

April 23, 1963

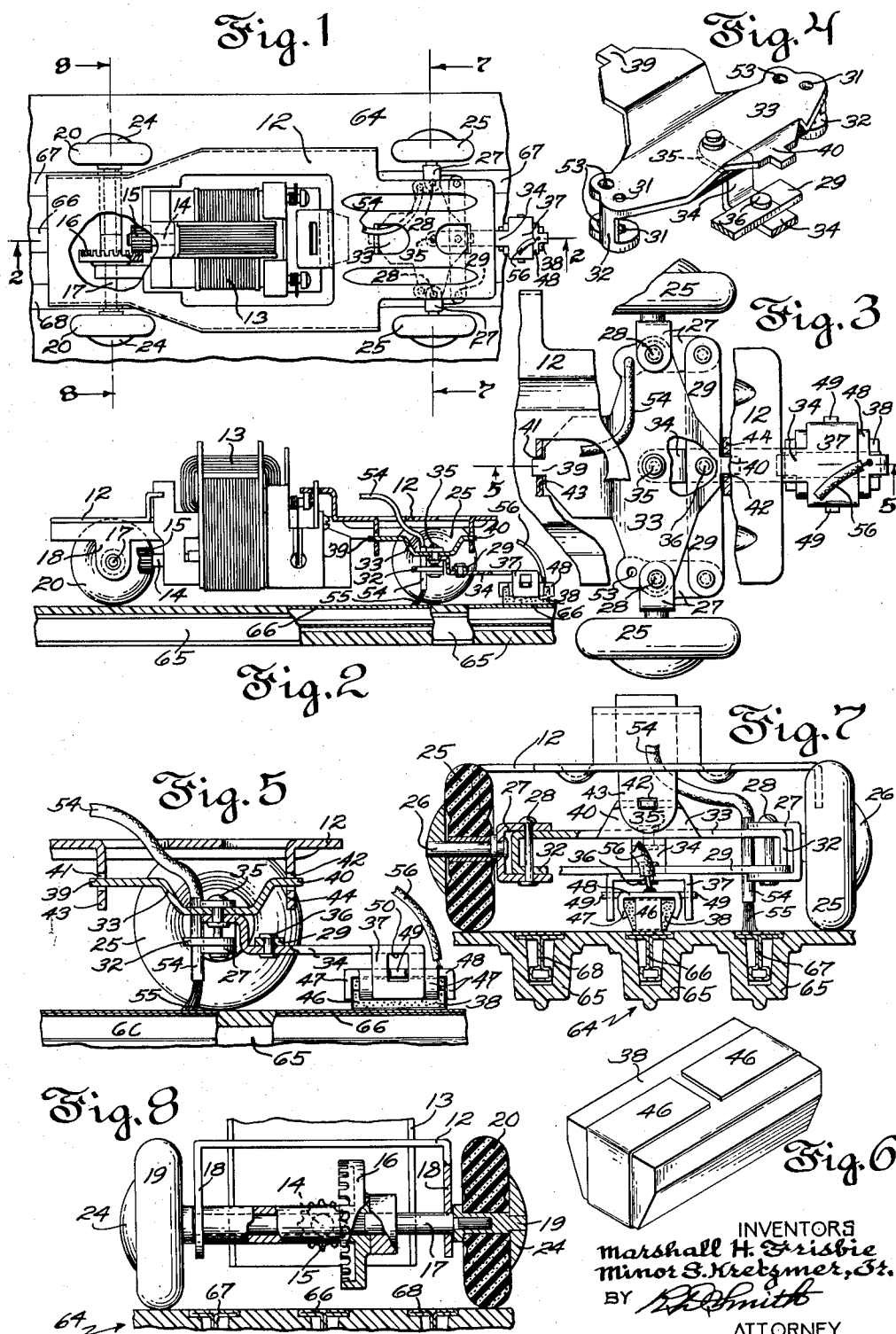
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3,086,319

ROAD TRAFFIC TOY REMOTE CONTROLLED

Filed April 25, 1960

3 Sheets-Sheet 1



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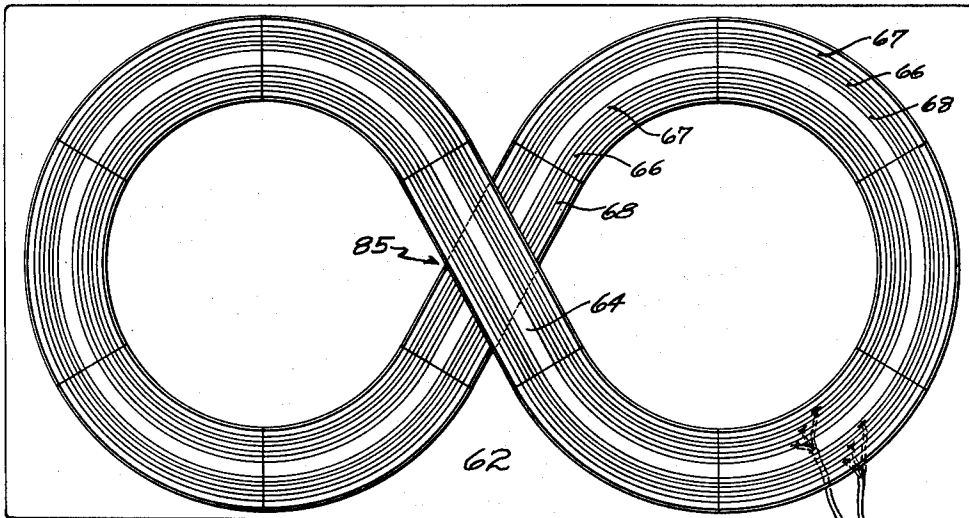
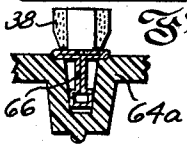
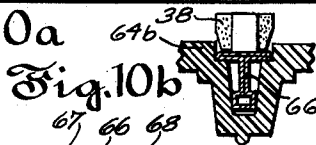
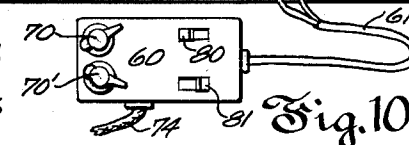
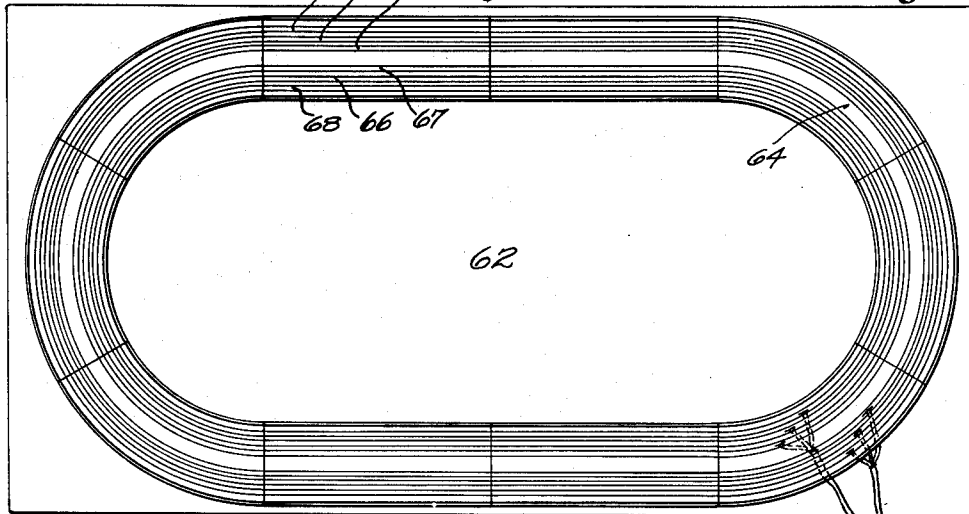
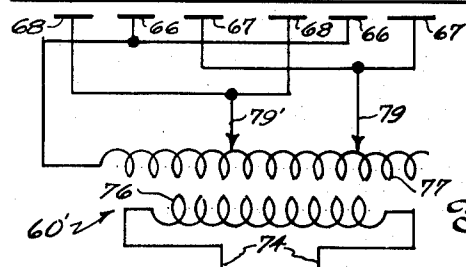
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Filed April 25, 1960

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Fig. 9



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ROAD TRAFFIC TOY REMOTE CONTROLLED

Filed April 25, 1960

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Fig. 11

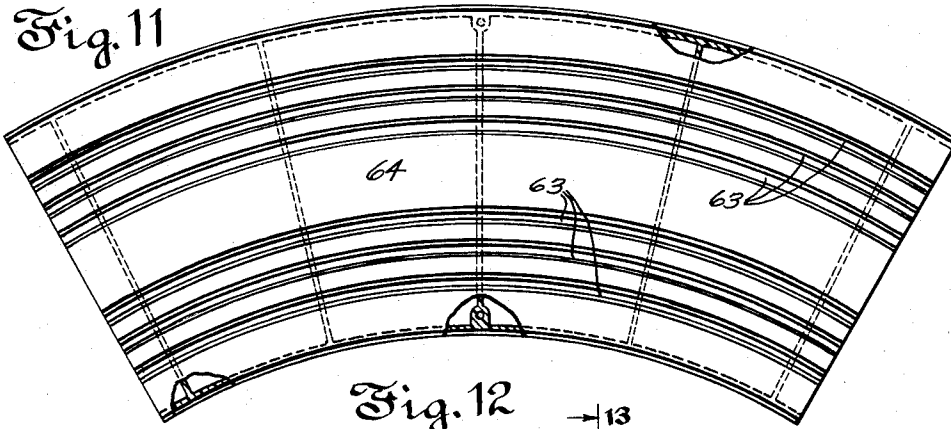


Fig. 12

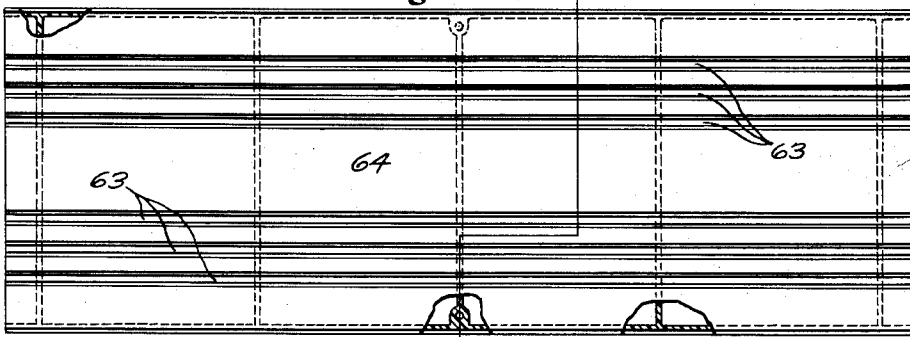
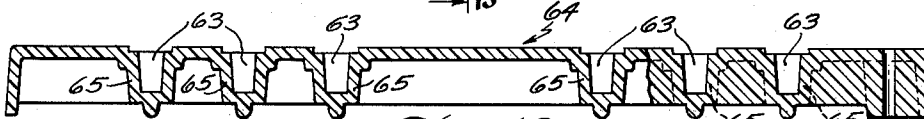


Fig. 14

Fig. 15

Fig. 16

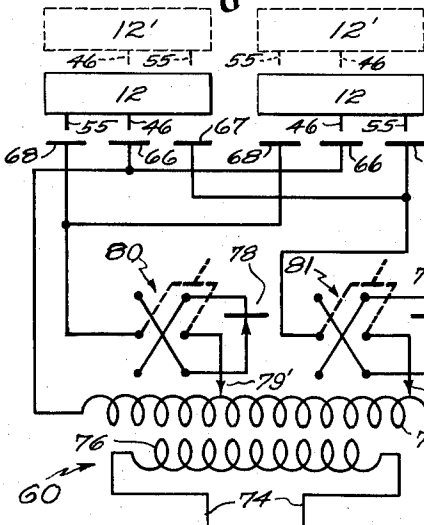
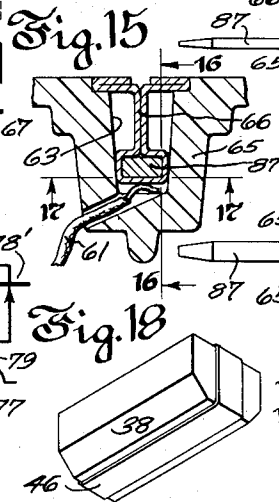
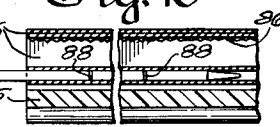
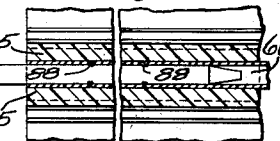


Fig. 17



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ROAD TRAFFIC TOY REMOTE CONTROLLED
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Filed Apr. 25, 1960, Ser. No. 24,496

5 Claims. (Cl. 46-244)

This invention relates to toy traffic systems in which toy wheeled vehicles are caused to travel in a manner that is realistically imitative of the appearance and performance of actual traffic moving on a rail-less street or thoroughfare, in that the stopping, starting and speed of travel of plural toy vehicles can be controlled by an operator stationed at a point remote from the roadbed without there being apparent the means by which control is imparted to the vehicle.

As previously proposed, remote controlled toy traffic systems have resorted to unrealistic mechanical means in the roadbed for directional guidance of the toy vehicles. Other unrealistic expedients have been proposed such as a harness of flexible conductors extending like reins from the vehicle to the hand of the operator, or the projection of light waves or sound waves focused on the vehicle as it travels, or conspicuous interruptions to the smoothness of the top roadbed such as slots, curbs, grooves or upstanding ridges serving to restrict the direction in which the vehicle can travel, also the loading of vehicles with weighty and costly dry cells of short life requiring frequent replacement as a source of current for the vehicle carried propulsion motor.

In contrast to such unrealistic and impractical expedients the present improvements have the following objectives among others:

One object is to start, stop and vary the speed of travel of one or more vehicles on a toy roadbed that, if desired, can appear to have a surface smoothness uninterrupted by slots, sunken grooves or upstanding track rails for mechanically determining the course of travel of the vehicle or vehicles. The lanes of vehicle travel can thus be made inconspicuous or if desired invisible, thereby making it possible for the toy roadbed to simulate more effectively in miniature the natural appearance of an ordinary town street or traffic thoroughfare.

Another object is to guide the vehicle in magnetically determined paths of travel without resort to a traveling magnet as means to tow the vehicle.

Another object is to utilize as a vehicle piloting means a stationary continuous way having a top surface lying flush with or slightly above or below the traveled surface of the roadbed and that is composed of a homogeneous metal that is electrically conductive with a magnetically permeable or paramagnetic content such as a ferrous metal alloy, which way can thus at one and the same time pilot the vehicle magnetically and/or mechanically and also furnish electric current for vehicle propulsion. For return of the current a parallelly disposed, companion way may be employed that is electrically conductive.

A still further object is to embody in a traffic simulating toy a vehicle directive automatic system such as is being planned for high speed turnpike constructions for holding real traffic vehicles to a predetermined lane or course of travel independently of steering by the occupant of the vehicle for avoidance of accidents caused by drowsiness or lack of alertness. A simple layout of a circuitous course of parallel ways, especially of the figure-8 overpass type shown in FIG. 9, affords for children an exciting miniature race track on which replicas of modern racing cars can be caused to pass one another, careen about curves, collide at high speeds, swerve off the race-

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way and in other ways duplicate the thrills of popular spectator racing meets.

These and other objects of the present improvement will become apparent in further detail from the following description of a successful embodiment of the invention having reference to the accompanying drawings, wherein:

FIG. 1 is a plan view of the chassis of a vehicle and its underlying roadbed in suitable toy size and incorporating the invention, portions being broken away to expose underlying parts more clearly.

FIG. 2 is an elevation taken mostly in section on the plane 2-2 in FIG. 1 looking in the direction of the arrows.

FIG. 3 is an enlarged plan view of the leading portion of the chassis of FIG. 1 with parts broken away to expose the steering mechanism.

FIG. 4 shows in perspective several of the parts of the steering mechanism detached from the vehicle.

FIG. 5 is an enlarged view of a portion of the steering mechanism as appearing in FIG. 2.

FIG. 6 is an enlarged perspective view of the vehicle steering magnet detached from the parts by which it is carried.

FIG. 7 is a front view of the vehicle shown on the same scale as FIGS. 3 and 5 and is taken partly in section through the vehicle and roadbed on the plane 7-7 in FIG. 1, looking in the direction of the arrows.

FIG. 8 is a rear view of the vehicle drawn on a scale like FIG. 7 taken partly in section on the plane 8-8 in FIG. 1 looking in the direction of the arrows.

FIGS. 9 and 10 show examples of various roadbed layouts that can be constructed by use of roadbed sections incorporating the profile construction shown in FIG. 7.

FIGS. 10a and 10b show modified relationships of the top surface of the central way to the adjoining top surfaces of the roadbed section.

FIGS. 11 and 12 are plan views respectively of curved and straight grooved parts of molded insulation usable as sections of a toy roadbed so constructed.

FIG. 13 shows on an enlarged scale the profile contour of integral roadbed sections such as those in FIGS. 11 and 12 taken in section on the planes 13-13 in FIG. 12, the metallic ways being removed.

FIG. 14 is a diagram of a suitable system of circuit connections that may be employed to supply reversibly polarized direct current to the metallic ways of the roadbed in a manner to exert independent control simultaneously upon a plurality of toy vehicles traveling over the same roadbed.

FIG. 14a is a diagram of alternating current circuitry in which rectifiers and reversing switches are omitted.

FIG. 15 shows on an enlarged scale the hollow end portion of one of the metallic ways of FIG. 7 equipped with an electrically conductive connector.

FIG. 16 is a view taken in section on the plane 16-16 in FIG. 15, looking in the direction of the arrows.

FIG. 17 is a view taken in section on the plane 17-17 in FIG. 15, looking in the direction of the arrows.

FIG. 18 is a perspective view of the bottom face of the magnet of FIG. 6.

Typical of a toy vehicle fitted to operate in a toy traffic system incorporating the present improvements, there is shown in FIGS. 1 and 2 a vehicle chassis 12. Any toy vehicle body (not shown) may be superimposed on the chassis 12 to cause the vehicle to resemble in miniature an automobile, truck, trailer, racing car, delivery wagon, piece of fire apparatus, or the like. Chassis 12 is equipped with a propulsion motor 13 whose drive shaft 14 fixedly carries the drive pinion 15 that is constantly in mesh with a driven crown gear 16 fixed on the live rear axle 17 of the vehicle. Axle 17 rotates freely in chassis bear-

ings 18 and drives the rear road wheels 20 whose tread portion, at least, is of electric insulative material.

Front wheels 25 are cantile and turn freely on pintles 26 projecting horizontally and fixedly from the swingable steering arms 27 on which the front wheels are retained by a hub cap 24 having a press fit on the pintle. Steering arms 27 are pivotally mounted on chassis 12 by means of king pins 28 carried by a bridge plate 33 that is loosely engaged with and depends from the chassis. Arms 27 are coupled together by a horizontal tie bar 29 so as to steer the vehicle by swinging the wheels 25 in unison about the king pins. Thus steering arms 27 form part of a wheel carriage supported by wheels 25 and pivotally related to the vehicle to permit the wheels to cant.

A pilot arm 34 has an upwardly offset rear end that is pivotally connected at 35 to the loose bridge plate 33 midway the width of the vehicle, and further is pivotally connected at 36 to the tie bar 29 so that swinging of pilot arm 34 about pivot 35 swings the arms 27 to steer and pilot the vehicle.

Bridge plate 33 is loosely mounted on chassis 12 by means of its upwardly offset rear end portion 39 and upwardly offset front end portion 40. These end portions are loosely retained in oversize apertures 41 and 42, respectively, in two tongues 43 and 44 struck downward from the sheet metal of the chassis 12. Each of the bridge plate end portions 39 and 40 is free to rise and fall and also to swivel a limited amount in the apertures 41 and 42. This permits a limited degree of tilting movement of the bridgeplate and pilot arm 34 in relation to the chassis 12 and enables all of the hereinafter described parts that are connected to pilot arm 34 to accommodate themselves to movement of the vehicle along the road surface without restrictive binding. Interconnected fragments of the aforementioned parts 33, 34 and 29 are shown in perspective in FIG. 4.

The front end portion or head 37 of the pilot arm 34 carries a vehicle piloting unit connected to a pivotal part 27 of the wheel carriage and comprising permanent magnet 38 which may be bare faced or which for some purposes hereinafter explained may have wrapped about it, preferably lengthwise, a very thin surfacing band 46 of phosphorus bronze or other suitable conductive metal which need be no thicker than .005 to .015 inch so as to lap the bottom surface of magnet 38 and intervene between the same and the top surface of para-magnetic way 66 its bottom conductive face riding in contact with the latter. Way 66 is central of each group of three metallic ways that are embedded in the roadbed as hereinafter more fully described. The permanent magnet 38 with its band 46 is fixedly held in the depending clutching fingers 47 of a conductive crown cap 48 having two lateral lugs 49 that are loosely retained in apertures 50 in opposite, downward bent, side walls of the head 37 of pilot arm 34. Limited movement in all directions is thus permitted to the lugs 49 in apertures 50 to an extent to afford freedom for the permanent magnet 38 and/or its band 46 to always rest freely by gravity as well as be drawn by magnetic attraction into contact with the surface of an electrically conductive and magnetically permeable vehicle guiding way 66 as it slides therealong. Magnet 38 has its north and south poles at opposite ends of its length and embraces the way 66.

As best shown in FIG. 7, each steering arm 27 straddles a U-shaped, downward and inward extension 32 of the sheet metal of bridge plate 33 and is pivotally coupled thereto by the king pins 28 which occupy vertically aligned holes 31 in extension 32. Also through the vertically spaced apart portions of U-shaped extensions 32 of the bridge plate there are coaxial, vertically aligned holes 53 of suitable size to receive and hold fixedly lodged therein the jacket of insulation on the end portion of a stranded electric lead 54. The bottom extremity of lead 54 is bared of insulation to expose the flexible conductive

wire strands 55 which can flex resiliently to serve as a current collector as they wipe conductively against the top surface of either one or the other of the metallic ways 67, 68 of the roadbed with which they ride in contact. Lead 54 connects electrically to the propulsion motor 13 of the vehicle as also does another very flexible lead 56 that is soldered to or is otherwise in permanent electrical connection with the crown cap 48 that holds magnet 38 as hereinbefore described. Lead 56 is so flexible as to offer negligible resistance to the limited free movements of permanent magnet 38. Through leads 54 and 56 motor 13 is thus energized by current derived from two of the electrically conductive lanes of the roadbed, such as 66, 67 or 66, 68.

FIGS. 11, 12 and 13 illustrate a suitable construction of insulative roadbed sections receptive to and serving to insulate the aforesaid metallic conductive ways, which latter can then be subjected to varied conditions of current supply in a manner to control the starting, stopping, speed and direction of travel of a vehicle like that illustrated in FIGS. 1 to 8, inclusive. A remote controller for this purpose is represented at 60 in FIGS. 9 and 10 having stationary wiring 61 invisibly connecting to the ways of the roadbed beneath the top surface thereof. Controller 60 and its electrical connections are preferably such that either direct current or alternating current can be fed therefrom to the ways of the roadbed with desired governing effect upon vehicles traveling the roadbed.

The roadbed 64 is best shown in FIGS. 7 and 13 to comprise an end to end assemblage of inverted tray like panel sections of molded insulative material such as high impact polystyrene or the like having depending ribs 65 extending lengthwise in the hollow thereof for stiffening and affording a base area on which the roadbed will rest. These may rest on or be in whole or in part elevated above a table or floor 62. Linear cavities 65 afford parallelly extending, laterally spaced grooves 63 opening through the top or traction surface of the roadbed, there being six such grooves in two groups of three grooves each.

In each of the grooves 63 there is lodged a continuously extending, metallic, electrically conductive way. As best shown in FIGS. 7 and 15 each way may comprise a continuous length of conventional rail of S-gauge, sheet metal, toy electric railway track inverted so that its usual "base" surfaces face upward and becomes the top surface to serve as a traffic lane. Said top surface may be flush with the top surface of the roadbed 64 as shown in FIG. 7 or may be slightly above the insulative roadbed surface as shown in FIG. 10a or depressed to any desired extent below the insulative roadbed surface as shown in FIG. 10b. In the latter case a continuous groove 59 is formed in the insulative body of the roadbed narrow enough to add more or less mechanical guidance to the magnetic attraction that holds the magnet to its predetermined course, depending upon the depth of the groove. The groove may be omitted where it is desired not to hold the magnet too positively to its course as for enabling the toy to simulate the racing hazard of "flying off the track" at high speed on the curves.

At least the middle way 66 of each group of three ways is of homogeneous electrically conductive metal having as an integral ingredient a magnetically permeable ferrous content, such as cold rolled steel. The relatively outer and inner flanking ways 67 and 68 in each group can be of ferrous metal or may be of brass or aluminum or any good electrically conductive material. The width of the way need be little if any wider than the bottom surface of the vehicle carried magnet 38 hereinbefore described. What normally constitutes the hollow head of the inverted toy railroad track rail is wedged permanently into the bottom portion of the tapered

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groove 63. This manner of holding the rail in the groove insures fixity of the rail in the roadbed structure.

The permanent magnet 38 is forcefully attracted to the middle way 66 as the car travels along the roadbed. Another of the two ways in each group of three is a flanking way constantly wiped by the stranded wire terminal 55 of the vehicle carried lead 54 which thus acts as a current collector or collecting shoe. The current for energizing the propulsion motor 13 will be derived from either of the metal ways 67 or 68, depending on which side of the vehicle is equipped with the current collector 55, and the direction in which the vehicle is traveling along the ways.

FIG. 14 illustrates the electrical system of current supply that is delivered to the ways of the roadbed under selective control at a point that may be remote from the toy so that a plurality of toy vehicles can be caused to follow one another, or to meet and pass, or to pass one another while traveling in the same direction, as in a race. The casing of a suitable dual electric controller is represented at 60 in FIGS. 9 and 10 having the plural control handles 70 and 70'.

Controller 60 as indicated in FIG. 14 contains the supply transformer whose primary winding 76 derives current through a conventional attachment cord 74. The secondary 77 is tapped at variable voltages by each of two sliding take-off arms 79' and 79 swung respectively by the independently operable handles 70 and 70' (FIGS. 9 and 10). Controller 60 also may contain rectifiers 78 and 78' and the polarity of the rectified current can be shifted by reversing switches whose handles 80, 81 are represented in FIGS. 9 and 10 as protruding from the casing of controller 60. One end of the transformer secondary 77 is shown in FIG. 14 to be connected to the magnetic conductive way 66 in both groups of three ways. Voltage varying take-off tap 79' is connected to the metallic ways 68 of both of said groups of ways while voltage varying take-off tap 79 is connected to the metallic ways 67 in both of said groups of ways. Connections from the components of controller 60 to the various conductive ways in the roadbed can be made beneath the latter through six wires leaving the controller in a split harness 61 in the manner that one such wire is shown to be connected in FIG. 15.

FIG. 14a illustrates a modified electrical system for alternating current supply that can be delivered to the same ways of the roadbed under selective control by a dual electric controller 60' that may be like controller 60 with rectifiers 78, 78' and reversing switches 80, 81 omitted. Its electrical connections to the ways will be recognized as similar to FIG. 14, the same reference numerals being employed.

FIGS. 9 and 10 show two of the many possible layouts of roadbed that can be built by joining together end-to-end sections of the bed structure. Some may be straight and others curved edgewise. Some sections may be supported at an incline to elevate one stretch of the roadbed so that it can cross another at a different level as at the location 85 in FIG. 9 as is characteristic of modern high speed thoroughfares.

FIGS. 15, 16 and 17 show in the form of connector pin 87 a conventional means for releasably holding the ways of different roadbed sections together end-to-end in lengthwise alignment. Each way is crimped on its surface 86 in FIG. 16 for interlocking engagement with the contacting surface of the relatively softer plastic material of roadbed 64 to prevent longitudinal relative movement between the way and the roadbed section. Connector pin 87 has cross grooves into which the thin sheet metal of the way is crimped at 88.

In operation a toy vehicle as illustrated in FIGS. 1 to 8 can be placed on the roadbed to straddle either one of the center ways 66 and can be headed in either of opposite directions along the ways. The current collect-

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ing magnet 38 will rest its weight freely on the top surface of way 66 preferably separated therefrom, if at all, by only the very thin conductive surfacing 46. Simultaneously the other current collector 54 will wipe one or the other of the metallic ways 67 or 68 in either of the two groups of ways shown in FIGS. 9 and 10, depending on the direction in which the vehicle is headed along the ways. A given vehicle 12 can be equipped with the current collector 55 on either the left side or right side of magnet 38 by placing the conductor 54 in a choice of the holes 53 that are on both sides of bridge plate 33 as represented in broken lines by the conductor 55 on cars 12' in FIG. 14. Thus without reconstruction, or having on hand a needless multiplicity of toy vehicles, a very large variety of traffic conditions can be set up on the roadbed by selecting which of the ways shall be used in the two groups of ways and in which direction the vehicles shall be headed. The vehicles can be made to meet on the same course and produce a collision or can meet and pass on different courses or can be made to race one another on the same or different courses while traveling in a common direction.

Such performance of the toy vehicles in paths of travel determined by unobvious means is under selective control as to starting, stopping, and speed from a remote point by turning the separate handles 70, 70' of the controller 60. If the ways are supplied with direct current, the direction of vehicle travel can be reversed by merely shifting the polarity of the ways from which the vehicles derive current by operating the switch handles 80, 81.

If the ways are supplied with alternating current the propulsion motor 13, whether universal for A.C. and D.C. or purely an A.C. motor, can be equipped with a reversing switch carried by the vehicle like that designated 13b in drawing FIG. 6 of a copending application, Serial No. 739,838, filed June 4, 1958, now Patent No. 3,024,739, owned by the assignee of the present applicants. In this event, each cutoff and restoration of current supply to the ways will cause the vehicle to start next in the opposite direction from that in which it was traveling when last stopped.

In more elaborate electrical systems a separately controlled supply of alternating or direct current can be supplied simultaneously to each of the non-magnetic ways 67, 68 in one or both of the groups of ways for the remote control of blowing horns, sounding sirens, operating electromagnetic steering mechanisms, etc. that may be carried by the vehicle and electrically energized on occasions by current derived from the ways under selective remote control.

It has been mentioned that the magnet 46 may be bare-faced or provided with a metallic surfacing band 46 wrapped around it. Considerations that will determine which is best pertain to factors of electrical conductivity and strength of magnetic attraction. If magnet 46 is a body of relatively poor electrical conductivity such as in the so-called ceramic magnets wherein salt of iron or ferric or ferrous oxide is incorporated with a suitable binder, the band 46 will supply the desirable better electrical conductivity. If the magnet has such attractive strength that the force with which it is drawn against the roadbed or way 66 in its sliding travel therealong would induce a drag or braking effect on the travel of the vehicle, the thickness of band 46 can provide more or less distance of separation between the bare surface of the magnet body and the path of ferrous material which it is tracking whereby the most efficient combination of electrical conductivity and magnetic compulsion can be attained.

The appended claims are directed to and intended to cover all variations of the embodiment of the invention herein illustrated and described as fall within a broad interpretation of the definition of the improvements as worded in the claims.

We claim:

1. In a toy traffic system the combination of, a wheeled vehicle having a propulsion motor and a cantible road wheel, a roadbed having a surface on which the road wheels of said vehicle may track along a predetermined course of travel, a wheel carriage supported at least in part by said cantible wheel and including a part pivotally related to the vehicle to permit said wheel carriage to cant, two parallel electrical conductive ways insulated from each other and each continuous as to electrical polarity without insulative gaps along said course of vehicle travel on said roadbed including a vehicle guiding way and a flanking way, the former comprising a body of homogeneous conductive metal having an ingredient of magnetically permeable substance, and a vehicle piloting unit connected to said pivotal part of said wheel carriage and including both an electrical conductive face positioned in riding contact with said vehicle guiding way and a permanent magnet positioned to maintain said guiding way within its magnetic field as the vehicle travels, a current collector carried by said vehicle in riding contact with said flanking way, and electrical connections operative to maintain said propulsion motor in circuit with said electrically conductive face and said current collector, whereby the vehicle derives steering guidance from one of said two ways and propulsion current from both of said two ways.

2. In a toy traffic system, the combination defined in claim 1, together with a third electrical conductive way parallel with the said two parallel conductive ways at a side of the said vehicle guiding way opposite the said flanking way and insulated therefrom, and a separate mounting structure carried at each side of the said vehicle constructed mechanically to hold the said current collector when the latter is shifted from one to the other of said mounting structures, whereby said current collector can be positioned to wipe either the said flanking current conductive way or the said third current conductive way and said vehicle can travel in the same course while deriving propulsion current simultaneously from the said vehicle guiding way and either said flanking conductive way or said third conductive way.

3. A toy traffic system as defined in claim 1, in which

the said magnet carries a non-magnetic metallic surface forming one of the said current collectors positioned to track conductively on the said vehicle guiding way.

4. A toy traffic system as defined in claim 1, in which the said magnet is carried on the said vehicle with sufficient looseness to rest its weight freely on the said vehicle guiding way as the said toy vehicle travels on the said roadbed surface.

5. In a toy traffic system the combination of, a wheeled vehicle having a propulsion motor, an insulative roadbed having a tread surface on which the wheels of said vehicle may track along a course of vehicle travel, three parallel electrical conductive ways relatively insulated from one another extending along and contiguous to said roadbed surface, a first current collector carried by and projecting downward from said vehicle into constant wiping contact with a median one of said ways, a second current collector carried by said vehicle, a mounting structure for said second current collector on each of opposite sides of said vehicle interchangeably receptive to said second current collector in a manner to hold the same removably fixed on either of said opposite sides of the vehicle in positions to wipe at any one time only a selected one of the other two of said three conductive ways, together with electrical connections operative to maintain said propulsion motor in circuit with said first current collector and with said second current collector at all times, whereby said vehicle can travel in the same course and derive propulsion current simultaneously from the said first conductive way and only a selected one of said other two conductive ways.

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