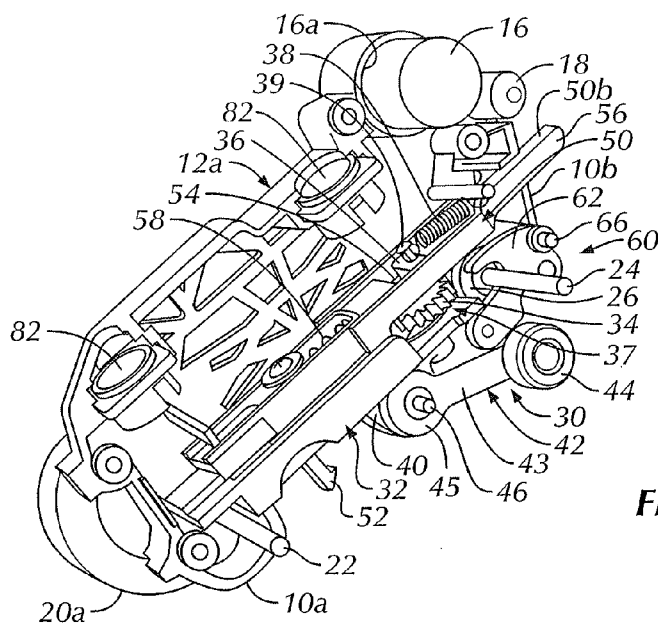




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- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
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(54) **Title:** WHEELIE TOY VEHICLE**FIG. 5**

(57) **Abstract:** A toy vehicle (10) having front and rear road wheels (20a, 20b) is provided with a mechanism (30) to elevate the toy vehicle (10) from an initial orientation supported on all of the road wheels into a wheelie orientation supported on the rear road wheels (20b) and to return the vehicle to the initial orientation supported on all of the road wheels. The mechanism (30) includes: a crank (37); a spring loaded wheelie bar (42); and a slide plate (50) driven by the crank so as to release the wheelie bar beneath the vehicle to elevate the vehicle from the initial orientation into the wheelie orientation and to thereafter extend a tongue member (56) from a rear end (10a) of the vehicle (10) to return the vehicle back to the initial orientation.

WHEELIE TOY VEHICLE

BACKGROUND OF THE INVENTION

[0001] A number of mechanisms have been disclosed for elevating a toy vehicle from an initial or normal configuration supported on all of its road wheels to a wheelie configuration supported on only its rear road wheels.

[0002] For example, US Patent Nos. 3,772,824 and 4,438,589 describe toy vehicles having weights which can be manually repositioned to selectively maintain a toy vehicle in an elevated wheelie orientation or on all of its road wheels. US Patent No. 1,682,764 describes a toy vehicle with an internal, motor shifted weight to do the same thing automatically.

[0003] Several US Patents describe motor driven toy vehicles with extendable fifth wheels or wheelie bars. US Patent No. 2,587,052 describes one with a motor driven rotary arm that regularly raises one side of the vehicle to cause the vehicle to turn at regular intervals. US Patent No. 3,574,267 describes one with a motor driven rotary crank that regularly raises and lowers a fifth wheel located beneath the bottom center of the vehicle slightly forward of the center of the four road wheels to raise and lower the front end of the vehicle at regular intervals. US Patent No. 4,363,187 describes one with an eccentric on a motor driven wheel that through a linkage extends and retracts a centrally located wheelie bar. US Patent No. 4,850,931 describes one having a worm on an undriven wheel axle that drives a gear mechanism, the gear mechanism permitting selective adjustment of the distance moved by the vehicle before a brake member is activated by the mechanism. US Patent No. 5,019,009 describes one having a side pivoting lift lever that is regularly deployed by an eccentric on a gear driven by the motor which cams the lever during each rotation of the gear. Finally, US Patent No. 4,894,042 describes one having a spring loaded and latched flip arm that is released by a sector worm gear driven by a worm on an undriven wheel axle of the vehicle and that is designed to flip the toy vehicle entirely over. The latching arm needs to be manually reset.

BRIEF SUMMARY OF THE INVENTION

[0004] In a toy vehicle (10) having a plurality of front and rear road wheels (20a, 20b), a mechanism (30) is provided to elevate the toy vehicle (10) from an initial orientation supported

on all of the plurality of road wheels into a wheelie orientation supported on only the rear road wheels (20b) of the plurality of road wheels and to return the vehicle to the initial orientation supported on all of the road wheels, the mechanism (30) comprising: a crank (37); a spring loaded wheelie bar (42); and a slide plate (50) driven by the crank so as to release the wheelie bar beneath the vehicle to elevate the vehicle from the initial orientation into the wheelie orientation and to thereafter extend a tongue member (56) from a rear end (12a) of the vehicle to return the vehicle back to the initial orientation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The foregoing summary, as well as the following detailed description of the invention, will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there are shown in the drawings embodiments which are presently preferred. It should be understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown. In the drawings:

[0006] FIG. 1 is a front perspective view of a toy vehicle of the present invention ;

[0007] FIG. 2 is an opposing rear perspective view of the toy vehicle of FIG. 1;

[0008] FIG. 3 is a bottom plan view of the toy vehicle of FIG. 1;

[0009] FIG. 4 is an exploded view of the chassis halves of the toy vehicle of FIG. 1

[0010] FIG. 5 is a top perspective view of the right chassis half with the wheelie mechanism installed;

[0011] FIG. 6 is an view of the right chassis half with the wheelie mechanism separated;

[0012] FIGS. 7A-7C are broken away side elevations of the toy vehicle illustrating the steps performed by the toy vehicle in elevating itself into a wheelie orientation and returning to its normal orientation supported on all four road wheels.

DETAILED DESCRIPTION OF THE INVENTION

[0013] The various figures depict a toy vehicle 10 of the present invention. The vehicle 10 is preferably unpowered and is operated by being pushed but the invention could be used on a motor propelled vehicle. The vehicle 10 includes a front end 10a and an opposing rear end 10b. The vehicle 10 includes a decorative body 14 on a chassis 12. The chassis 12 is preferably divided into right and left halves 12a, 12b. The vehicle 10 preferably includes four identical road

wheels 20. A front pair of the road wheels 20a is mounted on a front axle 22 that is itself supported for free rotation in mirror image journal openings 23 in the chassis halves 12a, 12b. A rear pair of the road wheels 20b is mounted on a rear axle 24 that is also supported for free rotation in mirror image journal openings 25 in the chassis halves 12a, 12b. Fixed to the rear axle 24 to rotate with the rear axle and pair of rear road wheel 20b is a worm 26.

[0014] Supported between the chassis halves 12a, 12b is a wheelie mechanism indicated generally at 30. Wheelie mechanism 30 is preferably a subassembly of the toy vehicle 10.

Wheelie mechanism 30 includes a main beam 32 which is fixedly positioned in the chassis 12 between the chassis halves 12a, 12b and a linear sliding carriage or "slide plate" 50. The main beam 32 supports the slide plate 50 on its upper side for longitudinal sliding movement and further supports for rotation beneath the slide plate 50, a worm gear 34 for engagement with the worm 26. A cam 36, preferably arcuate in shape, extends up from the top surface of the worm gear 34 and rotates with the worm gear 34. The combination of the worm gear 34 with the cam 36 forms a crank indicated at 37. A projection 40 from a bottom side of the main beam 32

supports a wheelie bar 42 on an axle 46. The wheelie bar 42 includes an arm 43 pivotally supported by the main beam 32 from projection 40 and the axle 46. The wheelie bar 42 further includes a pair of wheels 44 rotatably supported at a distal end of the arm 43. A spring 48 (see FIG. 7B), preferably a torsion spring, is located between the arm 43 of wheelie bar 42 and the projection 40 so as to bias to the wheelie bar 42 to its rearward, actuated position shown in the various FIGS. 2-6.

[0015] The slide plate 50 supports near its front end 50a a hook shaped latch member 52 that extend down from the chassis 12 through an opening 33 in the main beam 32 (see FIG. 3). Referring to FIG. 6, to the rear of the latch member 52, the slide plate 50 has an elongated opening 54 with an inner facing cam follower surface 55. The rear end 50b of the slide plate 50 is shaped into a tongue member 56, which normally projects from the rear end 10a of the chassis 12 and toy vehicle 10. Another spring 58, preferably a compression spring, is located between the slide plate 50 and the main beam 32 so as to bias the slide plate 50 with the latch member 52 and tongue member 56 rearward on the main beam 32. The latch member 52 is configured to engage a cross beam 43a of the wheelie arm 43 when the wheelie bar 42 is manually pivoted forward from its rearward, actuated position in FIGS. 2-6 to a forward, latched position (seen

only in FIG. 7A) and is biased by spring 58 to retain the wheelie bar arm 43 in the latched position.

[0016] The cam 36 extends up through the elongated opening 54 in the slide plate 50. The opening 54 is preferably of an elongated race track shape with a narrow slot 54a extending forward from a front left end of the opening 54. The slide plate 50 is moved, preferably pushed, forward from its rearward, actuated position indicated in the various FIGS. 2-6 by the cam 36 as the cam 36 is rotated by the worm gear 34.

[0017] A relatively heavy, metal weight 16 (silver cylinder) is fixedly positioned in the vehicle 10, preferably received in cylindrical wells 16a, 16b in the chassis halves 12a, 12b, so as to be fixedly positioned above and slightly to the rear of the rear axle 24 to move the center of gravity of the vehicle 10 to a position above and sufficiently close to the rear axle 24 in a longitudinal direction to more easily raise and lower the vehicle 10 as will be described. A roller 18 is preferably provided in the rear center of the chassis 12 and forms a third point of contact with the pair of rear wheels 20b to support the vehicle 10 on the support surface S in the elevated wheelie orientation (FIG. 7C).

[0018] Referring to FIG. 7A, the initial orientation of the toy vehicle 10 is standing on a support surface S on all four road wheels 20 with the wheelie bar 42 pivoted forward into engagement with latch member 52 and with the tongue member 56 projecting out the rear end of the chassis 12. The car 10 is manually pushed in a forward direction. Rotation of the rear wheels 20b rotates the rear axle 24 with worm 26. Worm 26 rotates worm gear 34 and cam 36. The leading edge of the cam 36 strikes a transverse forward edge 55a of the cam follower surface 55 of the opening 54 and pushes the slide plate 50 forward sufficiently for the latch member 52 to release the wheelie bar 42. The spring biased wheelie bar 42 rotates rearward (clockwise in FIG. 7B) elevating the front end 10a of the vehicle 10 and the front pair of wheels 20a from the support surface S onto its rear wheels 20b and the roller 18 (FIG. 7C). The wheelie bar 42 continues to rotate back to its rearward, released position shown in FIGS. 2-6 and 7C where it remains until manually returned to its forward, latched position (FIG. 7A). The cam 36 further moves the slide plate 50 sufficiently forward for the tongue member 56 to retract into the chassis 12 enough for the vehicle 10 to be raised by the wheelie bar 42 onto the rear road wheels 20b and the roller 18. As the cam 36 continues to rotate past the transverse support surface 55a, a trailing end of the cam 36 (with the metal pin 39) leaves the transverse surface 55a and aligns with the

narrow slot 54a. This permits the slide plate 50 to be sprung rearward, abruptly extending the tongue member 56 into contact with the support surface S with enough force to rotate the vehicle 10 forward about its rear wheels 20b and back onto all four road wheels 20a, 20b (FIGS. 1-2). The vehicle 10 is picked up to manually rotate the wheelie bar 42 forward to engage again with the latch member 52.

[0019] The invention includes a reset mechanism indicated generally at 60 that permits the crank 37 to be reset to an initial position when the vehicle 10 is raised and the wheelie bar 42 manually reset to the forward, latched position (FIG. 7A). A preferably tension type return spring 38 is attached to what is a trailing edge of the cam 36 through metal pin 39 fixed at that trailing edge of the cam 36. The spring 38 is located so as to rotate the cam 36 and crank 37 back to an initial or starting position when the worm gear 34 is released from the worm 26. The rear axle 24 and worm 26 are supported for up and down movement in chassis opening 25 by a pivot arm 62. Pivot arm 62 is pivotally supported on chassis 12 from another axle 66. The range of movement of axle 24 and worm 26 is indicated by the length of slot 25 seen in chassis half 12b in FIG. 4. Yet another spring 68 (preferably a torsion spring as depicted only in FIGS. 7A-7C) is positioned to bias the axle 24 up in slot 25 and the worm 26 into engagement with the worm gear 34. A lever 64 projects forwardly from the pivot arm 62. It is configured and located so as to be struck by a cam 45a on one of the gudgeons 45 on which the wheelie bar arm 43 is pivotally supported. Comparing FIGS. 7A and 7C, it can be seen that when the wheelie bar 42 is released from an initial, forward, latched position (FIG. 7A), it rotates clockwise in FIGS. 7B and 7C to the rearward, released position. The wheelie bar 42 remains there until it is manually returned to the forward, latched position.

[0020] When the vehicle 10 is raised from the support surface S and the wheelie bar 42 is manually returned to its forward, latched position, the cam 45a on gudgeon 45 of the wheelie bar arm 43 strikes lever 64 and pushes lever 64 and pivot arm 62 downward, thereby disengaging the worm 26 from the worm gear 34. That permits return spring 38 to return the worm gear 34 and cam 36 to their initial or starting position. Preferably, lever 64 has side to side and up-down tapers. Lever 64 is thinnest at a sloping bottom edge 64a and thickens as it extends upward to top edge which forms a cam following surface 64c. As a result, a sloping surface 64b is provided between the bottom edge 64a and cam following surface 64c. Cam 43a also tapers up in thickness from a leading edge (rear facing edge in FIG. 7A) to a trailing edge (forward facing

edge in FIG. 7A) also providing a laterally sloping surface that faces sloping surface 64b. The sloping surfaces slope in the same direction and permit lever 64 to be pushed aside by the cam 43a contacting the lever 64 beginning at the bottom edge 64a when the latch member 52 releases the wheelie bar 42 to rotate and elevate the front end 10a of the vehicle 10. The upper, cam following surface 64c of lever 64 is sufficiently wide to be engaged by the thicker edge of gudgeon cam 45a when the wheelie bar 42 is manually rotated and returned to its forward, latched position. The surfaces remain engaged until the gudgeon cam 45a passes off the distal tip of lever 64. While engaged, the pivot arm 62 is pushed downward against the bias of spring 68 depressing the rear axle 24 in slot 25 and disengaging the worm 26 from the worm gear 34. This arrangement keeps the worm 26 engaged with the worm gear 34 during elevation and wheelie operation of the vehicle 10 until the cam 36 on the worm gear 34 can rotate sufficiently to release the slide plate 50 to project the tongue member 56 out the rear of the vehicle 10 and pitch the vehicle 10 down to its normal operating position with all four road wheels 20 on the support surface S. The worm gear 34 is thus permitted to return to its initial or start position only when the wheelie bar 42 is manually returned to its forward, latched position.

[0021] It will be appreciated that the strength of the slide plate biasing spring 58, the wheelie bar torsion spring 46, lengths of the wheelie bar 42 and tongue member 56 protruding from the chassis 12 as well as the amount and location of the weight 16 all have to be adjusted to permit the elevation of the vehicle 10 from and the return of the vehicle to its four wheel normal operating position.

[0022] It will further be appreciated that there are slight differences in appearance between some of the components shown in FIGS. 1-6 and those in FIGS. 7A-7C. However the same functional components are identified by the same reference numerals in both sets of FIGS and operate as previously described.

[0023] It will also be appreciated that although the invention is described with respect to a four wheel vehicle, the vehicle could be provided with three road wheels, a front and a pair of rear wheels. While the four road wheels are identical the road wheels may differ in size front and rear. A pair of body receiving members 82 are provided supported between the chassis halves 12a, 12b to assist in the assembly of the toy vehicle 10 but other means may be used to join the body 14 with the chassis 12. It further will be appreciated by those skilled in the art that still other changes could be made to the embodiments described above without departing from

the broad inventive concept thereof. This invention is not limited to the particular embodiments disclosed.

CLAIMS

1. In a toy vehicle (10) having a plurality of front and rear road wheels (20a, 20b), a mechanism (30) is provided to elevate the toy vehicle (10) from an initial orientation supported on all of the plurality of road wheels into a wheelie orientation supported on only the rear road wheels (20b) of the plurality of road wheels and to return the vehicle to the initial orientation supported on all of the road wheels, the mechanism (30) comprising:

a crank (37);

a spring loaded wheelie bar (42); and

a slide plate (50) driven by the crank so as to release the wheelie bar beneath the vehicle to elevate the vehicle from the initial orientation into the wheelie orientation and to thereafter extend a tongue member (56) from a rear end of the vehicle to return the vehicle back to the initial orientation.

2. The mechanism of claim 1 wherein the slide plate includes a latch member (52) configured to releasably hold the wheelie bar (42) and wherein a rear end of the slide plate (50) forms the tongue member (56).

3. The mechanism of claim 2 further comprising a main beam (32) fixedly positioned in a chassis (12) of the toy vehicle (10), the main beam having an upper side supporting the slide plate (50) for longitudinal sliding movement in the vehicle and further rotatably supporting the crank (37) in engagement with the slide plate.

4. The mechanism of claim 3 wherein the crank (37) includes a cam (36) and the slide plate (50) includes a cam follower surface (55) and wherein the mechanism further comprises a spring (58) positioned to bias the slide plate to the rear end of the vehicle and the cam follower surface (55) of the slide plate (50) into contact with the cam (36) of the crank (37).

5. The mechanism of claim 4 wherein the cam follower surface (55) is formed by an opening (54) in the slide plate (50), the opening (54) including a transverse forward edge (55a) contacted by the cam (36) to push the slide plate forward thereby releasing the latch member (52) from the wheelie bar (42) while retracting the tongue member (56) into the chassis (12).

6. The mechanism of claim 5 wherein the cam follower surface (55) formed by the opening (54) is further formed by a longitudinal slot (54a) extending forward in the slide plate from a lateral end of the transverse forward edge (55a) of the cam following surface (55) at a forward end of the opening (54), the longitudinal slot (54a) being configured to receive at least a trailing edge of the cam (36) of the crank (37) to permit the slide plate (50) to be moved rearward by the spring (58) and extend the tongue member (56) from the rear end (10a) of the toy vehicle.

7. The mechanism of claim 4 wherein the toy vehicle (10) includes a chassis (12), a rear axle (24) mounting a rear pair (20b) of the plurality of road wheels (20a, 20b), the rear axle being supported for free rotation in openings (25) in the chassis (12), the mechanism further including a worm (26) fixed to the rear axle (24) so as to rotate with the rear wheels (20b) and the rear axle (20).

8. The mechanism of claim 7 further comprising a pivot arm (60) supporting the rear axle (24) with the worm (26) for up and down movement in the openings in the chassis (12).

9. The mechanism of claim 8 further comprising another spring (60) located to bias the pivot arm (60) so as to engage the worm (26) with a worm gear (34) forming the crank (37) with the cam (36).

10. The mechanism of claim 9 wherein the wheelie bar (42) is also supported for pivotal movement from a bottom side of the main beam (32).

11. The mechanism of claim 10 wherein the wheelie bar (42) includes an arm (42a) pivotally supported from the main beam (32) and wherein the pivot arm (62) supporting the rear axle (24) and worm (26) includes a lever (64) extending into contact with the wheelie bar arm (42a), the wheelie bar arm (42a) including another cam (43a) positioned to strike the lever (64) and pivot the lever (64) and the pivot arm (62) so as to disengage the worm (26) from the worm gear (34) to permit reinitialization of the crank (27).

12. The mechanism of claim 1 further comprising a weight (16) located above the rear axle (24) so as to shift a center of gravity of the vehicle from in front of the rear axle (24) in an initial orientation with all of the plurality of road wheels on a support surface to a location

over or slightly behind the rear axle (24) to maintain the vehicle elevated in the wheelie orientation on only the rear road wheels (20a) of the plurality of road wheels.

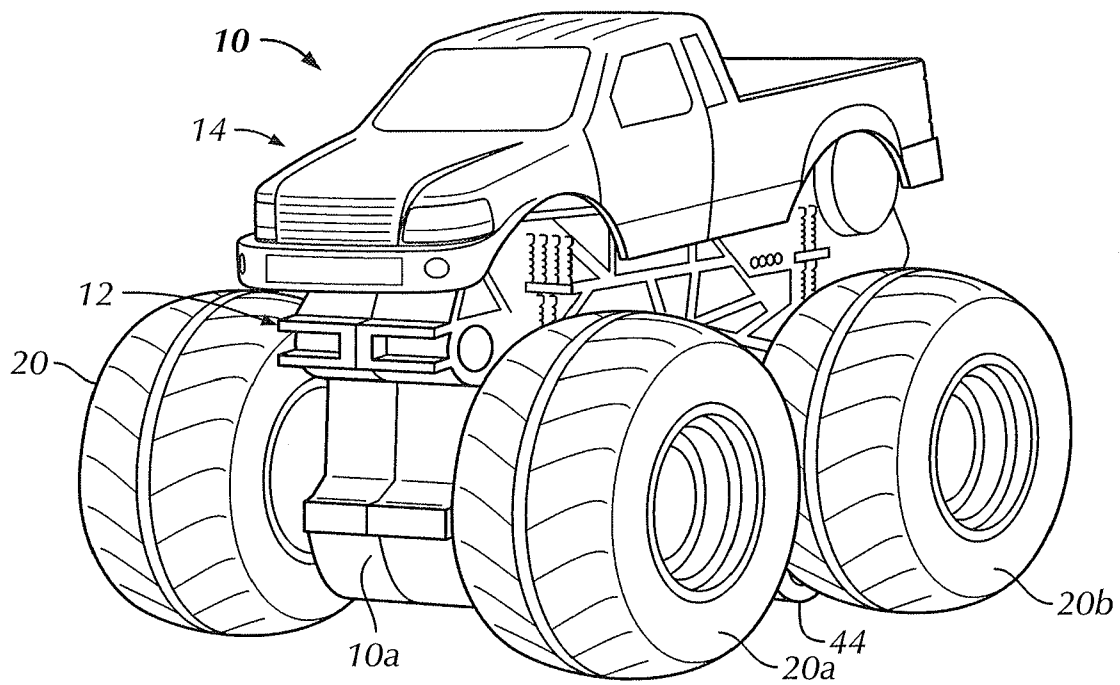


FIG. 1

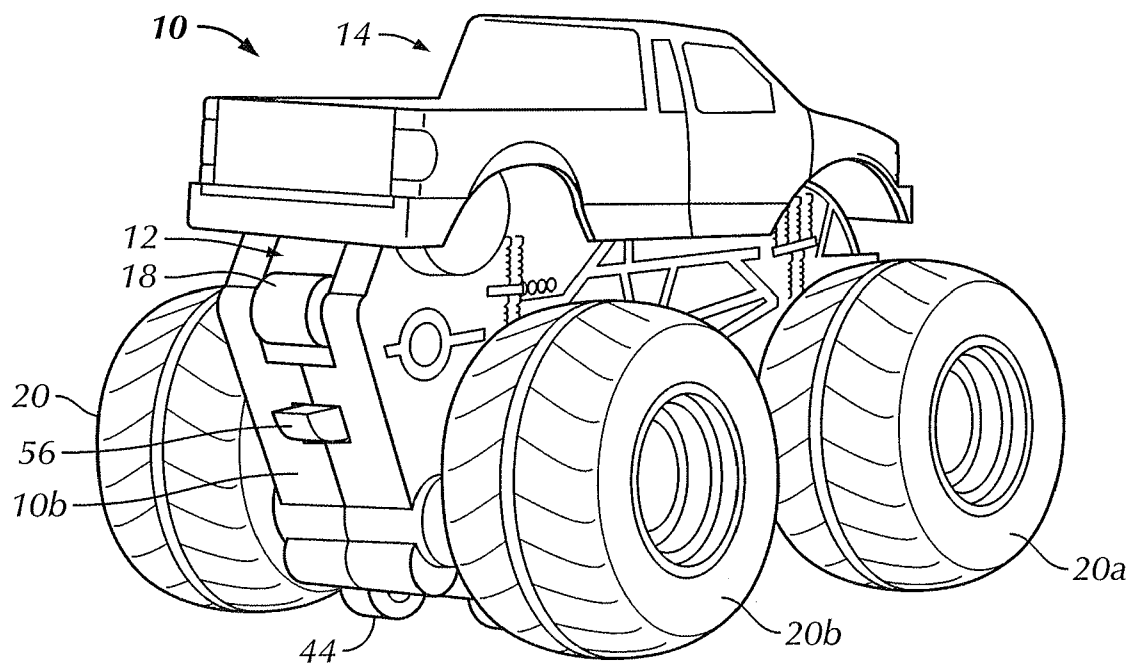


FIG. 2

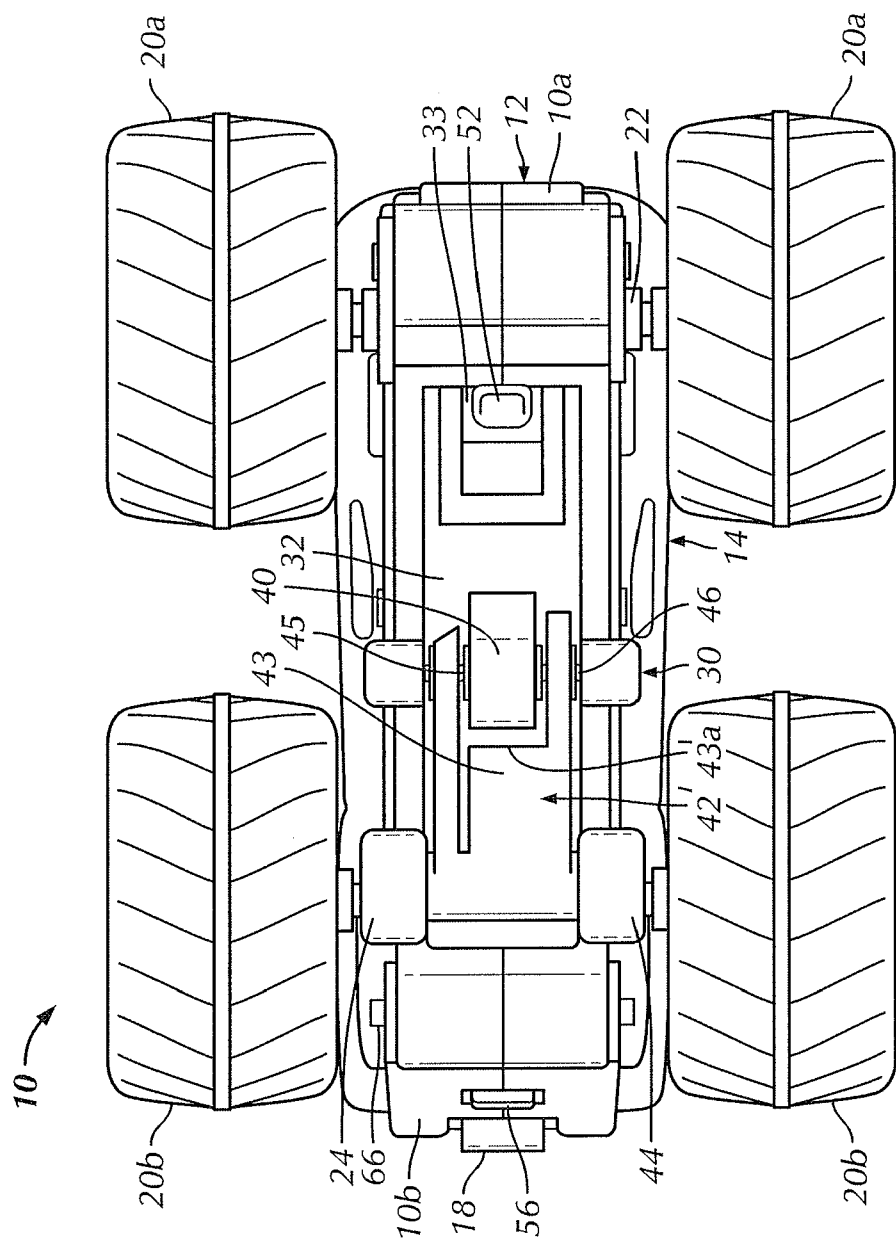


FIG. 3

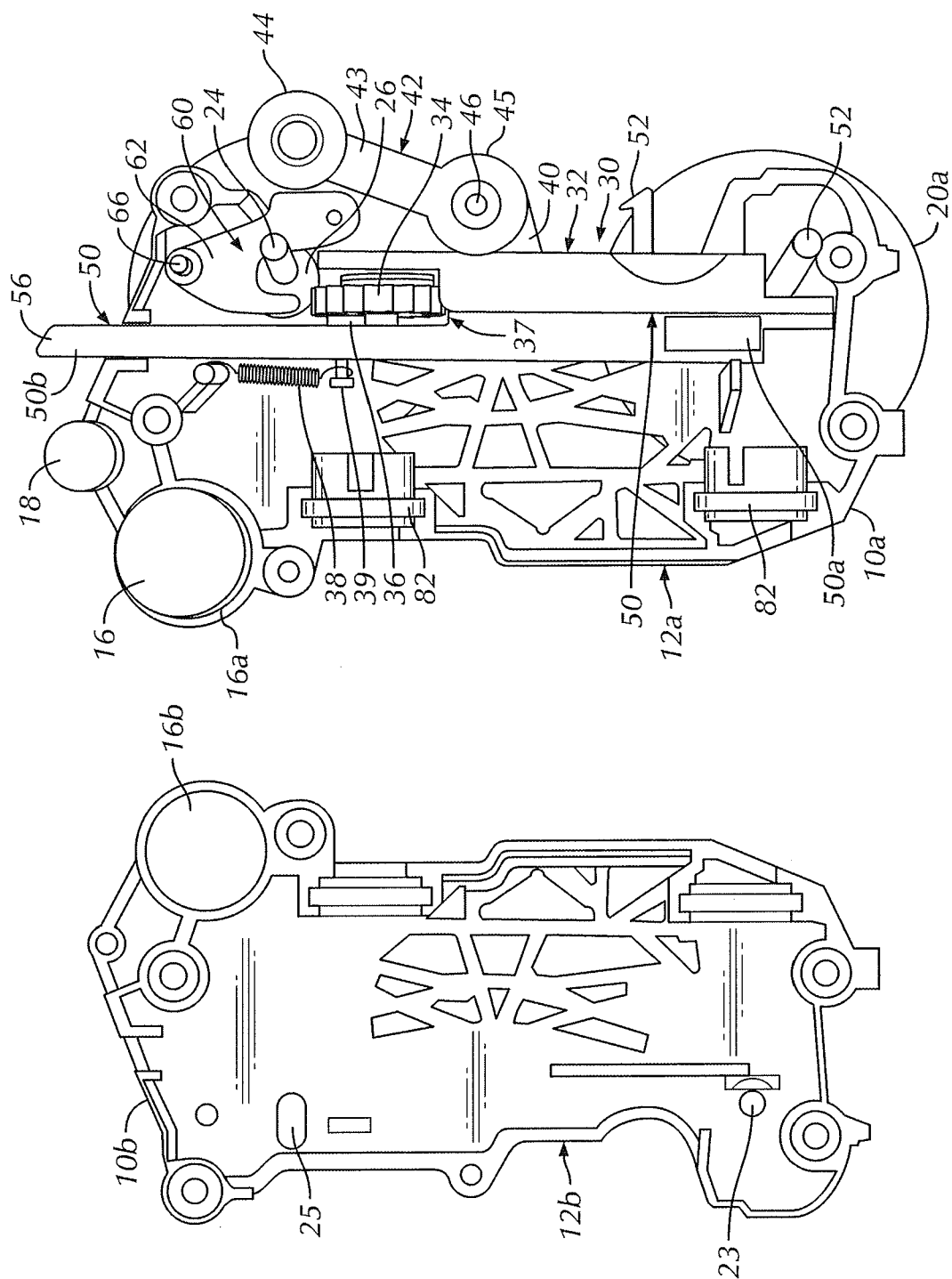


FIG. 4

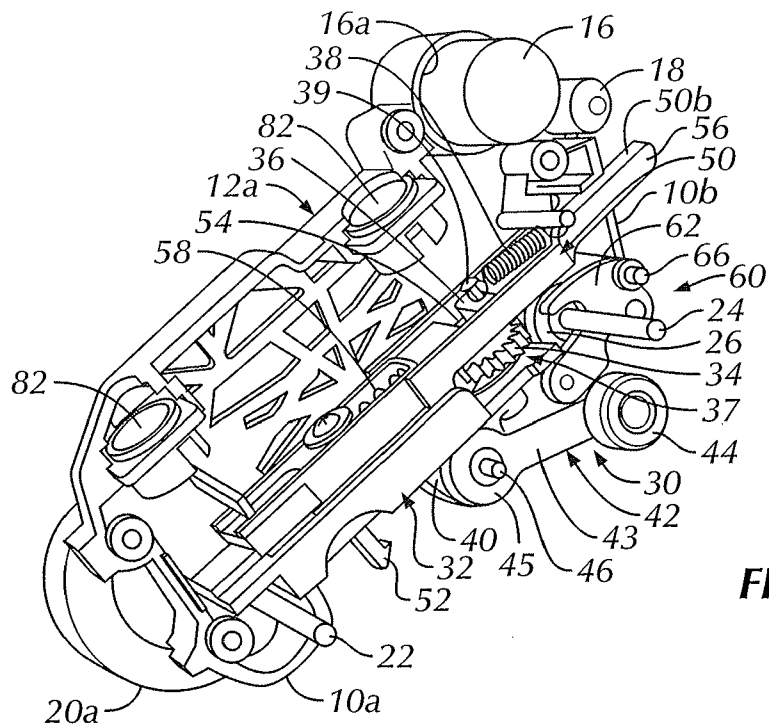


FIG. 5

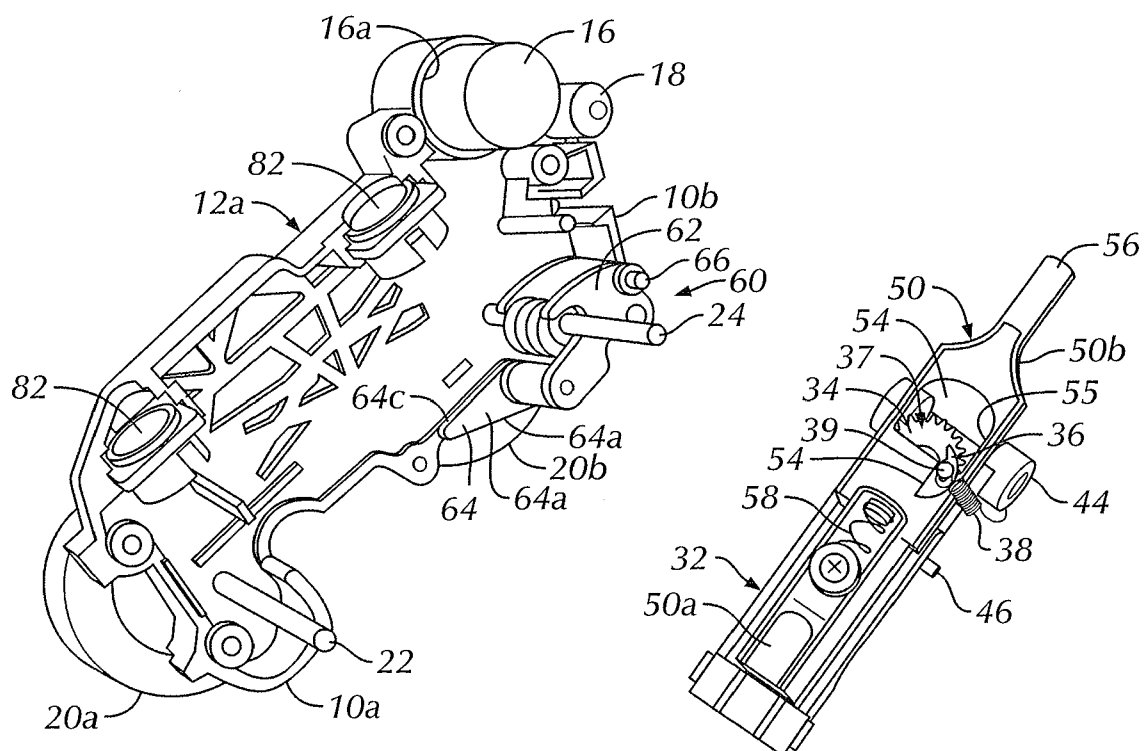


FIG. 6

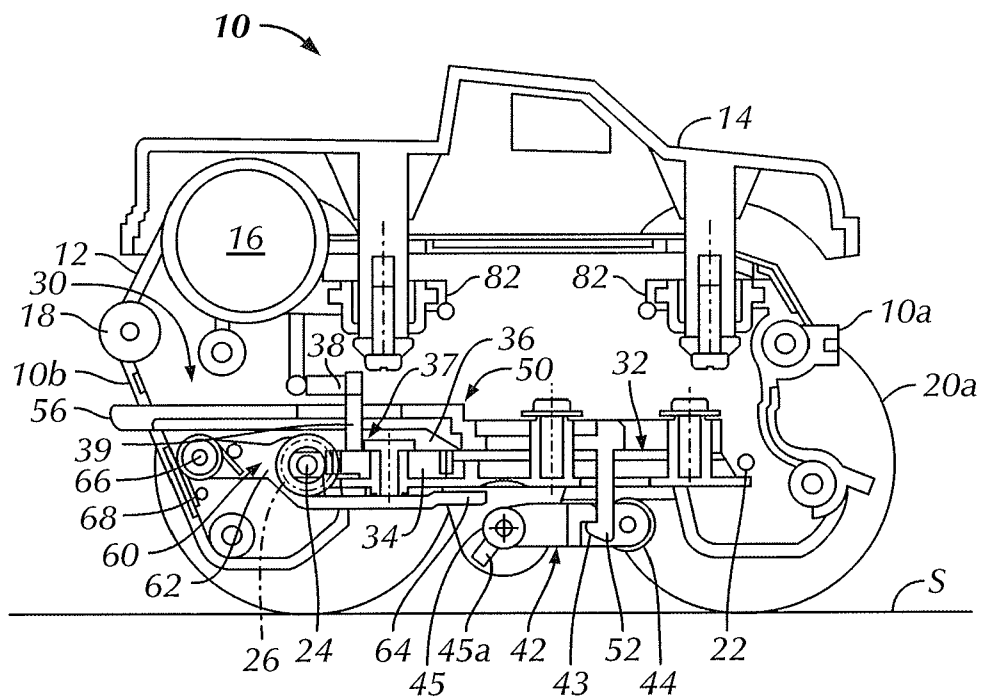


FIG. 7A

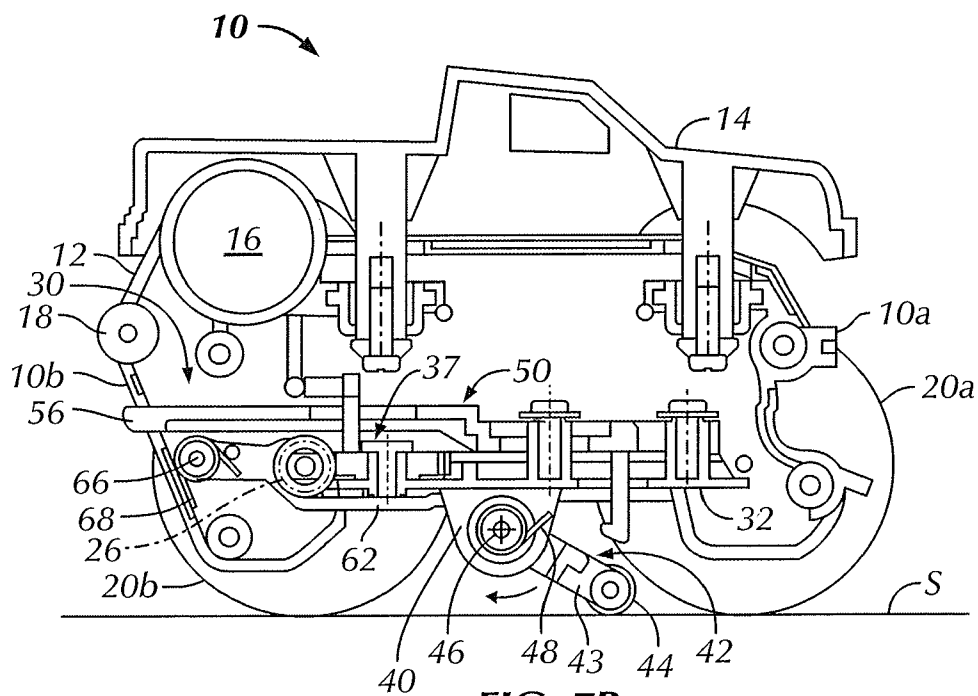


FIG. 7B

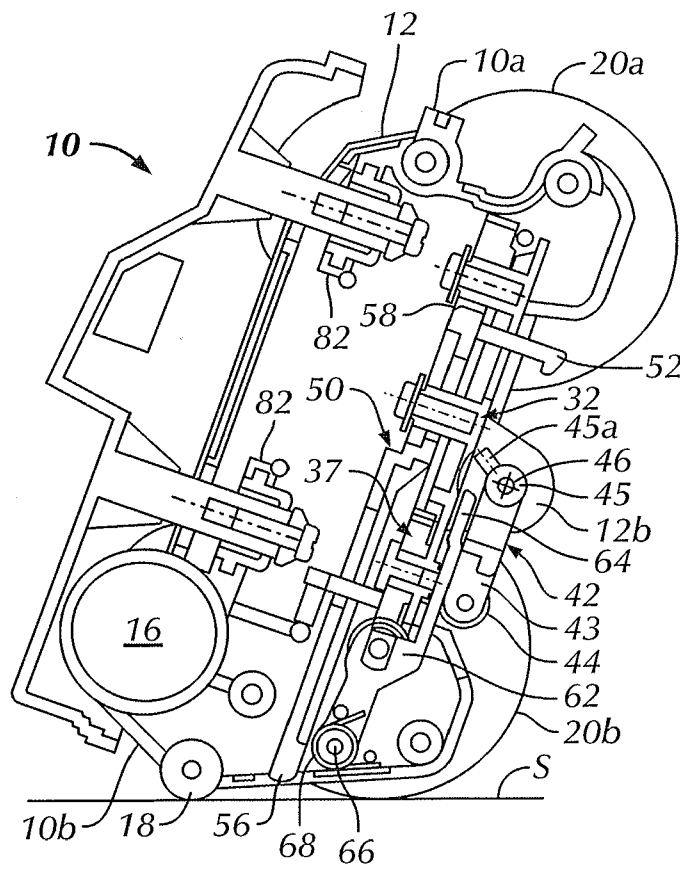


FIG. 7C

A. CLASSIFICATION OF SUBJECT MATTER***A63H 17/00(2006.01)i, A63H 17/26(2006.01)i, A63H 11/12(2006.01)i***

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A63H 17/00; A63H 17/26

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: "wheelie", "toy", "orientate"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 7686671 B2 (GOTOU TAKEO et al.) 30 March 2010 See abstract, columns 5, 6, claim 1 and figures 4, 9.	1-12
A	US 2009-0264046 A1 (MAYER MARK S.) 22 October 2009 See abstract, paragraphs 59, 60, claim 1 and figure 8.	1-12
A	US 2008-0261487 A1 (TORRES RONALD) 23 October 2008 See abstract, paragraphs 34, 57, claim 1 and figures 6-13.	1-12
A	US 04580994A A (FAUSER; FRITZ et al.) 08 April 1986 See abstract, column 5, claim 1 and figures 2, 5, 7.	1-12



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

19 JUNE 2012 (19.06.2012)

Date of mailing of the international search report

14 AUGUST 2012 (14.08.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
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City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

BAEK, Jae Hong

Telephone No. 82-42-481-5477



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2011/067697

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