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(54) **VIRTUAL LOOP PERFORMANCE TRACK FOR TOY VEHICLES**

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(57) **ABSTRACT**

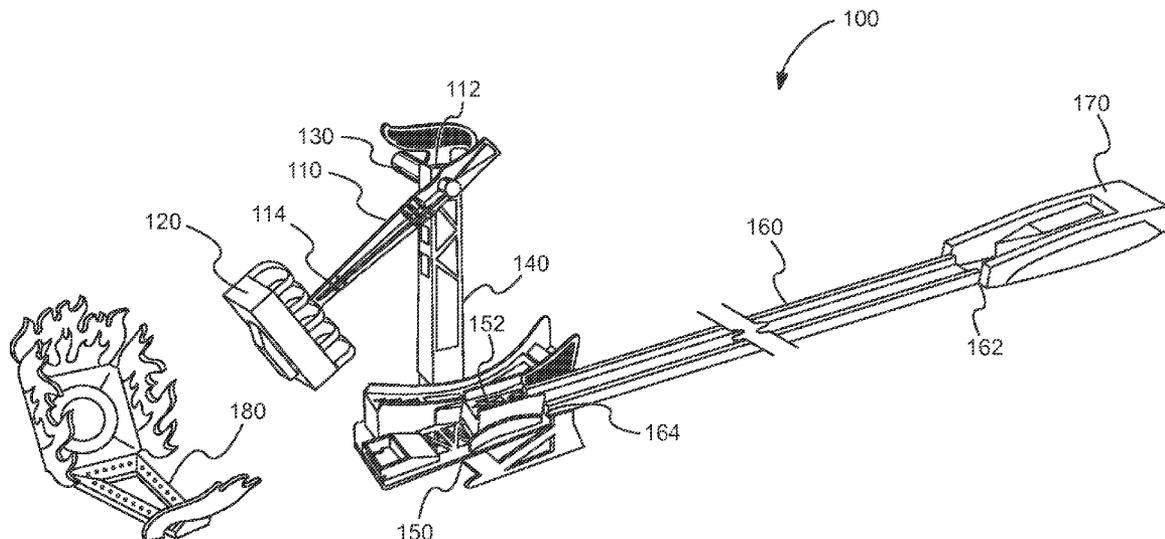
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A toy vehicle track set is provided. The track set, designed to be used with non-motorized toy vehicle, enables a toy vehicle to travel in a vertical loop without a loop track segment. The track set includes base with an entrance ramp and an exit ramp that enables a toy vehicle to enter and exit a vehicle carrier located at the end of a pendulum arm. The pendulum arm rotates in a vertical loop as a result of the kinetic energy of the toy vehicle and the spring energy of a coil spring located in an axle that couples the pendulum arm to a pillar.

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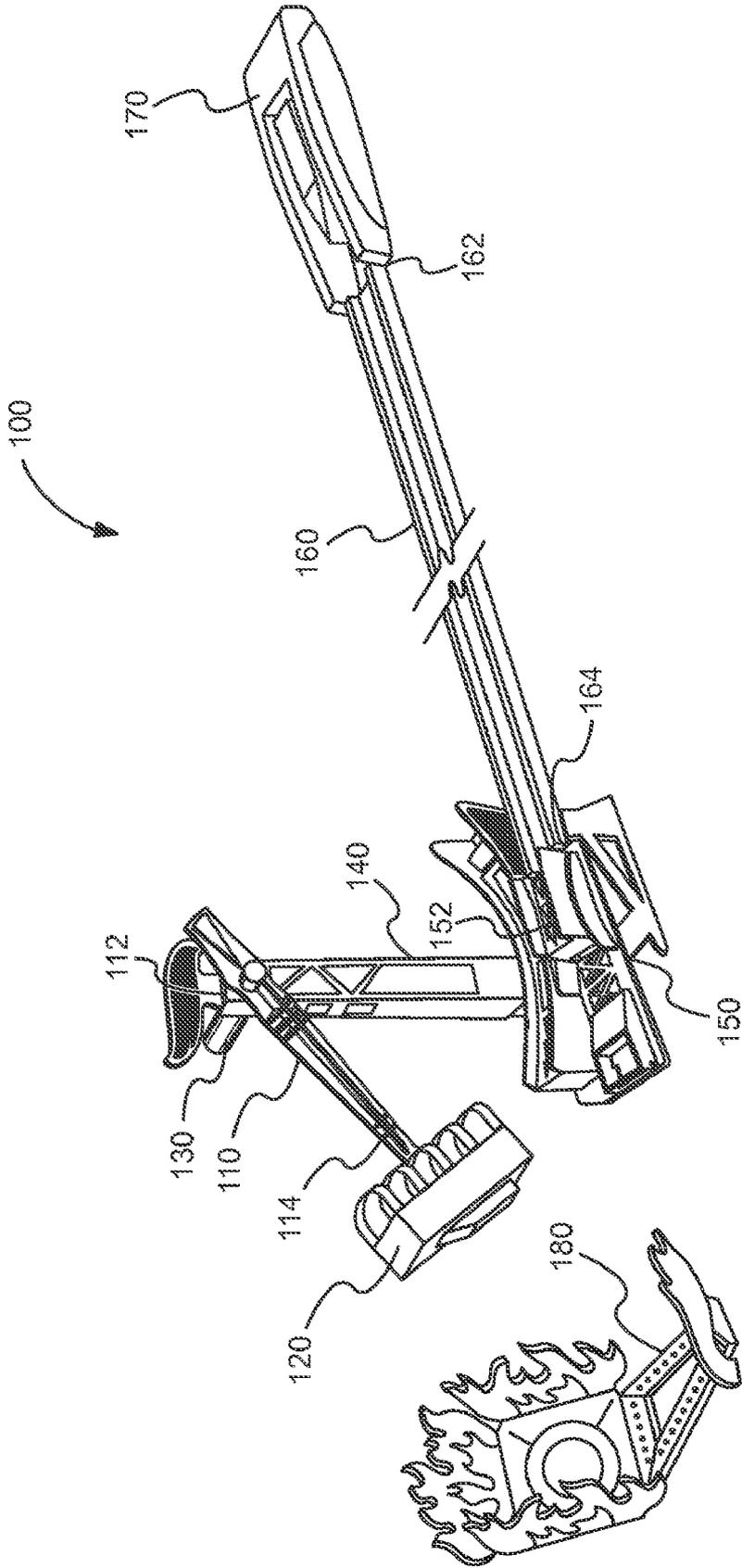


Fig. 1

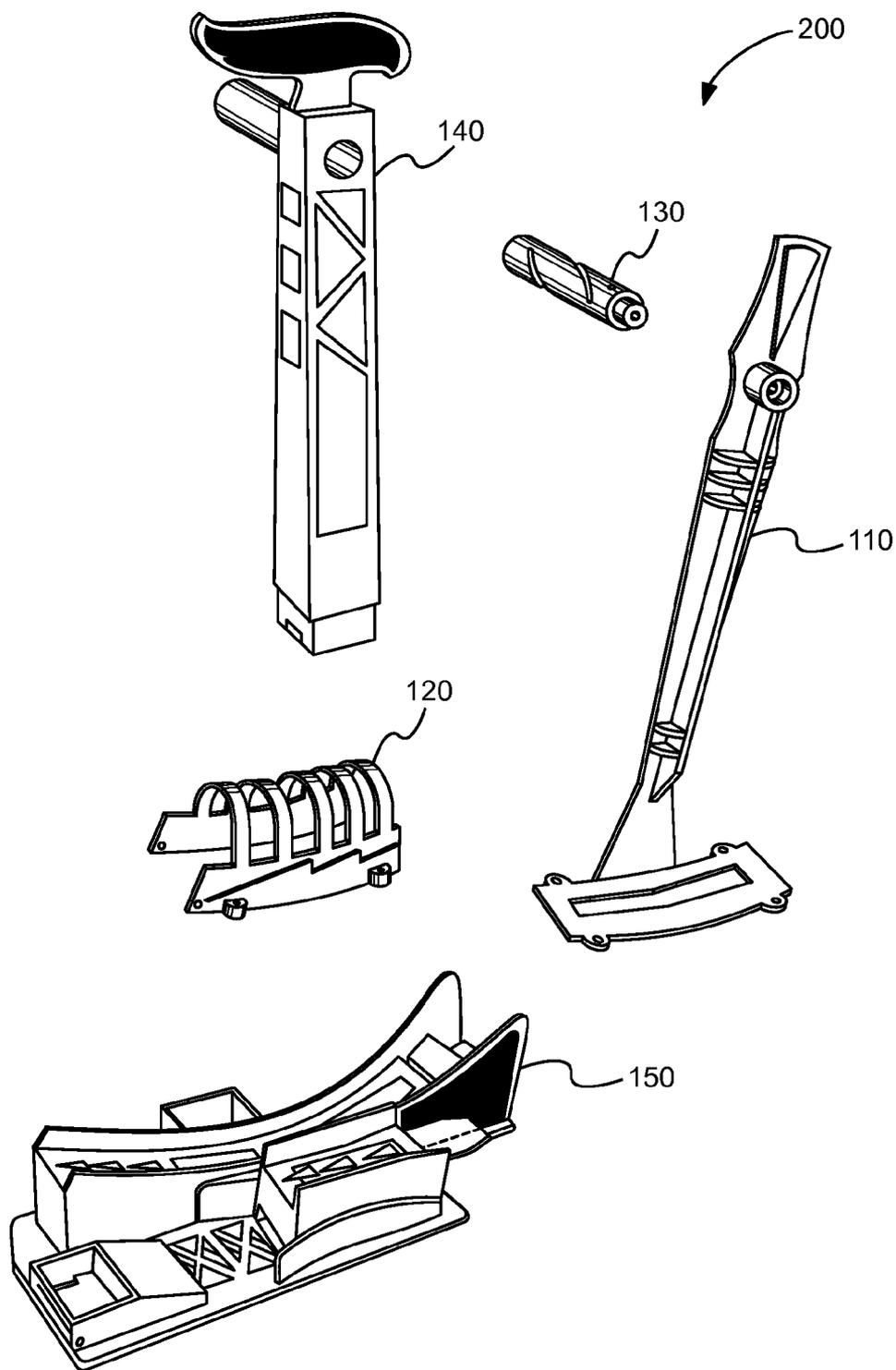


Fig. 2

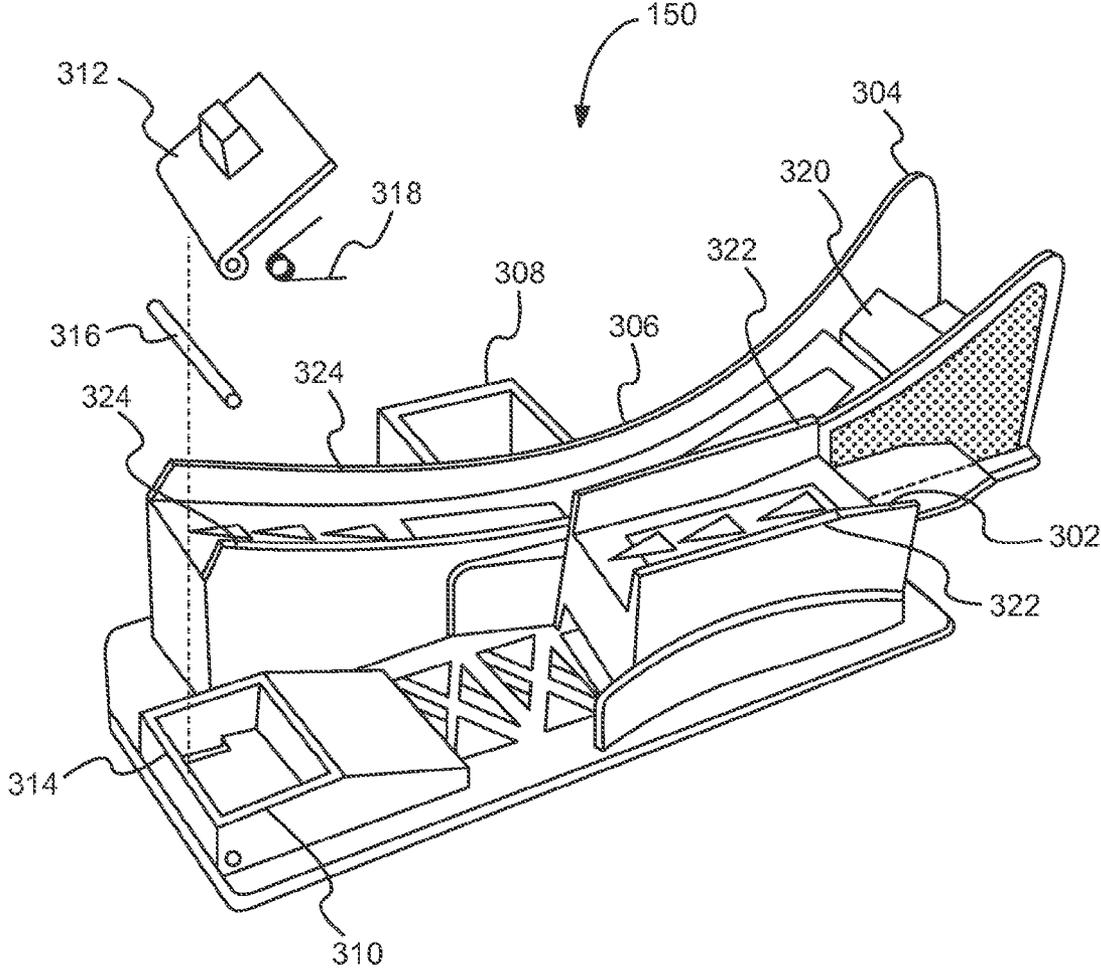


Fig. 3

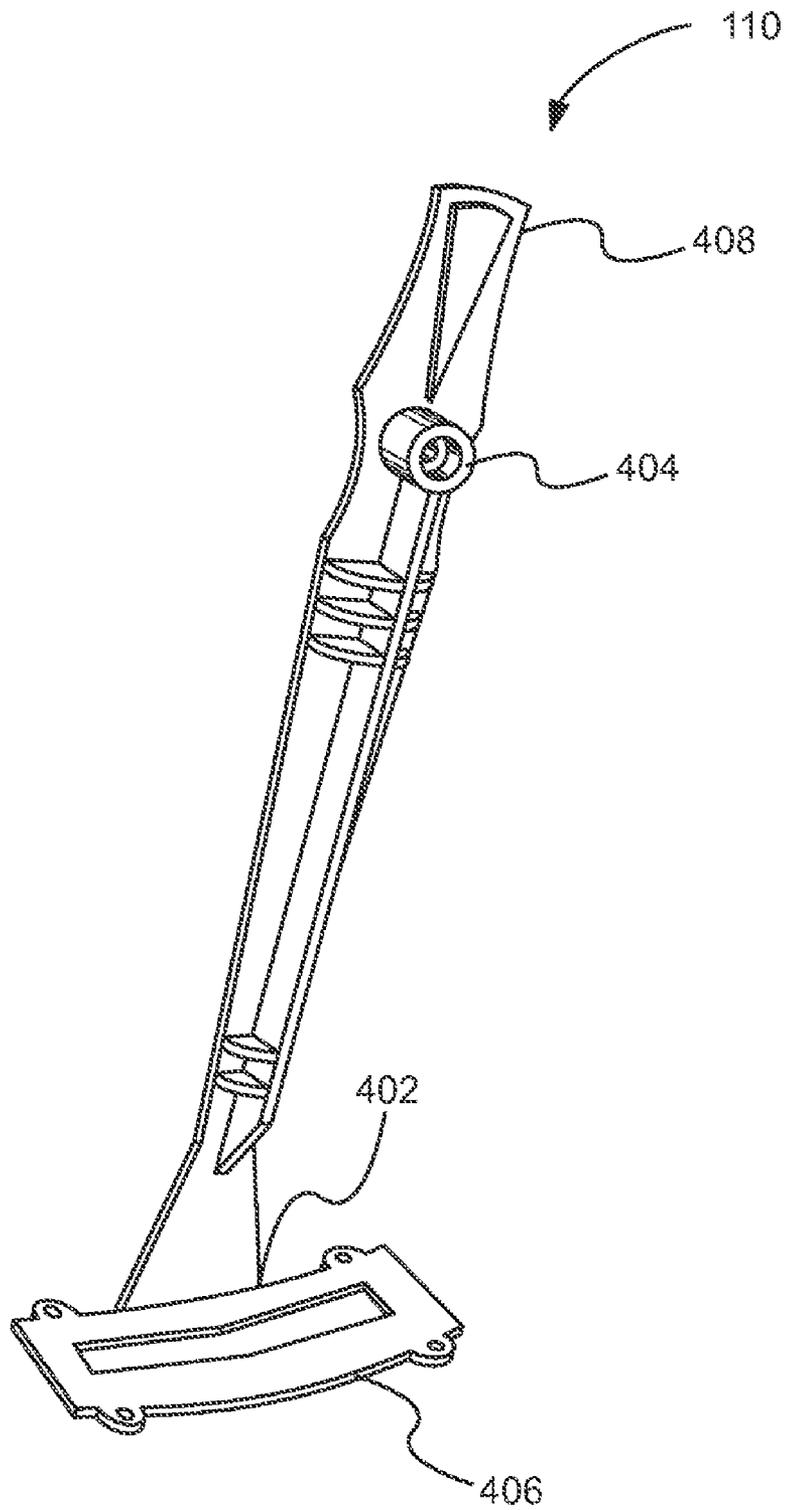
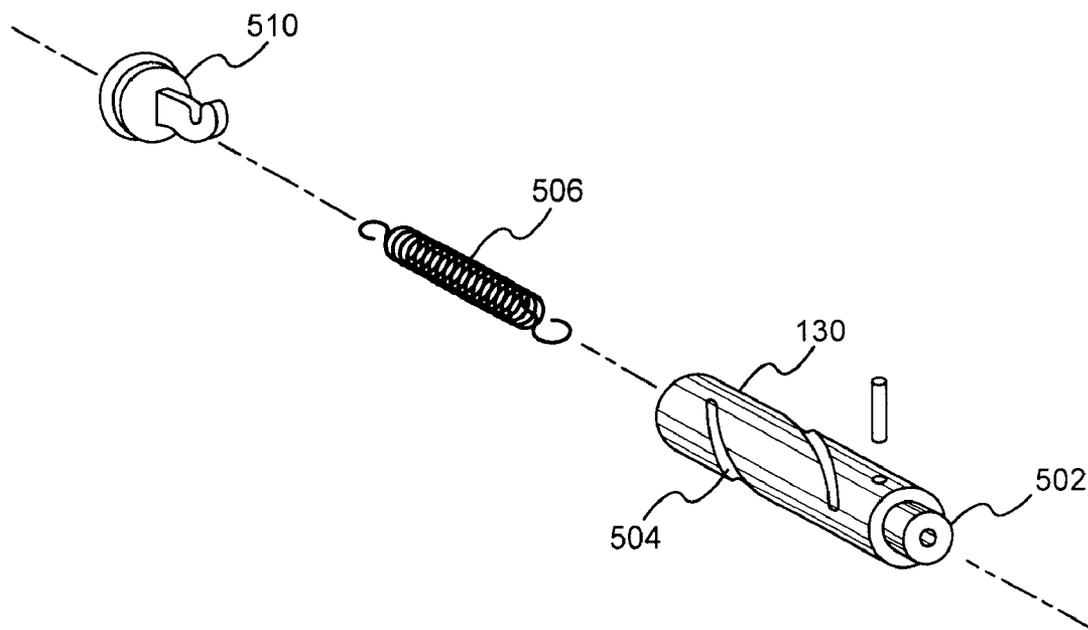


Fig. 4



**Fig. 5**

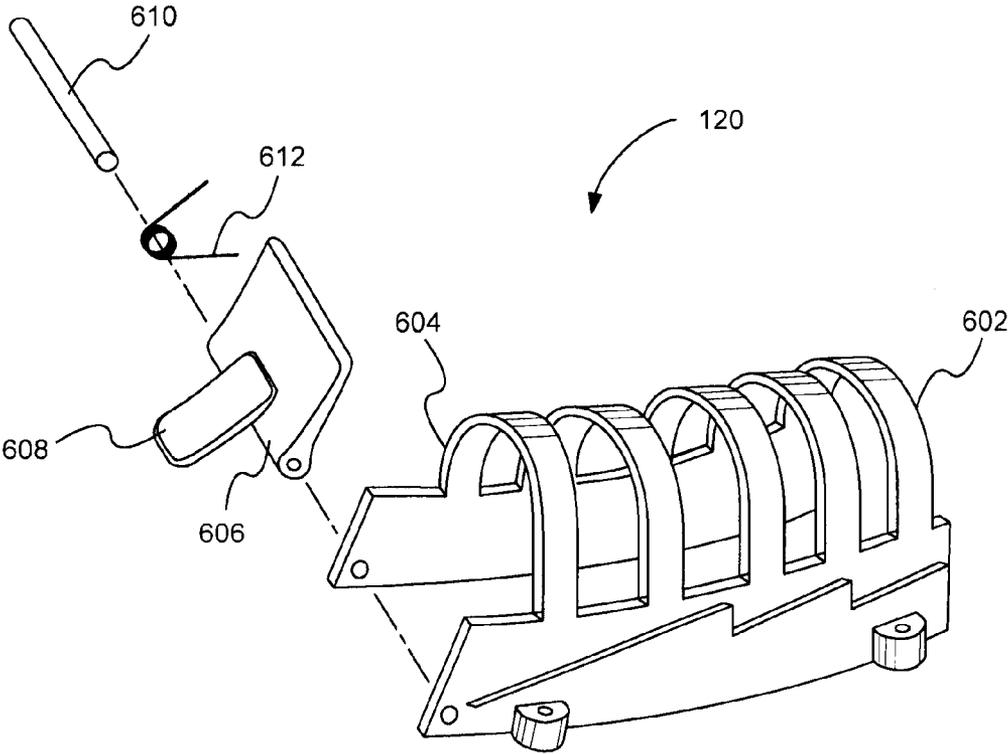


Fig. 6

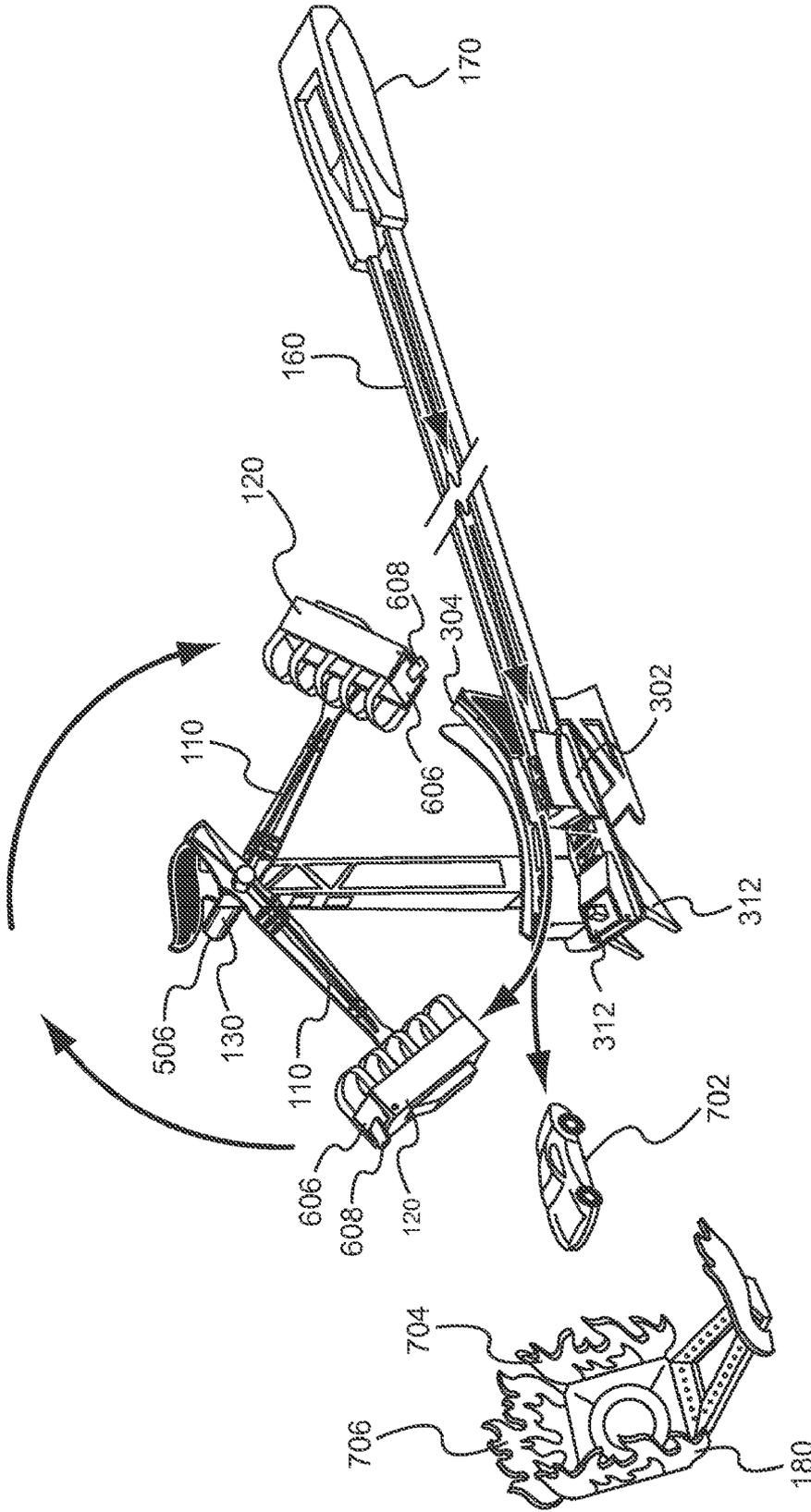


Fig. 7

**VIRTUAL LOOP PERFORMANCE TRACK FOR TOY VEHICLES**

**FIELD OF THE INVENTION**

[0001] The invention relates generally to toy vehicle track sets and more particularly to loop apparatus utilized therein.

**BACKGROUND**

[0002] Toy vehicle track sets in which self-powered vehicles are used are a popular and long-lasting category of toys. In some instances, such toy vehicles are powered by wind-up motors, electric motors, or inertial motors. In other instances, popular non-motorized toy vehicles include toy vehicles to which a velocity has been imparted such as, by the toy vehicle traveling a down sloping acceleration ramp at the entrance to the guided track or by placing the toy vehicle in a launcher, for example a spring loaded launcher that exerts a force on the toy vehicle. As toy vehicle track sets become more competitive, developers have sought to enhance the amusement and entertainment value of such toy vehicle track sets by including a variety of features. These features are sometimes referred to as "stunt devices". These stunt devices include a wide variety of track segment loops, jumps, collision apparatus and the like. Track loops are particularly popular enhancements to toy track sets. Examples of toy vehicle track sets containing such enhancements and stunt devices include U.S. patents U.S. Pat. No. 6,089,951, U.S. Pat. No. 5,234,216, and U.S. Pat. No. 6,241,573, and published United States Applications US20070293122 and US20080020675, assigned to the assignee of the present invention, each of which is hereby incorporated by reference in their entirety for all purposes. Examples of toy vehicle track sets include U.S. Pat. Nos. 6,508,179, 6,358,112, 5,643,040, 4,558,687, 4,575,350, 4,558,867, 4,496,100 and published United States Application US20070293123, assigned to the assignee of the present invention each of which is incorporated by reference in their entirety for all purposes.

[0003] Multiple loops and interlocking loops are popular especially for non-motorized toy vehicle track sets. Loops may serve to increase the toy vehicle's speed and therefore increase the excitement of the entertainment provided by the toy vehicle. Existing toy vehicle tracks for non-motorized toy vehicles generally include full loops or loops with only minor interruptions. Because non-motorized toy vehicles generally move only due to external forces imparted upon them, there are limited ways to increase the speed and or entertainment value of such toys. Moreover, interruptions along the track length often result in the toy vehicle becoming displaced from the track thereby ending the instant play session.

[0004] A substantial number of toy vehicle track sets utilize one or more loop portions to increase the amusement and entertainment of the user. Some toy vehicle track sets utilize loop portions in the track, which define a gap rather than a continuous loop. In such instances, the gaps are intended to be traversed or "jumped" by high-speed toy vehicles within the track set. However, the size of the gap that may be used for non-motorized toy vehicle track sets is limited by the speed of the toy vehicle.

[0005] While there are a vast variety of track sets with loops and other stunt devices, there is still a need and demand for toy track sets that provide novel entertainment mechanisms. Embodiments of the present invention provide a novel virtual track loop for use with non-motorized toy vehicles. Embodi-

ments of the present invention include a novel mechanism that causes a toy vehicle to travel in a nearly complete loop, using the vehicle's kinetic force combined with spring force, without the need for a complete track.

**SUMMARY**

[0006] In accordance with a preferred embodiment of the present invention, a toy vehicle track set is provided, the track set includes: a track segment with a first end and a second end; a base coupled to the first end of the track segment, the base including an entrance ramp and an exit ramp; a pillar having a first end and a second end; the first end of the pillar coupled to the base; an arm rotatably coupled to the second end of the pillar by an arm axle near the proximal end of the arm, such that the arm is free to rotate in a vertical loop; and a toy vehicle cage coupled to the platform at the distal end of the arm.

[0007] In another embodiment, a toy vehicle track set base is provided, the base includes a substantially level undersurface; an upper surface defining two ramps; a first ramp having an arm lock to secure a spring-loaded rotatable arm; a second ramp having a release mechanism to cause a gate on a toy vehicle cage located at the distal end of the spring loaded rotatable arm to open; and a foundation frame laterally coupled to the upper surface, the foundation frame supporting a pillar having the spring loaded rotatable arm with a toy vehicle cage coupled at the distal end of the pillar.

[0008] In addition a method of play for a toy vehicle track set is provided, the method of play includes loading a spring-loaded arm and cage assembly; propelling a toy vehicle toward the arm and cage assembly such that the toy vehicle enters the cage; releasing an arm lock such that the spring loaded arm and cage assembly rotate in a loop engaging a catch mechanism to stop the rotation of the loaded arm and cage assembly; and releasing the toy vehicle from the cage.

[0009] Other and further features and advantages of the present invention will be apparent from the following descriptions of the various embodiments. It will be understood by one of ordinary skill in the art that the following embodiments are provided for illustrative and exemplary purposes only, and that numerous combinations and modification of the elements of the various embodiments of the present invention are possible.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0010] Non-limiting and non-exhaustive embodiments of the present invention are described with reference to the following drawings. In the drawings, like reference numerals refer to like parts throughout the various figures unless otherwise specified.

[0011] For a better understanding of embodiments of the present invention, reference is made to the following Detailed Description, which is to be read in association with the accompanying drawings, wherein:

[0012] FIG. 1 is a perspective view of an exemplary toy vehicle track set in accordance with an embodiment of the present invention;

[0013] FIG. 2 is an exploded view of the virtual loop system of the toy vehicle track set of FIG. 1;

[0014] FIG. 3 is perspective view of the base of the virtual loop system of FIG. 2;

[0015] FIG. 4 is a detailed view of the arm of the virtual loop system of FIG. 2;

**[0016]** FIG. 5 is a detailed view of the arm axle of the virtual loop system of FIG. 2;

**[0017]** FIG. 6 is a detailed view of the cage of the virtual loop system of FIG. 2; and

**[0018]** FIG. 7 is a perspective view of a virtual loop system in motion in accordance with an embodiment of the present invention.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

**[0019]** The embodiments of the present invention are described more fully hereinafter with reference to the accompanying drawings, which form a part hereof, and which show, by way of illustration, specific exemplary embodiments by which the invention may be practiced. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Among other things, the present invention may be embodied as systems, or devices. The following detailed description should not be taken in a limiting sense.

**[0020]** Throughout the specification and claims, the following terms take the meanings explicitly associated herein, unless the context clearly dictates otherwise. The phrase “in one embodiment” as used herein does not necessarily refer to the same embodiment, though it may. Furthermore, the phrase “in another embodiment” as used herein does not necessarily refer to a different embodiment, although it may. Thus, as described below, various embodiments of the invention may be readily combined, without departing from the scope or spirit of the invention.

**[0021]** In addition, as used herein, the term “or” is an inclusive “or” operator, and is equivalent to the term “and/or,” unless the context clearly dictates otherwise. The term “based on” is not exclusive and allows for being based on additional factors not described, unless the context clearly dictates otherwise. In addition, throughout the specification, the meaning of “a,” “an,” and “the” include plural references. The meaning of “in” includes “in” and “on.”

**[0022]** Embodiments of the invention provide novel stunt devices that may be used in toy vehicle track systems. In the various embodiments toy vehicle track systems are designed to provide a track loop experience without the need to have a complete track loop. Embodiments of the invention provide for the novel loop system to be implemented with existing toy track systems.

**[0023]** By way of overview, embodiments of the present invention utilize an arm with a toy vehicle cage at its distal end, coupled to a pillar that enables the arm to travel in a vertical loop.

**[0024]** FIG. 1 is a perspective view of an embodiment of a toy track set 100. The track set 100 is designed to be used with non-motorized toy vehicles. A straight elongated track segment 160 is coupled to a toy vehicle launcher 170 at a first end 162 and to a base 150 at a second end 164. Although shown as a single-track segment, it is contemplated within the scope of the embodiments of the present invention that multiple track segments could be utilized by interconnecting the segments using coupling means known in the art. Furthermore, although depicted as a straight track segment, this is not intended to be a limitation on the embodiments and other geometries are contemplated within the scope of the embodi-

ments. In addition, although depicted as having a toy vehicle launcher 170 at one end 162 of the track segment 160, this is not intended to be a limitation on the embodiments of the present invention. Other means of placing a toy vehicle in motion are contemplated within the scope of the embodiments, including but not limited to a sloping acceleration track segment ramp, a track loop causing toy vehicle acceleration, a spring-loaded wheel system within the toy vehicle, and human-imparted velocity.

**[0025]** The second end 164 of the track segment 160 is coupled to an entrance ramp 152 of the base 150. A pillar 140 is located adjacent to the base 150 on the side opposite the entrance ramp 152. At the proximal end 112 of the pillar 140, there is an opening (not shown) configured to accept an axle arm 130. The axle arm 130 couples an arm 110 to the pillar 140. The arm 110 has a toy vehicle cage 120 located at its distal end 114.

**[0026]** Optionally included with the toy vehicle track set is a target 180. The target 180 is not coupled to the base 150 and may be placed anywhere in proximity to the base 150. The target is placed at a distance such that a toy vehicle exiting the track set may strike or land in the target. For example, in use the target may be placed approximately 24 inches or closer to the track set to catch the toy vehicle. The target 180 may be a container with a backstop and is designed to stop or catch and contain a toy vehicle when implemented with the toy vehicle track system 100.

**[0027]** The various components of the toy track set 100 may be comprised of plastic or any other suitable material and are fabricated in accordance with conventional fabrication techniques.

**[0028]** FIG. 2 is a breakaway view of the loop system of FIG. 1. The loop system 200 provides for a toy vehicle to travel in a nearly complete loop without the need for a track segment while still providing a track set that is easily storable. The various components are designed to be alternatively assembled in either an operative configuration or storage configuration. FIG. 2 shows an exploded view of the loop system 200 in which the base 150, pillar 140, arm 110, arm axle 130 and vehicle cage 120 have been separated one from the other disassembling the configuration previously described in FIG. 1. The elements shown in FIG. 2 may be easily stored when the track set is not in use.

**[0029]** FIG. 3 is perspective view of the base 150 of the loop system 200. The base 150 has a substantially level undersurface and an upper surface defining two ramps, an entrance ramp 302 and an exit ramp 304 offset from the entrance ramp 302. A track segment, such as the track segment 160 (not shown) described in FIG. 1 is coupled to the entrance ramp 302. The entrance ramp 302 and the exit ramp 304 are preferably constructed such that the cross section of the entrance ramp 302 and the cross section of the exit ramp are substantially similar to the cross section of the track segment 160. The entrance ramp 302 and exit ramp 304 are constructed with sidewalls or curbs 322, 324 to help ensure a toy vehicle used with the loop system 200 remains on the ramps. The exit ramp 304 extends the length of the base 150 and preferably has a curved shape. The exit ramp 304 more preferably is shaped as a portion of a loop. Adjacent to an outer edge 306 of the exit ramp 304 is a foundation frame 308. The foundation frame 308 may be positioned anywhere along the length of the outer edge 306 of the exit ramp 304, preferably however the foundation frame 308 is located half way to two thirds down the length of the exit ramp 304.

[0030] Also located on the base 150 is a launch block 310. The launch block 310 is positioned along the same side and at the far end of the entrance ramp 302. The launch block 310 is configured with an arm lock 312 at its far end 314 to mate with a gate on a toy vehicle cage as described below in detail. The arm lock 312 is attached to the launch block 310 with a lock axle 316 and an opening and closing mechanism is controlled by a lock torsion spring 318. The exit ramp 304 is configured with a release latch mechanism 320 to mate with a gate on the toy vehicle cage 120 as describe below in detail. The release latch mechanism 320 causes a gate on the toy vehicle cage 120 to open allowing the toy vehicle to exit the cage 120. The arm lock 312 acts to hold the toy vehicle cage 120 in a start position (with a loaded coil spring force) described in detail below.

[0031] FIG. 4 is a detailed view of the arm 110 of the loop system 200 of FIG. 2. The arm 110 has a receptacle 404 designed to receive an arm axle fitting at one end 408 and a platform 406 at the opposite end 402. The platform 406 forms a base of a vehicle cage, described in detail below. When in place, the arm axle 130 couples the arm 110 to the pillar 140. The platform 406 is curved in shape and preferably has a similar or the same profile as the exit ramp 304. The arm 110 acts as a pendulum to rotate the vehicle cage 120, which holds a toy vehicle, located at the distal end 402 in a vertical loop. The opposite end of the arm 110 is configured with a receptacle 404 to receive an axle arm so that the arm 110 may be coupled to a pillar.

[0032] FIG. 5 is a detailed view of the arm axle 130 of the virtual loop system of FIG. 2. The arm axle 130 has a fitting 502 designed to mate with the receptacle 404 FIG. 4 of the arm 110. The fitting may be part of the cylindrical structure or it may be a separate piece. The arm axle 130 is a hollow cylindrical structure with a spiral groove 504 along the outer surface of its length. Contained within the arm axle 130 is a coil arm spring 506. The coil arm spring 506 is held within the arm axle 130 by a pin 508 at the fitting 502 end of the arm axle 130 and by a spring cap 510 that is connected to the opposite end of the arm axle 130. The spiral groove 504 mates with a pin (not shown) located within the opening at the distal end of the pillar 140.

[0033] FIG. 6 is a detailed view of the toy vehicle cage assembly 120 of the loop system of FIG. 2. The toy vehicle cage assembly 120 ("the cage") may also be referred to as a carrier. The cage 120 enables a toy vehicle to be transported. The cage 120 is configured to attach to the platform 406 of the arm 110. The cage 120 may be permanently affixed to the platform 406 or may be removable and attached by clips, screws, or any other coupling means. Preferably, the cage 120 is sized so that a toy vehicle fits in the cage 120 easily and can easily enter and exit the cage but should not be so wide as to allow a toy vehicle to rotate about within the cage. The toy vehicle cage is generally a hollow rectangular shape having smoothed corners, with the one side of the rectangle removed. The removed portion is however not limited to a complete side and the portion removed may be greater or less than that specified. The cage 120 has an inner surface and an outer surface. The vehicle cage 120 may have solid sidewalls or sidewalls with openings so that a toy vehicle contained within the cage 120 is visible. Although described as rectangular in shape, this is not intended to be a limitation on the embodiments of the present invention, alternative geometries suitable to contain a toy vehicle are contemplated within the scope of the embodiments. The cage may be any elongated hollow structure that is sized to contain the toy vehicle. The

toy vehicle cage preferably however surrounds all sides of the toy vehicle to ensure the vehicle does not fall out of the vehicle cage when in motion.

[0034] In another embodiment, the toy vehicle cage is constructed with an uninterrupted outer wall and is affixed to the platform 406. In still another embodiment, the arm 110 does not have a platform and the vehicle cage is constructed with an uninterrupted outer wall and is affixed directly to the arm.

[0035] A first end 602 of the cage 120 is open and configured to receive a toy vehicle. The opposite end 604 of the cage 120 is configured with a cage gate 606. The cage gate has a tension tab 608. The cage gate 606 is coupled to the cage 120 with a gate axle 610. A torsion spring 612 maintains near constant tension on the cage gate tension tab 608. Although depicted as having the cage gate 606 coupled to the cage 120 at the lower edge of the cage 120, this is not intended to be a limitation on the embodiments of the present invention. It is contemplated within the scope that the cage gate 606 may be attached at the upper edge of the opening at the end 604 the cage 120 or along either side of the opening of the end 604. Similarly, the location of the tension tab 608 may vary depending on the point at attachment of the cage gate 606

[0036] FIG. 7 is a perspective view of the virtual loop system track set of FIG. 1 in motion in accordance with an embodiment of the present invention.

[0037] Embodiments of the present invention provide a novel toy track set loop in which an arm 110 having a toy vehicle cage 120 rotates a toy vehicle 702 in a loop and enables the toy vehicle 702 to make a stunt jump without a track. In operation, the arm 110 is wound counterclockwise so that the coil spring 506 is in a stretched state and loaded with energy. The cage 120 is locked in place by the arm lock 312 on the entrance ramp 302. The toy vehicle 702 is then set in motion. In the depicted embodiment, the toy vehicle 702 is launched from a toy vehicle launcher 170. The energy from the launcher 170 is imparted to the toy vehicle to create kinetic energy.

[0038] The toy vehicle 702 travels along the track segment 160 to the entrance ramp 302 and enters the cage 120. The kinetic energy of the toy vehicle 702 causes the arm lock 312 to release resulting in the arm 110 traveling upward. Because the arm 110 is fixed at one end, the arm 110 travels in a circular motion. The arm 110 continues to travel in a clockwise direction as the coil spring 506 located in the arm axle 130 returns toward its resting, non-stretched state. The spiral groove along the arm axle 130 guides the arm axle 130 through the receptacle 404 in the arm 110 resulting in the arm 110 traveling in a loop. The rotation of the arm 110 is driven by both the energy imparted from the toy vehicle and the energy stored in the coil spring 506. Preferably, the arm 110 travels clockwise approximately 320-340 degrees.

[0039] After the arm 110 rotates 320 to 340 degrees, the vehicle cage 120 comes in contact with the exit ramp 304 where the cage tension tab 608 contacts a release mechanism, which stops the rotation of the arm and the cage gate 606 opens releasing the toy vehicle 702 onto the exit ramp 304. The remaining approximately 20-40 degrees of the loop is provided by the exit ramp 304 on the base.

[0040] Upon making contact with the exit ramp, the toy vehicle 702 is thrust from the cage 120 and travels along or slightly above the exit ramp 304 which terminates in an upwardly projecting ramp portion and from which the toy vehicle is launched in an airborne projectile path. The landing point of the toy vehicle varies as a function of the vehicle's pre-launch velocity. The prelaunch velocity may vary depending upon the speed in which the toy vehicle 702 initially entered the vehicle cage 120.

[0041] When the toy vehicle 702 leaves the cage 120, its velocity will cause it to traverse the plane of exit ramp 304 on the base 150. The toy vehicle 702 once launched continues toward the target 180 in a ballistic path. The toy vehicle will either miss the target entirely, impact a portion of the target and fall out outside of the target or impact the target at either an interior wall 704 or backstop portion 706 in which case the target 180 may rotate backward, catching the toy vehicle 702.

[0042] The virtual loop system is preferably designed to release the toy vehicle from the cage such that it travels 6-24 inches horizontally from the virtual loop system to the target 180 (FIG. 1). The toy vehicle preferably travels at a maximum vertical height of between approximately 6 and 9 inches above the surface on which the toy vehicle track set rests.

[0043] As noted previously the forgoing descriptions of the specific embodiments are presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed and obviously many modifications and variations are possible in view of the above teachings. The embodiments were chosen and described in order to explain the principles of the invention and its practical applications, to thereby enable those skilled in the art to best utilize the invention and various embodiments thereof as suited to the particular use contemplated. It is intended that the scope of the invention be defined by the claims and their equivalents.

- 1. A toy vehicle track set comprising:
  - a track segment having a first end and a second end;
  - a base coupled to the first end of the track segment, the base having an entrance ramp and an exit ramp;
  - a pillar having a first end and a second end; the first end of the pillar coupled to the base;
  - an arm rotatably coupled to the second end of the pillar by an arm axle near a proximal end of said arm, such that the arm is free to rotate in a vertical loop; and
  - a toy vehicle cage coupled to the platform at a distal end of the arm.
- 2. The track set of claim 1, further comprising:
  - a launcher coupled to the second end of the track segment.
- 3. The track set of claim 1, wherein the toy vehicle cage comprises:
  - a generally hollow member having a portion of a sidewall removed and a first end and a second end, wherein the first end of the hollow member is open; and
  - a gate having a tension tab coupled to the second end of the hollow member.
- 4. The track set of claim 1, wherein the arm axle comprises:
  - a hollow cylindrical structure having a spiral groove along an outer surface and a first end and a second end wherein the first end is configured to accept a pin;
  - a fitting coupled to the first end;
  - a spring cap coupled to the second end; and
  - a coil spring contained within the hollow cylindrical structure by the pin at a first end and the spring cap at a second end.
- 5. The base of claim 1, wherein the exit ramp is offset from the entrance ramp.
- 6. The toy track set of claim 3, wherein the launcher comprises:

- a block positioned along the same side and at a far end of the entrance ramp;
- an arm lock coupled to the block with an axle and configured to mate with the gate on the toy vehicle cage and retain the toy vehicle cage in a start position; and
- a torsion spring coupled to the arm lock to control the opening and closing of the arm lock.
- 7. The toy track set of claim 6, wherein the exit ramp further comprises a release latch mechanism configured to open the gate of the toy vehicle cage.
- 8. The toy track set of claim 7, further comprising a target positioned in proximity to the base and designed to stop or catch and contain a toy vehicle exiting the toy vehicle cage.
- 9. A toy vehicle track set base comprising:
  - a substantially level undersurface;
  - an upper surface defining two ramps;
  - a first ramp having an arm lock to secure a spring-loaded rotatable arm;
  - a second ramp having a release mechanism to cause a gate on a toy vehicle cage located at the distal end of the spring loaded rotatable arm to open; and
  - a foundation frame laterally coupled to the upper surface, the foundation frame configured to support a pillar having the spring loaded rotatable arm with a toy vehicle cage coupled at the distal end of the pillar.
- 10. The base of claim 9 wherein the second ramp having a curved cross section extends the length of the base.
- 11. A toy vehicle stunt loop comprising:
  - a base;
  - a pillar coupled to the base;
  - a rotatable arm coupled to the pillar, wherein the rotatable arm is configured with a spring-loaded mechanism; and
  - a toy vehicle cage assembly coupled to a distal end of the rotatable arm.
- 12. The rotatable arm of claim 11 further comprising:
  - a platform located at the distal end of the pillar arm.
- 13. The toy vehicle cage assembly of claim 11, wherein the toy vehicle cage comprises:
  - an elongated hollow structure having a first end and a second end;
  - the first end of the hollow structure being open and configured to receive a toy vehicle; and
  - the second end of the elongated hollow structure configured with a gate having a tension tab.
- 14. The toy vehicle cage of claim 13, wherein the hollow structure is rectangular in shape.
- 15. The toy vehicle cage of claim 13, wherein the elongated hollow structure has solid sidewalls.
- 16. The toy vehicle cage of claim 13, wherein the sidewalls of the elongated hollow structure have openings.
- 17. The toy vehicle cage of claim 13, wherein a portion of the elongated hollow structure is removed and elongated hollow structure is couple to a platform located at the distal end of the pillar arm such that the platform restores the removed portion of the elongated hollow structure.
- 18. The base of claim 13, further comprising:
  - an arm lock located at one end to mate with the tension tab on the gate of the toy vehicle cage, the arm lock configured to hold the spring loaded rotatable arm with the vehicle cage assembly in a start position;
  - a release mechanism located at another end configured to mate with the tension tab on the gate, the release mechanism configured to stop the rotatable arm and open the gate on the toy vehicle cage assembly.

**19.** A method of play for a toy vehicle track set comprising:  
loading a spring-loaded arm and cage assembly;  
propelling a toy vehicle toward the arm and cage assembly  
such that the toy vehicle enters the cage;  
releasing an arm lock such that the spring loaded arm and  
cage assembly rotate in a loop  
engaging a catch mechanism to stop the rotation of the  
loaded arm and cage assembly; and  
releasing the toy vehicle from the cage.

**20.** The method of claim **19**, further comprising  
releasing the toy vehicle from the cage onto an upwardly  
projecting ramp;  
launching the toy vehicle in an airborne projectile path; and  
providing a target to which the launched toy vehicle is  
directed.

\* \* \* \* \*