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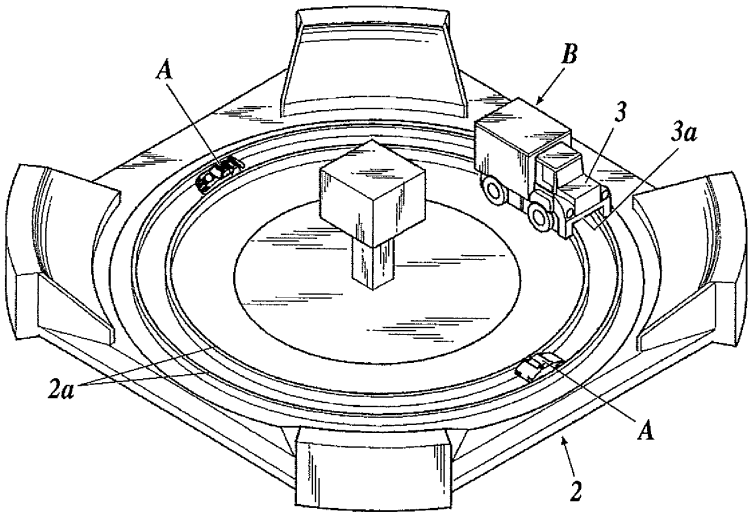
(54) Toy vehicle launching apparatus

(57) Disclosed is a toy vehicle accelerating apparatus of a travelling toy, the toy vehicle accelerating apparatus including: a vehicle body including a tunnel-like passage piercing the vehicle body in a front-back direction to allow a toy vehicle to pass through the passage; a drive roller, at least a part of which projects to the passage to press the toy vehicle passing through the passage; a roller driving section to give a rotative force for accelerating the toy vehicle to the drive roller; and a power source for the roller driving section, wherein the toy vehicle accelerating apparatus accelerates the toy vehicle entering the passage from one side thereof with the drive roller to discharge the toy vehicle from the other side of the passage.

FIG.1



EP 2 108 420 A1

Description

[0001] The present invention relates to a toy vehicle launching apparatus.

[0002] As a toy vehicle launching apparatus in which a motor drives drive rollers and the drive rollers launch a toy vehicle to make it travel, for example, there are toy vehicle launching apparatus disclosed in USP 5,299,969 (see FIG. 5), USP 5,899,789 (see FIG. 3), and USP 6,695,675 (see FIGS. 2-4). Any of these toy vehicle launching apparatus (toy vehicle accelerating apparatus) disclosed in these Patent Documents sets a part of a pair of drive rollers arranged so that their shafts may be parallel to each other so as to face to the side faces of a travelling lane, and supports the toy vehicle with drive rollers from both the side faces to launch the toy vehicle by the drive rollers.

[0003] Now, since an apparatus frame body equipped with a launching section is fixed to be installed on a course in each of the toy vehicle launching apparatus of the aforesaid Patent Documents, the toy vehicle cannot travel without making the toy vehicle enter the apparatus frame body with a human hand.

[0004] The present invention seeks to provide a toy vehicle launching apparatus capable of launching a toy vehicle only by moving an apparatus frame body equipped with a launching section to the toy vehicle to raise entertainment value.

[0005] According to one aspect of the present invention, there is provided a toy vehicle accelerating apparatus of a travelling toy, the toy vehicle accelerating apparatus including: a vehicle body including a tunnel-like passage piercing the vehicle body in a front-back direction to allow a toy vehicle to pass through the passage; a drive roller, at least a part of which projects to the passage to press the toy vehicle passing through the passage; a roller driving section to give a rotative force for accelerating the toy vehicle to the drive roller; and a power source for the roller driving section, wherein the toy vehicle accelerating apparatus accelerates the toy vehicle entering the passage from one side thereof with the drive roller to discharge the toy vehicle from the other side of the passage.

[0006] In a further aspect of the present invention, there is provided a travelling toy including an accelerating apparatus as defined above.

[0007] The term of "travelling toy" is the concept including the "toy vehicle" here, and indicates a whole travelling matter, such as a travelling structure (for example, a gate) other than the toy vehicle. The "travelling toy" may be the one including a power source to be able to be self-propelled, to say nothing of the one not including any power sources. In case of the "travelling toy" not including any power sources, it is needed to push it with a human hand to slide the "travelling toy" on a floor or the like to make it travel, or it is needed to rotate the wheels thereof to make it travel.

[0008] The term of "toy vehicle" may be a vehicle having a power source to be self-propelled, to say nothing of the one having no power sources. Incidentally, in the case of a toy vehicle having no power sources, it is preferable to be the one capable of being accelerated to travel by an inertia force.

[0009] Although the entering of the toy vehicle into the passage is preferably performed from the front side of the passage, the entering may be performed from the rear side of the passage.

[0010] Preferably, the drive roller is provided on each of both sides of the passage and each of the drive rollers is rotatable around a vertical shaft in the vehicle body, and each of the drive rollers is pressed to each corresponding side face of the toy vehicle to accelerate the toy vehicle.

[0011] Preferably, each of the drive rollers is movable between a close position, at which the drive rollers are close to each other, and a distant position, at which the drive rollers are distant from each other, within the passage, and each of the drive rollers is biased toward the close position by a biasing section to a degree of not preventing the toy vehicle from entering between the drive rollers.

[0012] Preferably, each of the drive rollers is severally attached to a swinging arm swinging in a predetermined range on a horizontal plane around a respective predetermined shaft, and the roller driving section includes a sun gear attached to the predetermined shaft and a planetary gear provided on a roller shaft and rotating integrally with the drive roller.

[0013] Preferably, the travelling toy travels on a track board, on which a circulating course is formed, the circulating course including a pair of rails projecting upwardly from a face of the track board to form a travelling lane for allowing the toy vehicle to travel between the pair of rails, and an under surface of the vehicle body is provided with a guide roller capable of abutting against an outer surfaces of the pair of rails to guide the travelling toy.

[0014] Preferably, the drive roller is made of an elastic synthetic resin and includes a boss fixed to a roller shaft, an orbicular zone-like rim constituting an outer periphery, and a spoke coupling the boss and the rim.

[0015] According to the aspect of the present invention, since the toy vehicle situated at an arbitrary position can be accelerated to travel only by moving the travelling toy equipped with the toy vehicle accelerating apparatus to a position of the toy vehicle, the entertainment value of the travelling toy can be enhanced.

[0016] The above and other objects, advantages and features of the present invention will become more fully understood from the detailed description given hereinbelow and the appended drawings which are given by way of illustration only, and thus are not intended as a definition of the limits of the present invention, and wherein:

FIG. 1 is a perspective view showing a circuit racecourse equipped with a toy vehicle accelerating ap-

paratus according to an embodiment of the present invention;
FIG. 2 is a plan view showing an internal mechanism of a travelling toy;
FIG. 3 is a rear view showing a guide structure of the travelling toy;
FIG. 4 is a perspective view showing the internal mechanism of the travelling toy conceptually;
FIG. 5 is a perspective view showing a drive roller, which is a constituent element of an accelerating section; and
FIG. 6 is a perspective view showing a clutch intervening in a motive power transmission system of the drive roller conceptually.

[0017] In the following, a toy vehicle launching apparatus according to an embodiment of the present invention will be described with reference to the attached drawings.

[0018] FIG. 1 is a perspective view showing a circuit racecourse model equipped with a toy vehicle launching apparatus according to the present invention; FIG. 2 is a plan view showing the internal mechanism of an apparatus frame body; FIG. 3 is a rear view showing a guide structure of the apparatus frame body; FIG. 4 is a perspective view showing the internal mechanism of the apparatus frame body conceptually; FIG. 5 is a perspective view showing a drive roller, which is a constituent element of a toy vehicle launching section; and FIG. 6 is a perspective view showing a clutch intervening in a motive power transmission system of the drive roller conceptually.

[0019] As shown in FIG. 1, a toy vehicle launching apparatus (toy vehicle accelerating apparatus; hereinafter referred to as a launching apparatus) 1 is configured in a travelling toy (automobile toy) B travelling on a circulation track board 2 of a circuit racecourse model. As shown in FIG. 1, a pair of circular rails 2a is provided on the track board 2. The travelling toy B travels into a predetermined direction on the track board 2 along the rails 2a. On the other hand, a toy vehicle (automobile toy) A smaller than the travelling toy B in size travels into the reverse direction on the track board 2. When the travelling toy B meets the toy vehicle A, the travelling toy B swallows the toy vehicle A to accelerate it, and then the travelling toy B discharges the toy vehicle A from the rear side of the travelling toy B. The discharged toy vehicle A keeps on running on the track board 2.

[0020] In the following, the mechanism of the above operation will be described.

(Track Board 2)

[0021] The pair of rails 2a provided on the track board 2 projects upward above the face of the board 2 to form a travelling lane of the toy vehicle A.

(Toy Vehicle A)

[0022] The toy vehicle A is not equipped with any power sources, and the wheels of the toy vehicle A are rotated by being given an external force, and thereby the toy vehicle A travels.

(Travelling Toy B)

[0023] In order to travel on the track board 2 by its own force, the travelling toy B is equipped with a power source, a motor 5, and a travelling mechanism 6 (see FIGS. 2 and 4). The travelling mechanism 6 includes a worm gear 8a fixed on the motor shaft, a crown gear 8b, a shaft 8c, a gear 8d, a crown gear 8e, and gears 8f, 8g, 8h, and 8i. Then, the travelling toy B transmits the motive power of the motor 5 to rear wheels 7 through the worm gear 8a, the crown gear 8b, the shaft 8c, the gear 8d, the crown gear 8e, and the gears 8f, 8g, 8h, and 8i to drive the rear wheels 7. Thereby, the travelling toy B is configured to be able to travel by its own force.

[0024] Moreover, a tunnel-like passage 3a piercing the travelling toy B into the front-back direction of the vehicle body 3 is formed in the travelling toy B. The passage 3a is formed for allowing the toy vehicle A to pass through the travelling toy B. The lower part of the passage 3a is opened, so as to allow the toy vehicle A travelling in the travelling lane to pass through the travelling toy B as it is without detaching the toy vehicle A from the travelling lane.

[0025] On both sides of the passage 3a, guide walls 3b and 3c to perform the travel guiding of the toy vehicle A by forming both the sides of the passage 3a in the width direction thereof are formed.

[0026] Among them, in view of the travelling toy B travelling on the circular rails 2a, the guide wall 3b situated on the inside of the circular rails 2a is formed to be curved in a bow or in an arc in a planar view. On the other hand, the guide wall 3c situated on the outside of the circular rails 2a is formed so as to extend in a straight line into the front-back direction of the vehicle body 3 at an intermediate part and to incline toward the outside in width direction of the vehicle body 3 at the front end part and rear end part thereof in a planar view. In FIG. 2, for the sake of the convenience for illustration, the rails 2a in straight lines are shown.

[0027] In particular, the reason why the guide wall 3b is formed in a curved shape in an arc in a planar view is that the travelling toy B travels in a predetermined direction on the track board 2 including the circular rails 2a. The reason is that if the guide wall 3b is formed in a straight line to extend in the front-back direction of the vehicle body 3, then the front end part of the guide wall 3b crosses the rail 2a on the inner side to protrudes into the travelling lane, and it becomes impossible to swallow the toy vehicle A into the vehicle body 3. Thus, in order to avoid such a situation, it is necessary that at least the front end part of the guide wall 3b is formed in a bow or

in an arc.

[0028] Moreover, the travelling toy B is equipped with a vehicle accelerating section within the passage 3a. The vehicle accelerating section includes a pair of drive rollers 10 as shown in FIGS. 2 and 4.

[0029] The drive rollers 10 are made of an elastic synthetic resin, such as silicon gum. The drive rollers 10 are fixed at the lower end parts of roller shafts 11. As shown in FIG. 5, each of the drive rollers 10 is composed of an orbicular zone-like rim 10a, a boss 10b fixed to the roller shaft 11, and spokes 10c coupling the rim 10a and the boss 10b with each other. In the drive roller 10, each of the spokes 10c is formed to be curved in an arc or in a bow by projecting toward the rotation direction of the drive roller 10.

[0030] The reason why each of the drive rollers 10 is formed of the elastic synthetic resin and is composed of the rim 10a, the boss 10b, and the spokes 10c is that the rim 10a between the adjacent spokes 10c is made to be easily deformed and thereby the rim 10a is made to abut on the side face of the toy vehicle A in a wide range to strongly push the toy vehicle A with the rim 10a in the part of the spokes 10c. Although the spokes 10c may not be a curved form, the curved forms of the spokes 10c are especially highly effective. With regard to this respect, if the drive rollers 10 are formed of a hard resin, then the drive rollers 10 contact with the side face of the toy vehicle A in the state of the line contact of the generating lines of the drive rollers 10, and consequently the drive rollers 10 sometimes slip on the side faces of the toy vehicle A and cannot push out the toy vehicle A strongly.

[0031] Moreover, the travelling toy B is equipped with a power source and a motive power transmitting mechanism 15 to transmit the motive power from the motor 5 to the drive rollers 10 on both sides. The power source and the motive power transmitting mechanism 15 are for the sake of rotating the drive rollers 10. The power source is used for travelling in common.

[0032] The motive power transmitting mechanism 15 constitutes the roller driving section together with the motor 5. The motive power transmitting mechanism 15 transmits the motive power to the drive rollers 10 on both sides through two motive power transmitting routs. The motive power transmitting rout from the motor 5 to the drive roller 10 on the left side in the travelling direction of the travelling toy B is the rout composed of the worm gear 8a fixed on the motor shaft, and gears 16a, 16b, 16c, 16d-1, and 16e-1. On the other hand, the motive power transmitting rout from the motor 5 to the drive roller 10 on the right side in the travelling direction of the travelling toy B is the rout composed of the worm gear 8a fixed on the motor shaft, and gears 16a, 16b, 16c, 16d-1, 16d-2, and 16e-2.

[0033] Moreover, the travelling toy B is equipped with a clutch mechanism 18 within the motive power transmitting mechanism 15. The clutch mechanism 18 works to drive the drive rollers 10 only when the vehicle body 3 of the travelling toy B is placed so as to bestride the pair of rails 2a.

[0034] The clutch mechanism 18, as shown in FIG. 6, includes a pair of clutch discs 19 and 20 and a clutch disc operating mechanism 21. Clutch teeth are formed on each of the opposed surfaces of the pair of clutch discs 19 and 20.

[0035] The pair of clutch discs 19 and 20 is for the sake of performing the coupling and decoupling of the gear 16c and the gear 16d. The pair of clutch discs 19 and 20 is provided on the same shaft 22 as that of the gears 16b and 16c. To put it concretely, the clutch disc 19 is fixed on the shaft 22 in the state of being incapable of rotating similarly to the gear 16b. However, the clutch disc 19 on one side is made to be movable in the shaft line direction along a spline 22a formed on the shaft 22. The clutch disc 20 on the other side is fixed to a gear 16c attached to the shaft 22 in the state of being capable of slipping. Then, when the mutual clutch teeth of the pair of clutch discs 19 and 20 engage with each other, the gears 16b and 16c couple with each other, and motive power is transmitted between them. On the other hand, when the engagement of the mutual clutch teeth of the pair of clutch discs 19 and 20 is released, the mutual coupling of the gears 16b and 16c is released, and no motive power are transmitted between them.

[0036] The clutch disc operating mechanism 21 is for the sake of performing the engagement and the release of the engagement of the mutual clutch teeth of the clutch discs 19 and 20. The clutch disc operating mechanism 21 includes an operation rod 23, a lever 24, and a spring 25. The operation rod 23 is provided to extend in the vertical direction of the travelling toy B. The lower end part of the operation rod 23 projects below from the bottom surface of the travelling toy B. The lever 24 performs a seesaw operation around its intermediate part as a shaft 24a. The lever 24 is hooked by the spring 25. One end side of the lever 24 biases the operation rod 23 toward the lower part, and the other side end of the lever 24 is inserted into a circumferential groove of the clutch disc 20.

[0037] When the travelling toy B is placed to bestride the pair of rails 2a, the operation rod 23 hits against the upper surface of the rails 2a and is pushed up. Thereby, the lever 24 performs a seesaw operation to make the clutch disc 19 descend and to make the clutch teeth of the clutch discs 19 and 20 engage with each other. On the other hand, when the vehicle body 3 of the travelling toy B is lifted, the operation rod 23 descends by a biasing force of the spring 25, and the mutual engagement of the clutch teeth of the clutch discs 19 and 20 is released.

[0038] Moreover, the travelling toy B is provided with planetary gear mechanisms 30 within the motive power transmitting mechanism 15. In order to make the drive rollers 10 abut against the side faces of the toy vehicles A having different breadths suitably, it becomes necessary for the drive rollers 10 themselves to move in accordance with the breadth of the toy vehicle A. On the other hand, since the drive rollers 10 are driven to rotate

by the motive power of the motor 5, the motive power of the motor 5 must be transmitted to the drive rollers 10. In order to satisfy both the necessities, the planetary gear mechanisms 30 are incorporated within the motive power transmitting mechanism 15.

[0039] Each of the planetary gear mechanisms 30 is composed of the gear (sun gear) 16d (16d-1 or 16d-2), a swinging arm 31, and the gear (planetary gear) 16e (16e-1 or 16e-2). Among them, the gear 16e is fixed to each of the roller shafts 11. Moreover, the swinging arm 31 is attached to each of the shafts 33, to which the gear 16d is attached, in the state capable of slipping.

[0040] The planetary gear mechanisms 30 are provided on both the sides of the travelling toy B in the travelling direction thereof.

[0041] Incidentally, in the planetary gear mechanisms 30, the gear (planetary gear) 16e is located at a position behind that of the gear (sun gear) 16d on both the sides of the travelling toy B, and the roller shaft 11 to which the gear 16e is fixed is configured to move at positions outer than that of the shaft 33 of the gear 16d in the width direction of the travelling toy B. Moreover, guide holes 34 for regulating the moving ranges of the roller shafts 11 are formed in the vehicle body 3. Thereby, each of the drive rollers 10 on both sides can move between each of the predetermined close positions and each of the predetermined distant positions in accordance with the breadth of the toy vehicle A.

[0042] According to the planetary gear mechanisms 30, when the gear 16d rotates by the motive power of the motor 5, as shown in FIG. 2, the roller shafts 11 and therefore the drive rollers 10 move inward in the width direction of the travelling toy B. In this state, when the toy vehicle A enters between the drive rollers 10 on both the sides, the front parts on both the sides of the toy vehicle A collide against the drive rollers 10 on both the sides, and the drive rollers 10 on both the sides move toward the outside in the width direction of the travelling toy B.

[0043] Moreover, the travelling toy B is provided with a biasing section 40 of the drive rollers 10 on both the sides, as shown in FIG. 4. The biasing section 40 is for the sake of pressing the drive rollers 10 on both the sides toward corresponding side faces of the toy vehicle A at a predetermined pressure.

[0044] The biasing section 40 is composed of a spring hooked between both the roller shafts 11 on both the sides or both the swinging arms 31 on both the sides. If the biasing section 40 is hooked between both the roller shafts 11 on both the sides, the biasing section 40 is arranged lest the biasing section 40 should prevent the rotations of the roller shafts 11. Moreover, the biasing force of the biasing section 40 is set to the one in the degree of not preventing the movements of the drive rollers 10 on both the sides caused by the entering of the toy vehicle A.

[0045] Moreover, the travelling toy B is provided with floating rollers 50 on both the sides of the front part and the rear part of the bottom surface of the vehicle body 3, as shown in FIG. 3. The floating rollers 50 abut against the outer surfaces of the rails 2a on both the sides at the time of the travel of the travelling toy B to work to guide the travelling toy B along the rails 2a.

[0046] Incidentally, the travelling toy B is provided with a travelling mode switching mechanism to switch the travelling mode of the travelling toy B between an automatic travelling mode and a manual travelling mode, although the travelling mode switching mechanism is not shown. The travelling mode switching mechanism makes a part of the gears 8e-8h in the travelling mechanism 6 movable in the shaft direction through levers or the like, and switches the travelling mode between the automatic travelling mode and the manual travelling mode by moving the part of the gears 8e-8h in the shaft direction with manipulators.

[0047] In the toy vehicle launching apparatus 1, the rear wheels 7 are driven by the motor 5, thereby the travelling toy B is made to travel along the rails 2a on the track board 2, and the drive rollers 10 on both the sides are also driven by the motor 5.

[0048] Then, when the travelling toy B meets the reversely sent toy vehicle A, the travelling toy B swallows the toy vehicle A within the passage 3a thereof. Then, when the toy vehicle A entering within the passage 3a reaches the drive rollers 10 on both the sides, the drive rollers 10 on both the sides put the toy vehicle A between them and accelerates it to discharge it to the rear direction of the vehicle body 3.

[0049] Incidentally, although the drive rollers 10 are installed on both the sides in the embodiment, the drive rollers 10 may be installed on an upper part of the passage 3a. Moreover, the travelling toy B may be provided with a floor surface on which the drive rollers 10 are installed, and may pick up the toy vehicle A from the travelling lane once to accelerate it.

[0050] According to this embodiment of the present invention, since the toy vehicle A situated at an arbitrary position can be accelerated to travel by moving the travelling toy B equipped with the toy vehicle accelerating apparatus 1 to a position of the toy vehicle A, the entertainment value of the travelling toy B can be increased.

[0051] Moreover, since each of the drive rollers 10 is pressed to each corresponding side face of the toy vehicle A to accelerate the toy vehicle A, the toy vehicles A having the distorted upper surfaces, such as a truck crane and a ladder truck, can be surely accelerated.

[0052] Moreover, each of the drive rollers 10 is movable between the close position and the distant position, and the drive rollers 10 are biased toward the close position by the biasing section 40. Consequently, toy vehicles A having different breadths can be surely accelerated.

[0053] Moreover, the swinging arm 31, the sun gear 16d, and the planetary gear 16e constitute the planetary gear mechanism 30, and motive power is transmitted through the planetary gear mechanism 30. Consequently, the motive power can be surely transmitted to the drive

rollers 10 on the basis of setting the drive rollers 10 themselves to be movable.

[0054] Moreover, the travelling toy B swallows the toy vehicle A and accelerates the toy vehicle A to discharge it on the track board 2, on which the circulating course is formed, and consequently the toy vehicle A can continually or intermittently travel.

[0055] Moreover, it is possible to abut the rim 10a against each of the side faces of the toy vehicle A in a wide area to strongly push out the toy vehicle A with the rim 10a at the spoke part by making the rim 10a between the spokes 10c easy to deform.

Claims

1. A toy vehicle accelerating apparatus of a travelling toy, the toy vehicle accelerating apparatus comprising:

   a vehicle body including a tunnel-like passage piercing the vehicle body in a front-back direction to allow a toy vehicle to pass through the passage;
   a drive roller, at least a part of which projects to the passage to press the toy vehicle passing through the passage;
   a roller driving section to give a rotative force for accelerating the toy vehicle to the drive roller; and
   a power source for the roller driving section, wherein
   the toy vehicle accelerating apparatus accelerates the toy vehicle entering the passage from one side thereof with the drive roller to discharge the toy vehicle from the other side of the passage.

2. A toy vehicle accelerating apparatus according to claim 1, wherein
   a drive roller is provided on each of both sides of the passage and each of the drive rollers is rotatable around a vertical shaft in the vehicle body, and
   each of the drive rollers is pressed to each corresponding side face of the toy vehicle to accelerate the toy vehicle.

3. A toy vehicle accelerating apparatus according to claim 2, wherein
   each of the drive rollers is movable between a close position, at which the drive rollers are close to each other, and a distant position, at which the drive rollers are distant from each other, within the passage, and each of the drive rollers is biased toward the close position by a biasing section to a degree of not preventing the toy vehicle from entering between the drive rollers.

4. A toy vehicle accelerating apparatus according to claim 2 or claim 3, wherein
   each of the drive rollers is severally attached to a swinging arm swinging in a predetermined range on a horizontal plane around a respective predetermined shaft, and
   the roller driving section includes a sun gear attached to the predetermined shaft and a planetary gear provided on a roller shaft and rotating integrally with the drive roller.

5. A toy vehicle accelerating apparatus according to any one of claims 1 to 4, wherein
   the travelling toy travels on a track board, on which a circulating course is formed, the circulating course including a pair of rails projecting upwardly from a face of the track board to form a travelling lane for allowing the toy vehicle to travel between the pair of rails, and
   an under surface of the vehicle body is provided with a guide roller capable of abutting against an outer surfaces of the pair of rails to guide the travelling toy.

6. A toy vehicle accelerating apparatus according to any one of claims 1 to 5, wherein the drive roller is made of an elastic synthetic resin.

7. A toy vehicle accelerating apparatus according to claim 6 wherein the drive roller includes a boss fixed to a roller shaft, an orbicular zone-like rim constituting an outer periphery, and a spoke coupling the boss and the rim.

8. A travelling toy comprising a toy vehicle accelerating apparatus as claimed in any one of claims 1 to 7.

FIG.1

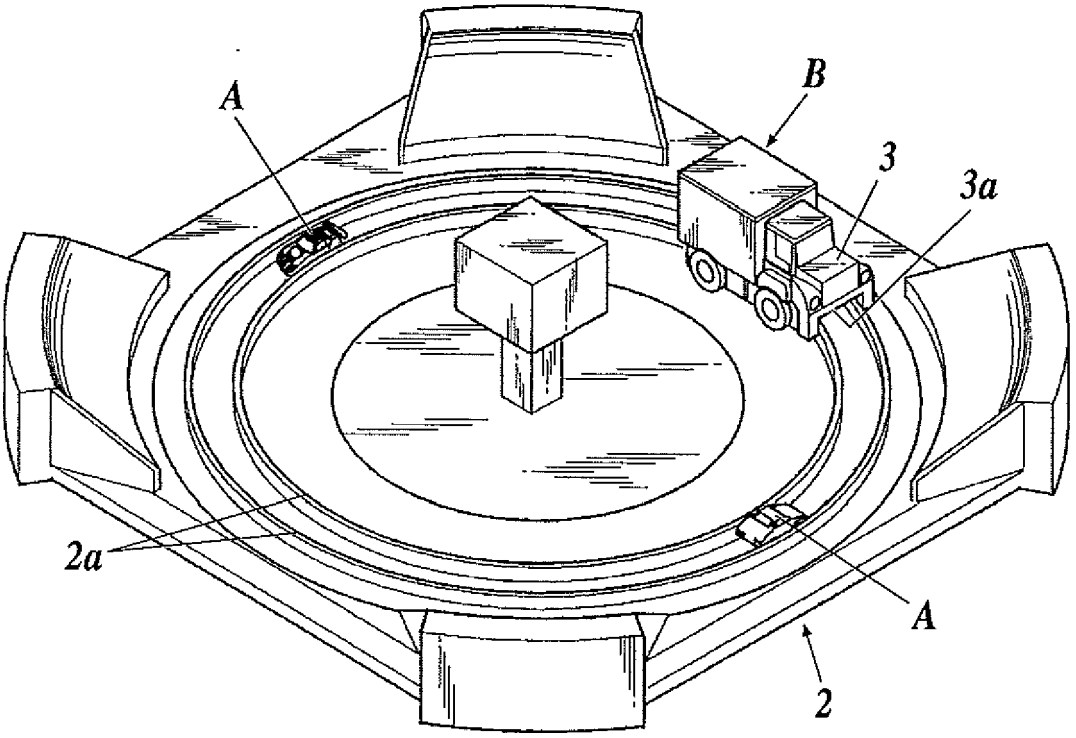
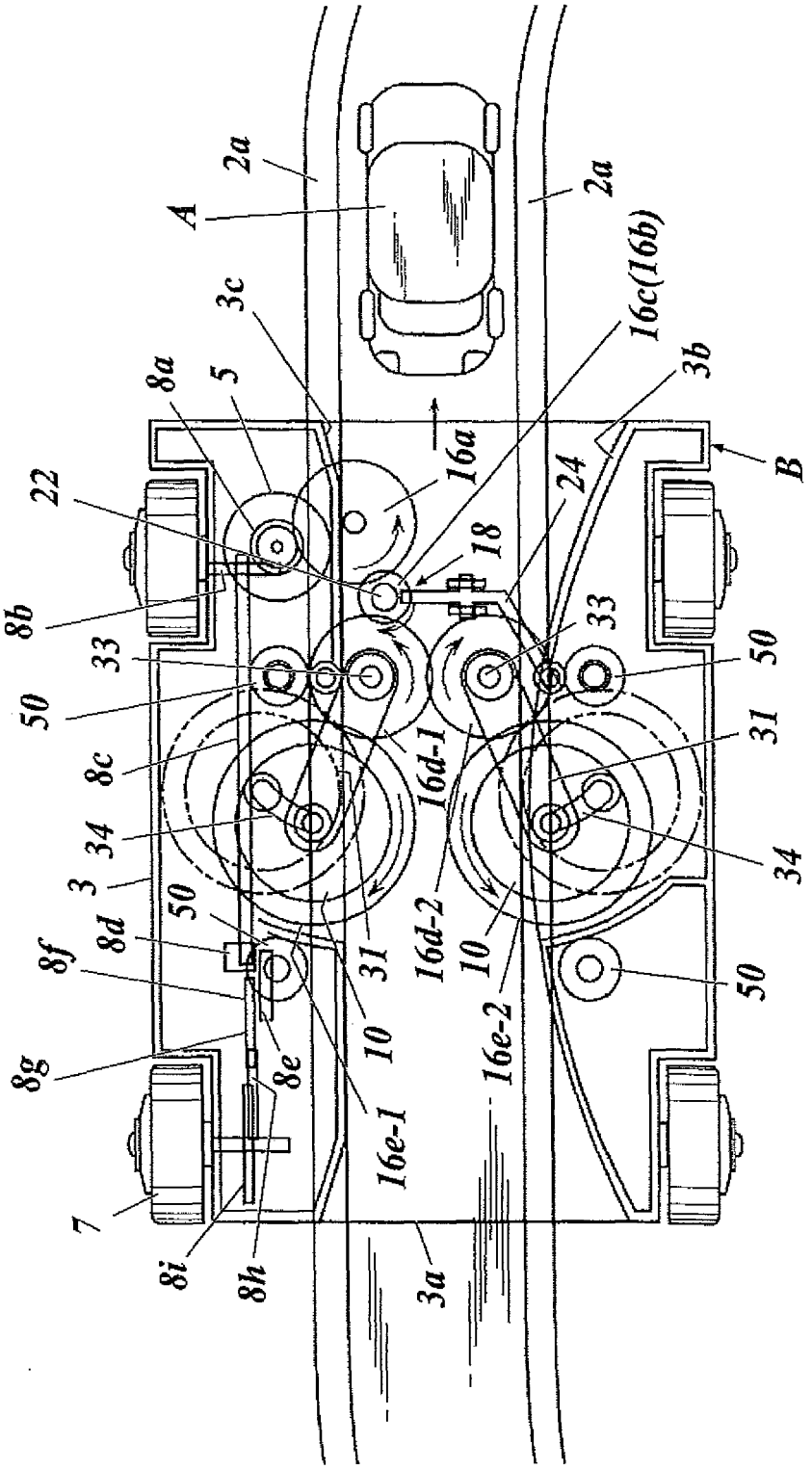


FIG.2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A
2a
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16c(16b)
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3b
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B
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33
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8c
16d-1
31
34
34
3
50
8d
8f
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8h
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FIG.3

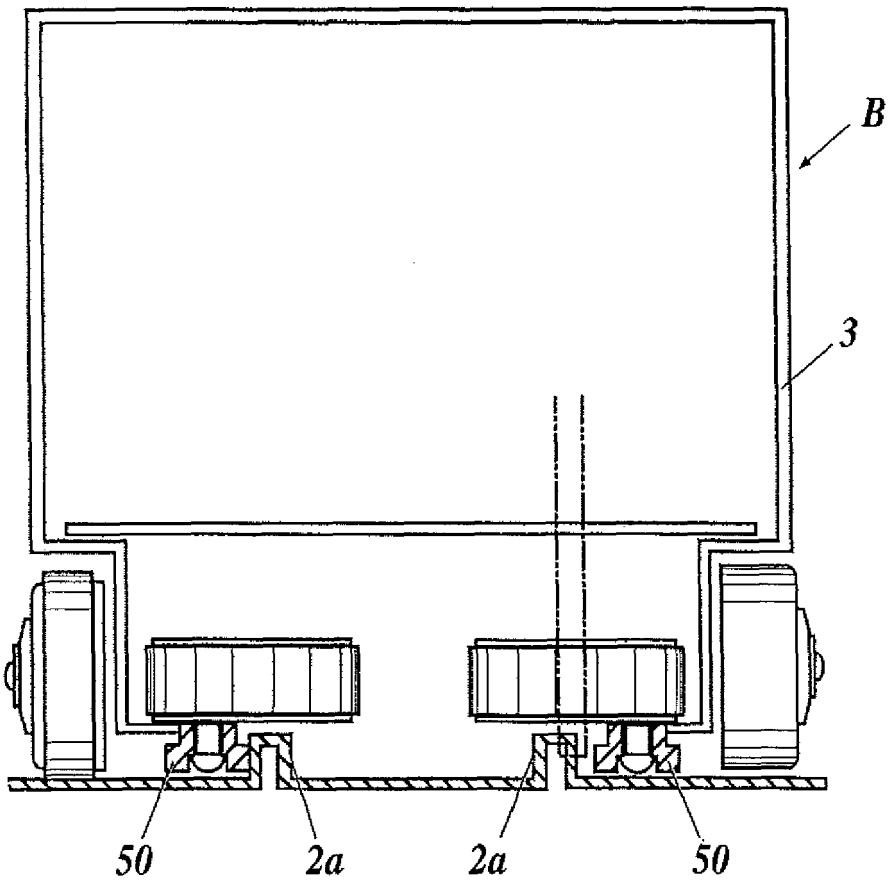

FIG.4

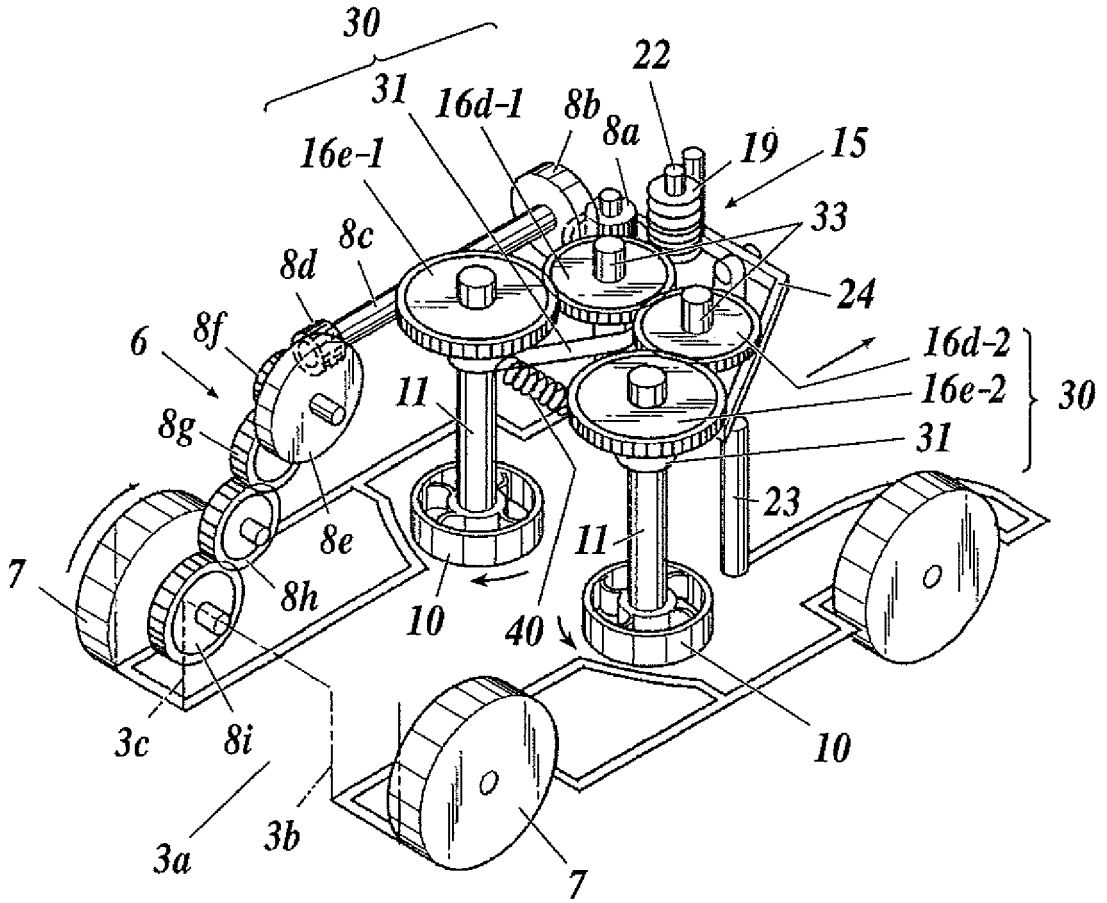
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FIG.5

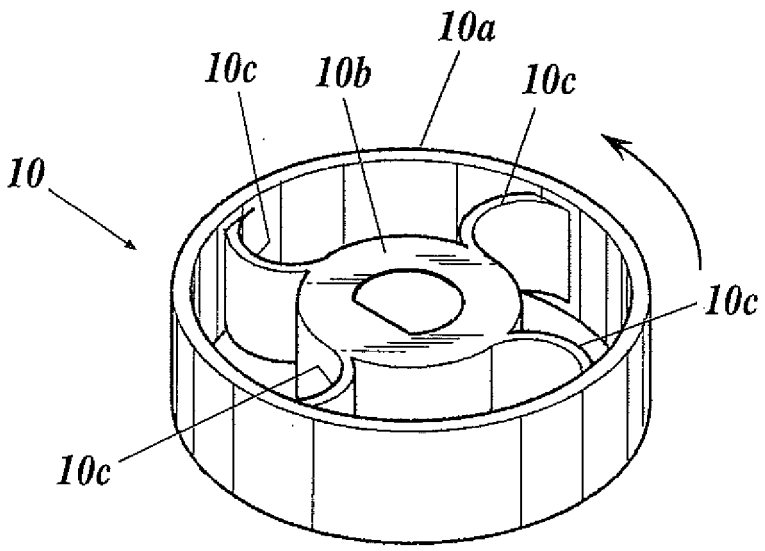
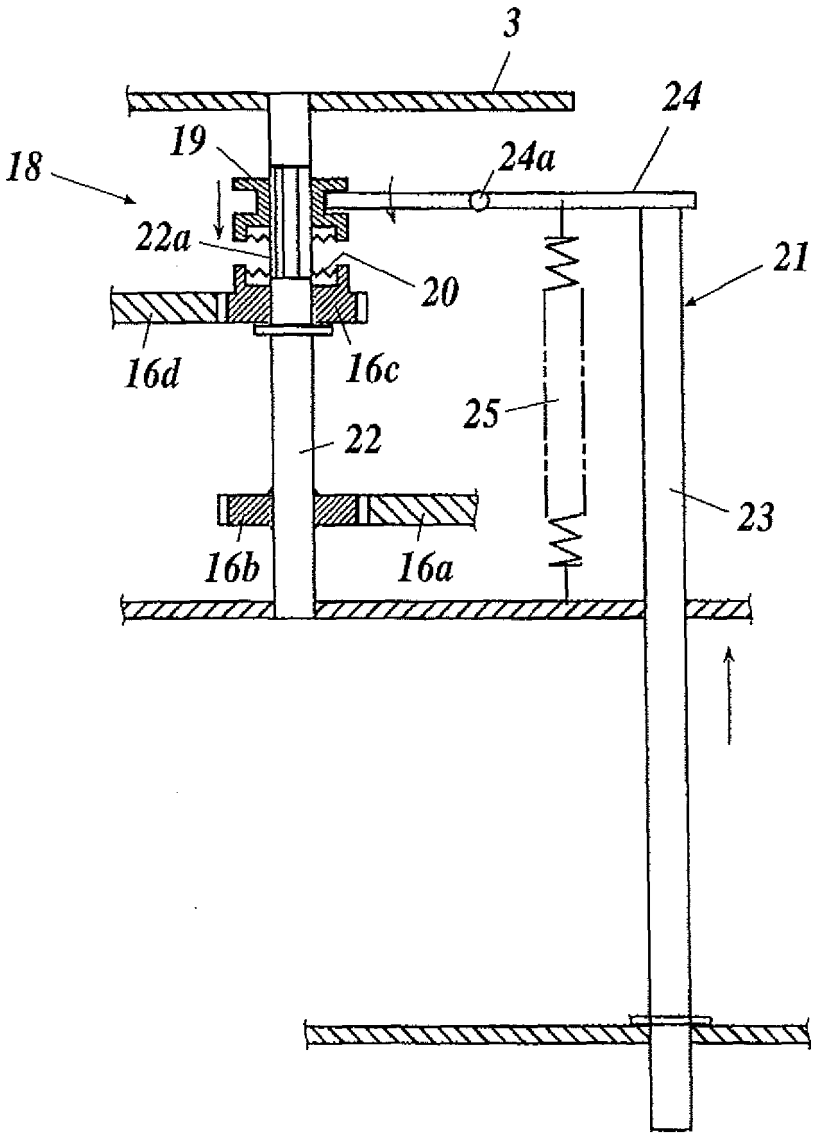


FIG.6



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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 09 15 6672

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 052 972 A (SUIMON YOSHIO [JP] ET AL) 1 October 1991 (1991-10-01) * column 2, line 61 - column 4, line 20; figures *	1-8	INV. A63H18/14 A63H17/26
A	US 6 089 951 A (OSTENDORFF ERIC [US]) 18 July 2000 (2000-07-18) * column 3, line 57 - column 4, line 39; figure 1 *	1-8	
A	US 3 641 704 A (SIMS ANSON ET AL) 15 February 1972 (1972-02-15) * column 5, line 6 - column 6, line 64; figures 7,8 *	1-8	
A,D	US 6 695 675 B1 (NGAN ROGER [US]) 24 February 2004 (2004-02-24) * column 4, line 28 - column 6, line 20; figures 1-3 *	1-8	
A	US 6 241 573 B1 (OSTENDORFF ERIC C [US] ET AL) 5 June 2001 (2001-06-05) * column 3, line 62 - column 4, line 11; figure 1 *	1-8	TECHNICAL FIELDS SEARCHED (IPC) A63H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 July 2009	Lucas, Peter

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