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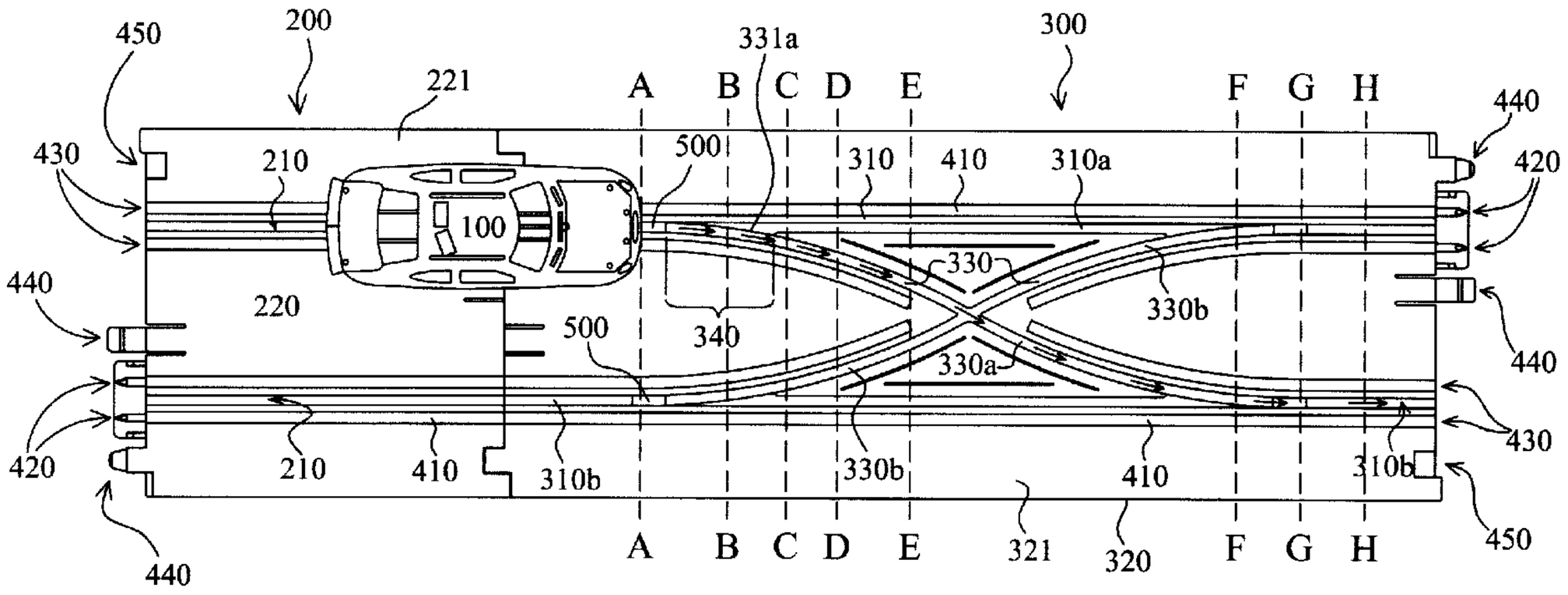

(57) Abrégé/Abstract:
A toy track comprising guide channels for guiding a toy vehicle to move along predetermined paths and ramping means for facilitating the toy vehicle to select a guide channel from a plurality of guide channels when the toy vehicle approaches a guide channel junction, said plurality of guide channels at said guide channel junction comprising a primary guide channel and a diversion guide channel which branches out from said primary guide channel, said ramping means being disposed on said primary guiding channel at a location approaching said guide channel junction, said guide channel junction including a diversion guide channel junction guide wall portion which forms part of said diversion guide channel at said guide channel junction, the height of said diversion guide channel junction guide wall portion being significantly less than the typical height of a guide channel wall of a typical guide channel outside said guide channel junction.

ABSTRACT

A toy track comprising guide channels for guiding a toy vehicle to move along predetermined paths and ramping means for facilitating the toy vehicle to select a guide channel from a plurality of guide channels when the toy vehicle approaches a guide channel junction, said plurality of guide channels at said guide channel junction comprising a primary guide channel and a diversion guide channel which branches out from said primary guide channel, said ramping means being disposed on said primary guiding channel at a location approaching said guide channel junction, said guide channel junction including a diversion guide channel junction guide wall portion which forms part of said diversion guide channel at said guide channel junction, the height of said diversion guide channel junction guide wall portion being significantly less than the typical height of a guide channel wall of a typical guide channel outside said guide channel junction.

IMPROVED TOY TRACK AND TOY VEHICLE

FIELD OF THE INVENTION

This invention relates to toys, especially toys comprising toy tracks and toy vehicles. More particularly, this invention relates to toys which are more commonly known as "slot cars" and which comprise toy vehicles with slot selection means and toy tracks with compatible guide slots. More specifically, although of course not solely limited thereto, this invention relates to toy sets comprising toy vehicles and track sets in which a player can cause a toy vehicle to select one of a plurality of guide slots on approaching a junction of guide slots.

BACKGROUND OF THE INVENTION

Toy sets comprising toy vehicles operating on a toy track with pre-defined guide channels are known, for example, in US 5,928,058, US 4,795,154 and US 3,630,524. The toy tracks of such toy vehicle sets usually comprise a plurality of guide channels with a plurality of intersections or guide channel junctions so that a toy vehicle running on the toy track can move from one loop of guide channels into another. The changing of guide channel loops is typically implemented, for example, through mechanical change-over means before a toy vehicle approaches the crossover junctions as in US 3,630,524. In this specification, the term "guide channel" also means guide slots wherever appropriate for the context.

In those known prior art teachings, a player has to separately and simultaneously control the movement of the toy vehicle and the switching of the guide channel selection mechanisms when a toy vehicle approaches an

intersection. This means that a player cannot concentrate on the manoeuvring of the toy vehicle. Hence, it is highly desirable if there can be provided toy vehicle sets in which a player can select a guide channel from a plurality of available guide channels at a guide channel intersection by controlling the movements of the toy vehicle.

OBJECT OF THE INVENTION

Accordingly, it is an object of the present invention to provide toy vehicle sets comprising toy tracks and toy vehicles in which a toy vehicle approaching a guide channel junction comprising a plurality of branching guide channels can select one of the available guide channels by manoeuvring the operation of a toy vehicle. At a minimum, it is an object of this invention to provide the public with a choice of toy vehicle sets with a novel channel selection means.

SUMMARY OF THE INVENTION

According to the invention, there is provided a toy set comprising a toy track and a toy vehicle, said toy track comprising guide channels for guiding said toy vehicle to move along predetermined paths on said track and guide channel selection means to facilitate said toy vehicle to select a guide channel from a plurality of guide channels when said toy vehicle approaches a guide channel junction at which junction a diversion guide channel branches out from a primary guide channel, said toy vehicle comprising corresponding guide channel selection means so that, when said toy vehicle approaches said guide channel junction, the guide channel selection means of said toy vehicle and toy track cooperate such

that a player can select the guide channel along which said toy vehicle will travel after said guide channel junction by manoeuvring the operation of said toy vehicle.

According to one aspect of the invention, there is provided a toy track comprising guide channels for guiding a toy vehicle to move along predetermined paths and ramping means for facilitating the toy vehicle to select a guide channel from a plurality of guide channels when the toy vehicle approaches a guide channel junction, said plurality of guide channels at said guide channel junction comprising a primary guide channel and a diversion guide channel which branches out from said primary guide channel, said ramping means being disposed on said primary guiding channel at a location approaching said guide channel junction, said guide channel junction including a diversion guide channel junction guide wall portion which forms part of said diversion guide channel at said guide channel junction, the height of said diversion guide channel junction guide wall portion being significantly less than the typical height of a guide channel wall of a typical guide channel outside said guide channel junction.

In one embodiment, the diversion guide channel junction guide wall portion extends obliquely across the width of said primary channel guide at said guide channel junction to form part of said diversion guide channel at said guide channel junction.

In another form, the diversion guide channel junction guide wall portion extends from one of the channel walls of said primary guide channel to abut one of the channel walls of a diversion guide channel at the end of said guide channel junction.

The diversion guide channel junction guide wall portion can, for example, curves convexly away from a channel wall of said primary guide channel at said guide channel junction to form part of said diversion guide channel at said guide channel junction.

Preferably, the portion of said guide channel junction outside the footprint of said diversion guide channel including an elevated platform which is substantially levelled with said diversion guide channel junction guide wall portion.

Preferably, the elevated platform extends between said diversion guide junction guide wall portion and the wall of said primary guide channel of said guide channel junction.

Preferably, said elevated platform gradually slopes away from said diversion guide junction guide wall portion and downwardly away from said guide channel junction.

As can be seen in the examples, the elevated platform having a generally wedged shape and diverging from the approaching side of said guide channel junction towards the departing side of said guide channel junction and along the primary guiding channel at the guide channel junction.

Preferably, said ramping means being disposed immediately before said elevated platform.

In the examples, the height of the top surface of said ramping means being comparable to that of the top surface of said elevated platform.

As a specific example, the top surface of said ramping means being between 1mm to 1.5mm above the bottom of said diversion guide channel at said guide channel junction. The highest portion of the ramping means being 0.5mm above the bottom of the guides channels.

Preferably, said guide channels outside said guide channel junction having a substantially rectangular cross-section.

Preferably, the width of said guide channels outside said guide channel junction being comparable to the height of the walls of said guiding channel.

Preferably, said ramping means including an surface ascending towards said guide channel junction, said ascending surface being adapted for interacting with a retractable channel guiding member of a toy vehicle adapted for use with said toy track so as to facilitate guide channel selection at said guide channel junction.

Preferably, said ascending surface of said ramping device being adapted for gradually reducing the length of said retractable channel guiding member of said toy vehicle while said toy vehicle transiting through said ramping means towards said guide channel junction during normal operation.

Preferably, said ramping means interacts with said channel guiding member of said toy vehicle while said toy vehicle transiting through said ramping means towards said guide channel junction during normal operation so that said channel guiding member of said toy vehicle will move from a first operating position to a second operating position.

According to another aspect of the present invention, there is provided a toy vehicle comprising a channel guiding member for guiding the motion of said toy vehicle along a guide channel of a toy track, said toy track comprising at least a primary guide channel and at least a diversion guide channel, said diversion guide branches out from said primary guide channel at a guide channel junction of said primary guide channel and said diversion guide channel, said channel guiding member being movable from a first operating position to a second operating position, wherein the spring urge against said channel guiding member being adapted so that, in use, the distance travelled by said vehicle during the time when said channel guiding member moves from said second operating position to said first operating position will substantially determine the channel guide along which said toy vehicle will travel after the channel junction.

Preferably, said channel guiding member being movable from a first operating position to a second operating position by spring urge and/or gravitation.

Preferably, said channel guiding member protruding downwardly from the bottom of said toy vehicle, said channel guiding member being retractable from said first operating position to said second operating position, said first operating position being further away from the bottom of said vehicle than said second operating position.

Preferably, said channel guiding member being retractable under spring urge for about 1mm to 1.5mm to move from said first operating position to said second operating position.

Preferably, said channel guiding member being retractable under spring bias along a substantially vertical direction when transiting through a ramping means at said guide channel junction when travelling along a guide channel and towards said guide channel junction.

Preferably, said channel guiding member including a shank which is extendable between said first operating position and said second operating position, wherein, in both said first and second operating positions, said shank being clear of the bottom surface of the guide channels except the ramping means and, when in said second position, said shank being in contact with said ramping means.

Preferably, said toy vehicle is travelling outside of said ramping means, said shank being at least 0.5 mm clear of the bottom surface of the guide channels.

Preferably, said toy vehicle including a magnet for holding the toy vehicle close to the surface of said toy track, said toy track being provided with corresponding magnetic material for magnetic coupling with said toy vehicle.

Preferably, said toy track including power supply rails of magnetic material for magnetic coupling with said toy vehicle.

By providing guide channel selection means which facilitate lane change through manoeuvring of the motion of a toy vehicle, a user can focus on the operation of the toy vehicle. This will enable a player to improve the skill of operation of the toy vehicle and make the game more interesting.

According to yet another aspect of the present invention, there is provided a vehicle racing toy comprising first and second electric toy vehicles, first and second controllers respectively for controlling said first and second electric toy vehicles, a toy rack on which said first and second electric toy vehicles operate and a common power supply rail distributed along said toy track for supplying operating power to said electric toy vehicles, wherein said first and second controllers including means to supply to said toy rack characteristic operating power which is respectively characteristic for the operation of said first and said second electric toy vehicles, said characteristic operating power including a speed control signal for controlling the speed of said electric toy vehicle.

According to yet another further aspect of the present invention, there is provided a toy track for use with a vehicle racing toy of claim 32, including a common power supply rail for supply power to said first and second toy vehicles, said common power supply rail being with a characteristic operating power supply, said characteristic operating power supply being an alternate current power supply of a prescribed frequency with different amplitudes in the positive and the negative cycles.

According to a further aspect of this invention, there is provided a toy vehicle for use with a toy track which is supplied with a characteristic operating power during normal use, the toy vehicle including a motor and electric power selection means for selecting power supply which is characteristic for the operating of said toy vehicle.

Preferably, said first and second controllers including means for obtaining power from a common alternate current power source, means for extracting said characteristic operating power from said common alternate power supply and means for varying the speed of said electric toy vehicle.

Preferably, said means for varying the speed of said electric toy vehicle including means for interposing said speed control signal on said characteristic operating power.

This invention also provides a controller for interposing said speed control signal on said characteristic operating power including a variable power alternating devices such as a rheostat.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the present invention will be explained in further detail below by way of example and with reference to the accompanying drawings, in which:-

Fig. 1 is a plan view showing a preferred example of a toy vehicle of this invention on approaching a guide channel junction while running on a primary guide channel of a preferred example of a toy track segment,

Figs. 1A to Fig. 1H are partial longitudinal cross-sectional views showing the sequential movements of the toy vehicle of Fig. 1 along the primary guide channel when moving from location A to location H of Fig. 1.

Figs. 1AA to Fig. 1HH respectively show the transversal cross-sectional views of the guide channel taken at locations A to H of Fig. 1 and illustrated with the vehicle at the relevant positions.

Fig. 2 is a plan view showing a preferred example of a toy vehicle of Fig. 1, running on a source primary guide channel, approaching a guide channel junction and then continue to move along a destination primary guide channel after the guide channel junction,

Figs. 2A to Fig. 2H are partial longitudinal cross-sectional views showing the progress of the vehicle moving from locations A to H of Fig. 1 and along a primary guide channel,

Figs. 2AA to Fig. 2HH are respectively the transversal cross-sectional views of the guide channel showing also the centre portion of the guide channel selection member of the toy vehicle with the toy vehicle progresses from locations A to H of Fig. 2,

Fig. 3 shows a partially exploded view of part of a toy vehicle of the present invention,

Fig. 4 shows an exemplary block circuit diagram of a vehicle toy set of the present invention, and

Fig. 5 shows a variation of the block circuit diagram of Fig. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An exemplary toy comprising a toy vehicle **100** and exemplary toy track segments is shown in the Figures. Referring firstly to Fig. 1, the exemplary toy track segments comprise an exemplary first type of toy track segment **200** and an exemplary second type toy track segment **300**.

The exemplary first type of toy track segment **200** comprises guide channels which are arranged as a plurality of primary guide channels **210** which are formed on a base member **220**. The exemplary primary guide channels **210** comprises substantially straight and parallel guide channels so that toy vehicles can race side by side on parallel primary guide channels. To form a racing track or a racing circuit of a desirable effective length, a plurality of first type toy track segments can be connected together. Of course, the first type **200** of toy track segments may comprise primary guide channels **210** which are non-straight, curved or meandering so that the ensemble of toy track segments can form a closed and end-less racing circuit without loss of generality.

The exemplary second type of toy track segment **300** comprises a plurality of guide channels which are formed on a base member **320**. The guide channels comprise a plurality of primary guide channels **310** and a plurality of diversion guide channels **330**. An exemplary diversion guide channel **330a** branches out from a source primary guide channel **310a** at a guide channel junction **340** and joins an adjacent, usually but not necessarily, parallel destination primary guide channel **310b**. In this exemplary toy track segment, two diversion guide channels **330** are shown. The guide channel junctions **340** from which the diversion guide channels branch out respectively, are approximately at the same longitudinal location on the toy track segment **300**.

As the exemplary diversion guide channels **330** have substantially the same curvature and both curve away from their respective source primary guide channels **310a, 310b**, the two diversion guide channels **330** intersect and cross over at about their respective middle portions. Naturally, the symmetry of the diversion guide tracks is only shown for convenience as a typical example and is not essential. Furthermore, it will be noted that the junctions at which the diversion guide channels merge with the destination primary guide channels become guide channel junctions at which the respective diversion guide channels will branch out for toy vehicles travelling along the opposite direction.

Generally speaking, guide channels **210, 310** are provided so that a toy vehicle equipped with appropriate or corresponding channel guiding means will move along a pre-determined path as defined by the guide channels on the toy track. Specifically, the toy vehicles are maintained along the prescribed paths through cooperative guidance or regulation of the channel guiding means of the toy vehicle by guiding walls of the guide channels. This type of vehicle toys in which the motion path is substantially governed by an elongated and depressed guide channel is commonly known as "slot cars" or "slot vehicles", although the guide channels can be wider than what is strictly understood as "slots" and the term "slot car" has become a generic term in the trade to mean this type of toy arrangement generally.

An exemplary cross section of a preferred guide channel comprising a primary guide channel as an example is shown in Fig. 1AA. The guide channel **310b** is formed below the top surface **321** of the base member **320** and is defined between first **311** and second **312** guide channel walls. Another exemplary cross

section of a preferred guide channel comprising a diversion guide channel as an example is shown in Fig. 1EE in which the guide channel **330b** is formed below the top surface **321** of the base member **320** and is defined between first **331** and second **332** guide channel walls. In general, the guide channels are disposed so that when a toy vehicle having channel guiding means are placed on the toy track with the channel guiding means appropriately aligned with the guide channels, the toy vehicle will travel along the guide channels due to the guiding effects of the channel guiding means.

As can be more clearly seen from the cross-sectional views, the channel guiding means comprises a channel guiding member **110** which is a downwardly extending channel guiding pin or shank. The channel guiding member **110** protrudes from the bottom of the toy vehicle **100** and extends towards the toy track surface **321** during normal use. The channel guiding member **110** and the guide channels are designed so that, during normal operation, the downwardly protruding pin or shank member will protrude into the hollow portion of the guide channel with its lower end cleared of the bottom surface of the guide channel while moving along the guide channels. In order to correct and regulate the direction of motion of the toy vehicles to maintain the prescribed paths, the channel guiding member **110** may interact with the sidewalls of the guide channels from time to time.

Exposed positive and negative power supply rails **410a,b** are disposed on top surface of the toy track adjacent to the guide channels so that an electric motor or other electric driving means in the toy vehicle can obtain its operating power from the power supply rails. The depressed guide channel is intermediate

the positive and negative power supply rails so that, when the toy vehicle is properly placed on the toy track, its channel guiding member will align with the guide track and its power contact members (not shown), which protrude from the bottom of the toy vehicle, will be in compressive contact with the power supply rails.

Although the primary guide channels in the first and the second type toy track segments of this example are substantially straight and parallel, it will be appreciated that it is not necessarily so and the primary tracks can be curved, winding or meandering to provide more fun and challenge in the control of the toy vehicles. In this specification, the term "primary guide channels" is used in an open manner to refer generally to a non-branching portion of a guide channel, as distinguished from a diversion guide channel which branches out from such a primary guide channel, and should not be construed narrowly.

The toy track segments are provided with electrical and mechanical coupling means so that adjacent toy track segments, which may comprise a combination of the first and the second exemplary toy track types, can be connected together for electrical and mechanical continuity. For example, electrical plugs **420** and sockets **430** can be integrally formed as part of the power supply rails and mechanical plugs **440** and sockets **450** can integrally moulded with the base member since the base member can be formed by hard plastics by plastic moulding, as are shown in the present example.

Referring next to an exemplary guide channel junction **340** of Figs. 1 and 2, the guide channel junction **340** comprises a primary guide channel **310a** portion

and a diversion guide channel **330a** portion. The primary guide channel **310a** portion extends linearly to form a continuous primary guide channel which extends along a prescribed direction of extension. The diversion guide channel **330a** branches out from the source primary guide channel **340** portion and joins the parallelly adjacent destination primary guide channel **310b** near the location designated by the line FF.

Although each of the primary guide channel and the diversion guide channel is defined by a respective pair of channel guide walls of substantially equal height outside the effective region of the guide channel junction **340**, it will be noted that the two guide channels share a common guide channel portion at the junction region (the region between lines BB and CC of Fig. 1). Specifically, the diversion guide channel is defined by a guide wall of a normal height and a depressed guide wall which is formed on the bottom of the primary guide channel portion. In addition, the primary guide channel at the junction comprises a single guide wall only and the other guide wall is missing so that the depressed guide wall **331a** also defines an entrance aperture to the collinear primary guide channel. As can be seen more clearly from Figs. 1CC, 1DD, 2CC and 2DD, the depressed diversion guide channel junction guide wall **331a** (the "Junction Guide Wall") is significantly or noticeably lower than a typical channel guide wall for purposes to be further described.

The Junction Guide Wall **331a** defines the beginning of a diversion guide channel **330** and also the entrance aperture to the primary guide channel **310a.** This Junction Guide Wall **331a** extends obliquely across the width of the source

primary channel guide and subsequently joins the guide wall of the diversion guide channel of a normal height at the end of the guide channel junction **340**

As can be seen from the Figures, the Junction Guide Wall **331a** extends obliquely across the width of the source primary channel guide and joins a junction of the guide walls formed by the near channel guide wall of the source primary guide channel and a guide wall of the diversion guide channel. It will be noted that the terms "distal" and "near" channel guide walls of the source primary guide channel refer conveniently to the channel guide walls which are respectively further away and closer to the destination primary guide channel **310b**. Also, it will be noted that the near channel guide wall of the source primary guide channel is interrupted and discontinuous at the guide channel junction and at the Junction Guide Wall 331a.

As a result of this joining, a wedge-shaped region is formed intermediate the Junction Guide Wall **331a** and the distal channel guide wall of the source primary guide channel. This wedge-shaped region comprises an elevated platform which extends across its lateral or transversal width and is substantially levelled transversally, so that a smooth transition can be provided for a toy vehicle to continue travelling along the source primary guide channel after crossing the guide channel junction in the manner to be explained. It will be appreciated that this wedge-shaped portion is on the bottom of the portion of the source primary channel guide at the guide channel junction **340**.

As the Junction Guide Wall **331a** defines a lateral guide wall of the diversion guide channel at the guide channel junction, it will be appreciated that

the initial portions of both the primary and the diversion guide channels substantially overlap at the initial or approaching portion of the guide channel junction and the extent of overlap decreases towards the diverging end of the guide channel junction until the primary guide channel and the diversion guide channel are finally separated at the junction of the guide walls.

Furthermore, the wedge-shaped platform slopes gradually downwards towards the bottom of the primary guide channel in a direction away from the guide channel junction to provide smooth transition of the toy vehicle during transit across the guide channel junction.

To provide smooth transition from the source primary guide channel to the destination primary guide channel, the diversion guide channel is gradually curved away from the source primary guide channel and is convexly curved towards the destination primary guide channel.

Cooperative guide channel selection means are provided on the toy track and toy vehicle to facilitate selection of a guide channel from a plurality of guide channels when a toy vehicle approaches a guide channel junction. The guide channel selection means enable a player to select a preferred guide channel along which the toy vehicle will travel after leaving the guide channel junction by manoeuvring the operation of the toy vehicle.

In this specific example, the guide channel selection means on the toy track comprises ramping means **500** disposed at the approaching side of the guide channel junction. The ramping means comprises an inclined surface which gradually ascends towards the guide channel junction, as is more particularly

shown in Figs. 1A to 1H and Fig. 2A to 2H. More specifically, the ramping means comprises a rounded bump with a convex surface protruding from the bottom of the primary guide channel at a location just before the guide channel junction and with its highest surface at a level comparable to the height of the Junction Guide Wall 331a. This ramping surface is adapted to interact with a retractable channel guiding member of a toy vehicle adapted for use with the toy track so as to facilitate guide channel selection at the guide channel junction. Specifically, the ascending surface of the ramping device is adapted for gradually reducing the length of a retractable channel guiding member of the toy vehicle while the toy vehicle transits through the ramping means towards the guide channel junction during normal operation.

Referring again to the Figures, the toy vehicle **100** comprises a vehicle body **120** which may be made of metal, plastics or a combination of both, wheels, a motor to drive the wheels, channel guiding member, power contacts to obtain power from the power supply rails **410a,b** on the track and a magnet **130** to maintain a close coupling between the toy vehicle and a corresponding magnetic part on the base member for better track adherence. The channel guiding means comprises a channel guiding member which may be a downwardly extending pin, shaft, piston or shank (for brevity, the term "downwardly extending member" will be used collectively) which has a lateral width lesser than but comparable to that of the guide channel to alleviate excessive deviation form the prescribed paths. The downwardly extending member protrudes from the bottom of the toy vehicle and its protruding length is adapted so that, during normal running on the guide channels, the downwardly extending channel member will protrude into the guide

channels adequate for guiding along the guide channel but with its free end cleared of the bottom surface of the guide channels for smooth running or operation.

In this example, the downwardly extending channel guiding member **110** is under spring bias or spring urge so that it will protrude maximally downwards with maximum extension from the toy vehicle towards the toy track during normal running on the track. Under this normal operating condition, the free end of this channel guiding member is free of the bottom of the guide channels. For example, the free end is about 0.5mm above the bottom of the guide channel.

When this spring urged channel guiding member **110** is urged upwards and away from the toy track surface so that its effective protruding length reduced, for example, when encountering the elevated surface of the ramping means mentioned above, the channel guiding member will be under spring urge to return to its extended position. Thus, the channel guiding member is movable under spring urge from a first (maximum extension) operating position to a second (reduced protrusion) operating position. By utilising the characteristic returning time required for the channel guiding member **110** to return from the second, spring biased position, to the first (maximum extended) position, a guide channel selection means can be provided.

In this specific example and as more particularly shown in Fig. 3, a combination of a helical spring **140** and a weight **150** is used to urge the channel guiding member **110** to return to the first operating position. The specific distance travelled by the vehicle during the time in which the channel guiding member **110**

moves from the second operating position to the first operating position, which is substantially toy vehicle speed dependent, is utilised to substantially determine the channel guide along which the toy vehicle will travel after the guide channel junction. Of course, it will be appreciated that a spring or a weight alone can be used in the channel guiding means to return the channel guiding member **110** to the first operating position, although in the latter case gravitational force (instead of spring urge) will be the returning force. Hence, it will be appreciated that the channel guiding means also serves as a channel selection means and the channel guiding member **110** also serves as a guide channel selection member in this preferred embodiment.

The operation of the toy vehicle on the exemplary toy track will be described in more detail below with reference to two typical operating modes. In the first operating mode as shown the first set of Figures, namely, Figs. 1, 1A to 1H and 1AA to 1HH, the toy vehicle is travelling at a first speed at the guide channel junction and will travel along the diversion guide channel **330a** to the destination primary guide channel as indicated by the arrows after the guide channel junction. In the second operating mode as shown the second set of Figures, namely, Figs. 2, 2A to 2H and 2AA to 2HH, the toy vehicle is travelling at a second, higher, speed at the guide channel junction and will travel along the primary guide channel **310a** as indicated by the arrows after the guide channel junction. The first and second speed is respectively below and above a predetermined threshold speed.

Referring to the first set of Figures, i.e., Figs. 1 to 1HH, an exemplary toy vehicle **100** is moving on a primary guide channel towards a guide channel

junction **340**. Before entering the guide channel junction **340**, the guide channel selection means of the toy vehicle will encounter the ramping means **500** disposed immediately before the guide channel junctions. This ramping means includes an ascending and arcuate surface which exposes above the bottom of the source primary guided track. The protruding surface is adapted so that when the channel guiding of the vehicle move across the ramping surface, the channel guiding member **110** of the toy vehicle **100** will move from the first operating position of Fig. 1A to the second operating position of Fig. 1B. After the channel guiding member **110** of the toy vehicle is clear of the ascending surface of the ramping means **500**, it will be returned by spring bias to the first operating position as shown in Figs. 1C to 1H. As the toy vehicle travels at this first speed which is below a threshold speed, the channel guiding member will have returned to the first operating position by the time the channel guiding member encounters the Junction Guide Wall **331a**. As a result, the subsequent motion of the toy vehicle **100** will be guided by the Junction Guide Wall **331a** and the toy vehicle will move along the diversion guide channel **330a** to join the adjacent destination primary guide channel **310b** as shown in Figs. 1D to 1H.

Referring next to the second set of Figures in which the toy vehicle is travelling at a second speed which is above a threshold speed, it will be noted that the channel guiding member **110** of the toy vehicle will be moved from the first operating position to the second operating position when the toy vehicle encounters the ramping means **500**. After the toy vehicle has departed from the ramping means, it will move forward according to its moment of inertia. At this second speed, which is above the prescribed threshold speed, it is designed and

calculated that the channel guiding member **110** of the toy vehicle will not yet return to the second operating position when it is at the location of the Junction Guide Wall **331a**. In other words, the channel guiding member **110** of the toy vehicle will return to its second operating position after it has passed or cleared the Junction Guide Wall **331a**. As the channel guiding member **110** of the toy vehicle **100** does not return to the second operating position until the Junction Guide Wall **331a** has been passed, the channel guiding member **110** of the toy vehicle will be cleared of the Junction Guide Wall **331a** and its motion will be guided subsequently by the guide walls of the primary guide channel after the guide channel junction. As a result, the toy vehicle will continue to move linearly along the primary guide junction without being diverted into the diversion guide channel.

Hence, by calculating the return time of the spring-biased channel guiding member **110** of the toy vehicle and the characteristic travelling time between the ramping means and the beginning of the Junction Guide Wall **331a**, a threshold speed at which the toy vehicle will bypass the Junction Guide Wall **331a** can be calculated or determined.

Furthermore, as the actual and exact distance between the clearance of the ramping means by the channel selection member **110** and the beginning of the Junction Guide Wall **331a** will depend slightly on the exact path or velocity of the toy vehicle immediately before encountering the ramping means, upon reaching the prescribed threshold speed and encountering the ramping means, whether the toy vehicle will continue to move along the primary guide channel or to be diverted will depend also on the skill of the player controlling the toy vehicle since the

performance of the toy vehicle will be somewhat affected if a user cannot maintain the toy vehicle to move along a straight path prior to encountering the ramping means. Furthermore, it will be noted that the primary guide channel after the guide channel junction is substantially tangential to the curvature of the diversion guide channel and is substantially in accordance with the motion of inertia of the toy vehicle prior to encountering the Junction Guide Wall **331a**. Of course, the primary guide channel can have any appropriate curvature after the guide channel junction without loss of generality.

In another preferred embodiment of a toy vehicle, the channel selection means or the channel guiding member **110** of the toy vehicle includes a guiding member which is pivotable between the first and the second operating position, for example, by spring bias, by gravitation, by combination of spring bias and gravitation, by hydraulic or other appropriate means, so as to effect the change or non-change of the motion path of the toy vehicle by pivotal motion of the channel guiding means **110**.

The exemplary vehicle toy sets of Figs. 4 & 5 comprise a toy track system assembled from a plurality of exemplary toy track segments or module such as that described above, first and second toy vehicles, first **510** and second controllers **520** respectively for controlling the first **100a** and the second **100b** toy vehicles, and a power supply **600**. The toy track system comprises a common power supply rail **410** which extends along the length of the toy track system for supplying operating power to the toy vehicles. The common power supply rail **410** typically, but not essentially, comprises positive and negative power rails **410a & 410b**. The toy vehicles are electrical power driven and are adapted to obtain their

operating power supply from the toy track system while moving along the track system. The first and the second controllers are provided with means for individually controlling toy vehicles so that a user can control the operation of the toy vehicles, for example, to control the speed of a toy vehicle.

Referring firstly to Fig. 4, the power supply **600** comprises an AC to AC adapter which converts an alternate current (AC) power of a characteristic voltage and frequency into an AC supply of the same characteristic frequency but with a lower characteristic voltage. For example, the typical AC mains supply in the USA has a characteristic voltage and frequency respectively of 110V root mean square (rms) and 60Hz while that for Europe are respectively 220V rms and 50Hz. The AC to AC adapter down-converts the AC mains power supply to a voltage, for example, to below 20 Vrms, for safe and appropriate operation of the toy vehicles.

The first and second controllers are respectively for controlling the first and second toy vehicles and each of the controllers comprises means for generating characteristic control signals for controlling the operation of the toy vehicle. In this preferred embodiment, the characteristic control signals are embedded into the power supply before the operating power is fed into the common power supply rails **410 a** & **b** for use by the vehicles. In this example, the control signals are in the form of a variable power output which will be transformed into the variable speed of the toy vehicles. To retrieve the operation or control signals characteristic or unique to their operation, the toy vehicles include means for differentiating and extracting the characteristic control signals and operating power.

The controller includes means to insert or imposing identity or identifying characteristics to the control signals generated by the control generating means. In these examples, a unidirectional electronic device (which is a diode **511** in the present example) is used as an example of such identifying characteristics insertion or imposing means. Of course, other unidirectional electronic devices, such as a duly biased Mosfet, can be used. The control signal generating means includes a variable resistor or a rheostat **512** to vary the operating power, whereby the speed of the motor of the toy vehicle can be changed and the motion of the vehicles along the tracks can be accordingly controlled as described above.

As can be seen from the circuits, the power supply output, the diode **511** and the rheostat **512** are connected in series so that the control signals will be superimposed onto the operation power to become the characteristic operating power before outputting. This characteristic operating power will then be output to the common power supply rail **410a & b** of the tracks and to be selectively picked up by the respective toy vehicles.

In order to pick up the characteristic operating power which embeds the control signals, the toy vehicles are provided with characteristic control signal pick up means which include a unidirectional electronic device (which is also a diode **160** in this embodiment) compatible with the unidirectional electronic device of the controller. As can be seen from Fig. 4, the diode **511** of the toy vehicle is connected in series with the motor **170** of the toy vehicle and consistent with the direction of current flow of the unidirectional device of the controller. By this arrangement, only the portion of power which can flow across both diodes can be picked up by the motor of the toy vehicle.

When a vehicle toy set is set up as shown in Fig. 4, a user can control a vehicle through the controller and the operation of the toy vehicle can be controlled by means of the rheostat. This variable power output is then conditioned by the diode so that only the portion of the current consistent with the diode flow will be output. This variable power output is then picked up by the toy vehicle having a corresponding and compatible unidirectional electronic device and, consequently, the speed of that toy vehicle can be controlled by the characteristic control signals embedded in the power supply. Hence, the toy vehicles and the controllers can be correspondingly and individually matched through matching arrangement of diodes respectively in the toy vehicles and the controller, even though the toy vehicles share the common power supply rail.

The schematic block diagram of Fig. 5 shows a variation of the toy vehicle set of Fig. 4 but with the AC power supply to the controllers isolated from the mains supply by a full-wave bridge rectifier. In order to generate the characteristic control signals, electronic switching means with appropriate timing control circuitry for generating AC pulses of positive and negative polarity and of a prescribed general pulse frequency are connected to the output of the rectifying bridge. Four electronic switches arranged in the H-topology are connected to the output of a full wave rectifying bridge to provide the AC pulses which constitute the characteristic operating power which can be selectively picked up by the compatible characteristic control signals pick up means of the respective toy vehicles substantially as described above.

While the present invention has been explained by reference to the preferred embodiments described above, it will be appreciated that the

embodiments are illustrated as examples to assist understanding of the present invention and are not meant to be restrictive on the scope and spirit of the present invention. The scope of this invention should be determined from the general principles and spirit of the invention as described above. In particular, variations or modifications which are obvious or trivial to persons skilled in the art, as well as improvements made on the basis of the present invention, should be considered as falling within the scope and boundary of the present invention.

More specifically, while the present invention has been explained by reference to a toy vehicle and toy track set in which the vehicle will maintain a substantially straight or inertia motion after a guide channel junction if the vehicle is travelling at a speed above a threshold speed prior to encountering a ramping means, it should be appreciated that the invention can apply, with trivial modification, to a toy track and vehicle set so that the motion of the toy vehicle will be diverted from a path of inertia or tangential direction if the speed of the vehicle exceeds a threshold speed when encountering a guide channel selection means without loss of generality.

CLAIMS

1. A toy track comprising guide channels for guiding a toy vehicle to move along predetermined paths and ramping means for facilitating the toy vehicle to select a guide channel from a plurality of guide channels when the toy vehicle approaches a guide channel junction, said plurality of guide channels at said guide channel junction comprising a primary guide channel and a diversion guide channel which branches out from said primary guide channel, said ramping means being disposed on said primary guiding channel at a location approaching said guide channel junction, said guide channel junction including a diversion guide channel junction guide wall portion which forms part of said diversion guide channel at said guide channel junction, the height of said diversion guide channel junction guide wall portion being significantly less than the typical height of a guide channel wall of a typical guide channel outside said guide channel junction.

2. A toy track according to Claim 1, wherein said diversion guide channel junction guide wall portion extends obliquely across the width of said primary channel guide at said guide channel junction to form part of said diversion guide channel at said guide channel junction.

3. A toy track according to Claim 2, wherein said diversion guide channel junction guide wall portion extends from one of the channel walls of said primary guide channel to abut one of the channel walls of a diversion guide channel at the end of said guide channel junction.

4. A toy track according to Claim 2, wherein said diversion guide channel junction guide wall portion curves convexly away from a channel wall of said primary guide channel at said guide channel junction to form part of said diversion guide channel at said guide channel junction.

5. A toy track according to Claim 1, wherein the portion of said guide channel junction outside the footprint of said diversion guide channel including an elevated platform which is substantially levelled with said diversion guide channel junction guide wall portion.

6. A toy track according to Claim 5, wherein said elevated platform extends between said diversion guide junction guide wall portion and the wall of said primary guide channel of said guide channel junction.

7. A toy track according to Claim 5, wherein said elevated platform gradually slopes away from said diversion guide junction guide wall portion and downwardly away from said guide channel junction.

8. A toy track according to Claim 5, wherein said elevated platform having a generally wedged shape and diverging from the approaching side of said guide channel junction towards the departing side of said guide channel junction and along the primary guiding channel at the guide channel junction.

9. A toy track of claim 5, wherein said ramping means being disposed immediately before said elevated platform.

10. A toy track of claim 5, wherein the height of the top surface of said ramping means being comparable to that of the top surface of said elevated platform.

11. A toy track of claim 10, wherein the top surface of said ramping means being between 1mm to 1.5mm above the bottom of said diversion guide channel at said guide channel junction.

12. A toy track of claim 5, wherein said guide channels outside said guide channel junction having a substantially rectangular cross-section.

13. A toy track of claim 12, wherein the width of said guide channels outside said guide channel junction being comparable to the height of the walls of said guiding channel.

14. A toy track according to Claim 1, wherein said ramping means including an surface ascending towards said guide channel junction, said ascending surface being adapted for interacting with a retractable channel guiding member of a toy vehicle adapted for use with said toy track so as to facilitate guide channel selection at said guide channel junction.

15. A toy track according to Claim 14, wherein said ascending surface of said ramping device being adapted for gradually reducing the length of said retractable channel guiding member of said toy vehicle while said toy vehicle transiting through said ramping means towards said guide channel junction during normal operation.

16. A toy track according to Claim 14, wherein said ramping means interacts with said channel guiding member of said toy vehicle while said toy vehicle

transiting through said ramping means towards said guide channel junction during normal operation so that said channel guiding member of said toy vehicle will move from a first operating position to a second operating position.

17. A toy vehicle comprising a channel guiding member for guiding the motion of said toy vehicle along a guide channel of a toy track, said toy track comprising at least a primary guide channel and at least a diversion guide channel, said diversion guide branches out from said primary guide channel at a guide channel junction of said primary guide channel and said diversion guide channel, said channel guiding member being movable from a first operating position to a second operating position, wherein the spring urge against said channel guiding member being adapted so that, in use, the distance travelled by said vehicle during the time when said channel guiding member moves from said second operating position to said first operating position will substantially determine the channel guide along which said toy vehicle will travel after the channel junction.

18. A toy vehicle according to claim 17, wherein said channel guiding member being movable from a first operating position to a second operating position by spring urge and/or gravitation.

19. A toy vehicle according to claim 17, wherein said channel guiding member protruding downwardly from the bottom of said toy vehicle, said channel guiding member being retractable from said first operating position to said

second operating position, said first operating position being further away from the bottom of said vehicle than said second operating position.

20. A toy vehicle according to claim 19, wherein said channel guiding member being retractable under spring urge for about 1mm to 1.5mm to move from said first operating position to said second operating position.

21. A toy vehicle according to claim 17, wherein channel guiding member being retractable under spring bias along a substantially vertical direction when transiting through a ramping means at said guide channel junction when travelling along a guide channel and towards said guide channel junction.

22. A toy vehicle according to claim 17, wherein said channel guiding member including a shank which is extendable between said first operating position and said second operating position, wherein, in both said first and second operating positions, said shank being clear of the bottom surface of the guide channels except the ramping means and, when in said second position, said shank being in contact with said ramping means.

23. A toy vehicle according to claim 21, wherein, when said toy vehicle is travelling outside of said ramping means, said shank being at least 0.5 mm clear of the bottom surface of the guide channels.

24. A toy vehicle according to claim 17, wherein said toy vehicle including a magnet for holding the toy vehicle close to the surface of said toy track, said toy track being provided with corresponding magnetic material for magnetic coupling with said toy vehicle.

25. A toy vehicle according to claim 24, wherein said toy track including power supply rails of magnetic material for magnetic coupling with said toy vehicle.

26. A toy set comprising a toy track and a toy vehicle, said toy track comprising guide channels for guiding said toy vehicle to move along predetermined paths on said track and guide channel selection means to facilitate said toy vehicle to select a guide channel from a plurality of guide channels when said toy vehicle approaches a guide channel junction at which junction a diversion guide channel branches out from a primary guide channel, said toy vehicle comprising corresponding guide channel selection means so that, when said toy vehicle approaches said guide channel junction, the guide channel selection means of said toy vehicle and toy track cooperate such that a player can select the guide channel along which said toy vehicle will travel after said guide channel junction by manoeuvring the operation of said toy vehicle.

27. A toy set of Claim 26, wherein the operation of said toy vehicle being manoeuvred including the speed of said toy vehicle so that the guide channel along which said toy vehicle will travel after said guide channel junction being substantially dependent on the speed of said toy vehicle approaching said guide channel junction.

28. A toy set of Claim 27 comprising a toy track of Claim 1 and a toy vehicle of Claim 17.

29. A toy set of Claim 27 comprising a toy track of Claim 2 and a toy vehicle of Claim 17.

30. A toy set of Claim 27 comprising a toy track of Claim 5 and a toy vehicle of Claim 17.

31. A toy set of Claim 27 comprising a toy track of Claim 14 and a toy vehicle of Claim 17.

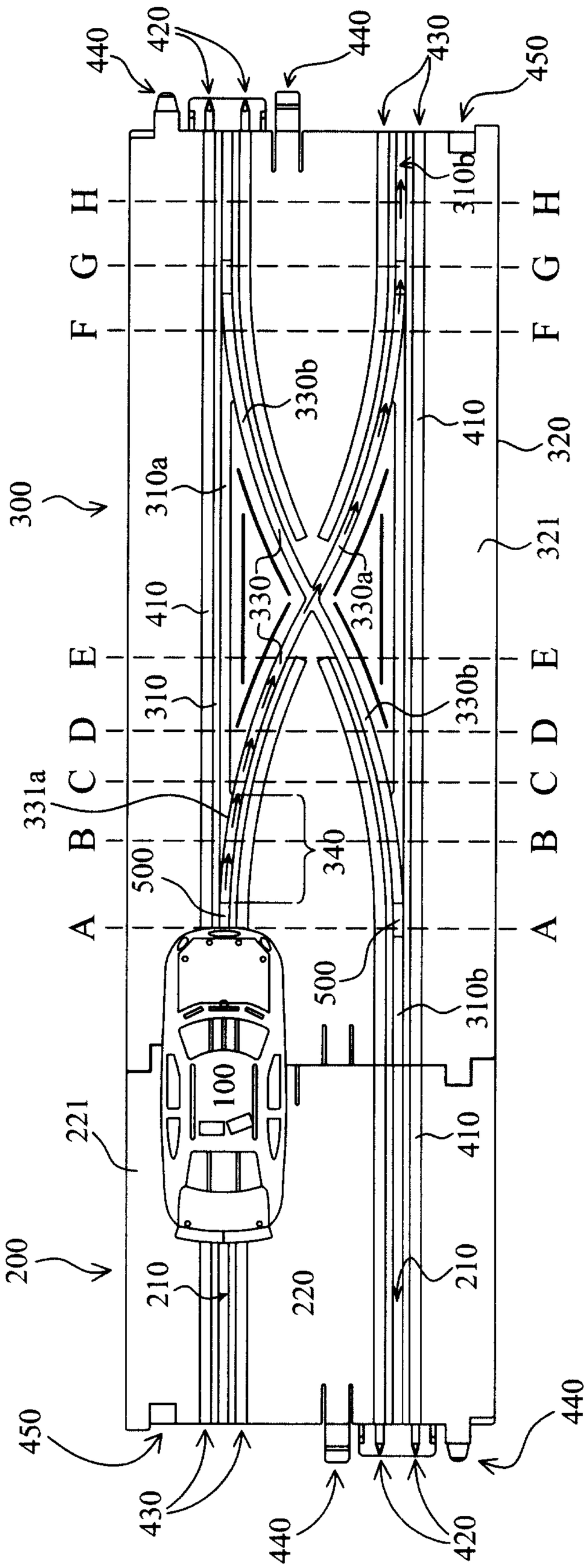
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Fig. 1

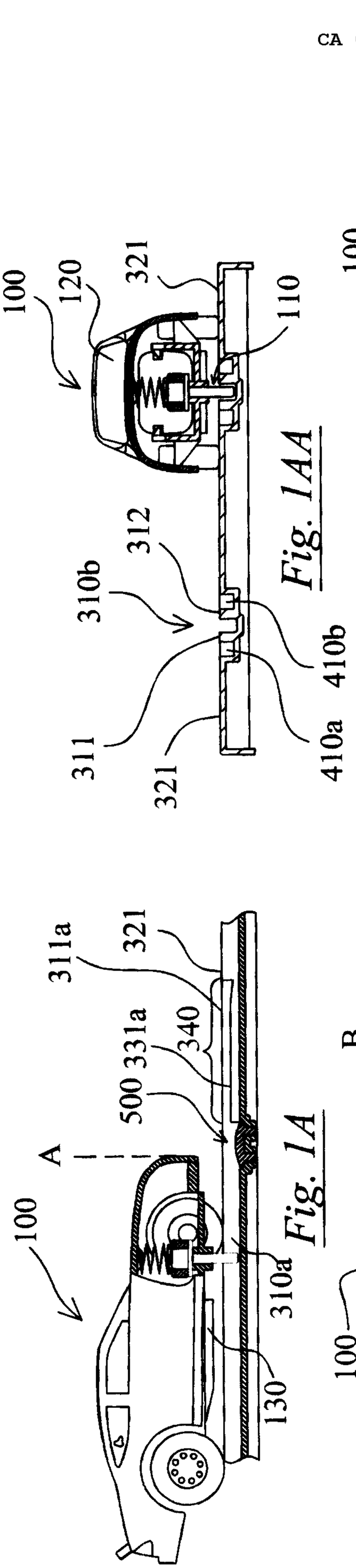

Fig. 1A

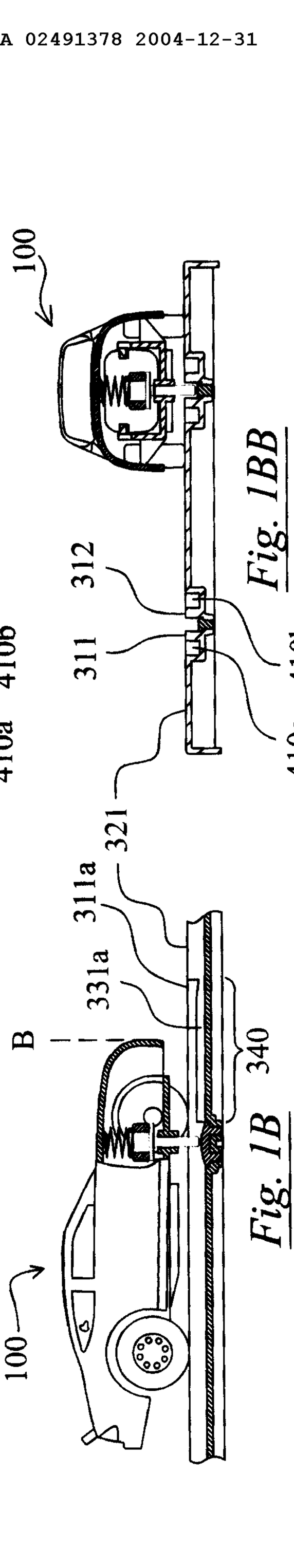

Fig. 1B

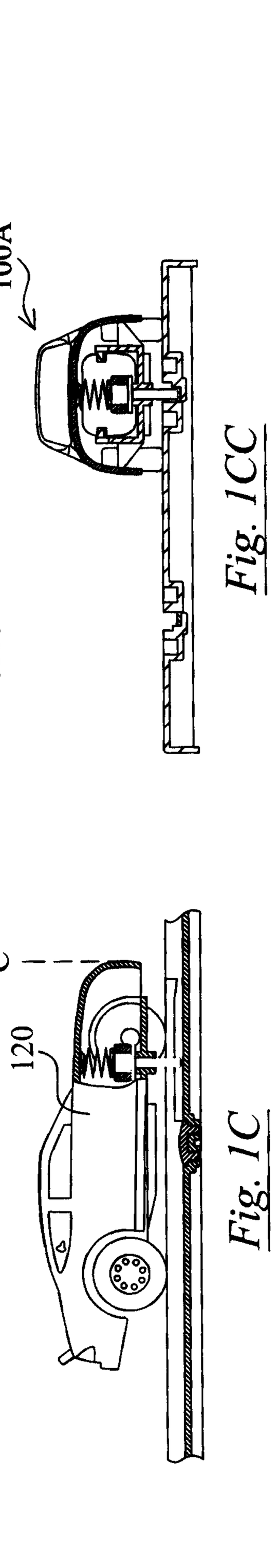

Fig. 1C

Fig. 1AA

Fig. 1BB

Fig. 1CC

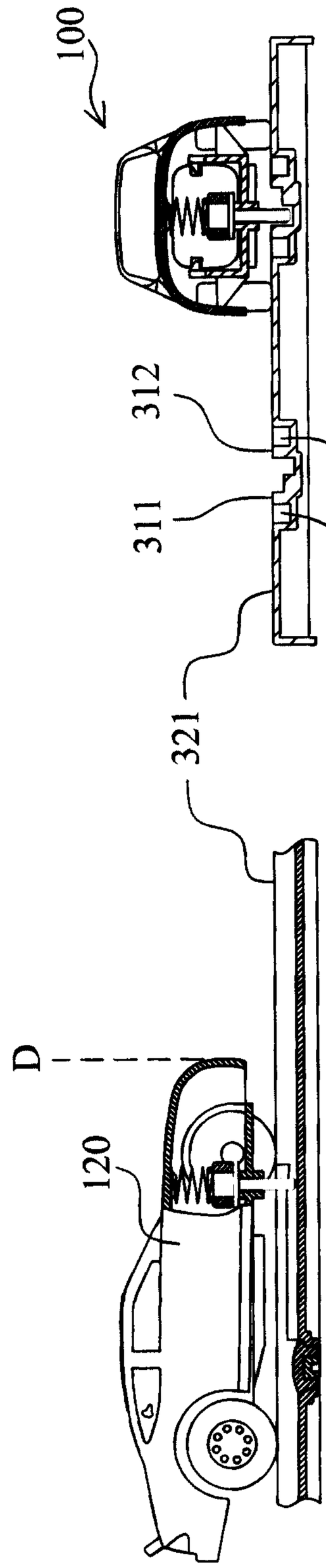

Fig. 1D

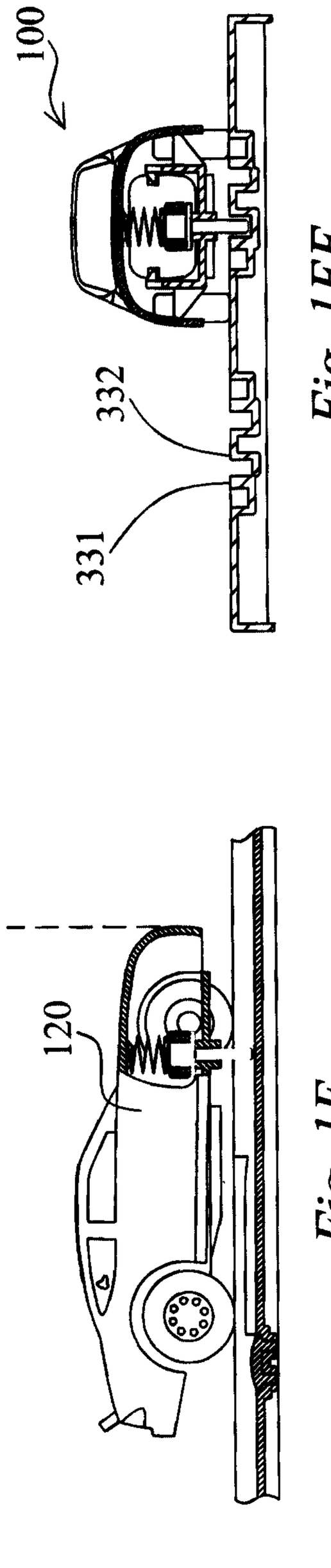

Fig. 1E

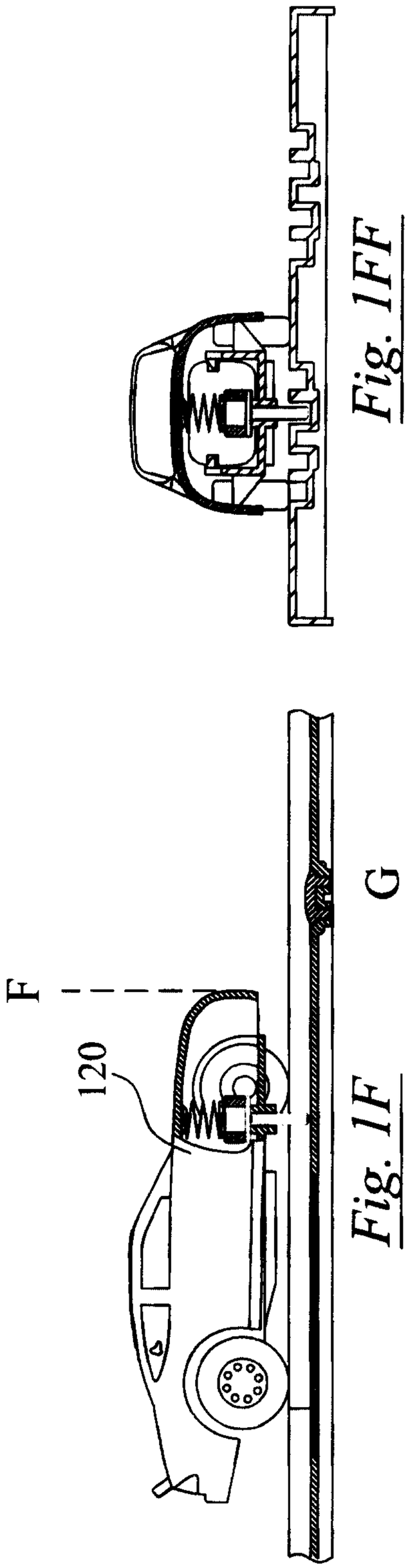

Fig. 1F

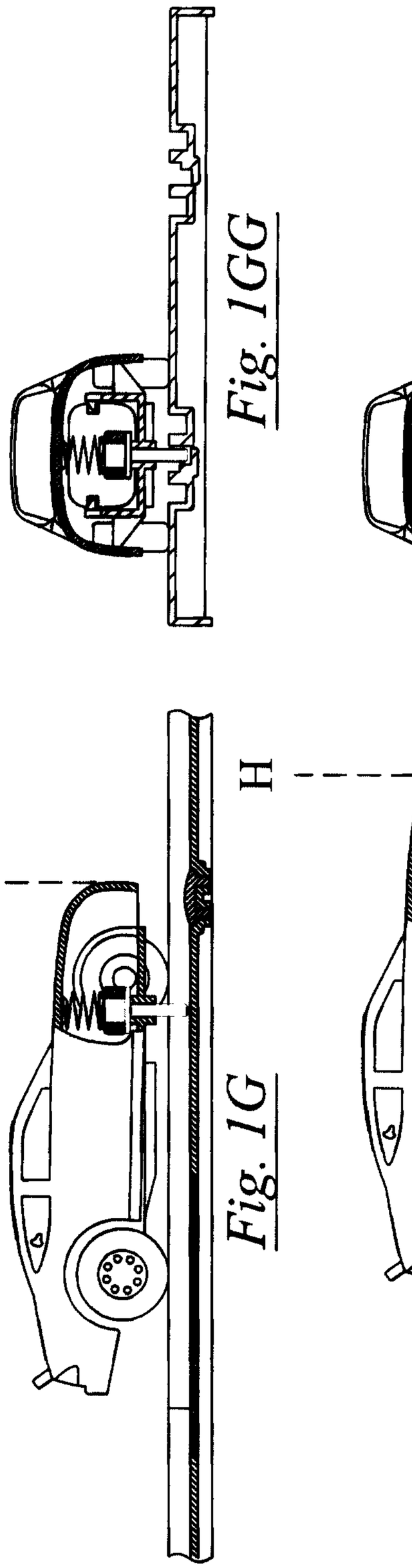

Fig. 1G

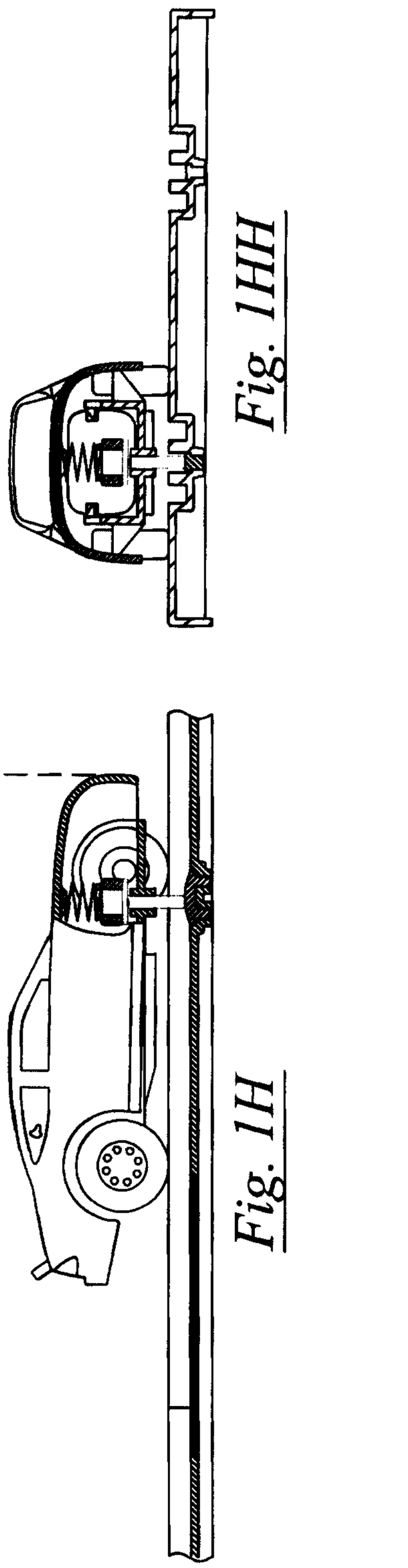

Fig. 1H

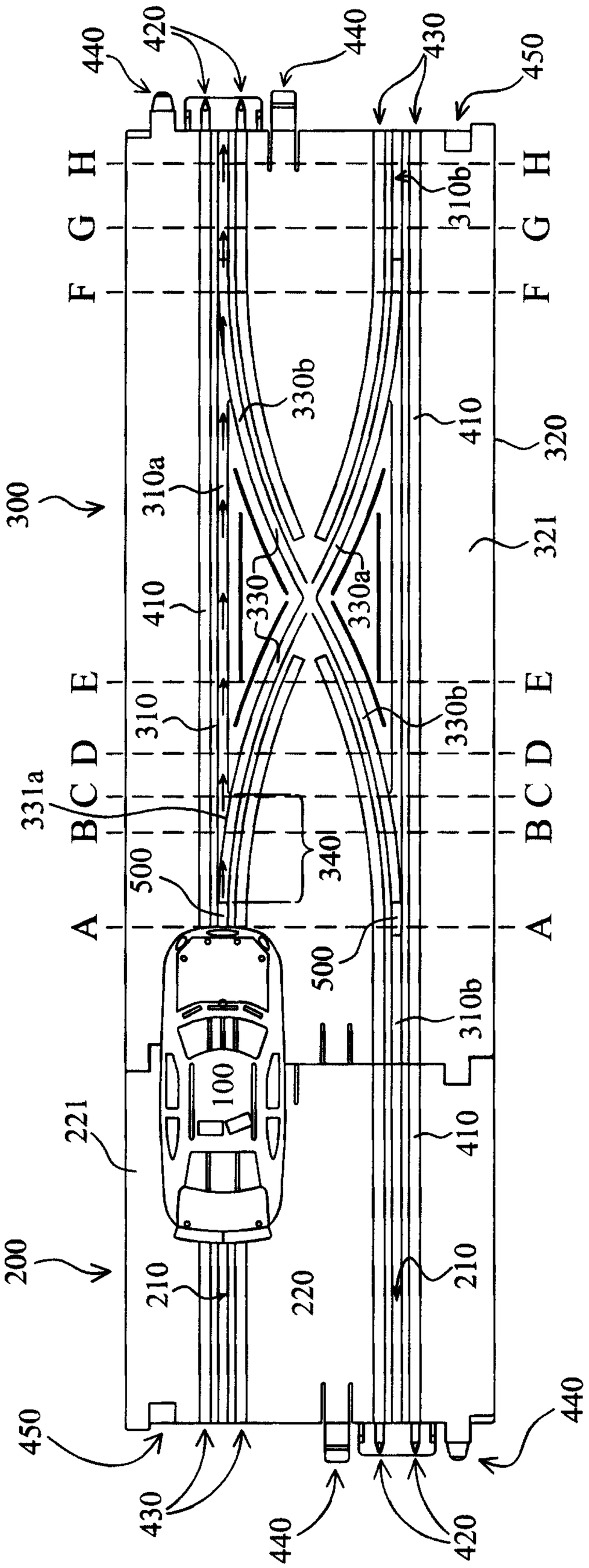
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Fig. 2

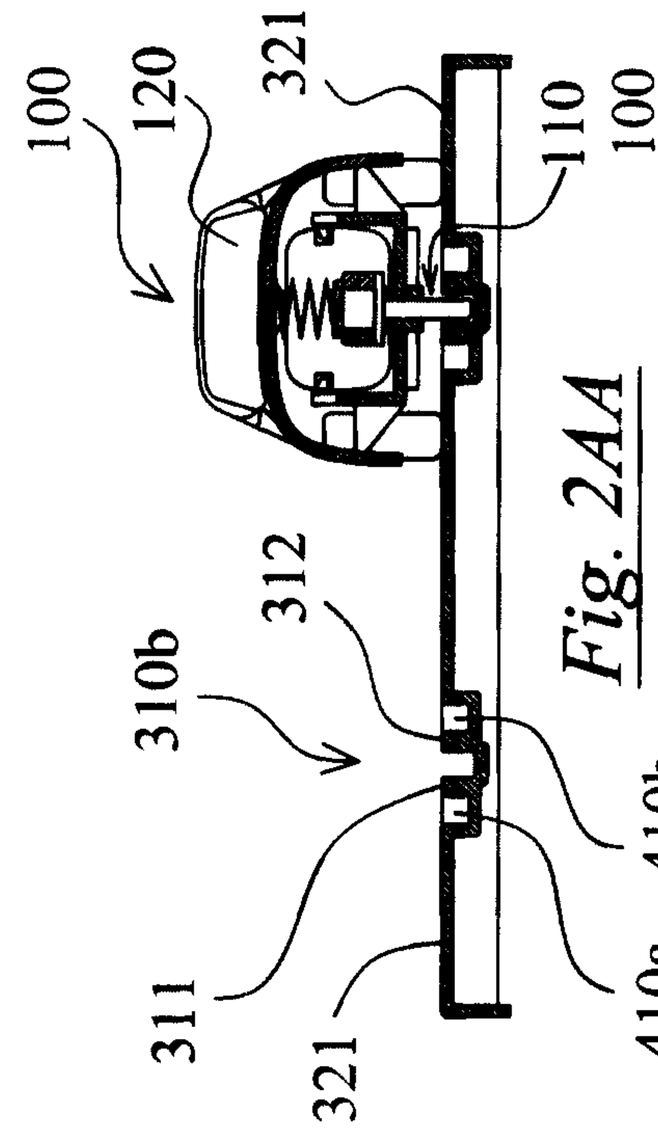
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Fig. 2A

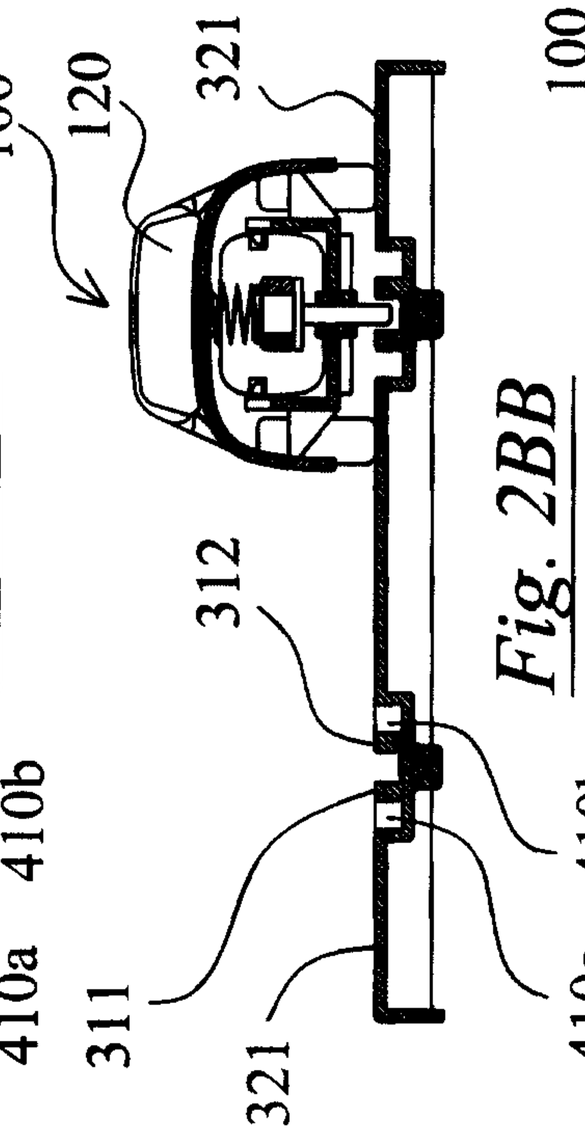
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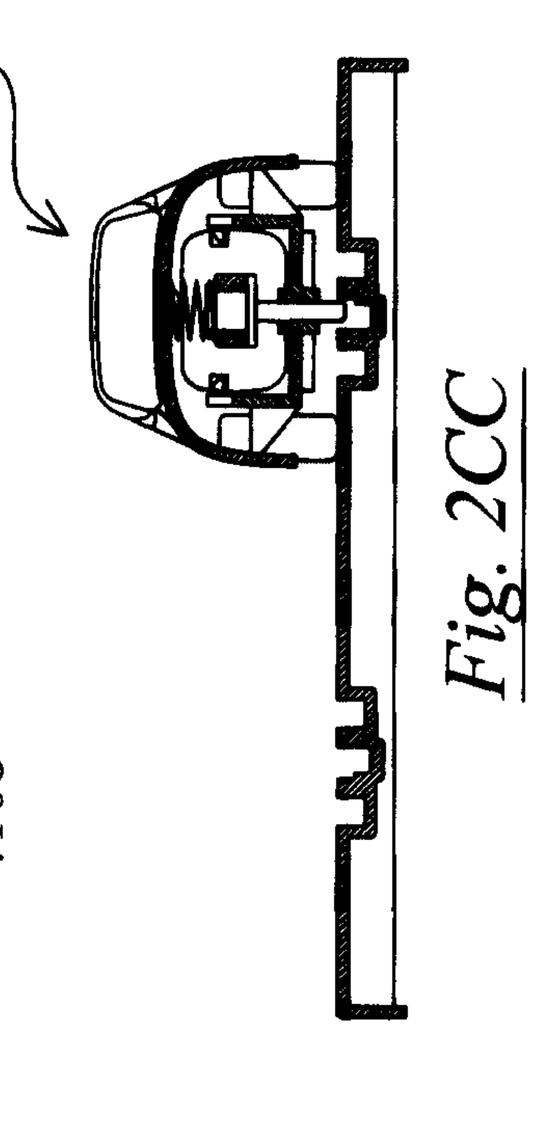
Fig. 2B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120
Fig. 2C

100
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321
110
310b
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410a
410b
Fig. 2AA

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311
321
410a
410b
Fig. 2BB

100
Fig. 2CC

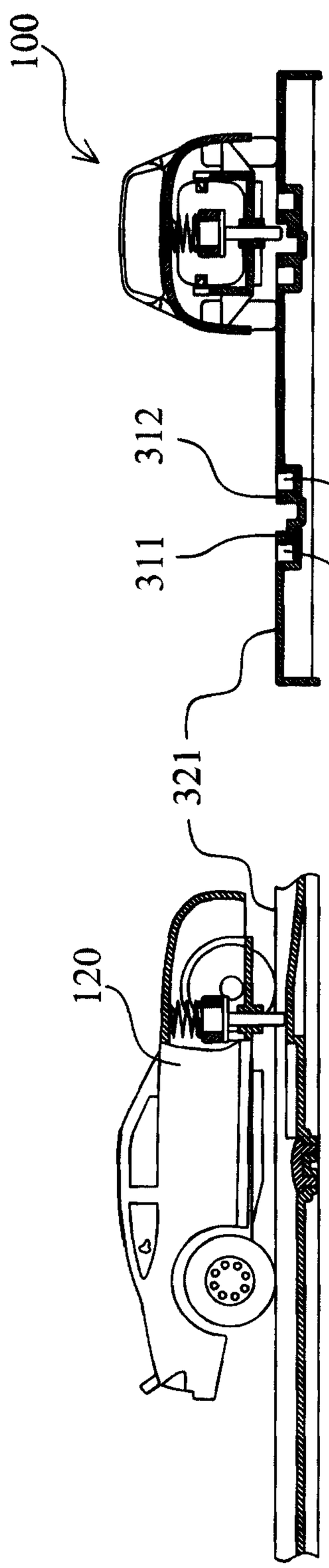


Fig. 2D

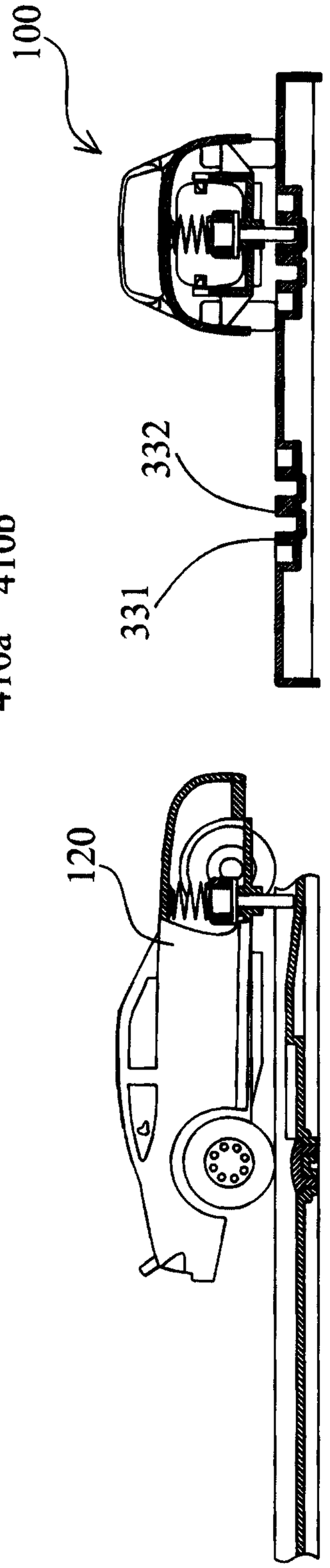


Fig. 2E

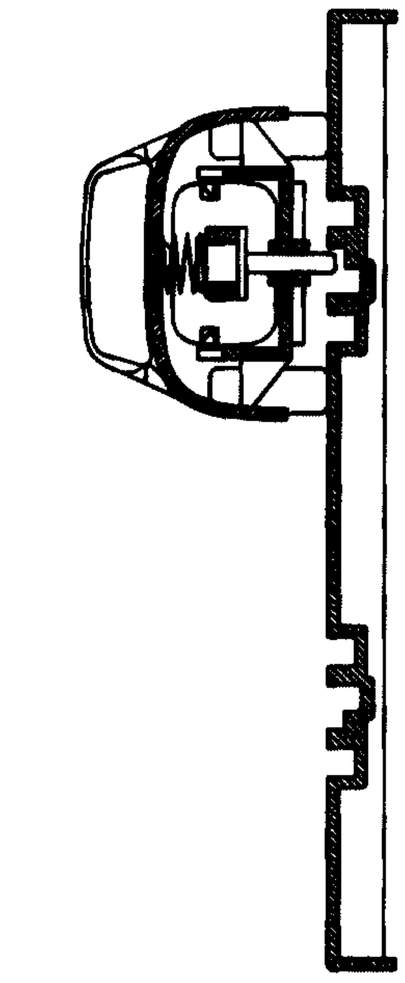


Fig. 2F

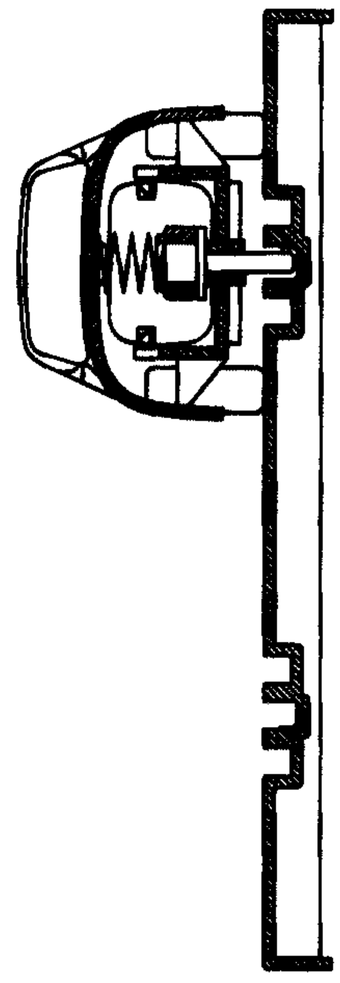


Fig. 2G

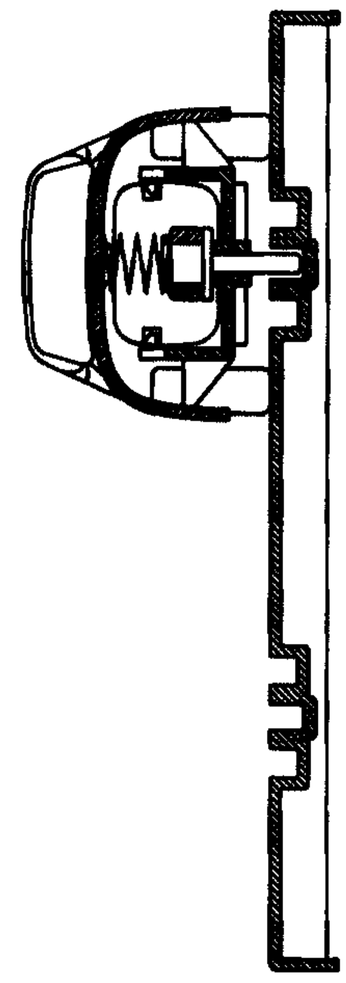


Fig. 2H

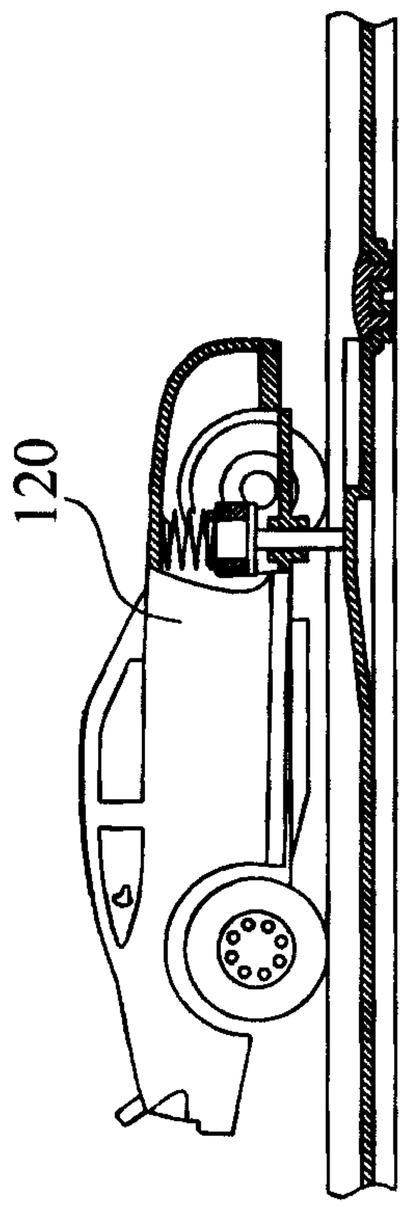


Fig. 2F

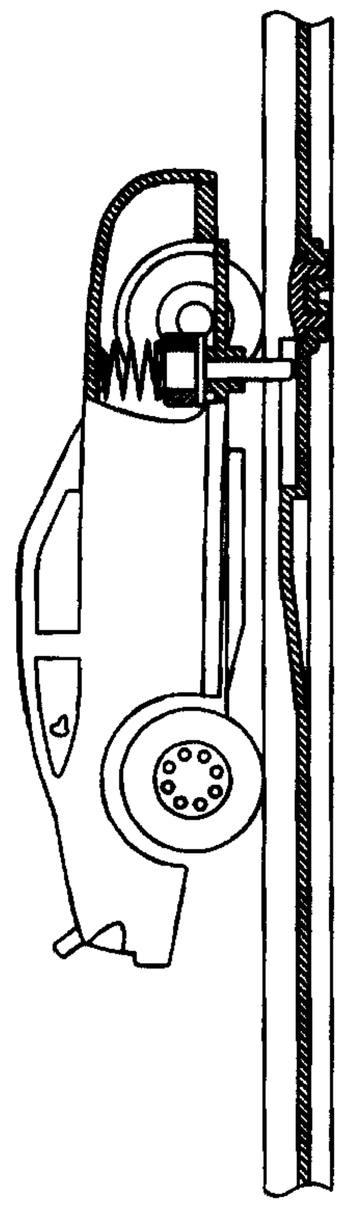


Fig. 2G

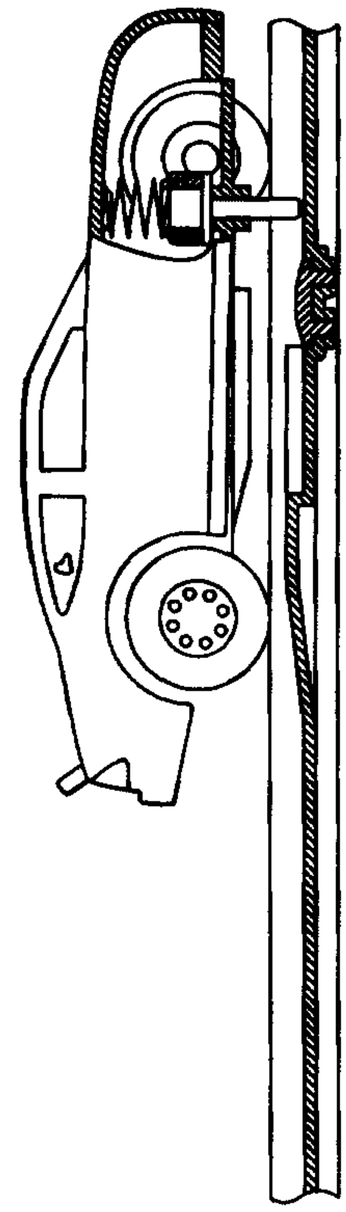


Fig. 2H

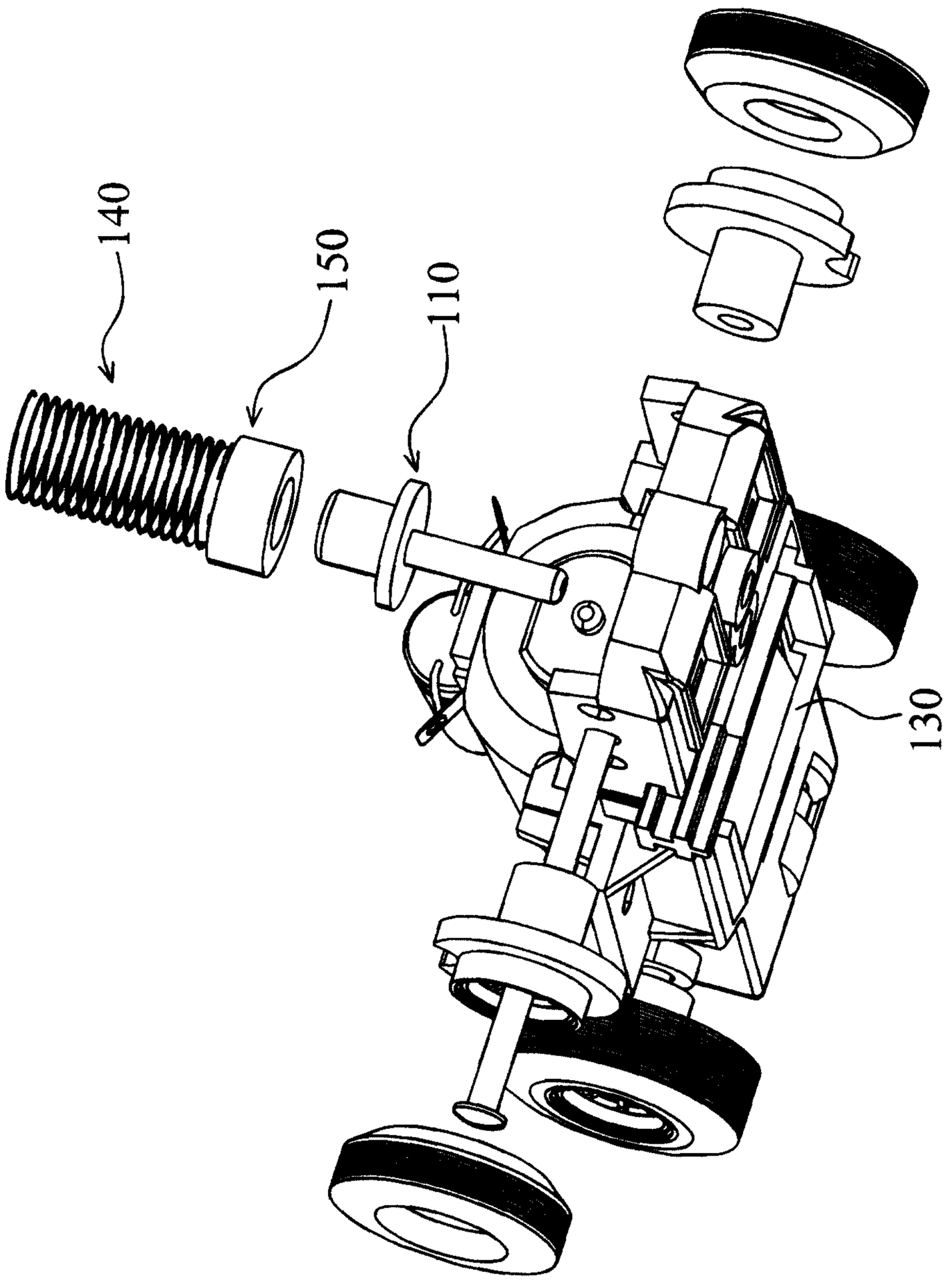
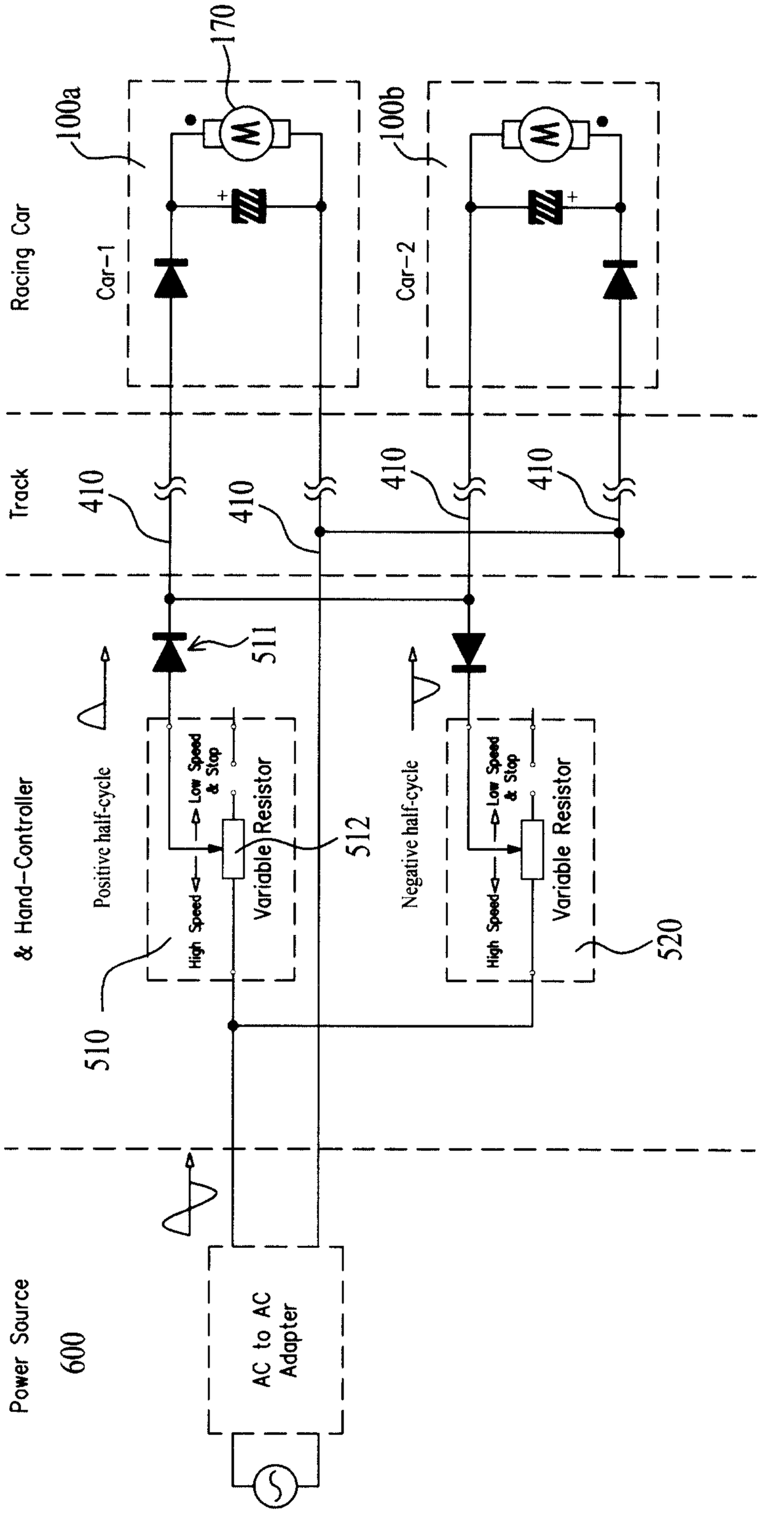


Fig. 3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512
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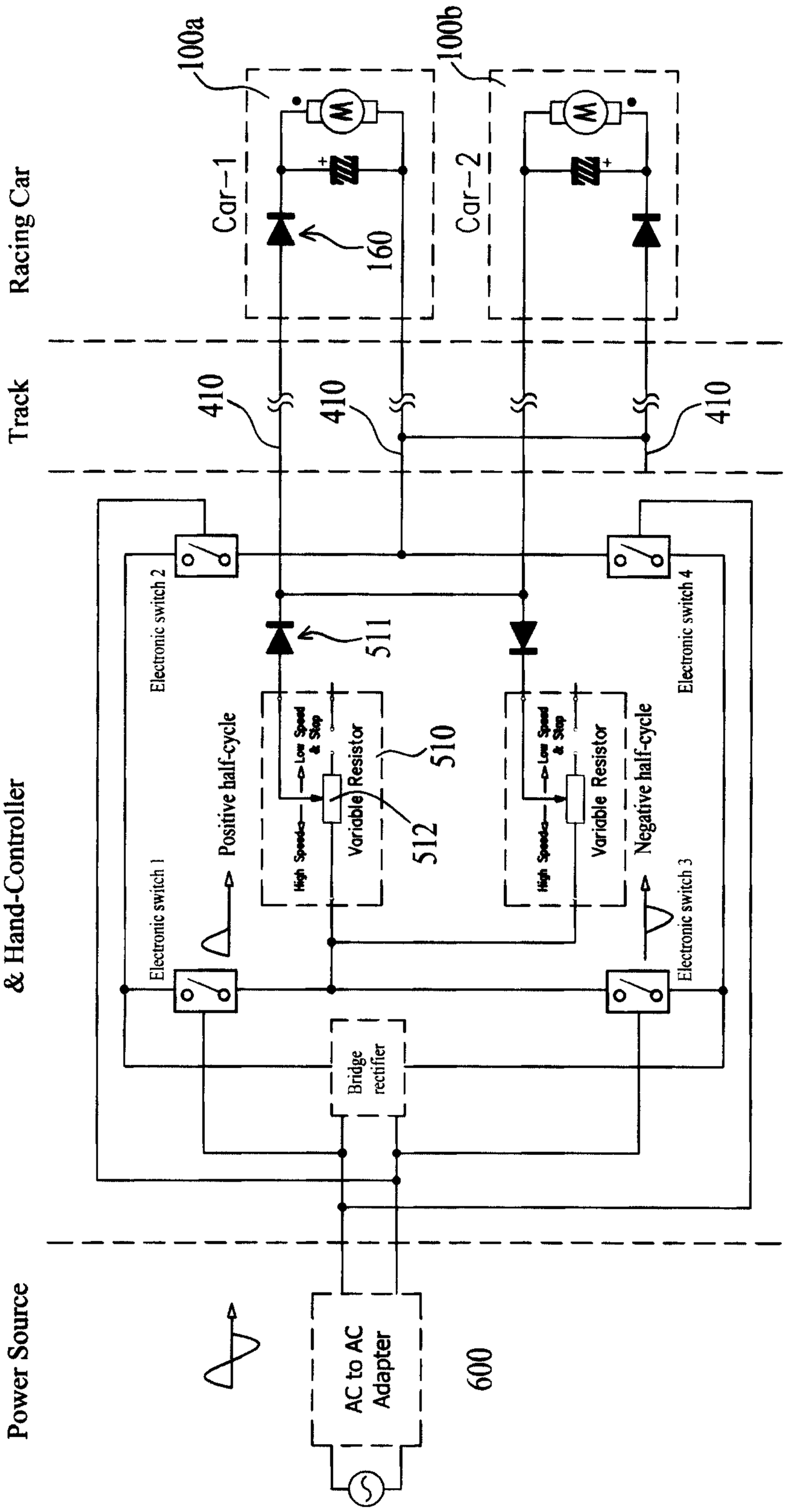
Positive half-cycle
Negative half-cycle
High Speed
Low Speed & Stop
Variable Resistor
510
Power Source
600
AC to AC Adapter

Fig. 4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High Speed
Variable Resistor
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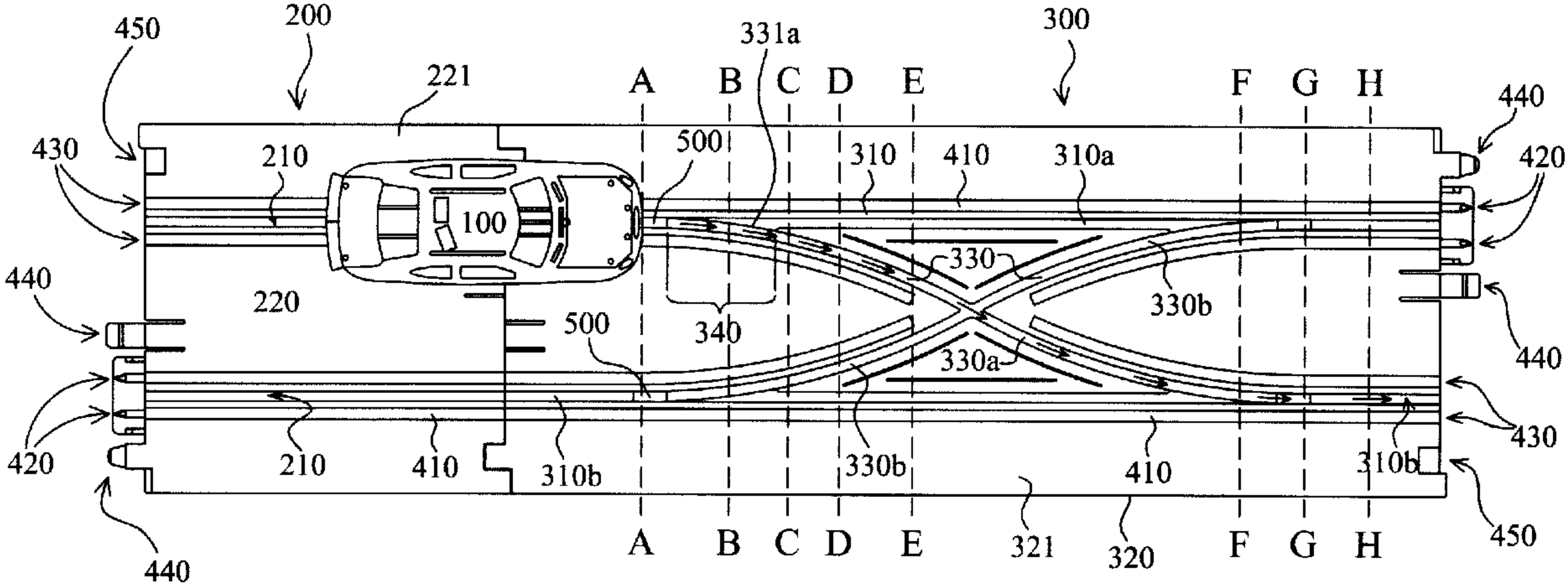
Electronic switch 4
Negative half-cycle
Electronic switch 1
Electronic switch 3
Bridge rectifier
Power Source
AC to AC Adapter
600

Fig. 5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