

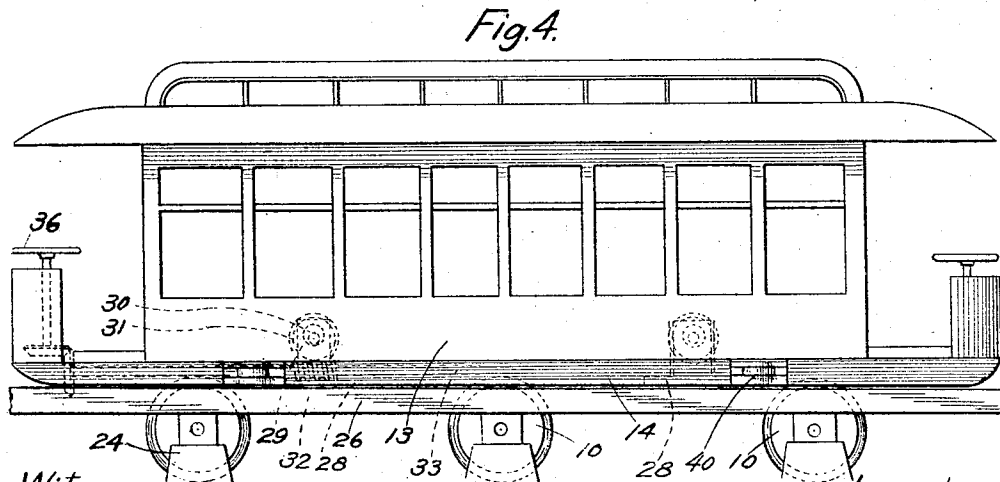
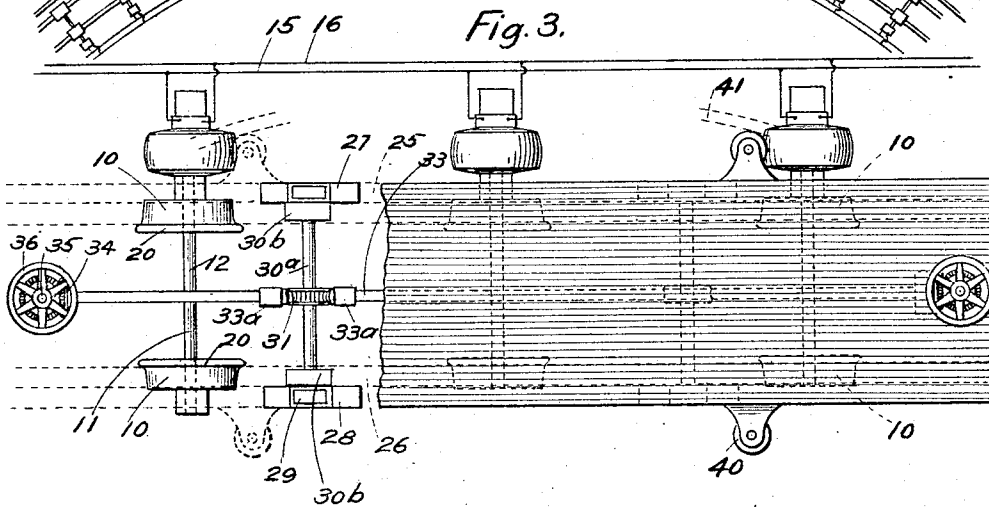
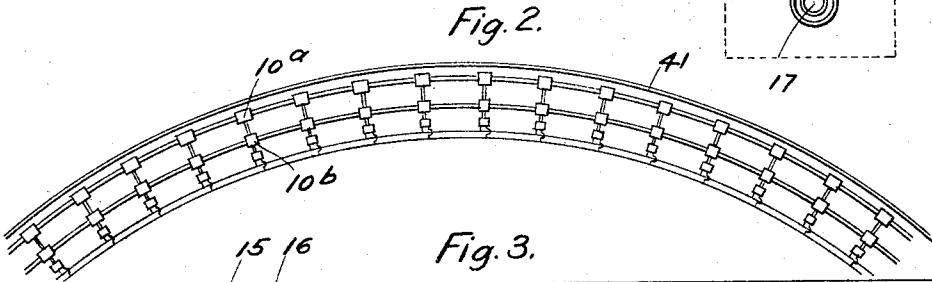
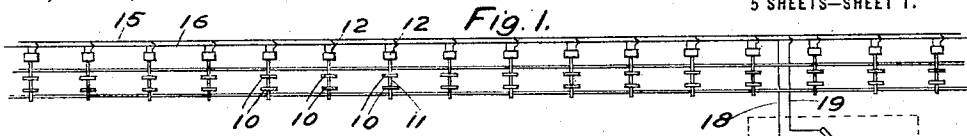
W. E. TRENT.
SYSTEM OF TRANSPORTATION.

APPLICATION FILED SEPT. 4, 1913. RENEWED FEB. 15, 1916.

1,198,605.

Patented Sept. 19, 1916.

5 SHEETS—SHEET 1.



Witnesses:

C. Burnap
Henry A. Parks

By

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5 SHEETS—SHEET 2.

Fig. 5.

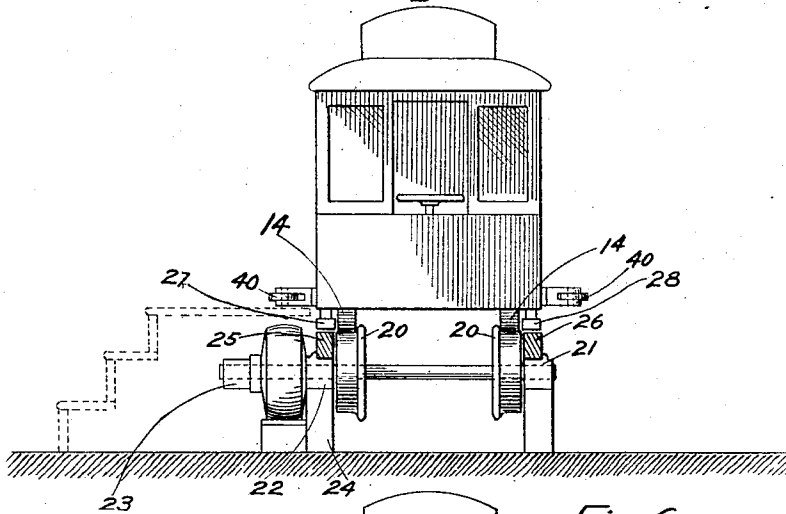


Fig. 6.

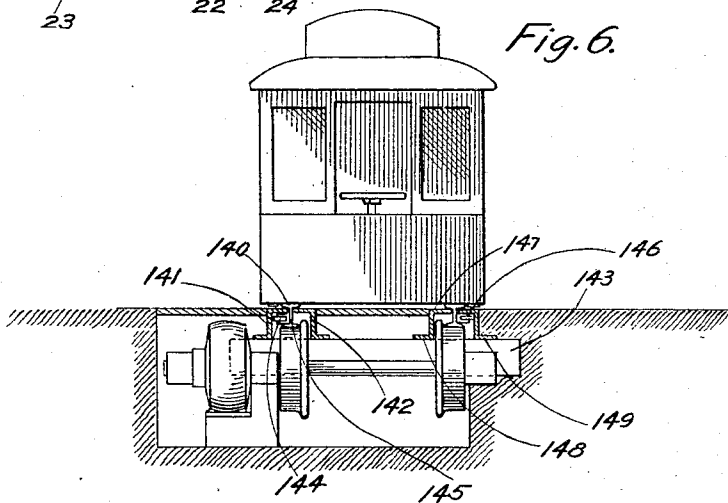
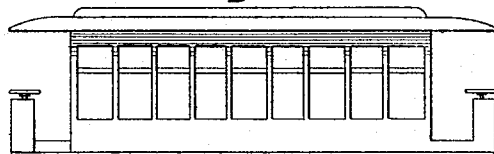


Fig. 7.



Witnesses:

C. D. Burnap

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Fig. 16.



By

Sheridan, Wilkinson & Scott Attys

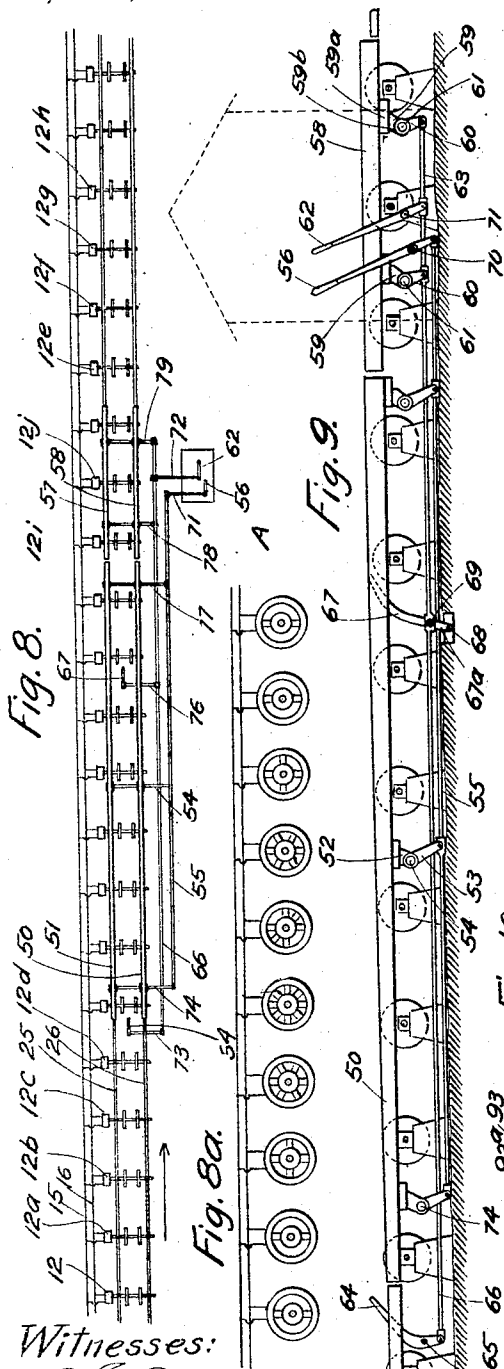
Inventor:

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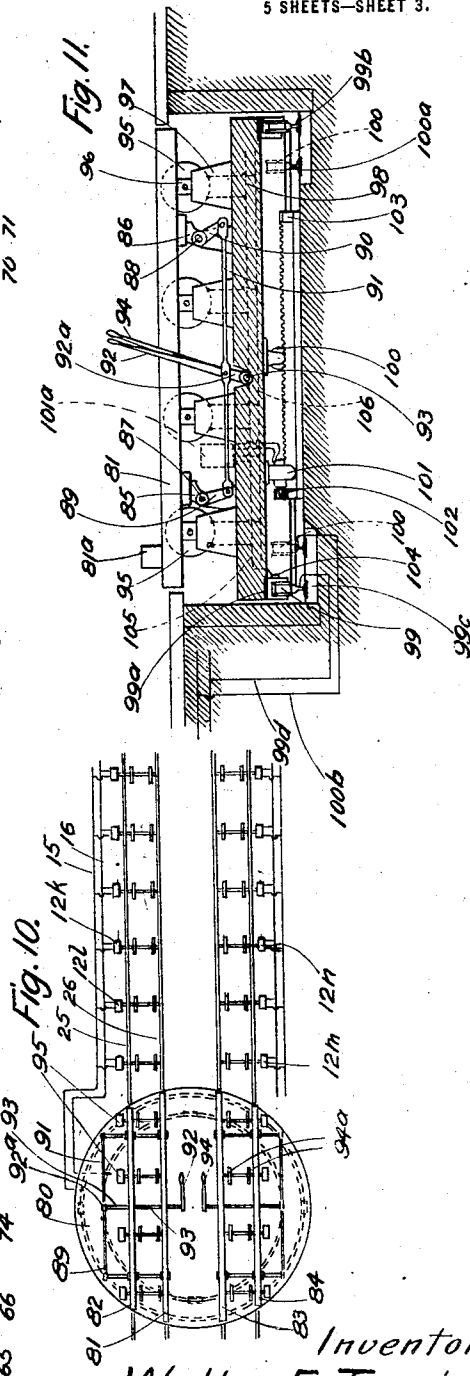
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5 SHEETS—SHEET 3.



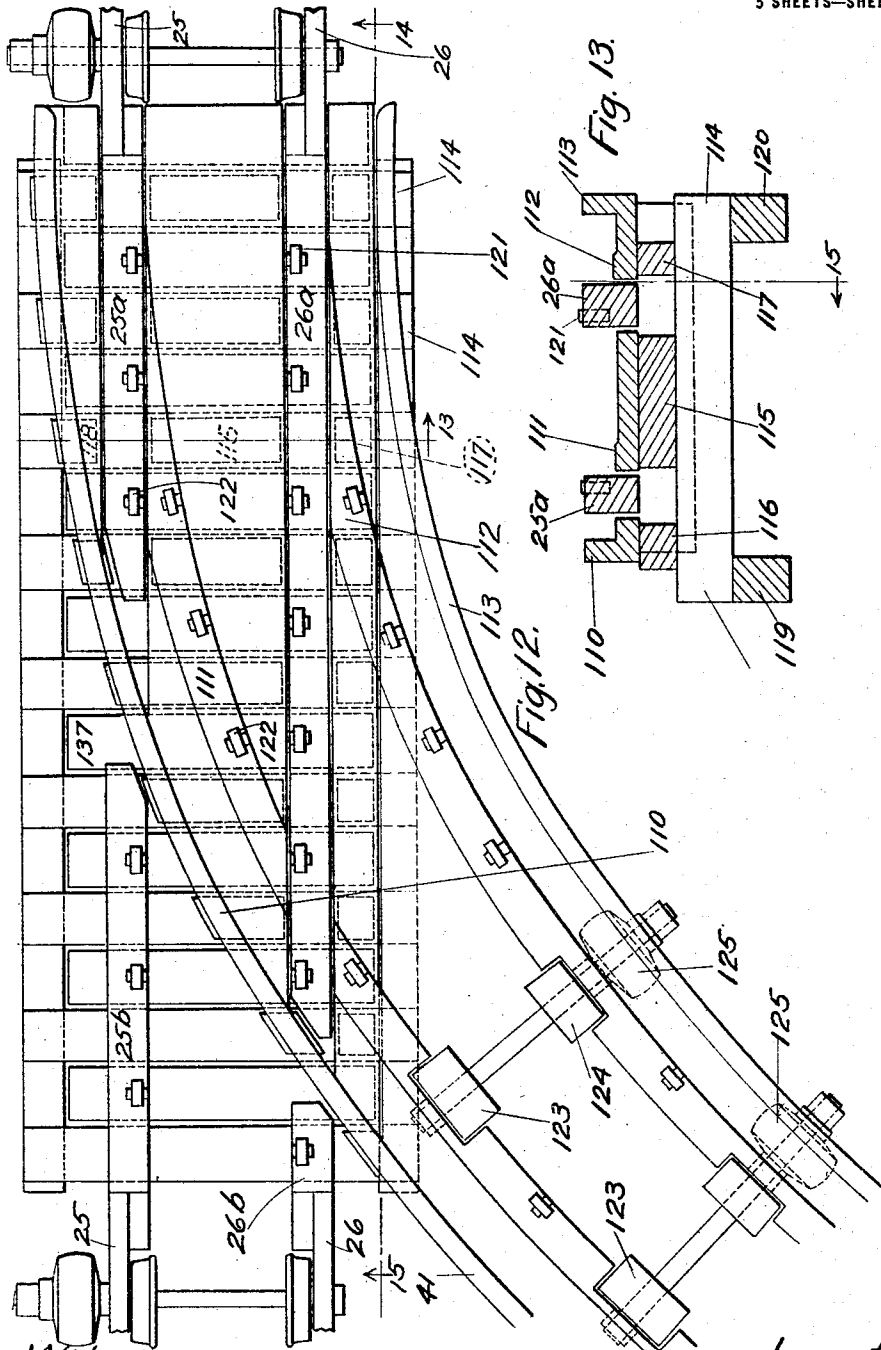
Witnesses:
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5 SHEETS—SHEET 4.



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5 SHEETS—SHEET 5.

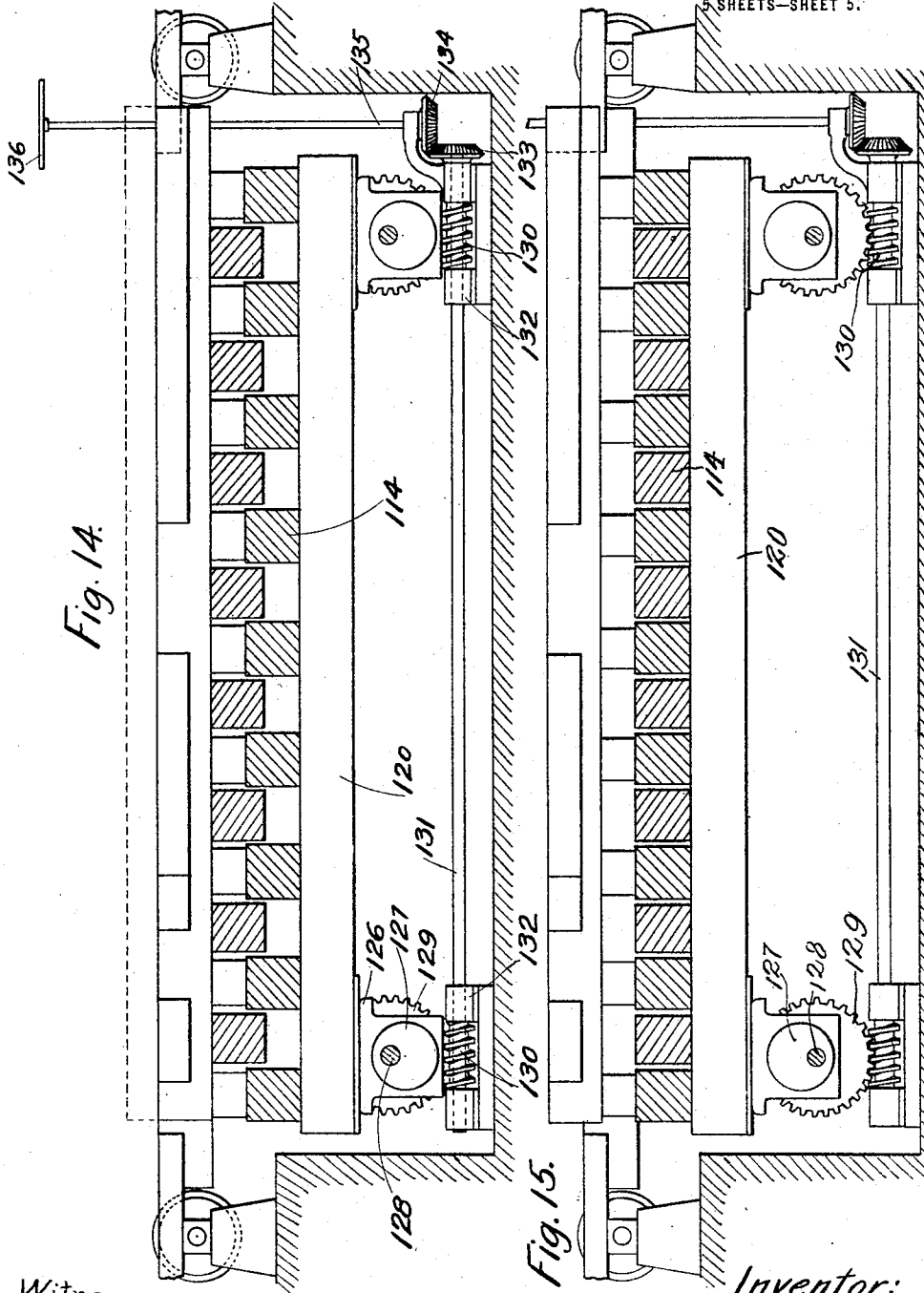


Fig. 14.

Fig. 15.

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UNITED STATES PATENT OFFICE.

WALTER E. TRENT, OF RENO, NEVADA.

SYSTEM OF TRANSPORTATION.

1,198,605.

Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed September 4, 1913, Serial No. 788,177. Renewed February 15, 1916. Serial No. 78,552.

To all whom it may concern:

Be it known that I, WALTER E. TRENT, a citizen of the United States, residing at Reno, in the county of Washoe and State of Nevada, have invented certain new and useful Improvements in Systems of Transportation, of which the following is a specification.

This invention relates to improvements in systems of transportation, particularly where it is desirable to run cars closely following each other or in other words to maintain very frequent service.

An important feature in this system is the operation of the cars in a manner which makes collisions practically impossible because of all the cars being carried over the road at a predetermined fixed speed. The cars are driven by rollers over which they pass and which have fixed positions in the path of travel and a fixed rate of rotation, so that the speed or velocity given to all the cars is the same and no matter how closely the cars travel their rate of travel is necessarily the same.

Another feature of my invention is to provide a system in which the cars are operated automatically or mechanically, so as not to require the manual services of the attendant accompanying each car except that of temporarily retarding the speed or stopping the car in case of emergency, at other points than the predetermined stations or stopping places. In other words the man accompanying the car, if such a man is used, has no duties or services to perform during the regular course of travel from station to station. I have also provided means of control at stations for stopping and starting the cars by an operator, though under normal operating conditions, the stopping will be automatically effected. It will only be necessary for the operator to start the car. I have also provided means whereby the incoming car will start the car ahead which may be standing at the station, thus making it impossible for cars to collide at the stations.

An important object of my invention, partly outlined above, is to provide a system in which the only manual work necessary in its operation on the part of the operators will be at the switches and at the ends of the line when the cars are turned or shifted to their return track. These opera-

tors are at fixed stations and not on the cars. In cases where loops are used at the ends of the line instead of turn tables and switches for transferring the cars to the return track no operators will be necessary.

Another object of my improved system is to provide means for recovering part of the energy of the moving cars when they are being stopped and this recovery of energy is obtained in the following manner: At points where the speed of the cars is to be reduced, preparatory to stopping at stations, the track rollers are fitted with motors having successively diminishing speeds. The car coming at a fixed or maximum speed runs on the rollers which are operated at lower speeds and the speed of the oncoming car accelerates these motors beyond their normal running speed. When a motor is driven beyond the speed for which it is built, it then becomes a generator and instead of drawing power from the line it will return power to the line until it is retarded to its normal speed. Therefore, the act of accelerating the motors having slower speeds creates a powerful brake and makes a conversion of the kinetic energy of the car into electrical energy which goes back into the electric line.

Another object of my invention is to utilize the driving power of the cars when running down grade when the tendency is to increase in speed because of the force of gravity. This tendency is to cause the rollers to run faster than that for which the motors were designed and this greater speed causes the motors to act as generators thereby resisting the increase of speed. The power developed by this increase of speed, the motors then running as generators, is sent back into the transmission line. Therefore, much of the power developed by the car when descending hills or grades is recovered, while at the same time the resistance of the motors then acting as generators, serves as a very efficient brake for the cars.

Another object of my invention is to produce a system which permits the using of motors built for the highest voltage and which reduces in proportion the size of wire required to transmit the power along the line. In the present systems of transportation, electrically operated, about 200 volts and seldom if ever higher than approximately 400 volts are used. The danger to

the crew and passengers prevents the use of higher voltage, but in my system, as described herein, there are no motors or electric currents of any kind on the cars, all
 5 wires being safely insulated and placed where nothing can come in contact with them. Motors can also be perfectly isolated, thus making conditions just as safe for the use of high voltage as for low voltage.
 10 Voltages not less than 2000 can be used, and standard motors now built for this voltage can be used with the consequent great saving in the size and cost of transmission wires.

15 In practically all present electrically operated transmission systems, direct current is used because it fulfils the exacting requirements of the motors operated in such systems. Alternating current motors would
 20 not fulfil the requirements in the present system, although, were it possible to have alternating current motors they would be much more preferable for many reasons, some of which are as follows:—Alternating
 25 current can be transformed readily to give higher or lower voltage while direct current cannot. Alternating current motors are very much cheaper, more reliable, less complicated, are not subject to the many
 30 weaknesses of direct current motors, and do not need as much attention to operate.

My new system, as above described, from a power standpoint, eliminates all objectionable conditions in connection with using
 35 alternating current motors and really makes their use desirable, as they offer superior service and performance under the conditions created, over direct current motors. I
 40 contemplate using alternating current squirrel type motors built to have what is commonly called a slip or in other words, slip ring motors. These motors are standard and are built so they will drop in speed from their normal speed sometimes as much
 45 as 20% before they will exert more than their normal power. By using such motors I get a fly-wheel effect from the driving rollers. These rollers when running at normal speed with their motors, have a certain
 50 potential energy which is given up when their speed is retarded, so by using slip motors the rollers are given a chance to deliver their stored energy while the motor slips in speed from its normal rate to
 55 the point where it commences to draw an abnormal amount of power to maintain its lower speed. As mentioned above, this slowing of speed may be as much as 20% below the normal running speed. After the
 60 car has passed a set of rollers and the speed has slipped or slowed, then the motor will exert its normal power until it has reached its normal speed and thus energy is gradually returned to the fly-wheels or rollers to
 65 help drive the next car and this condition

tends to give a more uniform power consumption throughout the system and greatly diminishes peak loads. This reduction of peak loads is very much to be desired for the reason that the equipment must have a capacity sufficient to meet the demands when
 70 they are the greatest. It is apparent, therefore, that the motors having this fly-wheel effect will not have to be larger to start the cars than is necessary to keep them going
 75 after they are accelerated. This fact, together with the fact that my cars have no tracks, wheels or motive machinery and therefore weigh but a small percentage of the weight of cars as now used, the power
 80 required to operate my system will be very much less than any system now in use.

When this system is adapted for regular street transportation or where a private
 85 right-of-way is not maintained, the car skids or tracks that come in contact with the rollers can be made of T rails or I beams or similar shapes so that they can work through narrow slots along the line of travel, thus making it impossible for
 90 horses, vehicles or people to come in contact with the rollers.

These and other objects and advantages of my improved system will be rendered more fully apparent in the following specification when taken in connection with the
 95 accompanying drawings and the novel features and combinations of parts therein will be more particularly set forth in the claims.

Figure 1 is a diagrammatic view of the
 100 track or line of travel as used in my improved system; Fig. 2 is a diagrammatic view of a curved portion of said track; Fig. 3 is a plan view with portions broken away of a car and a portion of the track and
 105 driving elements; Fig. 4 is a side elevation of one of the cars and a portion of the track and driving elements; Fig. 5 is an end elevation of the same; Fig. 6 is an end elevation of a modification; Fig. 7 is a side elevation
 110 on a smaller scale of one of the cars; Fig. 8 is a diagrammatic plan view of a portion of the track at a station; Fig. 8^a is a diagram showing motors of different speeds connected to the line wires to vary
 115 the speed of the car; Fig. 9 is a side elevation of the same on a larger scale; Fig. 10 is a plan view of a turn table; Fig. 11 is a vertical section of the same; Fig. 12 is a plan view of a switch; Fig. 13 is a vertical
 120 section thereof taken along the line 13—13 of Fig. 12; Fig. 14 is a vertical section of Fig. 13 taken along the line 14—15 of Fig. 12; Fig. 15 is a view similar to Fig. 14 with some of the parts shown in their elevated
 125 positions wherein the car will be caused to move from a main track to a branch line. Fig. 16 is a detail of a modification in the form of the brake track.

I accomplish the objects of my invention 130

by means of the driving rollers 10 which are fixed to shafts 11, disposed transversely of the path of travel and provided with electric motors 12, preferably of the alternating current type at the ends of said shafts. Each of said shafts is driven by one of said motors and is supplied by electrical energy through the supply conductors 15 and 16 disposed along said path of travel. The supply wires are provided with electrical energy by the alternating generator 17 located at a suitable station and connected with said conductors by the feeders 18 and 19.

The drive rollers 10 are disposed at such intervals along the path of travel that each of the cars 13 may preferably be supported by three of the rollers at all times, the cars being provided with runners or skids 14 on their bottoms which bear upon said rollers. Said runners or skids are preferably long and narrow bars or beams running lengthwise of the car and fitting between flanges 20 on the rollers. The shafts 11 are provided with bearings 21 and 22 suitably supported on small piers 24 of concrete or other suitable supporting means.

Immediately above the bearings 21 and 22 are located track bars or rails 25 and 26 upon which the friction blocks or brake blocks 27 and 28 may slide when it is desired to stop the car in emergencies. The brake blocks 27 and 28 are normally out of contact with said rails, being held in an elevated position by eccentrics 30 which are rotatively fitted to upright portions 29 of said brake blocks. The eccentrics 30 are fixed to transverse shafts 30^a, said shafts being provided with bearings 30^b fixed to the body of the car. Upon the shafts 30^a are fixed worm wheels 31 which mesh with and are driven by worms 30 fixed to the longitudinal shaft 33 mounted in bearings 33^a on the bottom of the car. At the ends of said shaft 33 are provided bevel gear connections 34 with upright hand wheel shafts 35 having hand wheels 36 fixed to their upper extremities.

Horizontally disposed rollers 40 are rotatably mounted upon the sides of the car and are adapted to bear upon guard rails 41 disposed at the side of the track when said track is curved. Said guard rails are illustrated in Figs. 2 and 12 in solid lines and in Fig. 3 in dotted lines.

At the stopping places or stations I provide the rails 50 which have their upper surfaces slightly inclined and disposed at a higher level than the tops of the rollers 10. The cars will therefore slide upon these elevated rails and will gradually be brought to a stop because of the friction resulting therefrom. In alinement with rails 50 I provide rails 58 at the exact point where it is desired to stop each car. The rails 58 are also elevated above the tops of the rollers

and are raised and lowered by arms or cams 59 which slide upon the lower surfaces of blocks 59^a secured to said rails. The arms 59 are secured to shafts 61 disposed transversely of the track and fixed to said shafts are arms 60 projecting downwardly and pivotally attached to a connecting rod or link 63. Pivotally attached to this link is a hand lever 62 pivoted at 71. This hand lever permits the station operator to raise or lower said rails 58 to such positions that the car will rest upon said rails or on the rollers, as occasion demands. In alinement with the link 63 is a long rod or link 66, extending to and pivotally attached to a lever 64 mounted at 65 in the fixed portion of the track preceding the elevated portion 50. The lever 64 has its end projecting above the track in the position in which it will be struck by the end of the car in case the station operator fails to move the lever 60 to a position which lowers the track 58. By this means it will be seen that if a car is standing at the station on the elevated rails 58 it will be lowered on to the rollers 10, and moved out of the way before an incoming car can reach the same position. I have also provided a second lever 67 adapted to project above the elevated portion 50 of the track when the lever 62 has been moved to the right. This lever 67 will be struck by the car if the operator fails to move the hand lever 62 back to its normal position shown in Fig. 9, before the car reaches said lever. This will insure the elevating of the track 58 to receive the incoming car before it reaches the rails 58. The lever 67 is pivotally attached at 69 to short arm 67^a fixed to the shaft 76 leading to said lever 67.

The cams or arms 59 are provided with a shoulder 59^b which engages the block 59^a in such manner as to lock the rails 58 in their upper position until the lever 62 is positively moved to the right.

The fixed portions 50 of the track may be lowered by arms similar to arms 59. The arms 52 are fixed to shafts 54 running transversely of the track, said shafts being provided with arms 53 pivotally attached to the connecting rod 55. Said connecting rod or link extends to a lever 56 at the station whereby the operator may lower the fixed rails 50 in case a car should be accidentally stopped thereon. When the rails 50 are thus lowered the rollers 10 will then engage the car and push it to the station. It will be noted that the various levers, 64, 67, 52, 59, 56 and 62 are fixed to shafts 73, 74, 54, 76, 77, 71, 72, 79, etc., disposed transversely of the track and provided with connections at their ends which lead to the station wherein they can be operated conveniently by the attendant at said station.

In Figs. 10 and 11 I have illustrated a turn table which is adapted for use with

my improved system at such points where it is desired to transfer a car from one track to another and to reverse the direction of movement of said car. The turn table body 5 80 is preferably circular in form and supports vertically movable rails 81, 82, 83 and 84 which are in alinement with the rails 25 and 26 of the line. The rails 81 and 82 preferably receive the incoming car from 10 the line on the right hand track and normally have a position slightly elevated above the rollers 95. The car will therefore slide on these rollers and be stopped by friction therewith. Blocks 81^a and 82^a are 15 used to prevent the car sliding too far. The rails 81 and 82 are held in their elevated position by arms or cams 85, 86 which are fixed to shafts 87, 88, said shafts being provided with arms 89, 90, at one end, 20 which are pivotally attached to the ends of the link 91. At the middle of the length of this link an arm 92^a is pivotally attached, said arm being fixed to a shaft 93, a hand lever 92 being secured to the opposite end 25 of said shaft. A similar lever 94 is connected with means similar to that described above, for raising and lowering rails 83 and 84. Rails 83 and 84 are in alinement with the return track, purpose of this arrangement being that the car may be lowered to the level of said return track and into contact with the rollers 94^a, which will cause the car to be started and transferred to said return track. It will be seen that an 35 operator standing within reach of the levers 92 and 94 may control both the incoming and outgoing cars.

The rollers 95 are provided with motors and are mounted on shafts provided with 40 bearings 96 which are supported by suitable piers 97 or other supports resting upon the turn table body 80. The body 80 is supported by suitable rollers 99 pivotally secured to the bottom of said turn table body and insulated therefrom, as shown at 99^a. The 45 rollers 99 run upon a circular track 99^b in the bottom of the pit containing the turn table. Said track 99^b may be supported by ties 99^c and insulated therefrom. One of 50 the main line conductors may be electrically connected with said rail by the branch conductor 99^d. The bearings of the rollers 99 may be connected with the various motors on the turn table by the conductor 105 55 and its branches. The opposite poles of the motors are connected by the conductor 106 and its branches to the series of rollers 100 which run upon another circular track 100^a very similar in all respects to the track 99^b. 60 Said track is connected to the other line conductor by the branch conductor 100^b and all the other features of said second circular track 100^a are the same as those of 99^b.

For the purpose of rotating the turn ta-

ble 80, I provide a motor 101, secured to the 65 bottom thereof and provided with a pinion 102 on its shaft which meshes with a circular rack 103 in the bottom of the pit. The motor 101 may be controlled by the operator that attends to the levers 92 and 94 70 a controller 101^a for such motor being placed within convenient reach of said operator.

In Figs. 12 and 13 I have illustrated a 75 switch for transferring the car from one track to another. For this purpose I have provided a guard rail 110 of curved form parallel to the track elements 111, 112 and adapted to guide the car around the curve by means of the side rollers 40. In order 80 to render the switch simple and efficient, I have mounted the essential parts thereof on a vertically movable platform composed of cross ties or beams 114. Portions of the main or straight track which do not com- 85 pose a part of the switch are held in a stationary position at a constant level by fixed cross ties 137. The fixed parts referred to are the portions 25^a, 25^b, 26^a and 26^b of the main track which are in alinement with 90 the rails 25 and 26 of said main track. In order to permit the vertical movement of the ties 114, I space them a considerable distance below the fixed rail portions and insert spacing blocks 115, 116 and 117 between 95 said ties 114 and the movable portions 110, 111, 112 and 113.

It will be seen that it is necessary to maintain the guard rail 110 below the level 100 of the sections of the main track when the switch is not in use. When the switch is to be used it is, of course, necessary to raise the guard rail. I support the movable cross ties 114 upon longitudinal beams 119 and 120 which in turn rest upon elevating 105 blocks 126. These blocks are fitted to eccentrics 127 fixed upon shafts 128 upon which in turn are secured worm wheels 129. Meshing with and driving said worm wheels are worms 130 secured to a shaft 131 mounted in bearings 132. At one end of the shaft 131 is fixed the bevel gear 133 meshing with a similar bevel gear 134 fixed to the lower 110 end of the vertical shaft 135. Shaft 135 is provided with a hand wheel 136 at its upper end. By means of this hand wheel it is obvious that an operator may raise or lower the movable portions of the switch at will.

I have provided small rollers 122 mount- 120 ed in the fixed portions of the main track and also in the movable portions of the switch by which the car may be carried along with the minimum of frictional resistance between the driving rollers of the 125 main track and the driving rollers 123 and 124 of the branch track. The driving rollers 123 and 124 of the curved part of the

branch track are conical in form in order to accommodate the circular path of the car. These rollers 123, 124 may be driven by motors 125 entirely similar in design to those used on the main track.

In Fig. 6 I have shown a modified form of the skids on the car and of the fixed portions of the track upon which the car runs. In this form I provide I-beams 140 to serve as skids or runners on the bottom of the car and provide rolled beams preferably of Z form 141 having their flanges in close proximity and with sufficient clearance only to freely permit the passage of the web 145 of said I-beam. The upper flanges 146 and 147 of these Z bars may be placed in a horizontal position flush with the street level. The lower flanges 148 and 149 of said Z bars may rest upon and be secured to cross ties 143 or other supports placed below the surface of the street. The vertical webs of the Z bars may serve as side guides upon which the side rollers 144 may run, said rollers being mounted upon the webs 145 of the I-beams. In this modified form of the car the only visible portions of the track will be narrow slots and the upper flanges of the Z beams and all parts of the track structure aside from these will be entirely below the surface.

Referring to Fig. 8 the motors 12^a, 12^b, 12^c and 12^d are constructed to run at successively decreasing speeds in the order of their approach to the station A. A car running upon the rollers driven by said motors will be gradually reduced in its speed for the reason that said motors will resist rotation at higher than their normal speeds. Running at higher speeds they will operate as generators and supply electrical energy to the system. The motors 12^e, 12^f, 12^g, 12^h are constructed to run at increasing speeds of rotation in the order of their departure from the station A. The motors 12ⁱ, 12^j, etc., at the station are constructed to run at a low speed.

In Fig. 8 I have shown a diagram of motors connected to the live wires, said motors have varying numbers of poles to cause them to run at different speeds. In a similar manner the motors 12^k, 12^l, etc., approaching the turn table 80 are constructed to run at successively decreasing speeds in the order of their approach and the motors 12^m, 12ⁿ, etc., are constructed to run at successively increasing speeds in the order of their departure from said turn table.

The rollers 10^a, 10^b in the curved part of the track, as well as the rollers 123 and 124 in the branch line, are made tapered or conical in form in order to accommodate the circular movement along said track.

The alternating current motors which I use in this system are of the type in which

a slip of speed of as much as 20% from their normal speed may occur. A certain reduction of speed on the rollers will occur during the passage of a car over them but the normal speed may be slowly recovered immediately thereafter. In this way the consumption of current by the motors is very uniformly distributed throughout the system.

In Fig. 16 I have shown a modified form of track 26^a and brake shoe 28^a, in which the contacting surfaces are inclined. In this form there will be a tendency to restore the car to its correct position on the rollers should it become displaced from them.

The operation of my improved system has already been largely referred to, but in addition thereto it may be said that the operator or attendant who travels in a car would ordinarily have nothing to do but watch the cars and the track ahead and apply the track brake if necessary. Said attendant may, of course, control the loading of the car and perform other duties if they are given him. An attendant at each station controls the stopping and starting of the car by manipulating the levers 56 and 62. By means of these levers he is enabled to bring the car to a stop on the vertically movable rails 58 and to cause the starting of said car by lowering said rails 58. When thus lowered, the car rests on the rollers and is started. Should a car become stopped upon the rails 50 the lever 56 will permit its removal from that position. An attendant on the turn table 80 may control the stopping of the cars upon said turn table by means of the lever 92. By means of the controller 101^a he can move said car to the outgoing side of said turn table after which he may start said car by lowering it into contact with the rollers 94^a by means of lever 94. In case the operator at the station fails to work the lever 62 properly the track levers 64 and 67 will perform the operation automatically. When it is desired to cause the car to take the switch on to the branch line it is only necessary to manipulate the hand wheel 136 whereby the guard rails 110 and 113 are elevated, together with the track elements 111 and 112 of said branch line. The car will travel around a considerable distance upon said switch because of its inertia after which the live rollers 123 and 124 will cause it to continue its travel.

An advantage of this improved system lies in the energy stored up in the rotating wheels on the motor shafts, said wheels being comparatively heavy so that when a load is suddenly thrown upon them the fly-wheel action of the wheels or rollers will serve to partially provide for such sudden

load during the passing of the car. The motors may, therefore, be of smaller capacity than would be required to move the cars without the assistance of said stored energy.

Another advantage lies in the use of individually operated electric motors running at fixed speed which require comparatively small current. The motors do not directly drive the car or cars and the fly-wheel action mentioned above will serve to partially make up for the sudden load when the cars pass over successive motor driven wheels. In this way a substantially constant current consumption is attained and the peak loads present in the operation of the ordinary electric car line are avoided.

Still another advantage is that high voltage motors may be readily utilized since the feed wires may be concealed or insulated, thereby removing danger of short circuiting of current or wires on the car. The use of alternating current motors of high voltage is possible since the speed of the same is maintained approximately constant or fixed, as stated above, the stopping and starting of the car being independent of the speed of the driving members which is not true in present day electric car systems. This condition must exist for the successful use of alternating current. This permits operation of the line at comparatively slight current cost both on account of the lack of variation of the consumption and inexpensive cost of wiring and the like where alternating current of high voltage is used.

Another advantage lies in the fact that any one or more of the motors may get out of order without stopping or seriously delaying the system. In a like manner any one of the cars may become damaged or totally disabled without seriously crippling the system for the reason that said car may be immediately removed from the track. The cars as used in this system are of very light weight for the reason that all of the trucks and driving machinery have been removed from them.

It will be noted that weight and complication has been removed from the cars in a very great degree and that for this reason the system is very efficient and reliable. The usual causes of delays in the present systems have been eliminated and the light and simple cars which I provide for the transportation of passengers and merchandise will be very easily and rapidly operated.

Another great advantage of this system is that much higher speed may be attained with greater safety than is possible in other systems for the reason that there are no wheels, trucks, motive power or any other parts on the cars that are liable to get out of order. This higher speed is also made

possible because the installation of the motors and rollers is such as to permit running at the higher speeds. This is due to their being permanently located and held by rigid bearings. Stationary machinery permits of higher and safer running speeds than movable machinery.

I have shown and described a system in which two conducting wires for the system are used but what is commonly known as the three-wire system and others are applicable to my improved system.

While I have described my improved system of transportation more or less precisely as regards the details of construction, I do not wish to be understood as limiting myself thereto as I contemplate changes in the form, the proportion of the parts and the substitution of equivalents as circumstances suggest or render expedient without departing from the spirit of my invention.

I claim—

1. In a system of transportation, a plurality of power imparting elements constituting a way, a plurality of separated and independently operable cars adapted to travel said way, said cars being supported upon and adapted to receive their motion from said power imparting elements.

2. In a system of transportation, a plurality of stationary power imparting elements constituting a way, a plurality of independent cars adapted to travel said way, said cars being arranged to receive motion from said power imparting elements, and means for independently controlling the travel of each car.

3. In a system of transportation, a plurality of stationary power imparting elements constituting a way, a car adapted to travel said way, said car being arranged to receive its motion from said power imparting elements, said elements being separately driven, and stopping stations for the cars intermediate the ends of the way.

4. In a system of transportation, a plurality of stationary power imparting elements constituting a way, a car adapted to travel said way, said car being arranged to receive its motion from said power imparting elements, said elements being separately driven to move said car at a predetermined fixed speed, and means independent of said elements for periodically stopping the travel of the cars.

5. In a system of transportation, a car, track members carried by said car, rotatable supporting elements located independently of said car, said elements being arranged to impart motion to said car, and means for interrupting the travel of the car without interrupting the rotation of said elements.

6. In a system of transportation, a plurality of separated and independent cars, track members carried by said cars, a plu-

reality of stationary rotatable driving elements, said elements being located independently of said car and constituting a way, said cars being normally supported upon one or more of said elements, said elements being arranged to impart motion to said cars to move the same over said way, a stopping platform for the cars, and means for preventing more than one car from stopping at the platform at the same time.

7. In a system of transportation, a car, track members carried by said car, a plurality of stationary rotatable driving elements, said elements being located independently of said car and constituting a way, said car being supported upon one or more of said elements at any one time, said elements being arranged to impart motion to said car to move the same over said way, and independent electrical driving means mounted on each element, whereby said elements are driven at a predetermined approximately constant speed.

8. In a system of transportation, a plurality of power imparting elements constituting a way, a car adapted to be driven over said way and receive its motion from said elements, and means to control the movement of said car at desired points along said way, said means being located at points of operation located independently of said car.

9. In a system of transportation, a car, a plurality of driving elements constituting a way, said elements being adapted to impart motion to said car to move the same over said way, and means to move said car out of operative position with respect to said elements, whereby the motion of said car may be stopped or started.

10. In a system of transportation, a car, a plurality of driving elements constituting a way and arranged to impart motion to said car to move the same over said way, means to move said car out of operative relation with respect to said elements, said means comprising braking means for stopping or resisting the movement of said car.

11. In a system of transportation, a car, a plurality of driving elements constituting a way and arranged to impart motion to said car to move the same over said way, means to move said car out of operative relation with respect to said elements, said means comprising braking means for stopping or resisting the movement of said car, said means being operable from said car.

12. In a system of transportation, a car, a way for said car, movable means on the way to impart movement to the car, supporting tracks located adjacent said way and means to support said car upon said tracks, at will, and to partially or wholly move the car out of engagement with said

movable means to decrease or stop the motion of said car.

13. In a system of transportation, a car, a way, means independent of the car to move said car along said way, tracks located adjacent said way, brake members carried by said car adjacent to and normally out of contact with said tracks, and means to contact said brake members with said tracks to rest said car thereon and regulate the engagement between the first mentioned means and the car whereby the contact of said brake members with said tracks will operate to reduce or stop the motion of said car.

14. In a system of transportation, a car, a plurality of separately driven power imparting elements constituting a way, a car supported upon and adapted to receive motion from said elements and be thereby moved along said way, tracks adjacent said way, brake members carried by said car normally adjacent to and out of contact with said tracks, and means to contact said brake members with said tracks to support said car thereon and move the same out of position driven by said elements, whereby the motion of said car will be resisted.

15. In a system of transportation, a car, a plurality of separately driven power imparting elements constituting a way, a car adapted to receive motion from said elements and be thereby moved along said way, tracks adjacent said way, brake members carried by said car normally adjacent to and out of contact with said tracks, means to contact said brake members with said tracks to support said car thereon and move the same out of position driven by said elements whereby the motion of said car will be resisted, and means to operate said brake blocks from said car.

16. In a system of transportation, a car, a plurality of separately driven power imparting elements constituting a way, a car adapted to receive motion from said elements and be thereby moved along said way, tracks adjacent said way, brake members carried by said car normally adjacent to and out of contact with said tracks, means to contact said brake members with said tracks to support said car thereon and move the same out of position driven by said elements whereby the motion of said car will be resisted, said members being mounted upon shafts, and means to raise or lower said members from said car.

17. In a system of transportation, a car, a plurality of separately driven power imparting elements constituting a way, a car adapted to receive motion from said elements and be thereby moved along said way, tracks adjacent said way, brake blocks carried by said car normally adjacent to and out of contact with said tracks, means to contact said brake blocks with said tracks

to support said car thereon and move the same out of position driven by said elements whereby the motion of said car will be resisted, said blocks being mounted upon shafts, and means to raise or lower said blocks, from said car, said means comprising eccentrics carried by said shaft and co-acting with said blocks to raise or lower the same upon rotation of said shafts.

18. In a system of transportation, a car, a plurality of separately driven power imparting elements constituting a way, a car adapted to receive motion from said elements and be thereby moved along said way, tracks adjacent said way, brake blocks carried by said car normally adjacent to and out of contact with said tracks, means to contact said brake blocks with said tracks to support said car thereon and move the same out of position driven by said elements whereby the motion of said car will be resisted, said blocks being mounted upon shafts, means to raise or lower said blocks from said car, said means comprising eccentrics carried by said shaft and coacting with said blocks to raise or lower the same upon rotation of said shafts, and means to rotate said shafts, said means being operable from said car and comprising a rotatable operating shaft operatively connected to said eccentric carrying shaft.

19. In a system of transportation, a car, a plurality of power imparting elements constituting a way, said car being supported upon and adapted to receive its motion from said elements to travel over said way, a station or stopping place, and means to stop said car at said station.

20. In a system of transportation, a car, a plurality of power imparting elements constituting a way, said car being adapted to receive its motion from said elements to travel over said way, a station or stopping place, means to stop said car at said station, and means to automatically start said car from said station upon approach of a second car.

21. In a system of transportation, a car, a plurality of power imparting elements constituting a way, said car being adapted to receive its motion from said elements to travel over said way, a station or stopping place, means to stop said car at said station, and means to automatically start said car from said station upon approach of a second car, said means being operated by said second car.

22. In a system of transportation, a plurality of power imparting elements constituting a way, a station or stopping place located adjacent said way, a car adapted to receive its motion from said elements and be driven along said way, and means to move said car out of position to receive a motion from said elements at or near said

station whereby said car may be brought to rest at said station.

23. In a system of transportation, a plurality of power imparting elements constituting a way, a station or stopping place located adjacent said way, a car adapted to receive its motion from said elements and be driven along said way, and means to move said car out of position, receiving motion from said elements at or near said station whereby said car may be brought to rest at said station, said means being controlled at a point independent of said car.

24. In a system of transportation, a plurality of power imparting elements constituting a way, a car adapted to receive its motion from said elements and travel over said way, a station or stopping place, track members located adjacent said way and normally out of contact with said car, means to move a portion of said track elements into contact with said car adjacent said station to move the car out of position driven by said power imparting elements whereby said car may be brought to rest at or near said station.

25. In a system of transportation, a plurality of power imparting elements constituting a way, a car adapted to receive its motion from said elements and travel over said way, a station or stopping place, track members located adjacent said way and normally out of contact with said car, means to move a portion of said track elements into contact with said car adjacent said station to move the car out of position driven by said power imparting elements whereby said car may be brought to rest at or near said station, and means to automatically move said track portion out of contact with said car upon the approach of a second car, whereby said first car will again receive motion from the adjacent of said power imparting elements.

26. In a system of transportation, a plurality of power imparting elements constituting a way, a car adapted to receive its motion from said elements and travel over said way, a station or stopping place, track members located adjacent said way and normally out of contact with said car, means to move a portion of said track elements into contact with said car adjacent said station to move the car out of position driven by said power imparting elements whereby said car may be brought to rest at or near said station, and means to automatically move said track portion out of contact with said car upon the approach of a second car, whereby said first car will again receive motion from the adjacent of said power imparting elements, said means being automatically operated by said second car.

27. In a system of transportation, a car, a plurality of power imparting elements con-

stituting a way, a car successively operated and driven by one or more of said elements, a portion of said way being curved, said elements constituting the curved portion of said way, having inclined portions, said portions being arranged to automatically provide for the centrifugal force of a car moving around said curve.

28. In a system of transportation, a car, a plurality of power imparting elements constituting a way, a car successively operated and driven by one or more of said elements, a portion of said way being curved, said elements constituting the curved portion of said way, having inclined portions, said elements being arranged to automatically move said car around said curve.

29. In a system of transportation, a car, a plurality of power imparting elements constituting a way, a car successively operated and driven by one or more of said elements, a portion of said way being curved, said elements constituting the curved portion of said way having inclined portions, said elements being arranged to automatically move said car around said curve, and means to prevent outward movement of said car around said curve.

30. In a system of transportation, a plurality of power imparting elements constituting a way, each of said elements comprising a rotatable shaft, supporting wheels carried by said shaft, each of said shafts being provided with a motor, and a car supported upon the supporting wheels of one or more of said elements and adapted to be moved along said way from element to element and receiving its motion therefrom, and means for interrupting the movement of such car at stated intervals along the way.

31. In a system of transportation, a plurality of power imparting elements constituting a way, each of said elements comprising a rotatable shaft, supporting wheels carried by said shaft, each of said shafts being provided with a motor, and a car supported upon the supporting wheels of one or more of said elements and adapted to be moved along said way from element to element receiving its motion therefrom, said car being provided with tracks or skids normally contacting with said wheels, and means for stopping succeeding cars without interrupting the movement of said elements.

32. In a system of transportation, a plurality of power imparting elements constituting a way, each of said elements comprising a rotatable shaft, supporting wheels carried by said shaft, each of said shafts being provided with separately driven driving means, and a car supported upon the supporting wheels of one or more of said elements and adapted to be moved along said way from element to element receiving its

motion therefrom, said car being provided with tracks or skids normally contacting with said wheels, and a station or stopping place adjacent said way, the elements away from said station being driven at a constant speed, the speed of successive elements being arranged to gradually decrease the speed of said car as it approaches said station and to increase it as it leaves said station.

33. In a system of transportation, a plurality of power imparting elements constituting a way, each of said elements comprising a rotatable shaft, supporting wheels carried by said shaft, each of said shafts being provided with separately driven driving means, a car supported upon the supporting wheels of one or more of said elements and adapted to be moved along said way from element to element receiving its motion therefrom, said car being provided with tracks or skids normally contacting with said wheels, a station or stopping place adjacent said way, the elements adjacent said station being driven at a constant speed, the speed of successive elements being arranged to gradually decrease the speed of said car as it approaches said station, and means to bring said car to rest at said station.

34. In a system of transportation, a plurality of power imparting elements constituting a way, said elements each comprising a rotatable shaft, and a motor driving said shaft, supporting members carried on said shaft, a car adapted to travel along said way and be supported by the supporting members of one or more of said elements, a station or stopping place adjacent said way, the motors in said elements in that part of the way which approaches the station being adapted to operate at successively decreasing speeds while the station is being approached, whereby said motors will serve to retard said car as said car rides upon them and drives them at higher than their normal speeds.

35. In a system of transportation, a plurality of power imparting elements constituting a way, said elements each comprising a rotatable shaft, and a motor driving said shaft, a generator connected with and adapted to supply said motors with electrical energy, supporting members carried on said shaft, a car adapted to travel along said way and be supported by the supporting members of one or more of said elements, a station or stopping place adjacent said way, the motors in said elements in that part of the way which approaches the station being adapted to operate at successively decreasing speeds while the station is being approached, whereby said motors will serve to retard said car as said car rides upon them and drives them at

higher than their normal speeds, at which higher speeds said motors will operate as generators and supply energy to the system.

5 36. In a system of transportation, a way, a car adapted to travel over said way, said car being moved by power imparted from rotatable elements located independently of said car and constituting supports for the
10 car, a second way diverging from said first named way, and means for diverting said car from said first named way to said second named way.

15 37. In a system of transportation, a way, a car adapted to travel over said way, said car being moved by power imparted from elements located and operable independently of said car and constituting said way, a second way diverging from said first named
20 way, means for diverting said car from said first named way to said second named way, and means for moving said diverting means into and out of operative position.

25 38. In a system of transportation, a way, a car adapted to travel over said way, said car being moved by power imparted from rotatable elements located independently of said car and constituting supports therefor, a second way diverging from said first
30 named way, and means for diverting said car from said first named way to said second named way, said car being moved over said second way by power imparted from elements located independently of said car and
35 constituting said second way.

39. In a system of transportation, a way, a car adapted to travel over said way, said car being moved by power imparted from rotatable elements located independently of
40 said car and constituting supporting means for the car, a second way of like character adjacent said first named way, and means for transferring said car from said first named way to said second way.

45 40. In a system of transportation, a way, a car adapted to travel over said way, said car being moved by power imparted from elements located independently of said car and constituting said way, a second way of
50 like character adjacent said first named way, said ways being adapted to support and move said car in different directions, adjacent portions of said first and second ways being movable and interchangeable.

55 41. In a system of transportation, a way, a car adapted to travel over said way, said car being moved by power imparted from elements located independently of said car and constituting said way, a second way of
60 like character adjacent said first named way, said ways being adapted to move said car in different directions, adjacent portions of said first and second ways being movable and interchangeable, and means for bring-

ing said cars to a stop on the incoming side 65 of said movable portions of said way.

42. In a system of transportation, a way, a car adapted to travel over said way, said car being moved by power imparted from elements located independently of said car 70 and constituting said way, a second way of like character adjacent said first named way, said ways being adapted to move said car in different directions adjacent portions of said first and second ways being movable 75 and interchangeable, means for bringing said cars to a stop on the incoming side of said movable portions of said way, and means for starting said car from the departing portion of said way. 80

43. In a system of transportation, a way, a car adapted to travel over said way, said car being moved by power imparted from elements located independently of said car and constituting said way, a second way of 85 like character adjacent said first named way and adapted to impart power and motion to said car in a different direction to said first named way, adjacent portions of said ways being movable and interchangeable, and 90 means for receiving and stopping said car on said portions independently of the power elements of said portions, said means being adapted to place said car into operative relation with said power imparting elements 95 at the will of the operator.

44. In a system of transportation, an electric generator, a way, a series of electric motors along said way, said motors being electrically connected with said generator to 100 receive power therefrom, a car adapted to receive motion from said motors as it travels along said way, and means for spacing the car from operative connection with said motors. 105

45. In a system of transportation, an electric generator, a way, a series of electric motors along said way, said motors being electrically connected with said generator to receive power therefrom, and a car adapted 110 to receive motion from said motors as it travels along said way, said generator and said motors being of the alternating current type.

46. In a system of transportation, an electric generator, a way, a series of electric motors along said way, said motors being electrically connected with said generator to receive power therefrom, a car adapted to receive motion from said motors as it travels 120 along said way, and means independent of said car for controlling its travel.

47. In a system of transportation, an electric generator, a way, a series of electric motors along said way, said motors being 125 electrically connected with said generator to receive power therefrom, a car adapted to receive motion from said motors as it travels

along said way, means independent of said car for controlling its travel, and means on said car for retarding its travel.

48. In a system of transportation, an electric generator, a way, a series of electric motors along said way, said motors being electrically connected with said generator to receive power therefrom, a car adapted to receive motion from said motors as it travels along said way, a station on said way, the motors on said way near said station being constructed to run at successively decreasing speeds in the order of their positions approaching said station, whereby a retarding and stopping of said car due to the resistance to rotation of said motors at higher than their normal speeds may be effected.

49. In a system of transportation, an electric generator, a way, a series of electric motors along said way, said motors being electrically connected with said generator to receive power therefrom, a car adapted to receive motion from said motors as it travels along said way, a station on said way, the motors near said station on the departing side thereof being constructed to run at successively increasing speeds in the order of their position departing from said station, whereby accelerating of the speed of said car may be effected.

50. In a system of transportation, a road way having a series of rotatable rollers adapted to support and impart movement to a car, and means adjacent the rollers at predetermined points throughout the road bed for automatically regulating the driving engagement between the car and rollers.

51. In a system of transportation, a way having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, one of said parts comprising the rollers and tracks being vertically adjustable whereby to regulate the driving engagement between the car and rollers.

52. In a system of transportation, a way having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, said track being adapted to be engaged by the car and having an inclined portion whereby to gradually move the car out of contact with the rollers.

53. In a system of transportation, a way having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, a portion of said tracks being movable vertically whereby to elevate the car above and out of contact with the rollers.

54. In a system of transportation, a way

having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, a portion of said tracks being bodily movable vertically whereby to elevate the car above and out of contact with the rollers, and means for imparting movement to the tracks.

55. In a system of transportation, a way having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, a portion of said tracks being movable vertically whereby to elevate the car above and out of contact with the rollers, and means acting automatically to move said tracks vertically.

56. In a system of transportation, a way having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, a portion of said tracks being movable vertically whereby to elevate the car above and out of contact with the rollers, means acting automatically to raise or lower the tracks into and out of engagement with the rollers, and manual means for adjusting said tracks.

57. In a system of transportation, a way having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, a portion of said tracks being movable vertically whereby to elevate the car above and out of contact with the rollers, and means arranged in the path of the car to be actuated by the movement thereof to adjust said movable tracks.

58. In a system of transportation, a way having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, one of said parts comprising the rollers and tracks being vertically adjustable whereby to regulate the driving engagement between the car and rollers, and automatically operable means for imparting movement to said adjustable part.

59. In a system of transportation, a way having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, one of said parts comprising the rollers and tracks being vertically adjustable whereby to regulate the driving engagement between the car and rollers, and automatically operable means for imparting movement to said adjustable part, said

means having an actuating trip device arranged in the path of and adapted to be actuated by the movement of a car over the rollers.

5 60. In a system of transportation, a way, rolling elements arranged transversely of the way to support and impart movement to cars along the way, a stopping platform, means for elevating the platform to space
10 the car out of contact with the rolling members, and means actuated by the movement of a succeeding car whereby to lower the preceding car into contact with the rolling members, previous to the engagement of the
15 succeeding car with the platform.

61. In a system of transportation, a way having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car
20 over the rollers, one of said parts comprising the rollers and tracks being vertically adjustable whereby to regulate the driving engagement between the car and rollers, a
25 car adapted to travel over said way, and friction devices carried by the car to engage said tracks.

62. In a system of transportation, the combination of a way, a car adapted to
30 travel over said way, movable means on the way to support and impart movement to the car along the way, an inclined track adapted to be engaged by the car to gradually move the latter out of engagement with
35 said movable means, and a bodily movable platform to be engaged by the car, said platform connecting with said inclined tracks.

63. In a system of transportation, a way
40 having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, means for automatically releasing
45 the operative drive connection between the rollers and car whereby to stop the car, and means whereby said operative drive connection between the rollers and car is established by the movement of a succeeding car.

50 64. In a system of transportation, a way having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car
55 over the rollers, said rollers being provided with motors, and a series of said motors having successively diminishing speeds.

65. In a system of transportation, a way having a series of rotatable rollers adapted
60 to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, said rollers being provided with motors, and a series of said motors hav-

ing successively diminishing speeds, whereby the travel of the car over the last mentioned rollers constitutes said motors as generators for the electrical system.

66. In a system of transportation, a way, a car adapted to travel over said way, said
70 car being moved by power imparted by elements located independently of said car and constituting said way, and operatively associated electric connections for said elements, whereby certain of said elements
75 form generators.

67. In a system of transportation, the combination of a way, a car adapted to travel over said way, a series of rotatable elements positioned along said way adapted
80 to support and impart movement to the cars along the way, means whereby certain of said rotatable elements move at a slower rate of speed than others along the way, and electric driving means for said rollers,
85 the rollers rotating at a reduced speed being adapted when engaged by the car to constitute generators, substantially as and for the purpose described.

68. In a system of transportation, a way
90 having a series of rotatable rollers adapted to support and impart movement to a car, a platform or tracks extending longitudinally of the direction of travel of the car over the rollers, said rollers being provided
95 with motors, a series of said motors having successively diminishing speeds, whereby to gradually retard the movement of a car, and succeeding motors thereafter having successively increasing speeds, substantially as
100 and for the purpose described.

69. In a system of transportation, a car, a plurality of driving elements constituting a way, said elements being adapted to impart motion to said car to move the same
105 over said way, and automatically operable means to move the car out of operative engagement with respect to said elements, whereby the motion of said car may be
110 stopped.

70. In a system of transportation, a plurality of power imparting elements constituting a way, each of said elements comprising a rotatable member, driving means for said member, a car supported upon the rotatable members, and adapted to be moved
115 along said way from member to member receiving its motion therefrom, said car being provided with tracks or skids normally contacting with said wheels, and a station or
120 stopping place adjacent said way, the elements away from said station being driven at a constant speed, the speed of successive elements being arranged to gradually decrease the speed of said car as it approaches
125 said station, and to increase it as it leaves said station.

71. In a system of transportation, a plu-

5 rality of power imparting elements consti-
tuting a way, each of said elements compris-
ing a rotatable member, driving means for
said member, a car supported upon the ro-
tatable members, and adapted to be moved
along said way from member to member re-
ceiving its motion therefrom, said car being
provided with tracks or skids normally con-
tacting with said wheels, and a station or
10 stopping place adjacent said way, and means
for positioning the car out of contact with
the rotatable members at said station.

72. In a system of transportation, a plu-
rality of power imparting elements consti-
15 tuting a way, each of said elements com-
prising a rotatable member, driving means
for said member, a car supported upon the
rotatable members, and adapted to be moved
along said way from member to member re-
ceiving its motion therefrom, said car being
provided with tracks or skids normally con-
tacting with said wheels, a station or stop-
ping place adjacent said way, means for po-
sitioning the car out of contact with the ro-
tatable members at said station, and means
20 actuated by the movement of a succeeding
car for again establishing driving connec-
tion between the car and rotatable members.

73. In a system of transportation, an elec-
30 trical generator, a way, a series of electric
motors along said way, said motors being

electrically connected with said generator to
receive power therefrom, rollers adapted to
be driven by the motors, a car supported
upon and adapted to receive motion from 35
said rollers, and means independent of the
rollers and car for controlling the travel of
the car.

74. In a system of transportation, the
combination of a way having rotatable sup- 40
porting and driving means for cars, a plu-
rality of independent cars positioned on said
supporting means, a stopping station inter-
mediate the ends of the way, and means
whereby an incoming car will start a pre- 45
viously stopped car at the station.

75. In a system of transportation, the
combination of a way having a series of
rotatable elements forming supports, and 50
means for imparting travel to cars along
the way, motors for driving said elements,
and means whereby said motors may con-
stitute generators when the rotatable ele-
ments run faster than that for which the
motors are designed. 55

In testimony whereof, I have subscribed
my name.

WALTER E. TRENT.

Witnesses:

WALTER A. SCOTT,
HENRY A. PARKS.

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