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(54) MOVING SYSTEM FOR VEHICLES OF AN AMUSEMENT RIDE AND METHOD FOR OPERATING SUCH A MOVING SYSTEM

(57) Moving system (1) for at least one vehicle (50) of an amusement ride (100), the moving system (1) comprising a support structure (2) which is fixed to the ground or to a base platform, at least one pivoting arm (10', 10"; 20', 20") coupled to said support structure (2) to pivot around a pivot axis (A1', A1"; A2', A2") with respect to the support structure (2), and at least one movable rail portion (3) for supporting the vehicle (50), constrained to said at least one pivoting arm (10', 10"; 20', 20"), wherein said at least one pivoting arm (10', 10"; 20', 20") is pivoted to perform one or more oscillations for moving said movable rail portion (3) supporting the at least one vehicle (50) from a first position P1 wherein said rail portion (3) is in connection with said first fixed rail portion (101).

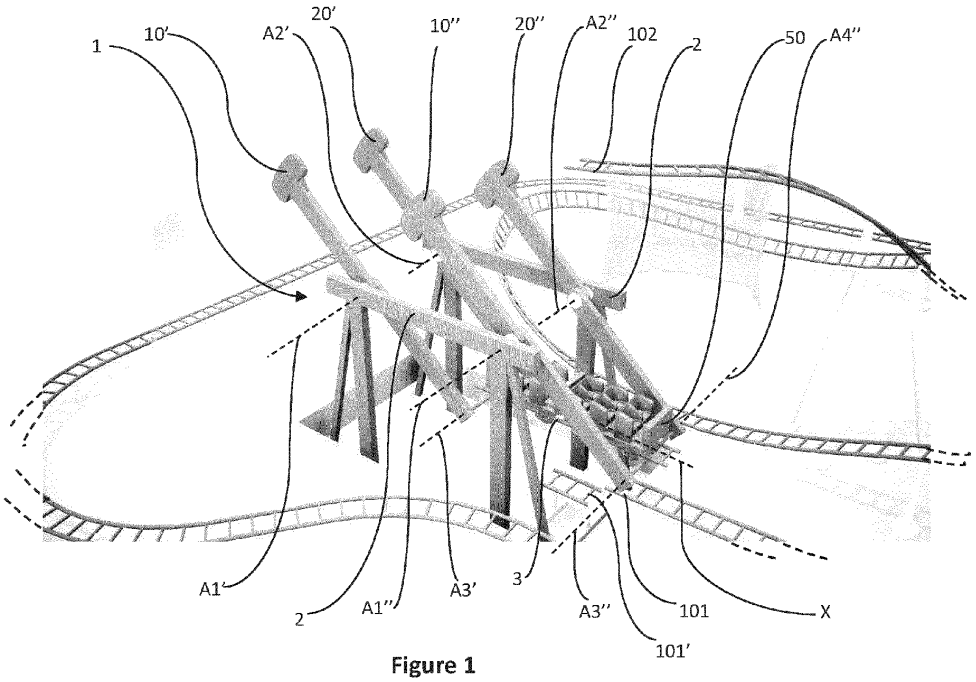

Figure 1

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Description

Field of the invention

[0001] The present invention relates to a moving system for vehicles of an amusement ride, and to a method for operating such a moving system.

[0002] In particular, the moving system according to the invention is used in combination with an amusement ride comprising fixed rail portions, and one or more vehicles travelling along said rail portions.

[0003] The present invention is further directed to an amusement ride comprising such a moving system.

Background of the invention

[0004] Different moving systems, provided in combination with an amusement ride for moving vehicles between different rail portions of the amusement ride, are known in the art.

[0005] Moving systems where the users are mainly lifted along a vertical direction from a first lower position to an upper position are known. In these amusement rides, the users are lifted and then suddenly and rapidly lowered, to provide the feeling of a free fall. These amusement rides provide thrill and excitement to the user, but these feeling are mainly provided by the fall, i.e. by a short amount of time.

[0006] Solutions for providing a somewhat diversified experience to the user are also known, such as moving systems, in particular lifting devices for vehicles of an amusement ride, wherein the vehicles can be moved on transport platforms of the lifting device, and can be supported by said platforms while being moved from a first lower position to a second higher position, with a roadway connection for returning the vehicles to the first lower position.

[0007] For example, DE19615114 discloses a lifting device for vehicles, in particular for water-bound or rail-bound vehicles, in which the vehicle enters into connection with the lifting device in a lower position at an inlet area, and the vehicle is subsequently moved up to an upper position at an outlet area, wherein it is released again.

[0008] A vehicle to be lifted is arranged at an inlet area of the lifting device, which is a ferris wheel, provided between the lower and upper positions. The ferris wheel has guide elements with load platforms for supporting the vehicle to be lifted during the lifting phase.

[0009] Document AT392598 discloses a ferris wheel-like lifting device having transport platforms for raising a vehicle from an entry lower level to a higher level during the rotation of the lifting device and are returned from there via a track to the entry level. A disadvantage of such systems is the relatively large space requirement of the lifting device.

[0010] Another disadvantage of the known systems is the lack of stability of the platforms supporting the vehicles during the rotation of the lifting device.

[0011] Furthermore, the experience of the user on known moving system is repetitive over time, since a ferris wheel provides for a constant and relative slow displacement of the vehicles.

[0012] An object of the present invention is thus to provide a moving system and an amusement ride comprising such a moving system, providing a diversified experience and thrill to the user.

[0013] Another object of the present invention is to provide a moving system in a simple and reliable manner.

[0014] A further object of the present invention is to provide a moving system providing a safe experience to the user.

Summary of the invention

[0015] These and other objects are achieved by the present invention, and in particular by a moving system for vehicles of an amusement ride according to one or more of the appended claims. The present solution provides a moving system for at least one vehicle of an amusement ride, for moving at least one vehicle at least between a first fixed rail portion and a second fixed rail portion of the amusement ride, according to claim 1.

[0016] Additional features/aspects are presented in the dependent claims.

[0017] The moving system according to the invention comprises a support structure which is fixed to the ground or to a base platform, at least one pivoting arm coupled to said support structure to pivot around a pivot axis with respect to the support structure, and at least one movable rail portion for supporting the vehicle, constrained to said at least one pivoting arm, wherein said at least one pivoting arm is pivoted to perform one or more oscillations for moving said movable rail portion supporting the at least one vehicle from a first position wherein said rail portion is in connection with said first fixed rail portion.

[0018] It has to be noted that the term "oscillation" is used here and in the following to indicate a swing, or movement in one direction, of the at least one pivoting arm.

[0019] The first oscillation may take place when the movable rail portion constrained to the at least one arm is displaced sideways, for example by means of a motor, from its resting position. According to an embodiment the resting position can be an equilibrium position, e.g. with the pivoting arm and the vehicle arranged in vertical position due to gravity force.

[0020] The oscillating movement of the pivoting arm and of the vehicle can reach different angles starting from the resting position.

[0021] It has to be noted that during one oscillation, the at least one pivoting arm with the vehicle supported on the movable rail portion, is pivoted from the resting position through an angle comprised between 0° and 360°, preferably between 0° and 180°. According to an embodiment the at least one pivoting arm with the vehicle

supported on the movable rail portion, is pivoted from the resting position of an angle substantially equal to 90°, then its travel direction is inverted, and it is pivoted back toward the resting position, and it traverses the resting position and pivots, i.e. continue the oscillation, through an angle comprised between 0° and 180°.

[0022] According to this path, during a single oscillation, the at least one pivoting arm with the vehicle supported on the movable rail portion is in the rest position twice: at the beginning of the oscillation, when the arm is firstly pivoted from the resting position, and after the travel direction is inverted and the pivoting arm traverses the resting position.

[0023] According to an embodiment, the oscillation is a rotation of the at least one pivoting arm preferably equal to or less than 180° starting from the resting position.

[0024] According to an embodiment, independently from the resting position, the at least one pivoting arm with the vehicle supported on the movable rail portion, does not move beyond the upper vertical position with respect to the ground or with respect to the base platform on which the support structure of the moving system is arranged.

[0025] The oscillation also comprises a returning movement, i.e. a drop, towards the resting position that can be generated by the motor and/or a restoring force due to gravity that will move back the pivoting arm and the vehicle toward the resting position.

[0026] Such returning part of the oscillation towards the resting position can be greater than 180°, i.e. the returning movement can allow the pivoting arm and the vehicle to move beyond the resting position.

[0027] Advantageously, the moving system allows for displacing the vehicle while providing entertainment and thrill to the user, in view of the one or more oscillations.

[0028] Furthermore, advantageously, having a movable rail portion that is constrained to the at least one arm allows easy loading/unloading operation of the vehicles on/from the moving system. In fact, in an exemplary embodiment of a moving system according to the invention, the vehicle can be loaded on the movable rail portion simply by moving from the first fixed rail portion of the amusement ride toward the movable rail portion.

[0029] Advantageously, having the movable rail portion constrained to the at least one arm, allows for a very stable support of the vehicle during the oscillation of the moving system.

[0030] According to an aspect, at the end of said one or more oscillations said movable rail portion supporting the at least one vehicle reaches at least one second position wherein said rail portion is in connection with said second fixed rail portion.

[0031] Advantageously, the vehicle can be unloaded from the movable rail portion simply by moving toward the second fixed rail portion of the amusement ride. In an embodiment, the vehicle is oscillated one or several times and it is subsequently unloaded from the movable rail portion back onto the first fixed rail portion of the ride to continue moving along the ride.

[0032] In an embodiment, the second fixed rail portion is at the same level of the first fixed rail portion, i.e. the second fixed rail portion is a part (a continuation) of the first fixed rail portion. In this embodiment, the vehicle reaches the movable, or mobile, rail portion, is oscillated at least once, preferably several times, and is then unloaded to the second portion to continue the drive along its original direction.

[0033] According to an aspect, the moving system comprises at least a couple of pivoting arms coupled to said support structure and constrained to opposite sides of said movable rail portion with respect to its longitudinal axis.

[0034] Advantageously, constraining the movable rail portion to a couple of pivoting arms at opposite sides with respect to its longitudinal axis, allows for a great stability of the vehicle supported on the movable rail portion during the one or more oscillations. In fact, this configuration provides for a symmetrical distribution of the weight of the movable rail portion and of the vehicle, and of the relative load forces exerted at the connection points of the movable rail portion with the pivot arms.

[0035] According to a preferred embodiment, the moving system comprises two couples of pivoting arms coupled to said support structure, wherein the pivoting arms of each couple of pivoting arms are constrained to opposite sides of said movable rail portion.

[0036] According to an aspect, the moving system comprises one or two couples of pivoting arms, the pivoting arms, opposed to each other, are pivotable around the respective pivot axes in parallel planes with respect to said support structure.

[0037] According to a further aspect, the movable rail portion is rotatably constrained to the at least one arm at a respective at least one rotation axis of the movable rail portion with respect to said at least one arm.

[0038] Advantageously, the connection between the movable rail portion and the at least one arm allows for the rotation of the movable rail portion with respect to the arm, i.e. the movable rail portion is not rigidly connected to the pivoting arm and can rotate to assume a desired orientation with respect to the ground during the one or more oscillations.

[0039] According to an aspect, the at least one oscillation of the at least one arm around the respective pivot axis with respect to said support structure results in the rotation of said movable rail portion around the rotation axis of the movable rail portion with respect to said at least one arm.

[0040] Advantageously, the rotation of the movable rail portion with respect to the pivoting arms is caused by the only oscillation of the pivoting arms, and no external means, such as an electric motor, are needed.

[0041] According to an aspect, the at least one oscillation of the at least one arm with respect to said support structure, results in that said movable rail portion rotates around the at least one rotation axis in order to maintain

its longitudinal axis parallel with respect to the ground.

[0042] Advantageously, according to this configuration, the vehicle is supported on the movable rail portion, rotatably constrained to the arms, so that the seats are maintained in a substantially vertical manner during operation of the moving system, i.e. the users are not turned upside down during the pivoting of the arms.

[0043] According to an aspect, the at least one pivoting arm is pivoted to perform one or more oscillations with an angle that may be a complete turn of 360° or may be equal to or less than 180° starting from the resting position of the moving system 1.

[0044] It has to be noted that the one or more oscillation can be performed both clockwise and/or counterclockwise.

[0045] According to a further aspect, the movable rail portion is connected to said at least one pivoting arm with its longitudinal axis which is substantially perpendicular to the pivot axis of the at least one pivoting arm.

[0046] According to an aspect, the at least one pivoting arm is pivoted to perform one or more oscillations for moving said movable rail portion supporting the at least one vehicle at least between said first position and a second position, wherein said first position and said second position are placed at different heights with respect to the ground.

[0047] According to an aspect said second position is arranged at a height greater than the height of said first position. Advantageously, at the end of said one or more oscillations said movable rail portion supporting the at least one vehicle reaches at least one second position wherein said rail portion is in connection with said second fixed rail portion that is arranged at greater height with respect to said first position wherein said rail portion is in connection with said first fixed rail portion.

[0048] According to an aspect, the first position is arranged close to the ground, while the second position is arranged at greater distance from the ground, preferably is arranged at the greatest distance from the ground that can be reached by means of the pivoting movement of the pivoting arm.

[0049] According to an embodiment, passengers may be loaded or unloaded to and from the vehicle at one of the vehicle positions; e.g. passengers may board the vehicle at the lower position, the vehicle is than brought to the second, higher, position to start the ride from said second position.

[0050] In the above embodiment, the movable rail portion and preferably the initial part of the second fixed rail portion are inclined in such a way as to facilitate the start of the ride.

[0051] The present invention is further directed to a method according to claim 13, for operating a moving system comprising the following steps:

(a) moving at least one vehicle from said first fixed rail portion to said movable rail portion,

(b) pivoting said at least one pivoting arm to perform one or more oscillations for moving said movable rail portion supporting the at least one vehicle from a first position wherein said rail portion is in connection with said first fixed rail portion.

[0052] According to an aspect, at the end of said one or more oscillations in said step (b), said movable rail portion supporting the at least one vehicle reaches at least one second position wherein said rail portion is in connection with said second fixed rail portion.

[0053] The present invention is further directed to an amusement ride according to claim 15, comprising at least one first fixed rail portion and at least one second fixed rail portion and a moving system according to the invention, wherein said moving system moves at least one vehicle at least between said first fixed rail portion and said second fixed rail portion.

Description of the figures

[0054] One or more embodiments of the present invention are now described in greater detail with reference to the accompanying drawings provided by way of non-limiting example, wherein:

- Figure 1 is a perspective view of an embodiment of a moving system according to the invention during its operation;
- Figure 2 is a front view of an embodiment of a moving system according to the invention during its operation;
- Figure 3 is a front view of the moving system shown in figure 2 during its operation;
- Figure 4 is a front view of the moving system shown in figure 2 during its operation;
- Figure 5 is a perspective view of the moving system in its resting position;
- Figure 6 is a perspective view of the moving system in its resting position;
- Figure 7 is a perspective view of the moving system in a second position.

Detailed description of the invention

[0055] With reference to figures, the moving system 1 for vehicles 50 is part of an amusement ride 100, for moving at least one vehicle 50 from a first fixed rail portion 101 of the amusement ride 100.

[0056] In particular, the moving system 1 moves the at least one vehicle 50 at least between a first fixed rail portion 101 and a second fixed rail portion 102 of the amusement ride 100.

[0057] With reference to figure 1, portions of the rail of an amusement ride 100 are visible which form part of the path, which may have various sections with different curvature or straight portions.

[0058] The fixed rail portions 101, 102 can be part of a path with different straight and curved sections, for ex-

ample a closed track loop.

[0059] The moving system 1 according to the invention comprises a support structure 2 which is fixed to the ground or to a base platform, i.e. a support structure 2 that, in use, is generally placed on the ground or, more in general, coupled to (or leaned on) an external surface or platform.

[0060] At least one pivoting arm 10', 10"; 20', 20" is coupled to the support structure 2 to pivot around a respective pivot axis A1', A1"; A2', A2" with respect to the support structure 2, and at least one movable rail portion 3 for supporting the vehicle 50 is constrained to the at least one pivoting arm 10', 10"; 20', 20".

[0061] With reference to figures 2 and 3, it has to be noted that the at least one pivoting arm 10', 10"; 20', 20" can be pivoted both clockwise and counterclockwise from a first position, preferably its resting position P1, preferably an equilibrium position, and the movable rail portion 3, constrained to the pivoting arms 10', 10"; 20', 20", pivots, or swings, along a circular pathway, tracing at least an arc of the circle.

[0062] Preferably, the at least one pivoting arm 10', 10"; 20', 20" is pivoted to perform one or more oscillations, with an angle equal to or less than 180° starting from the first position P1, preferably the resting position P1 of the moving system 1. In other words, the at least one pivoting arm 10', 10"; 20', 20" is pivoted to perform one or more oscillations, tracing an arc of circumference through an angle that depends on the location of said first and second positions. In the shown embodiment said angle is substantially equal to 180° starting from the resting position P1 of the moving system 1.

[0063] According to a possible embodiment, during the first oscillation, the at least one pivoting arm 10', 10"; 20', 20" with the vehicle 50 supported on the movable rail portion 3, is pivoted from the resting position P1 through an angle comprised between 0° and 180°, preferably substantially equal to 90°, then the pivoting direction is inverted, and the at least one pivoting arm 10', 10"; 20', 20" is pivoted back toward the resting position P1, and it traverses the resting position P1 and pivots through an angle comprised between 0° and 180°.

[0064] According to this path, during a single oscillation, the at least one pivoting arm 10', 10"; 20', 20" with the vehicle 50 supported on the movable rail portion 3 is in the resting position P1 twice: at the beginning of the oscillation, before the at least one pivoting arm 10', 10"; 20', 20" is firstly pivoted from the resting position P1, and after the pivoting direction is inverted, the at least one pivoting arm 10', 10"; 20', 20" drops back and traverses the resting position P1.

[0065] As will be better discussed in the following, the angle of the one or more oscillations depends on the displacement between the first position P1 from which the movable rail portion 3 is moved and the second position P2 to be reached.

[0066] As above mentioned, during pivoting of the arms 10', 10"; 20', 20", the end of each arm 10', 10"; 20', 20" moves along a path which is typically a circular path, wherein the ends of an arm 10', 20'; 10", 20" are the two areas of the pivoting arms 10', 20'; 10", 20" placed at the greatest distance from the relevant arm axis A1', A1"; A2', A2".

[0067] According to an aspect, the pivoting arms 10', 10"; 20', 20" are pivoted at the same angular speed. In other words, at a given time, during operation of the moving system 1, all the arms 10', 10"; 20', 20" have the same angular speed. The angular speed of the pivoting arms 10', 10"; 20', 20" may be varied over time.

[0068] According to a possible embodiment, the moving system 1 comprises at least one couple of pivoting arms 10', 10"; 20', 20", constrained to opposite sides of said movable rail portion 3.

[0069] According to a possible preferred embodiment shown by way of example in Figure 1, the moving system 1 comprises two couples of pivoting arms 10', 10"; 20', 20", wherein the pivoting arms 10', 10"; 20', 20" of each couple are constrained to opposite sides of the movable rail portion 3.

[0070] With reference to the shown embodiment, couples of opposite arms 10', 10"; 20', 20" substantially share the same arm axis. As an example, in the shown (preferred) embodiment, there are four arms 10', 10"; 20', 20", and two arm axes.

[0071] With reference to Figure 1, arms 10', 10" share the same pivot axis, and similarly arms 20', 20" share a second pivot axis.

[0072] Even if a couple of arms 10', 10"; 20', 20" share the same pivot axis, the pivot points are distinct one from the other, i.e. there is a single and distinct pivot point for each arm 10', 10"; 20', 20". Due to this fact, there may be a minimum difference, due to tolerances, between the orientation of the pivot axes of opposite arms of a couple of arms. However, such a minimum difference, due to previously mentioned tolerances, fall within the definition of "substantially sharing the same arm axis".

[0073] With reference to the attached figures 1 - 4, the support structure 2 comprises two supports 2', 2", and the pivoting arms 10', 10"; 20', 20" of one couple of pivoting arms are constrained to a respective trestle support 2', 2", such that they result opposed to each other.

[0074] Each arm 10', 20'; 10", 20" is typically coupled to the support structure 2 by means of a hinge point or pivot point.

[0075] Preferably, two pivoting arms 10', 20'; 10", 20" constrained to the same support 2', 2" are disposed parallel to each other.

[0076] It has to be noted that the pivoting arms 10', 10"; 20', 20" of a couple are opposed to each other, such that they can be constrained to opposite sides of the movable rail portion 3 with respect to its longitudinal axis X.

[0077] According to a possible embodiment, the opposite pivoting arms 10', 10"; 20', 20" of each couple of pivoting arms 10', 10"; 20', 20", are pivotable around the respective pivot axes A1', A1"; A2', A2" in parallel planes.

[0078] Furthermore, all the pivot axes A1', A1"; A2',

A2" lie on the same plane.

[0079] The movable rail portion 3, carrying the vehicle 50, is constrained to the at least one arm 10', 20'; 10", 20", with plurality of seats for the users of the amusement ride 100.

[0080] The movable rail portion 3 is preferably constrained at the ends of the pivoting arms 10', 20'; 10", 20", wherein the ends of an arm 10', 20'; 10", 20" are the two areas of the pivoting arms 10', 20'; 10", 20" placed at the greatest distance from the relevant arm axis A1', A1"; A2', A2".

[0081] According to a possible embodiment, the vehicle 50 is supported on the movable rail portion 3 constrained to the arms 10', 20'; 10", 20" so that the seats do not change their orientation with respect to the movable rail portion. In other words, according to an embodiment the users are not turned upside down during the pivoting of the arms 10', 20'; 10", 20".

[0082] The at least one pivoting arm 10', 10"; 20', 20" of the system 1 according to the invention is pivoted to perform one or more oscillations for moving the movable rail portion 3 supporting the at least one vehicle 50, from a first position P1 wherein the rail portion 3 is in connection with the first fixed rail portion 101 of the amusement ride 100.

[0083] According to a possible embodiment, the at least one pivoting arm 10', 10"; 20', 20" is pivoted by means of known means. As an example, not visible in the shown embodiment, one or more motor is used to cause a rotation of the at least one pivoting arm 10', 10"; 20', 20" with respect to the support structure 2.

[0084] More in particular, one or more motor can be used to control the pivoting of the at least one pivoting arm 10', 10"; 20', 20" during both the raise from the resting position P1 and the subsequent drop toward the resting position P1.

[0085] It has to be noted that the one or more motor used to cause a rotation of the at least one pivoting arm 10', 10"; 20', 20" with respect to the support structure 2 can invert its rotation direction, such that the at least one pivoting arm 10', 10"; 20', 20" can be alternatively pivoted clockwise and counter-clockwise. In this way the oscillation of the at least one pivoting arm 10', 10"; 20', 20" is always controlled during both the raise from the resting position P1 and the drop toward the resting position P1.

[0086] At the end of said one or more oscillations the movable rail portion 3 supporting the at least one vehicle 50 reaches at least one second position P2 wherein the rail portion 3 is in connection with a second fixed rail portion 102 of the amusement ride 100.

[0087] As previously mentioned, the second position P2 may be higher or lower than the first position. In another embodiment, the second position may be at the same height and in an embodiment the second position may be corresponding to the first position. In the latter embodiment, the movable portion of rail is oscillated and eventually brought back to its initial position P1 from which the vehicle may proceed to ride back along the previously run rail portion. In an embodiment, not shown in the figures, the ride path continues after the first position P1 and the vehicle can thus continue along the fixed rail, following the same initial direction, e.g. from left to right in the figures.

[0088] It has to be noted that the movable rail portion 3 is constrained to the at least one pivoting arm 10', 10"; 20', 20" with its longitudinal axis X having the same orientation of the longitudinal axes of the first fixed rail portion 101 and of the second fixed rail portion 102.

[0089] Preferably, the movable rail portion 3 is constrained to the at least one pivoting arm 10', 10"; 20', 20" with its longitudinal axis X which is substantially perpendicular to the pivot axis A1', A1"; A2', A2" of the at least one pivoting arm 10', 10"; 20', 20".

[0090] In this way, as will be better discussed in relation to the method according to the invention, the vehicle 50 arriving at the first fixed rail portion 101 is moved toward the movable rail portion 3 and stopped on the movable rail portion 3 maintaining the same travel direction. Similarly, at the end of the one or more oscillations, wherein the movable rail portion 3 is in connection with the second fixed rail portion 102, the vehicle 50 is moved toward the second fixed rail portion 102 maintaining the same travel direction.

[0091] With reference to the attached figures, the first position P1 from which the movable rail portion 3 is moved, and the second position P2 reached by the movable rail portion 3 at the end of the one or more oscillations, are placed at different heights h1, h2 with respect to the ground.

[0092] According to this embodiment, the value of the angle of the oscillations of the at least one pivoting arm 10', 10"; 20', 20" depends on the height value h2 of the second position P2 with respect to the height value h1 of the first position P1.

[0093] According to an aspect the second position P2 (see for example figure 7) is arranged at a height h2 greater than the height h1 of said first position P1 (see for example figures 5 and 6). At the end of said one or more oscillations said movable rail portion 3 supporting the at least one vehicle reaches at least one second position P2 wherein said rail portion is in connection with the second fixed rail portion 102 that is arranged at greater height h2 with respect to said first position P1 wherein said rail portion is in connection with said first fixed rail portion 101. According to an aspect, the first position P1 is arranged close to the ground (see for example figures 5 and 6 wherein the vehicle in the resting position P1 is arranged in the closest position to the ground), while the second position P2 is arranged at greater distance from the ground (see for example figure 7), preferably is arranged at the greatest distance from the ground that can be reached by means of the pivoting movement of the pivoting arm.

[0094] According to a further possible embodiment, not shown in the attached figures, the first position P1 from which the movable rail portion 3 is moved, and the second

position P2 reached by the movable rail portion 3 at the end of the one or more oscillations, are placed at the same height with respect to the ground.

[0095] As above mentioned, according to this embodiment, the movable portion of rail is oscillated and eventually brought back to its initial position P1 from which the vehicle may proceed to ride back along the previously run rail portion.

[0096] In an embodiment, not shown in the figures, the ride path continues after the first position P1 and the vehicle can thus continue along the fixed rail, following the same initial direction, e.g. from left to right in the figures.

[0097] It has to be noted that, with reference to the attached figures, the moving system 1 is always disclosed in connection with an amusement ride 100 comprising two fixed rail portions 101, 102, but alternative configurations wherein a moving system 1 is used in connection with an amusement ride 100 comprising three or more fixed rail portions are not excluded, wherein the three or more fixed rail portions can be reached with the pivoting arms performing oscillations with different angles.

[0098] With reference to figure 1, the movable rail portion 3 is rotatably constrained, or hinged, to the at least one arm 10', 10"; 20', 20" at a respective at least one rotation axis A3', A3"; A4', A4" of the movable rail portion 3 with respect to the at least one arm 10', 10"; 20', 20".

[0099] According to a possible embodiment, the at least one oscillation of the at least one arm, preferably four arms 10', 10"; 20', 20" around the respective pivot axis A1', A1"; A2', A2" with respect to the support structure 2, results in the rotation of the movable rail portion 3 around the rotation axis A3', A3"; A4', A4" of the movable rail portion 3 with respect to the at least one arm 10', 10"; 20', 20".

[0100] In other words, preferably, the rotation of the movable rail portion 3 around the rotation axis A3', A3"; A4', A4" is only caused by the pivoting of the at least one arm 10', 10"; 20', 20", with no external contribution such as, for example, use of a motor. In particular, the at least one oscillation of the at least one arm 10', 10"; 20', 20" with respect to the support structure 2, results in that the movable rail portion 3 rotates around the at least one rotation axis A3', A3"; A4', A4" in order to maintain its longitudinal axis parallel with respect to the ground.

[0101] As above mentioned, the present description is further directed to an amusement ride 100, for example a roller coaster, comprising at least one first fixed rail portion 101 and at least one second fixed rail portion 102 and a moving system 1 according to the invention, wherein the moving system 1 moves at least one vehicle 50 at least between said first fixed rail portion 101 and said second fixed rail portion 102.

[0102] It has to be noted that, with reference to the attached figures, the amusement ride 100 is shown comprising two fixed rail portions 101, 102, but alternative configurations wherein the amusement ride 100 comprises three or more fixed rail portions are not excluded, wherein the three or more fixed rail portions can be reached with the pivoting arms performing oscillations through different angles.

[0103] With reference to figure 1, portions of the rail of an amusement ride 100 are visible which form part of the rail path, which may have various sections with different curvature or straight portions.

[0104] The fixed rail portions 101, 102 can be part of a similar complex rail path with different straight and curved sections, for example a closed track loop.

[0105] Figure 1 shows a possible embodiment of the amusement ride 100, wherein the first fixed rail portion 101 comprises a removable end portion 101' which can be moved away, and preferably lowered or moved laterally, with respect to the fixed rail portion 101 after the vehicle 50 is moved to the movable rail portion 3.

[0106] The movement of removable end portion 101' after the vehicle has been loaded on the movable rail portion 3 is also visible in figure 6, wherein after the vehicle has been loaded on the movable track portion 3 (see figure 5), the movable rail portion 3 is moved away, and preferably lowered or moved laterally (see figure 6).

[0107] In this way, the first fixed rail portion 101 does not interfere with the movable rail portion 3 during the one or more oscillations.

[0108] According to a possible embodiment, not shown in figures, the second fixed rail portion 102 comprises a removable end portion which can be moved away, and preferably raised or moved laterally, with respect to the fixed rail portion 102 after the vehicle 50 is positioned on the movable rail portion 3.

[0109] In this way, the second fixed rail portion 102 does not interfere with the movable rail portion 3 during the one or more oscillations.

[0110] In the following, a possible embodiment of the relevant steps of a method for operating a moving system 1 according to the invention will be briefly disclosed.

[0111] The method according to the invention comprises a first step (a) of moving at least one vehicle 50 from a first fixed rail portion 101 of the amusement ride 100 to the movable rail portion 3 of the moving system 1.

[0112] With reference for example to figure 5 and 6, this step is preferably operated while keeping the movable rail portion 3, constrained to the pivoting arms 10', 10"; 20', 20", fixed in the first position P1, wherein the rail portion 3 is in connection with the first fixed rail portion 101 of the amusement ride 100.

[0113] The method according to the invention comprises the further step (b) of pivoting the at least one pivoting arm 10', 10"; 20', 20" to perform one or more oscillations for moving the movable rail portion 3 supporting the at least one vehicle 50 from the first position P1 wherein the rail portion 3 is in connection with said first fixed rail portion 101.

[0114] With reference for example to figure 7, at the end of said one or more oscillations in step (b), the movable rail portion 3 supporting the vehicle 50 reaches a second position P2 wherein the movable rail portion 3 is

in connection with a second fixed rail portion 102 of the amusement ride 100.

[0115] In other words, according to a possible embodiment with reference to the attached figures, in order to move the vehicle 50 from the first position P1 to the second position P2, the moving system 1 is operated to swing clockwise from a first position P1, shown for example in figure 5 or 6, to an intermediate position as shown for example in figure 3 and 4.

[0116] The system then returns, swinging counterclockwise, towards the first position P1, passing the resting position and reaching for example the position in figures 1 and 2, and then swings clockwise towards the second position P2 shown in figure 7.

[0117] It should be noted that this path is described only as an example and is to be considered non-exclusive. It should also be noted that the first position P1 can be crossed several times during the oscillating movement of the moving system 1.

Claims

1. Moving system (1) for at least one vehicle (50) of an amusement ride (100), the moving system (1) comprising a support structure (2) which is fixed to the ground or to a base platform, at least one pivoting arm (10', 10"; 20', 20") coupled to said support structure (2) to pivot around a pivot axis (A1', A1"; A2', A2") with respect to the support structure (2), and at least one movable rail portion (3) for supporting the vehicle (50), constrained to said at least one pivoting arm (10', 10"; 20', 20"), wherein said at least one pivoting arm (10', 10"; 20', 20") is pivoted to perform one or more oscillations for moving said movable rail portion (3) supporting the at least one vehicle (50) from a first position (P1) wherein said rail portion (3) is in connection with a first fixed rail portion (101) of the amusement ride (100).

2. Moving system (1) according to claim 1, wherein at the end of said one or more oscillations said movable rail portion (3) supporting the at least one vehicle (50) reaches at least one second position (P2) wherein said rail portion (3) is in connection with a second fixed rail portion (102) of the amusement ride (100).

3. Moving system (1) according to claim 1 or 2, which comprises at least a couple of pivoting arms (10', 10"; 20', 20"), constrained to opposite sides of said movable rail portion (3) with respect to its longitudinal axis (X).

4. Moving system (1) according to any previous claims, which comprises two couples of pivoting arms (10', 10"; 20', 20"), wherein the pivoting arms (10', 10"; 20', 20") of each couple of pivoting arms (10', 10"; 20', 20") are constrained to opposite sides of said movable rail portion (3) with respect to its longitudinal axis (X).

5. Moving system (1) according to claim 3 or 4 wherein said pivoting arms (10', 10"; 20', 20") of said at least one couple of pivoting arms (10', 10"; 20', 20"), opposed to each other, are pivotable around the respective pivot axes (A1', A1"; A2', A2") in parallel planes.

6. Moving system (1) according to any previous claims, wherein said movable rail portion (3) is rotatably constrained to the at least one pivoting arm (10', 10"; 20', 20") at a respective at least one rotation axis (A3', A3"; A4', A4") of the movable rail portion (3) with respect to said at least one arm (10', 10"; 20', 20").

7. Moving system (1) according to claim 6, wherein the at least one oscillation of the at least one arm (10', 10"; 20', 20") around the respective pivot axis (A1', A1 "; A2', A2") with respect to said support structure (2), results in the rotation of said movable rail portion (3) around the rotation axis (A3', A3"; A4', A4") of the movable rail portion (3) with respect to said at least one arm (10', 10"; 20', 20").

8. Moving system (1) according to claim 6 or 7, wherein the at least one oscillation of the at least one arm (10', 10"; 20', 20") with respect to said support structure (2), results in that said movable rail portion (3) rotates around the at least one rotation axis (A3', A3"; A4', A4") in order to maintain its longitudinal axis (X) parallel with respect to the ground.

9. Moving system (1) according to any previous claims, wherein said at least one pivoting arm (10', 10"; 20', 20") is pivoted to perform one or more oscillations with an angle equal to or less than 180° starting from the resting position (P1) of the moving system (1).

10. Moving system (1) according to any previous claims, wherein said movable rail portion (3) is connected to said at least one pivoting arm (10', 10"; 20', 20") with its longitudinal axis (X) which is substantially perpendicular to the pivot axis (A1', A1"; A2', A2") of the at least one pivoting arm (10', 10"; 20', 20").

11. Moving system (1) according to any previous claims, wherein said at least one pivoting arm (10', 10"; 20', 20") is pivoted to perform one or more oscillations for moving said movable rail portion (3) supporting the at least one vehicle (50) at least between said first position (P1) and a second position (P2), wherein said first position (P1) and said second position (P2) are placed at different heights (h1, h2) with respect to the ground, preferably said second position

(P2) is arranged at a height (h2) greater than the height (h1) of said first position (P1)

12. Method for operating a moving system (1) according to any claims 1-11 comprising the following steps:

(a) moving at least one vehicle (50) from a first fixed rail portion (101) to said movable rail portion (3),
(b) pivoting said at least one pivoting arm (10', 10"; 20', 20") to perform one or more oscillations for moving said movable rail portion (3) supporting the at least one vehicle (50) from a first position (P1) wherein said rail portion (3) is in connection with said first fixed rail portion (101).

13. Method according to claim 12, wherein at the end of said one or more oscillations in said step (b), said movable rail portion (3) supporting the at least one vehicle (50) reaches at least one second position (P2) wherein said rail portion (3) is in connection with said second fixed rail portion (102).

14. Amusement ride (100) comprising at least one first fixed rail portion (101) and at least one second fixed rail portion (102) and at least one moving system (1) according to any claims 1 - 13, wherein said moving system (1) moves at least one vehicle (50) at least between said first fixed rail portion (101) and said second fixed rail portion (102).

15. Amusement ride according to claim 14, wherein said first position is located at a position of the ride comprising means for embarking and/or disembarking passengers.

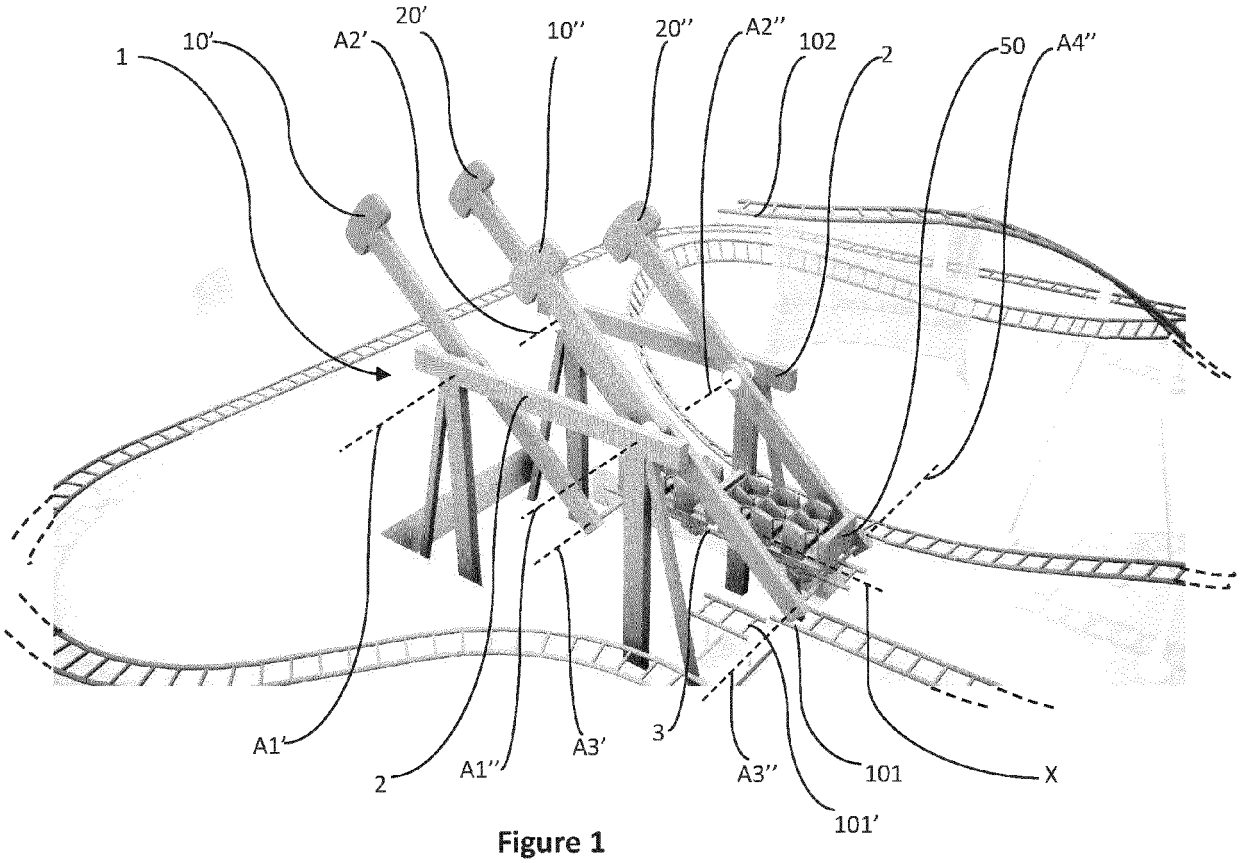

Figure 1

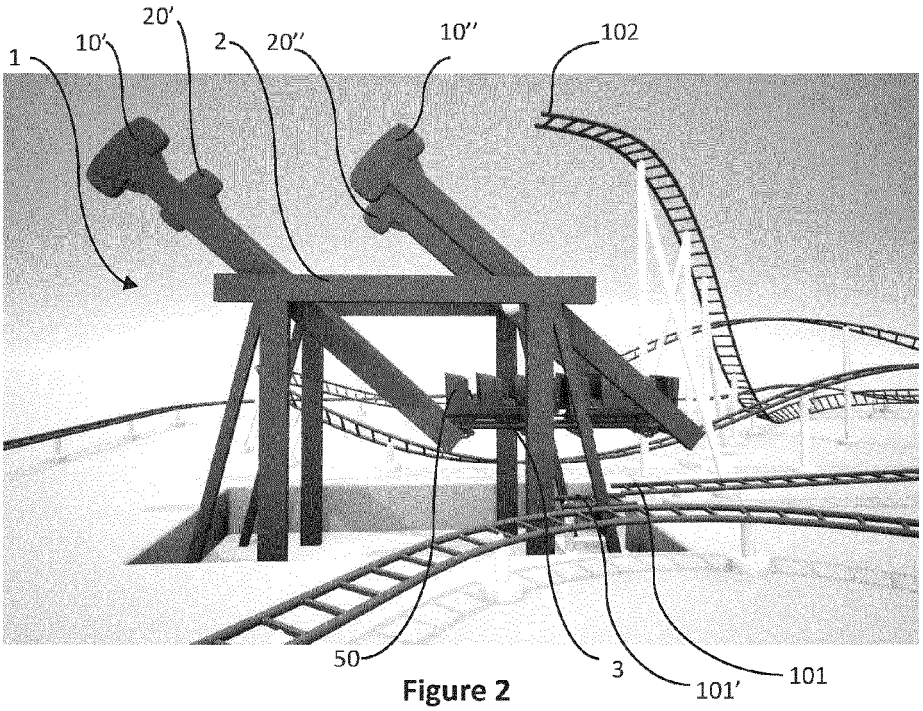

Figure 2

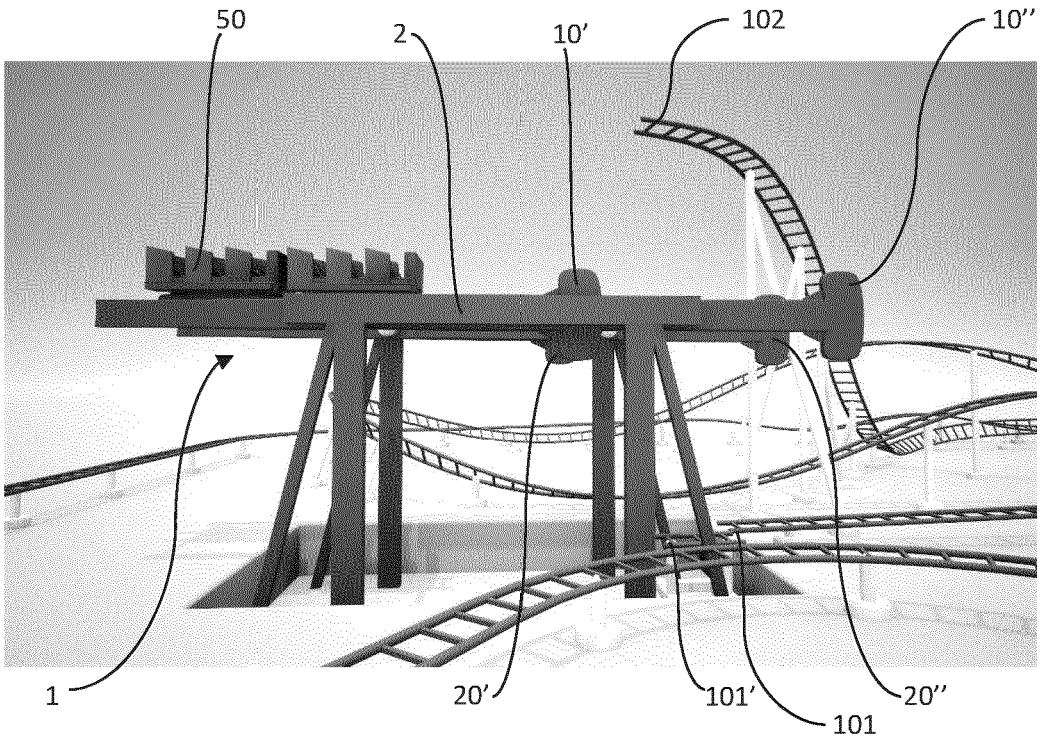

Figure 3

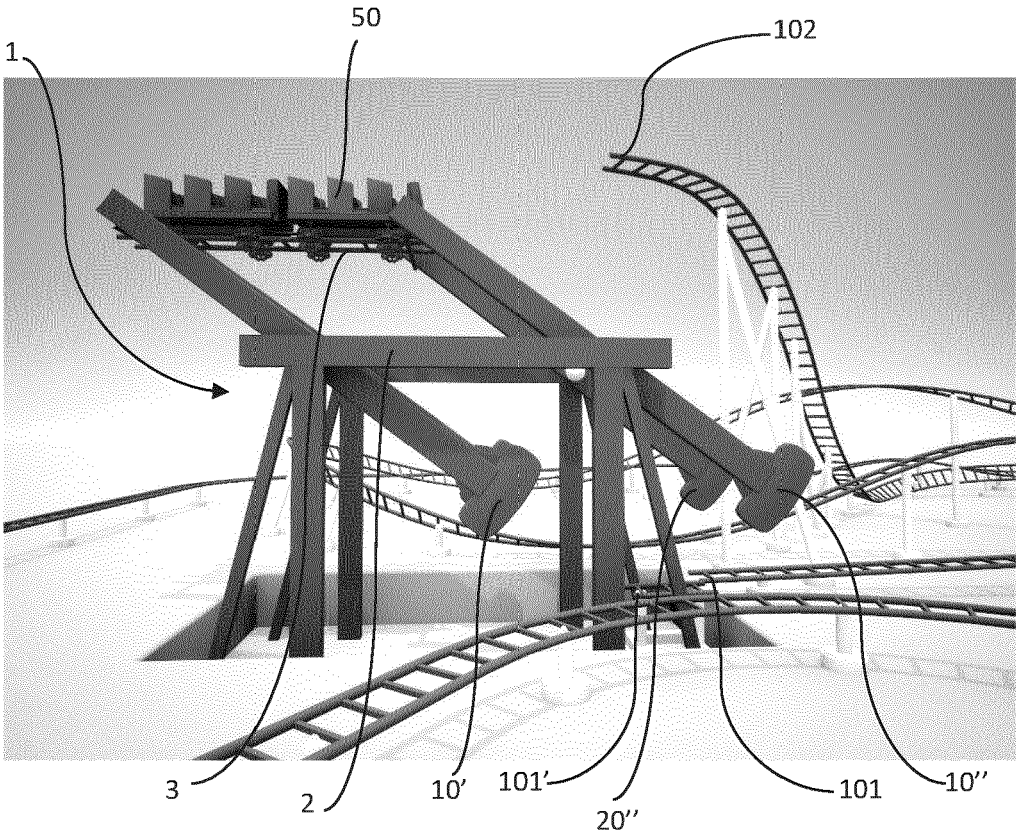

Figure 4

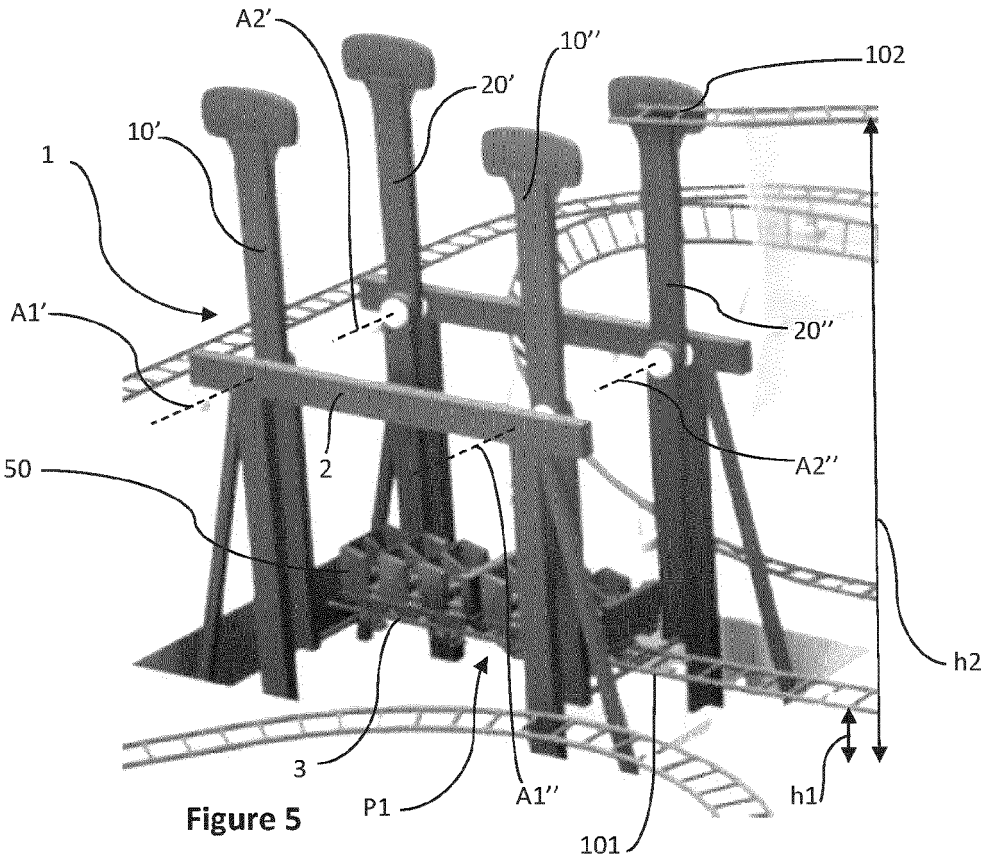

Figure 5

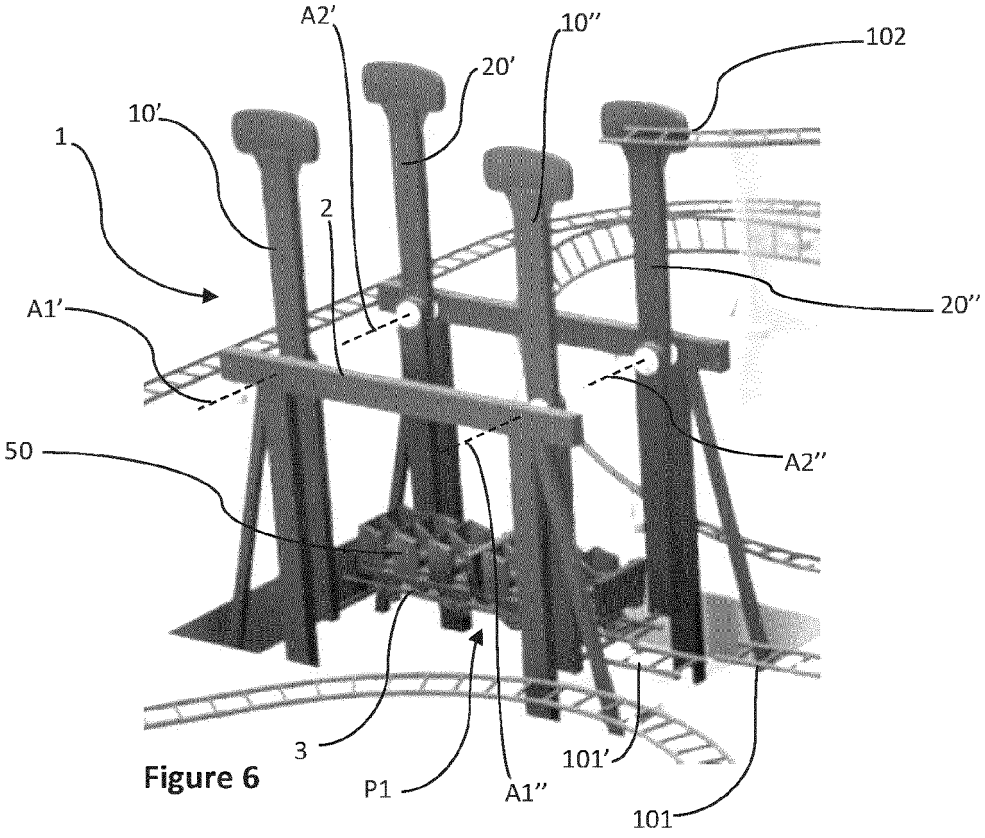

Figure 6

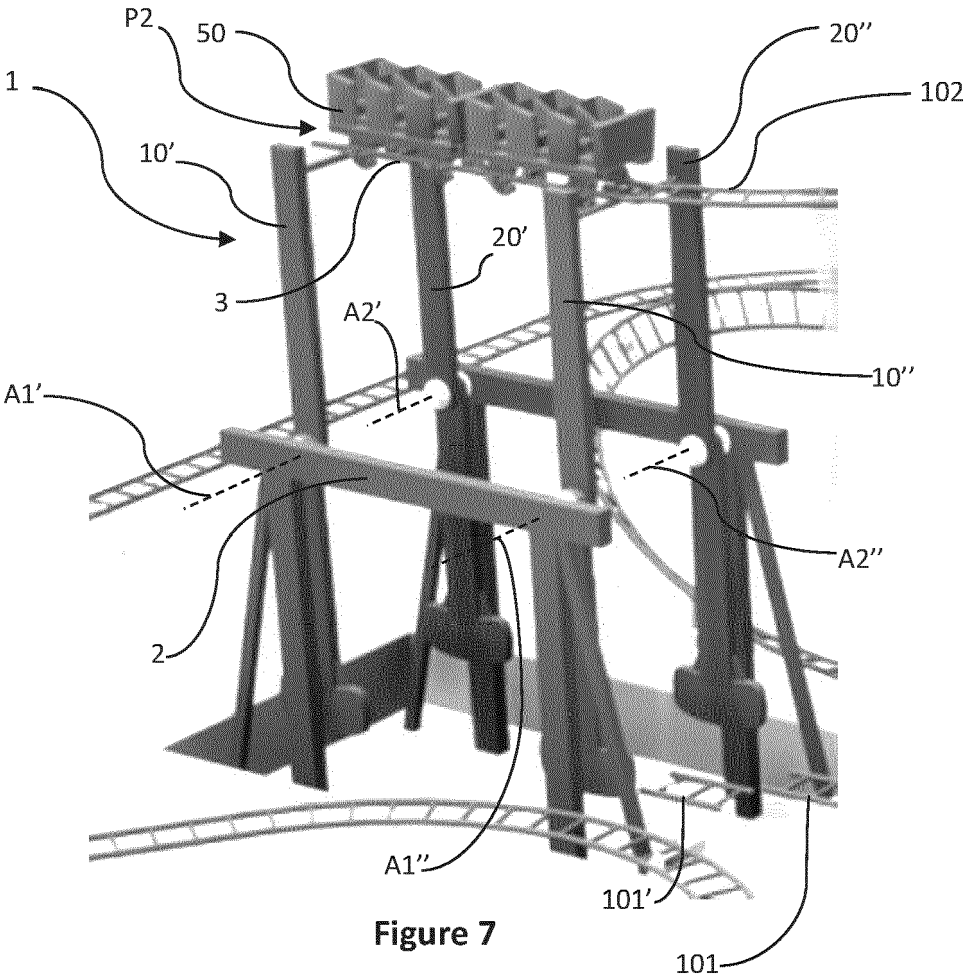

Figure 7

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EUROPEAN SEARCH REPORT

Application Number
EP 24 15 1890

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2022/362682 A1 (LAFFIN KRISTOPHER M [US]) 17 November 2022 (2022-11-17) * paragraphs [0021]-[0055]; figures 1A, 1B, 2-4 *	1-15	INV. A63G21/14 A63G7/00 A63G27/00 A63G31/00
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 May 2024	Turmo, Robert

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