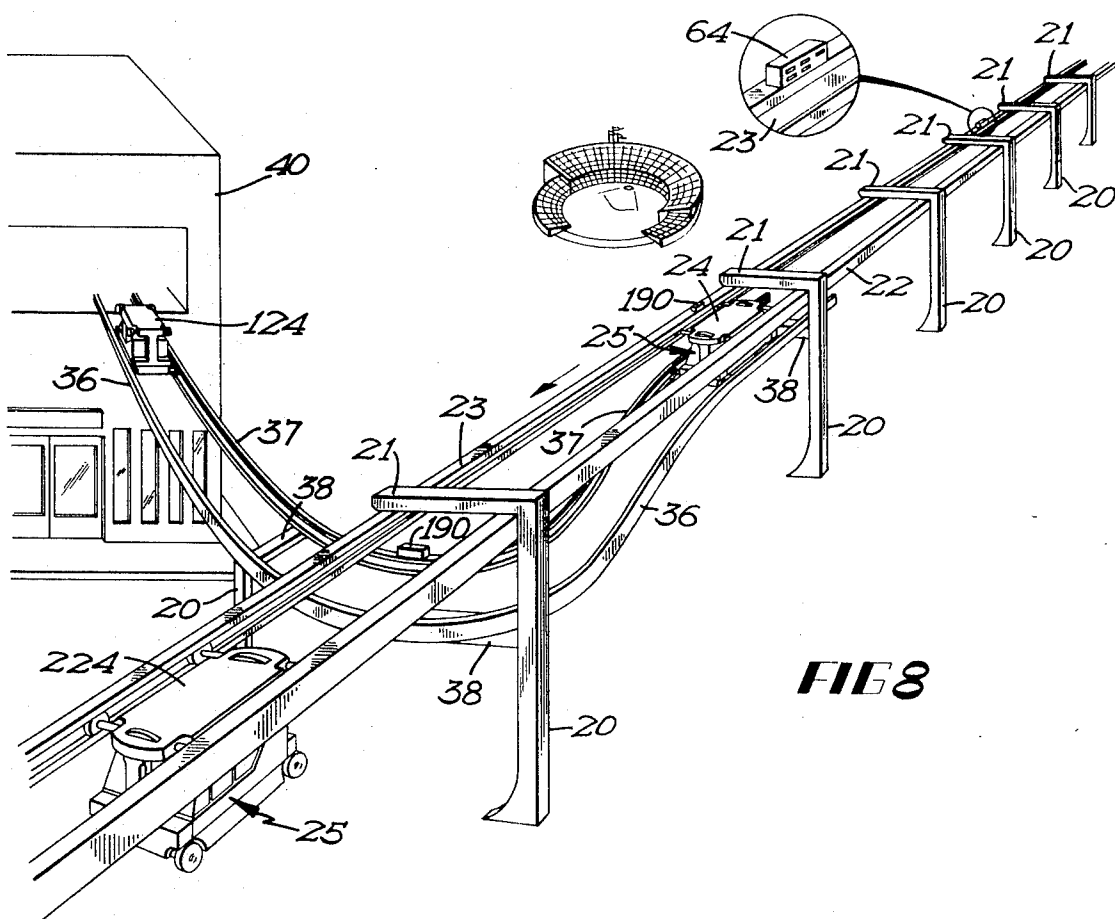


FIG 8

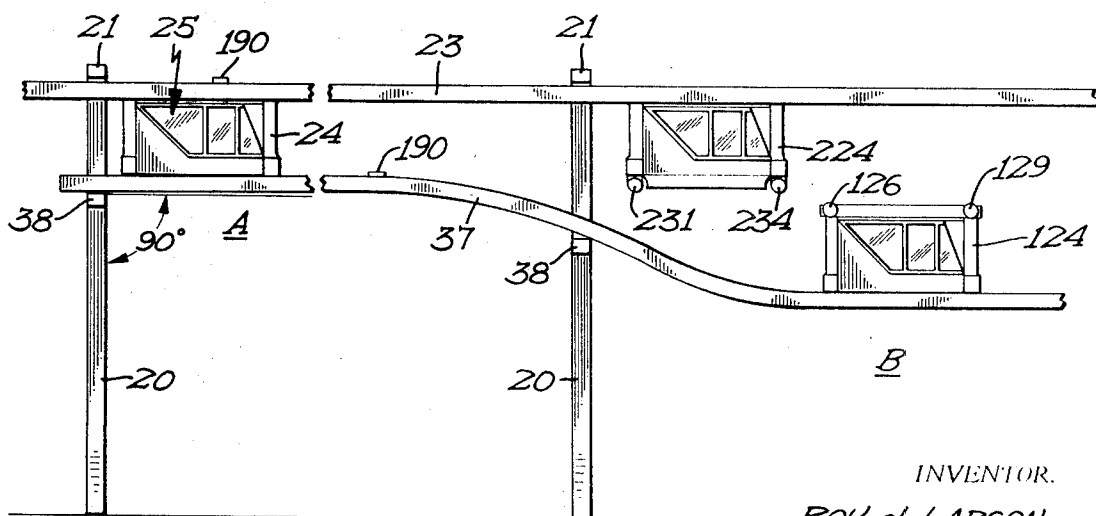


FIG 9

INVENTOR.
 ROY D. LARSON
 BY *Schroeder, Siegfried & Ryan*
 ATTORNEYS

FIG 11

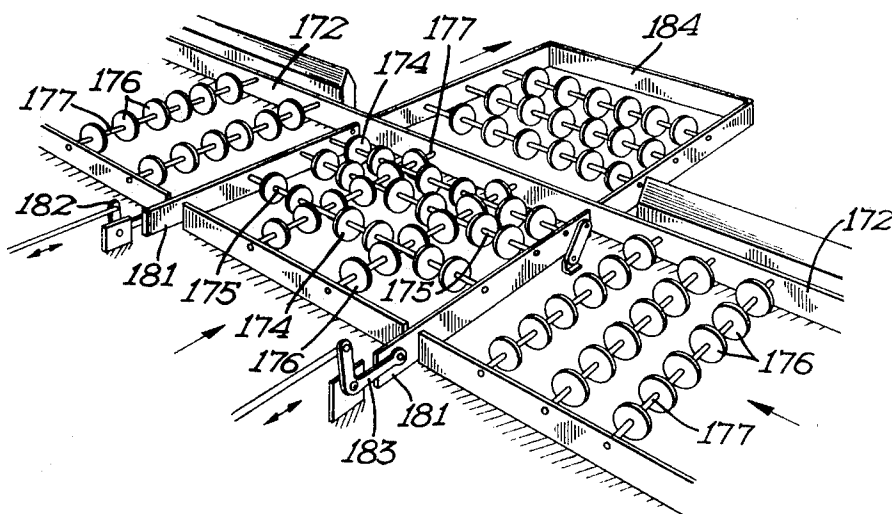
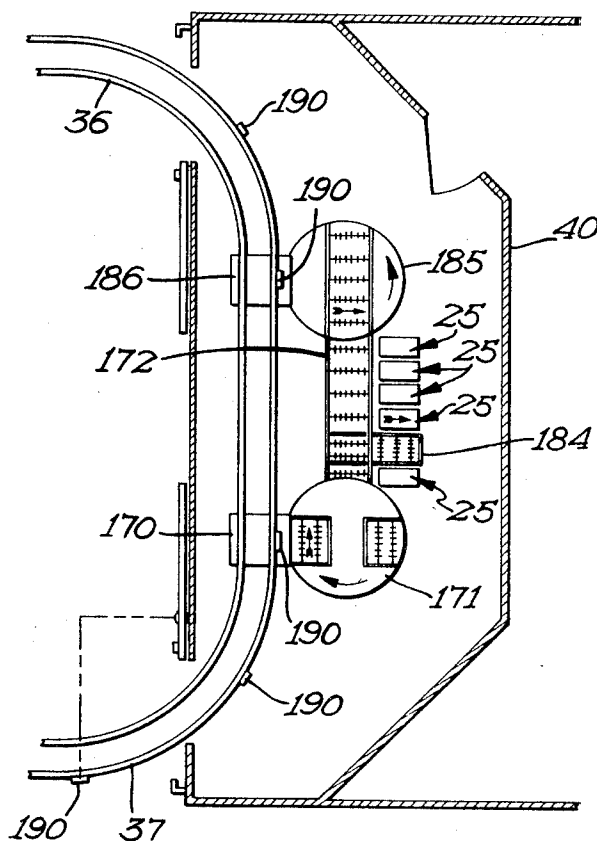


FIG 12

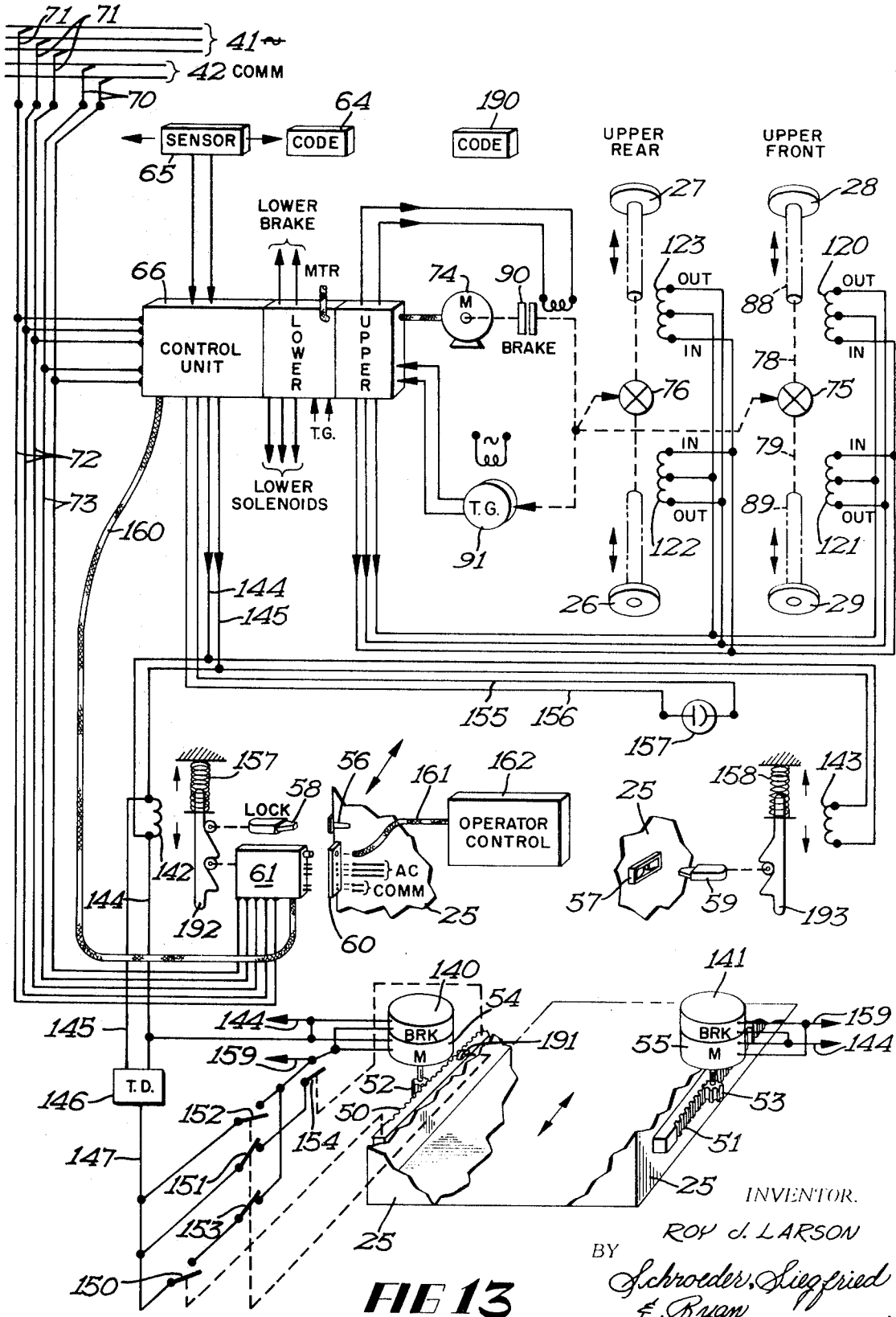
INVENTOR.

ROY J. LARSON

BY

Schroeder, Siegfried
& Ryan

ATTORNEYS



MASS TRANSIT SYSTEM

This invention relates to the field of transportation and more particularly to the field of a mass transit system for the conveyance of people and materials.

Every metropolitan area of any significant size is suffering from inadequate transportation of facilities and generally has been under a transportation handicap for some time. The only practical means available for the solution of this problem in most areas is the highway and automobile transportation with the further expansion of the highway system into urban areas which has many disadvantages because of the dislocation of existing homes and businesses and because of the large amount of lane occupied for such purposes and its relatively high cost to acquire. An alternate form of transportation is needed that will move not only people but goods and commodities cheaply, conveniently, safely, and rapidly from fringe areas to a downtown metropolitan area and particularly from any location in the metropolitan area to any other location within that area and particularly for a system which may be altered or changed to provide flexibility to meet the expanding need of any metropolis.

There have been many attempts to comply with this type of requirement and meet the needs of the mass transit system by using fixed conventional rails, monorails and other guidance tracks underground as well as at grade level and elevated level. However, these attempts to solve the transportation problem have generally met with little success because of the relatively high cost and lack of general ability to accommodate more than a small fraction of the overall traffic need due to the fixed routes and schedules of the system. The most promising of the various transit systems which have been proposed to date are systems employing lightweight cars or vehicles suspended from overhead monorail structures such as the type of system found in U.S. Pat. No. 2,825,291 and No. 3,081,711 which are typical of the suspended overhead systems. However, the problem of switching the cars from one track to another presents a problem which does not appear to have been solved by such a mechanism in a satisfactory manner.

The present invention is directed to a means of solving the problem of switching the cars from one path to another and this is accomplished in the present invention without any movement of the rail system. The present invention suspends the car or vehicle from more than one point of suspension and thus allows a switching technique by changing the driving mechanism of the vehicle while the rails over which it operates are fixed.

It is therefore a general object of this invention to provide a transit system making use of lightweight cars or capsules which are transferred over a system of rails by a carrier equipped with a dual driving mechanism, each of which is capable of alternately engaging or disengaging a rail system over which it is to run.

It is a further object of this invention to provide a capsule which may be moved on to or off from a load-bearing vehicle at a secondary station while traffic proceeds on the main line at a standard speed and on an uninterrupted period.

It is another object of this invention to provide a transportation system that is controlled by an operator in the capsule through an automatic control system that guides the capsule to its destination.

It is a further object of this invention to provide a rail system over which the vehicles may operate which is relatively free from obstructions caused by inclement weather conditions.

It is another object of this invention to provide a secondary track system permitting storage of the capsules and facilitating their removal and reentry upon a vehicle.

It is a further object of this invention to provide different portions of a secondary track system for acceleration and deceleration of the vehicle to synchronize its movement with the vehicles on a main line.

FIG. 1 is a diagrammatic perspective view of a typical transportation system incorporating my invention suspended over a sidewalk;

FIG. 2 shows a side elevation of a passenger container or capsule in an open position for loading and shows a preferred seating arrangement;

FIG. 3 is an isometric view of a cargo capsule shown in an "open" position for loading;

FIG. 4 shows a perspective view of the transporter or carrier vehicle with its upper running gear extended and the lower gear in retracted position;

FIG. 5 is an elevation of a rail system suspended from a cantilevered column;

FIG. 6 is a cross section of a rail showing the power and communications conductors disposed in a sheltered portion of the rails;

FIG. 7 shows a front elevation view of a passenger capsule or container;

FIG. 8 is a diagrammatic perspective view of my invention with a station track or secondary track connected to the main line and a vehicle in the position of having just engaged the station track;

FIG. 9 is a side elevation view of the preferred switching arrangement in which the upper track is the main line and the lower track is a station track;

FIG. 10 is a diagrammatic view of the driving train showing the device for extending or retracting the wheel assemblies;

FIG. 11 is a diagrammatic plan view of a station showing a parking arrangement for capsule parking;

FIG. 12 shows a capsule handling conveyor and parking unit used with the station equipment; and

FIG. 13 is an electrical schematic diagram of the transporter or carrier vehicle.

The vehicles used in the system will travel at speeds which will vary in the density of the traffic and particularly with the concentration of terminal facilities. Speeds of approximately 40 miles per hour will be practical in downtown areas and speeds of 40—60 miles per hour will be obtainable in residential areas and up to 75 miles per hour and faster in urban and outlying areas. As traffic increases in a particular area and additional stations are connected with the main line, traffic will be slowed in speed to reduce the length of acceleration and deceleration sections and to accommodate a higher density flow of traffic. Should a particular section of the system become loaded to the point where the speeds are reduced below an optimum speed, then an express rail can easily be added to that particular area to relieve the congestion.

As found in FIGS. 1, 5 and 6, there is illustrated a transit system comprising a plurality of support columns 20 which are securely anchored to a supporting medium such as a sidewalk, or some anchor firmly embedded in the earth. Each of the support columns have a transverse member 21 secured thereto which is located above the street and may be positioned approximately 15 feet above the street level to clear any surface traffic. Secured to each of the transverse members 21, are a pair of rails 22 and 23 which are secured in a parallel relationship. That is, the rails 22 and 23 are horizontally displaced from each other and secured in a parallel relationship, to each other. A vehicle 24 having a capsule 25 secured therein is supported on rails 22 and 23 by an upper set of driving wheels 26 through 29 (FIG. 4). A lower set of driving wheels 31 through 34 is also drivingly connected to vehicle 24. A more detailed view and description will be set forth later with respect to the vehicle as seen in FIG. 10.

As just described, and shown in primarily FIG. 1, rails 22 and 23 form a main line or main track system which may be the express track for conveying the vehicles from one place to another or in some instances it may be a feeder or secondary line leading up to a main line. Reference is now made to FIG. 8 in which rails 22 and 23 form a main line or main track system. Another pair of rails 36 and 37 are secured to a second plurality or set of transverse members 38 which are also secured in cantilever fashion to supporting columns 20.

Rails 36 and 37 form a secondary track and in the view illustrated, curve downwardly and off to one side of the main line where the tracks enter a station 40. As shown, vehicle 24 has entered and engaged the secondary track or has engaged rails 36 and 37. Another vehicle 124 is shown entering station 40 by the facilities of secondary tracks 36 and 37. Additionally, another vehicle 244 is shown continuing on the main line through the use of rails 22 and 23. As will be explained in more detail later, the system shown in FIG. 8 may be expanded by adding additional vertical sections to the supporting columns 20 and adding additional transverse members to carry another pair of rails.

Referring specifically to FIG. 6, it will be seen that rail 23 which is typical of all the rails, is formed in the shape of a letter "C." The upper transverse leg contains a plurality of power conductors 41 and a plurality of communication conductors 42 both of which extend along the rails to provide power and control or communication signals. A guide track 43 is secured to the lower transverse member of the C-shaped channel member through the use of a plurality of two-part shims 44 which are used to provide the proper grade adjustment over which the wheel of the vehicle will travel. It will of course be understood that each of the channels forming the rails is similarly constructed and that the open portions face each other such as shown in FIG. 5. By locating the power and communications conductors 41 and 42 on the upper inside portion of the rails, maximum protection will be obtained from the elements. It will also be observed that a lip member 45 forms a safety flange at the outer extremity of the lower transverse member of rail 23 to prevent a wheel from being accidentally retracted to the position such as found for the lower wheels 31 and 32 as shown in FIG. 5.

The capsules which are carried by the vehicle are shown principally in FIGS. 2, 3 and 7. FIGS. 2 and 7 show diagrammatically the capsule which is used for moving passengers from one location to another and as shown, a reversible seat 46 may be placed in the position shown or moved towards the other position so that the passengers may face each other by sitting in reversible seat 46 and another seat 47. The capsules are hinged at an upper edge and upon being lowered into an operable position, are ready for use by a vehicle. A pair of racks 50 and 51 are secured transversely across the ends of capsule 25 and are disposed to engage a pair of pinion gears 52 and 53 respectively (FIG. 13). Pinion gears 52 and 53 are driven by a pair of capsule driving motors 54 and 55 respectively. A pair of locking members 56 and 57 are secured near the upper portion of the capsule driving motors 54 and 55 respectively. A pair of locking members 56 and 57 are secured near the upper portion of the capsule body that are adapted to communicate with a pair of locking bolts 58 and 59 respectively. Situated below locking member 56 is a communications connector 60 which is adapted to be engaged by a mating connector 61. The capsule just described is approximately 7 feet long, and approximately 4 feet high and 4 feet wide.

The cargo capsule 25a (FIG. 3) has a pair of hinged portions 62 and 63 which are pivotally secured to the front and trailing edges of the upper portion of the capsule so that the "box" may be opened and a load placed therein. Pivotable portions 62 and 63 are then moved to the closed position so that the capsule becomes, in effect, a box containing cargo material. The dimensions of the cargo capsule are approximately the same as those described for transporting passengers.

Referring once again to FIGS. 8, 9 and 10 as vehicle 24 moves along the main line or track, it encounters a code-bearing member 64 which is mounted upon rail 23 in advance of the secondary rails 36 and 37 forming the secondary track. The code which is found in code-bearing member 64 is detected or sensed by a sensor 65 which is physically connected to the vehicle such as the vehicle 24. The signal which is detected by sensor 65 is used to energize a control unit 66 through a pair of conductors 67 and 68 conveying the code signals. Certain communications or code signals may also be supplied to control unit 66 through suitable brushes or pickup

devices 70 and power is supplied through a plurality of brushes 71. If the code detected by sensor 65 coincides with the destination code which is contained within the control unit 66, control unit 66 will cause the actuation of the lower driving mechanism. The upper driving mechanism is shown in FIGS. 10 and 13 and it will be understood that the lower driving mechanism is identical to the upper mechanism and for this reason it is not shown. Electrical power is supplied to control unit 66 through a plurality of power conductors 72 which are connected to brushes 71 and communications and code signals are carried on conductors 73 which are connected to brushes 70. Upper driving wheels 26 through 29 are driven by a motor 74 which is drivingly connected to a pair of differentials 75 and 76. Differential 75 has a pair of splined output shafts 78 and 79 which are drivingly connected to wheels 28 and 29 respectively. In a similar manner, the output of differential 76 is connected to wheels 26 and 27 through a pair of splined shafts 80 and 81 respectively. Each of wheels 26 through 29 have splined hubs 86 through 89 respectively so that the wheels may move transversely on the splined shafts and thus engage or disengage the respective rails over which they move. A brake 90 and a tachometer 91 are drivingly connected to motor 74 to provide braking for motor 74 and provide an output signal of the motor speed respectively.

A pair of bracket members 92 and 93 are secured to the vehicle frame and provide pivot points for four yoke members 94, 95, 96, and 97. Yoke members 94-97 are pivotally secured to the ends of brackets 92 and their opposite ends are pivotally connected to four solenoid arms 104 through 107 respectively. Hubs 86 through 89 contain four collars 110 through 113 respectively which are held in place on the splined hubs by flange members. The collars 110 and 111 are pivotally connected to yokes 96 and 97 by a pair of pins 114 and 115 respectively and yokes 94 and 95 are connected to collars 112 and 113 by a pair of pins 116 and 117 respectively. Four solenoids 120 through 123 are connected to armature control arms or armatures 104 through 107 respectively, and are physically secured to the vehicle frame. In other words, upon movement of control arms 104 through 107, the yokes are moved inwardly or outwardly in a transverse direction to cause the wheels 26 through 29 to be moved in a transverse direction to engage or disengage a cooperating rail.

Referring principally to FIG. 13, it will be seen that motor 54 has a brake 140 connected thereto and motor 55 has a brake 141 connected thereto. Current is supplied to the brakes and motor in the following manner. Power is supplied from control unit 66 to a pair of locking solenoids 142 and 143 through a pair of conductors 144 and 145. Conductor 144 may be considered the common conductor and is connected to both capsule driving motors and brakes 54, 55 and 140, 141 respectively. A time delay mechanism 146 is also connected to conductors 144 and 145 and upon being energized, produces a closed circuit for an output after a predetermined period of time has elapsed. In the instant invention, the time delay would be on the order of 2 or 3 seconds. Time delay 146 has its output connected through a conductor 147 to one terminal of a normally open switch 150, and to one terminal of a normally closed switch 151 which in turn is connected to one terminal of a normally open switch 152. The other terminal of switch 150 is connected to one terminal of a normally closed switch 153. The other terminal of switch 153 is connected to motor 54, and brake 140. The other terminal of switch 151 is connected to the other terminal of switch 154. Switch 150 which is normally open is closed by encountering the end of rack 50 and normally open switch 154 is also closed by encountering the other end of rack 50. In other words, regardless of which side of the vehicle the capsule is inserted, a circuit is closed to the capsule driving motor. In addition thereto, the other terminal of switch 152 is connected through a conductor 159 to switch terminal 154 which is connected directly to motor 54 and brake 140. It will of course, be understood that motor 55 and brake 141 are connected in a similar manner through conductors 144 and 159. Additionally, upon energiz-

ing solenoids 142 and 143, a pair of tension springs 157 and 158 are placed under tension while disengaging locks 58, 59, and connector 61.

Upon deenergizing solenoid coils 142 and 143, locks 58 and 59 engage their respective mating members, and electroconical connectors 61 and 60 are joined. A code-bearing cable 160 is also connected to connector 61 and control unit 66. Another code bearing cable 161 is connected between plug or connector 60 and an operator control mechanism 162 which is contained within capsule 25. Control unit 66, sensor 65, code member 64, and operator control 162 may be of the types disclosed in the patents to Wales, et al. U.S. Pat. No. 3,075,653 and to Wilson, U.S. Pat. No. 3,214,003. For instance, the operator control 162 may take on the form of the push buttons as shown in FIG. 7c of the Wilson patent, U.S. Pat. No. 3,214,003. Furthermore, both patents just mentioned disclose various means for forming a code such as found on code member 64 and both show forms of detecting the code by a sensor or means for detecting a magnetic code. Also, through the use of an electronic "AND" circuit solenoids 142 and 143 may be controlled and such a circuit is found in FIG. 8 of Wales, et al. U.S. Pat. No. 3,075,653.

Reference is now made to FIGS. 11 and 12 in which there is shown a parking station or transfer station 40 which has secondary rails 36 and 37 pass through an unloading point 170 which is adjacent to a turntable mechanism 171. A capsule such as capsule 25 is moved laterally on to turntable 170, the turntable rotated 90° and the capsule is then in a position to be moved over a conveyor 172. A portion of conveyor 172 has a diverter section 173, formed therein in which a plurality of rollers 174 are secured to a plurality of shafts 175, the shafts having their longitudinal axis in the longitudinal direction of conveyor 172. For the particular embodiment shown, conveyor 172 is formed of a number of rollers 176 which are secured to a plurality of shafts 177, the shafts being transverse to the direction of movement of the vehicles over conveyor 172. Rollers 174 are of a smaller diameter than rollers 176 and are secured to a pair of pivot bars 180 and 181 through securing shafts 175 in place. Pivot bars 180 and 181 are connected to a pair of lever mechanisms 182 and 183 which are pivoted at their opposite ends by a pair of appropriate pivot bars. Upon lever members 182 and 183 being actuated, rollers or wheels 174 are moved upwardly into the path of any vehicle moving over conveyor 172 and the direction of movement of the vehicle may then be changed to that of a lateral movement at which time the vehicle is moved on to a storage section 184 which has its rollers and the shafts therefore oriented in the same manner as rollers 174 and shafts 175. Thus, a vehicle may be moved laterally to a parking position. As shown in FIG. 11, a plurality of capsules 25 are stored on sections of the conveyor such as the storage section 184. Another turntable 185 is situated at the end of conveyor 172 and rotates the capsule 25 into a position where they may be received onto a vehicle at a loading point 186.

It will also be found that additional code memory mechanisms 190 are strategically located along rails 37 for detection by sensor 65 to cause acceleration, deceleration, or initiate a breaking action to properly control the movement of the vehicle.

OPERATION

Assuming that it is desirable to move a passenger-carrying capsule from one station such as 40 to another, certain events will take place. Assuming that the vehicle is at loading station 186, a capsule 25 is directed from a storage location 184 onto conveyor 172 where turntable 185 rotates the capsule so that it may be in a position to be moved laterally onto vehicle 24. As capsule 25 is moved laterally, rack 50 encounters either switch 150 or 154 which supplies current to motor 54 and releases brake 140, it being understood that time delay mechanism 146 still remains energized from the signal being supplied from control unit 66. As rack 50 moves towards its

center position, a detent 191 encounters switches 153, 151, and 152 causing switches 153 and 151 to be opened and switch 152 to be closed. Thus, the circuit to motor 54 and brake 140 is opened thus locking the capsule in place. It will of course be understood that motor 55 and brake 141 are actuated at the same time and operate in the same manner. Once switch 152 is closed, a circuit is completed to control unit 66 which will be used with the detection of a code member 190 to cause actuation of the device which will be explained later. Detection of a code-bearing element 190 causes the proper signal to be detected by sensor 65 and in the instant application, solenoid 142 is deenergized along with time delay 146 causing springs 157 and 158 to move to a pair of locking bars 192 and 193 into a position where locks 58 and 59 engage cooperating members 56 and 57 and electrical connectors 60 and 61 are joined together. Operator control 162 is then energized to produce a comparison signal to control unit 66 and vehicle 24 starts its movement with wheels 31 through 34 engaging tracks 37 and 36. Upon passing code sensor 190, the vehicle is accelerated. By reference to FIG. 9, and assuming the car is moving from point B to point A, it will be seen that as a vehicle such as vehicle 124 moves along the track that it is elevated and upon passing code member 190, a code is detected which causes the wheels at the upper part of the vehicle to be extended and engage rails 22 and 23 of the primary or main track. It will be noted in FIG. 9 that the rails are pitched upwardly from point 'A' towards point 'B' so that the upper wheels when extended are slightly above the guide track 43 to clear flange 45 such as found in FIG. 6 and as the vehicle moves to point 'A' rails 37 and 38 are at a vertical distance such that the vehicle may continue on the main line without an appreciable jar or bumping effect taking place. The incline of rails 37 and 28 may be 5° or 6° above a horizontal.

Upon sensor 65 detecting code member 190, signals are applied to solenoids 120 through 123 to cause the wheels 26 through 29 to be extended outwardly and when extended, the wheels will be above guide track 43. As the vehicle continues to move, rails 36 and 37 are sloped downwardly and wheels 26 through 29 come in contact with guide tracks 43. Once the vehicle 24 is running on rails 22 and 23 and rails 36 and 37 have been cleared, the lower wheels are retracted which again may be done through the medium of a code member 190 being detected by a sensor 65. The vehicle continues along rails 22 and 23 until it nears the transfer station. As the vehicle approaches another set of secondary tracks such as tracks 36 and 37 as found in FIG. 8, another code member 64 is encountered prior to reaching the secondary track. Sensor 65 detects the code on code member 64 and again causes the lower wheels to be extended through actuation of another set of solenoids similar to solenoids 120 through 123 which are labeled on the control diagram found in FIG. 13. Reference is now made to FIG. 9 in which vehicle 24 is moving from point 'A' towards point 'B'. As shown in FIG. 13, only a single sensor 65 is shown but of course it will be understood that where necessary, sensor 65 may have another sensor identical thereto connected to control unit 66 so that code members 190 and 64 may be detected along the rails regardless of whether the sensor is located relative to the upper or lower portion of vehicle 24. Upon code member 190 being detected along rail 23, upper wheels 26 through 29 are retracted through a signal supplied to solenoids 120 through 123 and the vehicle continues on its way. Upon detecting another code member 190 on rail 37, vehicle 24 decelerates and moves vertically lower and away from rails 22 and 23 where the vehicle continues on its way towards station 40.

Returning again to FIG. 11, a first code member 190 is detected which causes the vehicle to be decelerated further and may be used to apply a signal to brake 90 and cause the vehicle to slow down an additional amount. Upon the vehicle reaching another unloading station such as the one designated 170, vehicle 24 comes to a stop, motor 74 is deenergized and brake 90 is energized to stop the forward motion of the vehicle. Code member 190 located at the unloading station 170

produces a signal which is applied to conductors 144 and 145 causing solenoids 142 and 143 to be energized. Upon energizing solenoids 142 and 143, locking members 59 are disconnected from their corresponding members 56 and 57 and electrical connections between connectors 60 and 61 are broken. The same signal applied to conductors 144 and 145 energize a time delay mechanism 146 and after a short time delay, current is applied to motors 54 and 55 and brakes 140 and 141 to deenergize the brakes and energize the motors through switch 152. Upon a slight movement of racks 50 and 51 with respect to their respective driving motors, switch 152 is opened because the switch follower is no longer engaged with detent 191 and switches 151 and 153 are closed. Depending on the direction of movement of rack 50 with respect to the vehicle, switch 150 or 154 will continue to be closed thus supplying current to motors 54 and 55. Upon capsule 25 reaching the extreme position for being disconnected from a vehicle 24, the other switch, either switch 150 or 154, will also open and brakes 140 and 141 will be energized while motors 54 and 55 will be deenergized. In such a position, capsule 25 may be rotated by turntable 171 and moved upon conveyor 172 until a diversion location is reached. Actuation of pivot arms 182 and 183 will allow the capsule to be moved laterally from conveyor 172 into a storage position 184.

A photoelectric cell 157 detects the absence of the capsule on the vehicle and applies a signal to control unit 66 to again energize motor 74 and deenergize brake 90 causing the vehicle to move along the secondary track. Signals from photoelectric cell 157 also cause control unit 66 to deenergize solenoids 142 and 143. It will of course be recognized that an interlock circuit may be provided to keep the locking mechanism and electrical connector 61 in an unlocked position if it is so desired. Upon vehicle 24 arriving at loading position 186, another code member 190 is detected and solenoids 142 and 143 are again energized to cause the locking bolts 58, 59 and connector 61 to be withdrawn so that another capsule 25 may be moved on to vehicle 24.

It will also be obvious that the passenger capsules which contain an operator control such as member 162 may change their destination if it is desired and have the capsule removed at a different location than that one set into the control previously. It should also be recognized that a form of operator control will be contained on the cargo capsules so that they may be directed to a proper destination. It will also be recognized that the communication conductors may have certain overriding signals applied thereto in case of an emergency or problems effecting the entire main line. It should be kept in mind that there are no moving parts on the rail system requiring movement of track or rail members for switching from one line to another. The vehicles will generally be moving about the main line system until a demand is made for their use and switching is required to bring the vehicles in to a transportation station. Through the use of the communications conductors, it will also be possible for a station operator to "call" one of the vehicles to the loading station through the use of segmented conductors supplying a proper code signal which may be used to override the signals supplied by control unit 66. By utilizing several of the segmented communications conductors in different combinations and through the use of different voltages or frequencies, an unlimited number of signals may be directed to control unit 66.

It will also be recognized that the drive mechanism may be of another type such as a linear induction motor which may replace the wheel drive.

The system may also be used in tunnels and at other grade levels than the system shown. For example, over a long distance where switching is not required, the vehicles may run on the lower gear on rails constructed near ground level.

What I claim is:

1. A transportation system comprising:

a. a plurality of support columns spatially disposed from each other and anchored to a supporting medium, said plurality of support columns defining a smooth line relationship;

b. a plurality of first transverse members, each of which is vertically disposed above said supporting medium and secured to one of said plurality of support columns defining a substantially straight line;

c. a plurality of second transverse members vertically disposed from said first transverse members a predetermined vertical distance, each of which is secured to certain of said support columns adjacent each other;

d. a first pair of rails forming a primary track adapted to support a load-bearing vehicle and being secured in transverse parallel relationship to said plurality of first transverse members;

e. a second pair of rails adapted to support a load-bearing vehicle forming a secondary track defining a smooth vertical curve varying from said first transverse members forming a substantially straight line and being secured in transverse parallel relationship to said plurality of second transverse members and disposed in the same plane having a vertical component as said first pair of rails;

f. a vehicle including an upper and lower set of driving and guiding wheels, said wheels adapted to cooperatively engage said first and second pair of rails and rotate with respect thereto; and

g. wheel actuating mechanisms operably connected to said vehicle and said upper and lower set of driving and guiding wheels causing substantially alternate and simultaneous selective engaging and disengaging of said first and second pair of rails in operable relationship facilitating entering and leaving said primary and secondary tracks.

2. The vehicle of claim 1 including:

h. a releasable capsule carried by said vehicle, said capsule being adapted to move laterally with respect to said vehicle for engagement and disengagement therewith.

3. The structure of claim 2 including:

i. code means identifying the rail location at which said upper and lower set of driving and guiding wheels are to be actuated, said code means being secured to said first and second pair of rails in predetermined relationship to said vehicles;

j. code sensing means sensing the code of said code means and producing output signals in accordance therewith, said sensing means being secured to said vehicle to pass in spaced and confronting relationship with said code means;

k. and control apparatus responsive to said output signals from said code sensing means for controlling the movements of said vehicle.

4. The structure set to, in claim 3 including;

l. capsule drive means connected to, and energized by said control apparatus and secured to said vehicle in driving relationship with said capsule facilitating lateral movement thereof with respect to said vehicle.

5. The structure of claim 4 including:

m. a locking mechanism controlled by said control apparatus having a first part thereof secured to said vehicle and a second part thereof secured to said capsule, said first and second parts operably engaging the disengaging each other in cooperation with said capsule drive means facilitating locking and unlocking said capsule with respect to said vehicle.

6. The structure of claim 5 including:

n. brake apparatus operably connected to said control apparatus and said upper and lower set of driving and guiding wheels controlling the braking movements of said vehicle.

7. The structure of claim 3 including:

o. a speed sensing apparatus connected to said upper and lower set of driving and guiding wheels and producing output signals in accordance therewith, said speed sensing means having its output connected to said control apparatus.

8. The structure set forth in claim 5 including:

p. time delay means electrically connected to said control apparatus and said capsule drive means causing energiza-

tion of said capsule drive means after said locking mechanism is disengaged.

9. The transportation system as set forth in claim 1 including:

q. a storage track disposed adjacent said secondary track for storing said vehicle when not in use; 5

r. a vehicle diverting mechanism operably connected to said secondary and storage tracks in vertical transporting relationship, said diverting mechanism moving said vehicle between said secondary and storage tracks. 10

10. The wheel actuating mechanisms of claim 1 including:

s. extendable means secured to said vehicle causing lateral movement of said upper and lower set of driving and guiding wheels facilitating engagement and disengagement of said first and second pair of rails. 15

11. The structure as set forth in claim 3 including:

t. electrical conductors secured to said first and second pair of rails carrying power and communications;

u. electrical brushes secured to said vehicle communicating with said electrical conductors and connected to said control apparatus. 20

12. The structure as set forth in claim 11 wherein said first and second pair of rails include being formed in a C-shaped cross section and being disposed with the open portions facing 25

each other, said electrical conductors being disposed in the upper portions of said rails.

13. The structure as set forth in claim 12 including:

v. a grade adjusting mechanism formed in two parts, the first of which is secured to the lower portion of said first and second pair of rails, and the second of which is secured in confronting relationship to said first part and contains a running surface for said upper and lower set of driving and guiding wheels, said grade adjusting mechanism changing the angle of said running surfaces with respect to said first and second plurality of transverse members.

14. The vehicle diverting mechanism set forth in claim 9 including:

w. a turntable mechanism adapted to operably engage the vehicle and facilitate a rotational movement thereof.

15. The second pair of rails forming a secondary track set forth in claim 1 including:

w. a first pair of rail sections inclined upwardly and secured to the ends of said second pair of rails;

x. a second pair of rail sections inclined downwardly and secured intermediate and adjacent to said first pair of rail sections.

30

35

40

45

50

55

60

65

70

75