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- (71) **Applicants:** **TOP NOTCH TOYS LIMITED** [—/CN]; Flat 14, 6/F, New City Centre, 2 Lei Yue Mun Road, Kwun Tong, Kowloon (CN). **J-MARKETING CO., LTD.** [JP/JP]; 1-35-8-301, Red Wing Bldg., Akabane-nishi, Kitaku, Tokyo 115-0055 (JP).
- (72) **Inventor:** **SUZUKI, Masaki**; 2-19-11 Tokorooka, Yachi, Kahoku Cho, Nishimurayama Gun, Yamagata 999 3513 (JP).
- (74) **Agent:** **LUNG TIN INTERNATIONAL INTELLECTUAL PROPERTY AGENT LTD.**; Rm. 1512, 15/F., West Tower, Shun Tak Centre, 168-200 Connaught Road Central, Hong Kong (CN).

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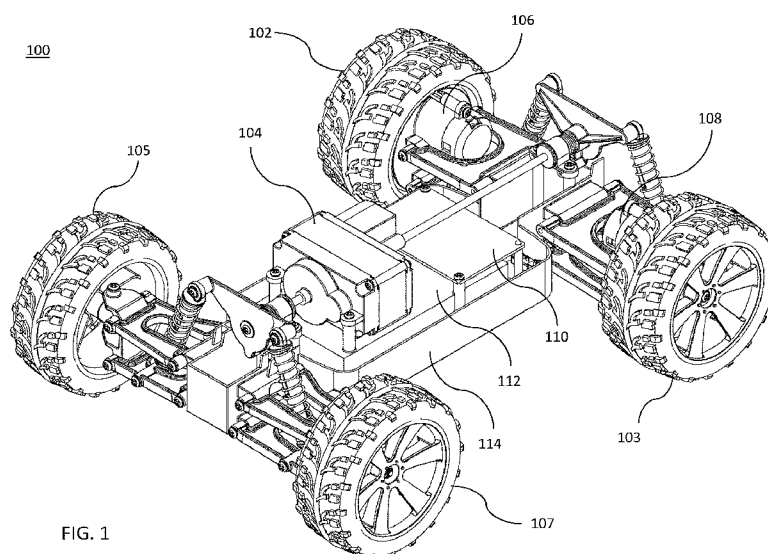
(54) **Title:** SWING BUGGY TOY MODEL

FIG. 1

(57) **Abstract:** A toy model having a chassis (114), radio control circuitry' (110), shock absorbers (320), and a swing servo mechanism (104) configured to move left and right wheels (105, 107) of the model up and down. A leaning mechanism in communication with the radio control circuitry (110) and the swing servo (104) is employed, and the leaning mechanism is configured to provide a leaning movement and to shift a center of gravity of the model in a steering direction. Steering knuckles (420) are twisted against steering holders (516) to make a twisted angle (503, 505) with respect to a pivot pin (509), and the pivot pin (509) enables the simultaneous leaning movement of the model and steering to an inclined side of the model.

SWING BUGGY TOY MODEL**RELATED APPLICATION DATA**

[0001] This application claims priority from U.S. Provisional Application Serial No. 61/762,542 filed on February 8, 2013.

BACKGROUND**Field of the Technology**

[0002] The present invention relates to radio control toy models. More particularly, it relates to a radio control toy model which is capable of maintaining stable attitude with shifted center of gravity by leaning the vehicle body to the left or right and also steering to the left or right simultaneously.

Description of the related art

[0003] In order to maintain stable attitude or to increase steering performance, conventional radio control toy vehicles are generally designed with, for example, contraption on suspension, optional tire material, added differential gear systems on driving wheels, or other methods to increase the friction force (i.e., “grip”) against running surfaces. However, those conventional radio control toy vehicles may still turn over or skid on slippery or uneven surfaces due to the limited friction force or the “grip.” Thus, it becomes apparent that there is a need for a system which provides better steering performance and controllability in radio control toy vehicles.

SUMMARY

[0004] Conventional radio control toy vehicles are generally positioned horizontally to the running surfaces, but according to one aspect of the present principles, a radio control toy vehicle may shift its center of gravity to the steering direction by leaning the vehicle body by employing a servo mechanism when the vehicle turns to the left or right. In one embodiment, a proprietary steering mechanism may be linked simultaneously with the leaning movement of the vehicle body, so that front wheels are also able to face to the turning direction.

[0005] Centrifugal force is generally produced opposite to the turning direction of vehicle in motion when it is forced to change the direction. Conventional radio control toy vehicles may turn over or skid when the centrifugal force exceeds the gripping force of the vehicles. However, the radio control toy vehicle according to one aspect of the present principles is able to keep a stable attitude when the vehicle turns to the left or right because its center of gravity may be shifted opposite to the centrifugal force by employing a servo mechanism to achieve the leaning movement. Therefore, the present principles are able to provide better steering performance and controllability to the radio control toy vehicles.

[0006] Other aspects and features of the present principles will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are designed solely for purpose of illustration and not as a definition of the limits of the present principles, for which reference should be made to the appended claims. It should be further understood that the drawings are not necessarily drawn to scale and that, unless otherwise indicated, they are merely intended to conceptually illustrate the structures and procedures described herein

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] In the drawings wherein like reference numerals denote similar components throughout the views:

[0008] Figure 1 is a top view of the interior of the toy model with leaning capability according to an embodiment of the present principles;

[0009] Figure 2 is perspective views of the exterior of the toy model with leaning capability according to an embodiment of the present principles;

[0010] Figure 3 is a schematic view of the inner workings of the steering mechanism of the toy model with leaning capability according to an embodiment of the present principles;

[0011] Figure 4 is a cross sectional view of the toy model with leaning capability showing the steering and leaning system according to an embodiment of the present principles;

[0012] Figure 5A is a top and front cross sectional view of the toy model with leaning capability in a non-active position according to an embodiment of the present principles;

[0013] Figure 5B is a top and front cross sectional view of the toy model with leaning capability in an active position according to an embodiment of the present principles;

[0014] Figure 6 is a perspective view of a three wheeled embodiment of the toy model with leaning capability in a non-active position according to an embodiment of the present principles; and

[0015] Figure 7 is a perspective view of the interior of a three wheeled embodiment of the toy model with leaning capability in an active position according to an embodiment of the present principles.

DETAILED DESCRIPTION

[0016] The radio control toy model which is capable of maintaining stable attitude with shifted center of gravity by leaning the vehicle body to the left or right and also steering to the left or right simultaneously according to the present principles may include a variety of configurations.

[0017] By way of example, and referring initially to FIG. 1, a top view of the interior of the toy model with leaning capability 100 is illustratively depicted according to an embodiment of the present principles. In accordance with one implementation, the radio control toy vehicle 100 includes tires/wheels 102, 103, 105, 107, a swing servo 104, motor/gear assemblies 106, 108, a printed circuit board/receiver (RX PCB) 110, a battery 112, and a chassis 114. The swing servo may activate the steering system in one embodiment.

[0018] The left and right driving motors 106, 108 may be located at the rear of the chassis 114. The left motor 108 may drive a left rear wheel 103, and the right motor 106 may drive a right rear wheel 102. A servo motor may be located inside the swing servo 104, which may provide a steering motion either to the left or right for the front wheels 105, 107. The RX PCB 110 may receive a signal from a remote or transmitter (not shown). The RX PCB 110 may control the left and right driving motors 106, 108 and the servo motor individually and allows each motor turn either in clockwise, counter-clockwise or stop modes. The user can control the vehicle, and may direct the vehicle to move, for example, forward, backward, left turn, right turn or stop by using various combinations of rotations from the left and right driving motors 106, 108 and the steering motor.

[0019] Referring now to FIG. 2, perspective views of the exterior of the toy model with leaning capability are illustratively depicted according to an embodiment of the present principles. In one embodiment, the swing servo enables the vehicle body lean to the left or

right as shown in 206 and 202, respectively. A top view of the vehicle body shown leaning to the left or right is illustratively depicted in 210 and 208, respectively. The Swing Servo is also able to activate steering system via linkage mechanism (not shown). The leaning movement of the vehicle is able to shift its center of gravity to the opposite direction of the centrifugal force when the car turns to the left or right, as shown in 202 and 206.

[0020] Referring now to FIG. 3, a schematic view of the inner workings of the steering mechanism of the toy model with leaning capability 300 is illustratively depicted according to an embodiment of the present principles. In one embodiment, the proprietary steering system on the chassis includes a swing servo 302, one or more upper arms 304, a swing plate 306, one or more steering links 308, "Pin A" 310, one or more steering knuckles 312, one or more knuckle holders 314, one or more screw shafts 316, one or more lower arms 318, and one or more shock absorbers 320.

[0021] Referring now to FIG. 4, a cross sectional view of the toy model with leaning capability showing the steering and leaning system 400 is illustratively depicted according to an embodiment of the present principles. In one embodiment, the proprietary steering system on the chassis 416 includes "Pin A" 402, one or more steering links 404, 405, a swing plate 406, one or more shock absorbers 408, one or more upper arms 410, one or more knuckle holders 412, one or more lower arms 414, 418, and one or more steering knuckles 420.

[0022] In one embodiment according to the present principles, the leaning movement of the vehicle may be controlled by the swing servo, and the proprietary steering system may be linked with the leaning movement of the vehicle and may enable the vehicle steer either to the left or right simultaneously with the leaning movement.

[0023] The swing plate 404 may be moved by a servo motor inside the Swing Servo mounted on the chassis 414 via gear reduction. The top of each shock absorber 406 may be connected to the swing plate 404, and the bottom of each shock absorber 406 may be

connected to the left and right lower arms 412, 418. The shock absorbers 406 are able to change rotary motion of the swing servo to vertical motion, and the vertical motion may be transmitted to the lower arms 412, 418 and all suspension related mechanisms. The leaning movement of the vehicle can be controlled by the above-mentioned multiple linked mechanism.

[0024] In one embodiment, during the execution of the leaning movement, the shock absorbers 408 are not compressed and are able to maintain normal stroke even during the leaning movement, so the shock absorbers 408 are able to provide the same shock absorbing effect as when the vehicle is in horizontal position even when the vehicle turns to the left or right and/or is leaning. The left and right steering links 404, 405 may be connected to the chassis 414 and each side of the steering knuckles 420, and the steering knuckles 420 surrounded by the knuckle holders 410 may be connected to each side of the lower arms 412, 418 and the upper arms 410, 411, which may also be connected to the chassis 414.

[0025] Referring now to FIG. 5A and FIG. 5B, a top and front cross sectional view of the toy model with leaning capability in a non-active position 500 and a top and front cross sectional view of the toy model with leaning capability in an active position 510, respectively, are illustratively depicted according to an embodiment of the present principles

[0026] In one embodiment, only one side of the lower arms 508, the upper arms 506, and the steering links 512 is connected to the chassis 501. When the vehicle leans either to the left or right by the swing servo, the steering knuckles 514 may be twisted against the steering holders 516 and may form a "twisted angle" 503, 505 with respect to the pivoting of "Pin A" 509 because the length of the lower arms 506 and the upper arms 508 are different from the length of the steering links 512. The steering knuckles 514 may be connected to the front wheels and may determine the steering direction of the vehicle. The present principles

may enable the leaning movement of the vehicle and may also enable the vehicle to steer to the inclined side of the vehicle simultaneously.

[0027] In another embodiment, to enable the steering and leaning mechanism to be more efficient, the leaning movement enabled by the swing servo may be added to the rear suspension as well as the front suspension. It is noted, however, that the leaning movement only added to the front suspension is also an efficient mechanism. It is further noted that while a vehicle with two (2) driving motors in the rear of the chassis with a conventional front steering system is discussed above as an exemplary embodiment, it is to be understood that the present principles may be applied to any sorts of vehicles (e.g., front drive vehicles, 4-wheel drive vehicles, 3-wheel vehicles, etc.).

[0028] It is further noted that while the above example shows a pickup truck mounted on a low profile chassis, it is contemplated that not only the pickup truck or buggy style body (not shown) mounted on the low profile chassis may be employed, but any other sorts of vehicles may be employed according to the present principles (e.g., vehicles with a higher profile chassis such as monster truck, which can be more efficient for the present principles because the center of gravity can be placed in higher location).

[0029] Referring now to FIG. 6, a perspective view of a three wheeled embodiment of the toy model with leaning capability in a non-active position 600 is illustratively depicted according to an embodiment of the present principles. In one embodiment, the toy model includes a swing servo 602, an RX PCB 604, a battery 606, a chassis 608, a motor/gear assembly, 610, and tires/wheels 612.

[0030] Referring now to FIG. 7, , a perspective view of a three wheeled embodiment of the toy model with leaning capability in an active position 700 is illustratively depicted according to an embodiment of the present principles. In one embodiment, the toy model

includes a swing servo, 702, an RX PCB 704, a battery 706, a chassis 708, a motor/gear assembly 710, and tires/wheels 712.

[0031] While there have been shown, described and pointed out fundamental novel features of the present principles, it will be understood that various omissions, substitutions and changes in the form and details of the methods described and devices illustrated, and in their operation, may be made by those skilled in the art without departing from the spirit of the same. For example, it is expressly intended that all combinations of those elements and/or method steps which perform substantially the same function in substantially the same way to achieve the same results are within the scope of the present principles. Moreover, it should be recognized that structures and/or elements and/or method steps shown and/or described in connection with any disclosed form or implementation of the present principles may be incorporated in any other disclosed, described or suggested form or implementation as a general matter of design choice. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

CLAIMS

What is claimed is:

1. A model comprising:

a chassis (114);

radio control circuitry (110);

shock absorbers (320);

a swing servo mechanism (104) configured to move left and right wheels (105, 107) of the model up and down; and

a leaning mechanism in communication with the radio control circuitry (320) and the swing servo (104), wherein the leaning mechanism is configured to provide a leaning movement and to shift a center of gravity of the model in a steering direction.

2. The model of claim 1, wherein the shock absorbers (320) are not compressed by the movement of the left and right wheels (102, 103) of the model up and down by the swing servo mechanism (104).

3. The model of claim 2, wherein the shock absorbers (320) maintain a normal stroke and enable a same shock absorbing effect during the movement of the left and right wheels (102, 103) of the model up and down as when the model is in a horizontal position.

4. The model of claim 1, further comprising:

one or more steering knuckles (420);

one or more steering holders (516);

a pivot pin (509);

wherein the one or more steering knuckles (420) are twisted against the one or more steering holders (516) to make a twisted angle (503, 505) with respect to the pivot pin (509);
and

wherein pivoting about the pivot pin (509) enables the leaning movement of the model and steering to an inclined side of the model to occur simultaneously.

5. The model of claim 4, wherein the steering knuckles (420) are connected to the front wheels (105, 107), and determine the steering direction of the model.
6. The model of claim 1, further comprising one or more upper arms (508), one or more lower arms (506), and one or more steering links (512).
7. The model of claim 6, wherein the length of the one or more upper arms (508) and the one or more lower arms (506) is different from the length of the steering links (512).
8. The model of claim 1, wherein the swing servo mechanism (104) enables the leaning movement in both a front and rear suspension of the model.

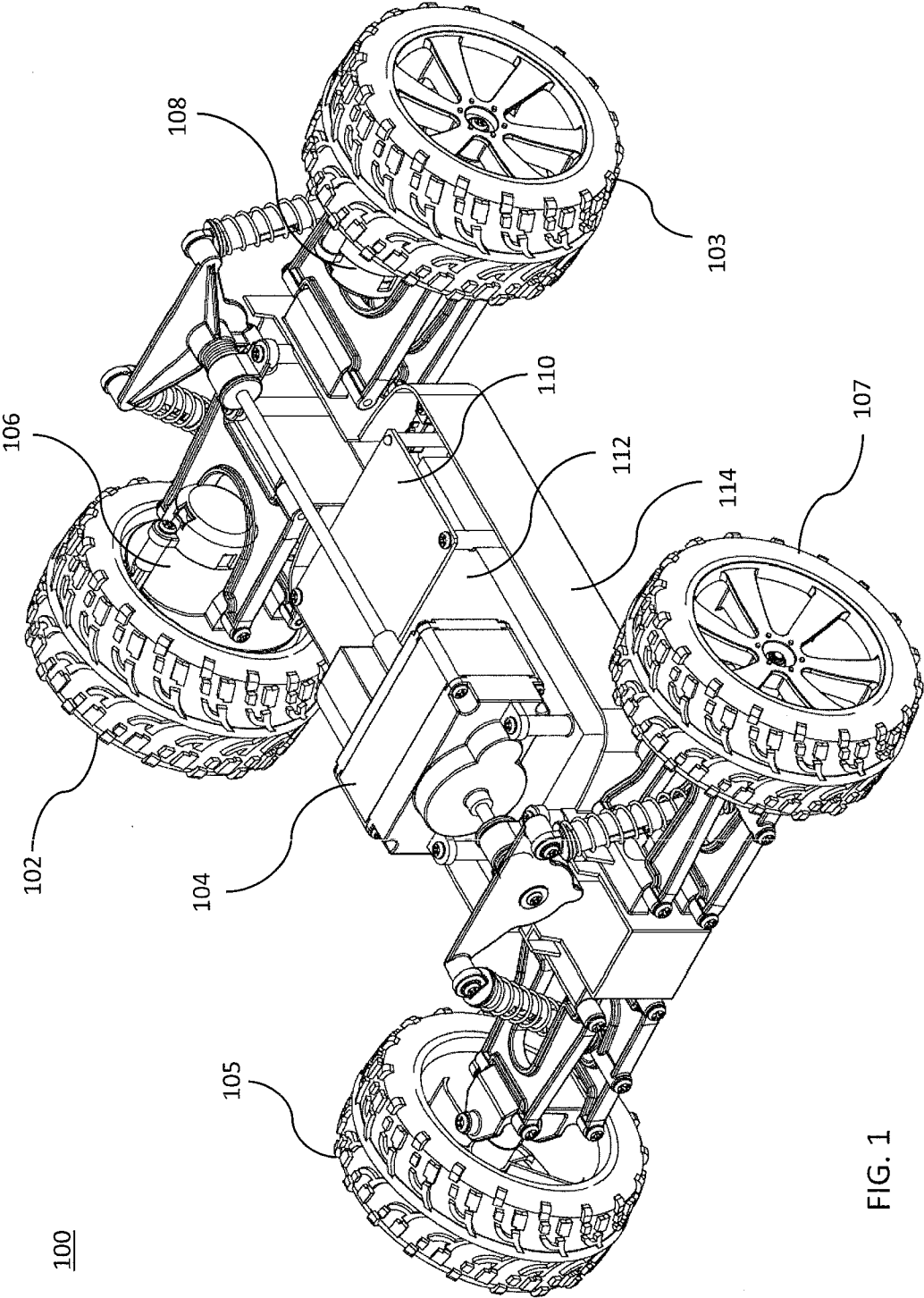


FIG. 1

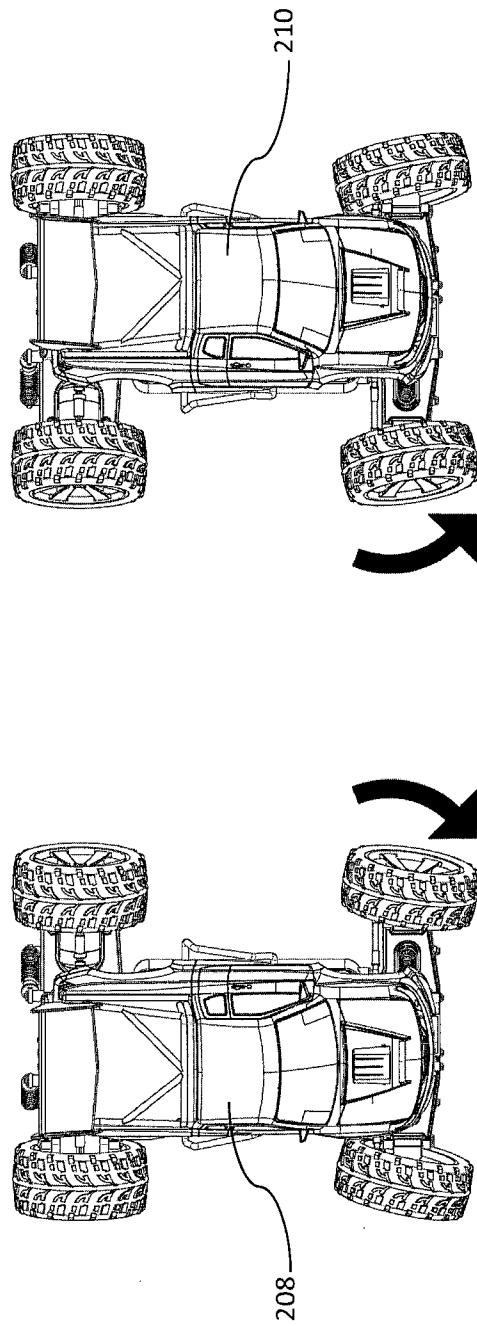
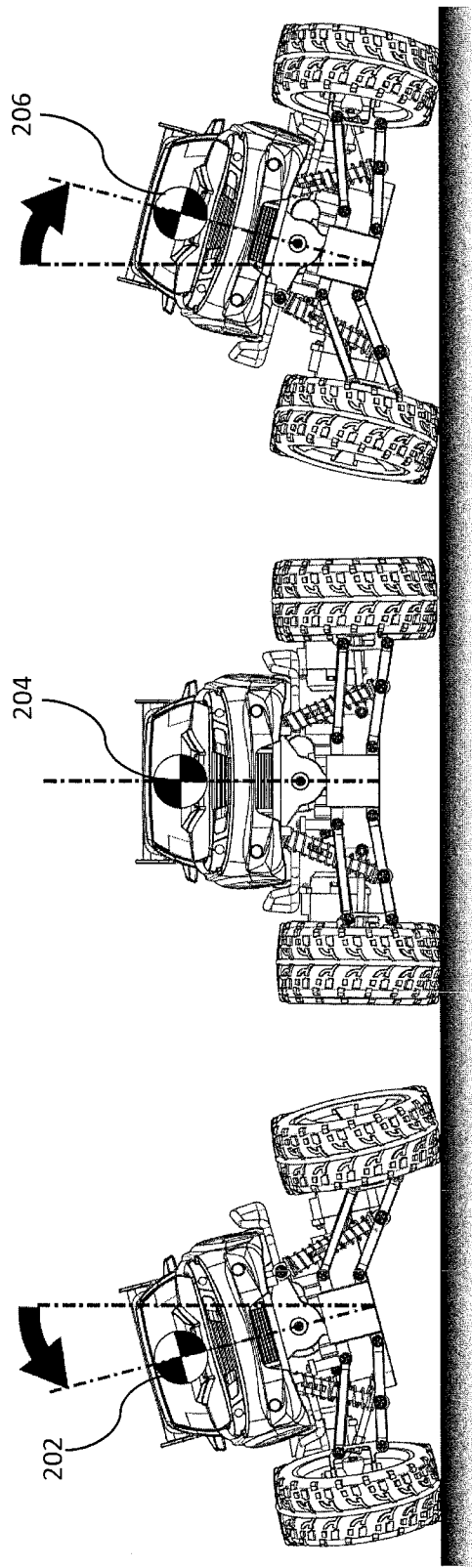


FIG. 2

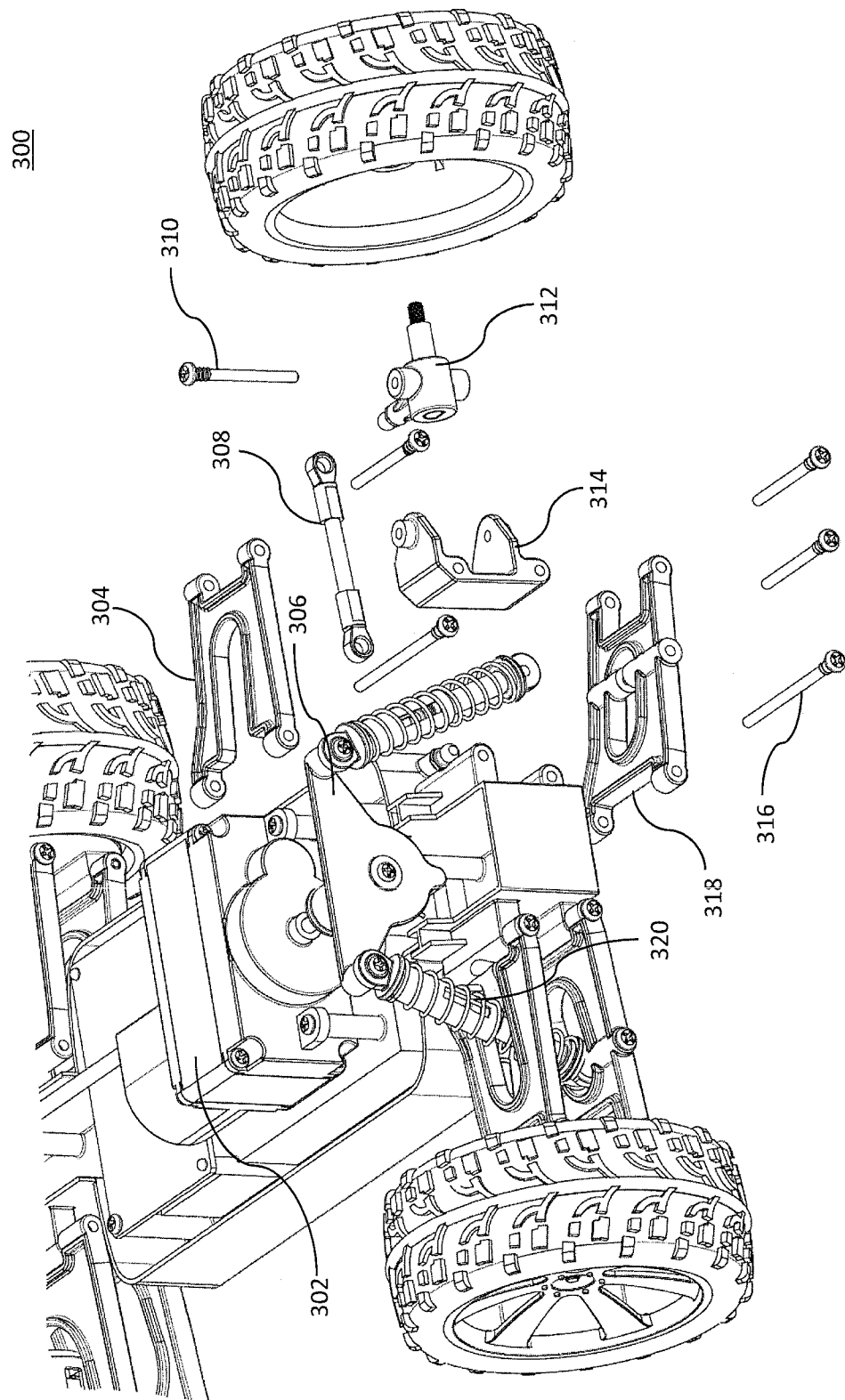


FIG. 3

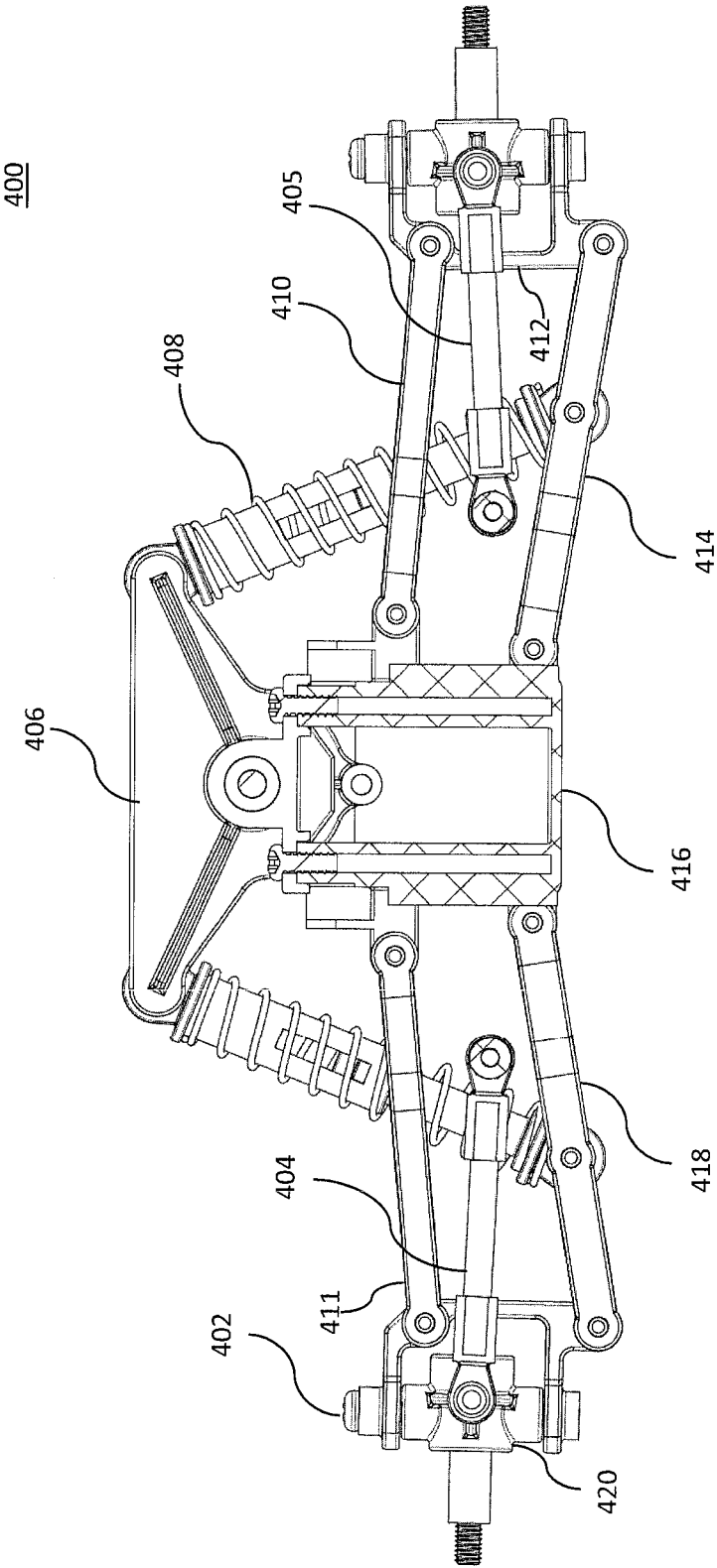


FIG. 4

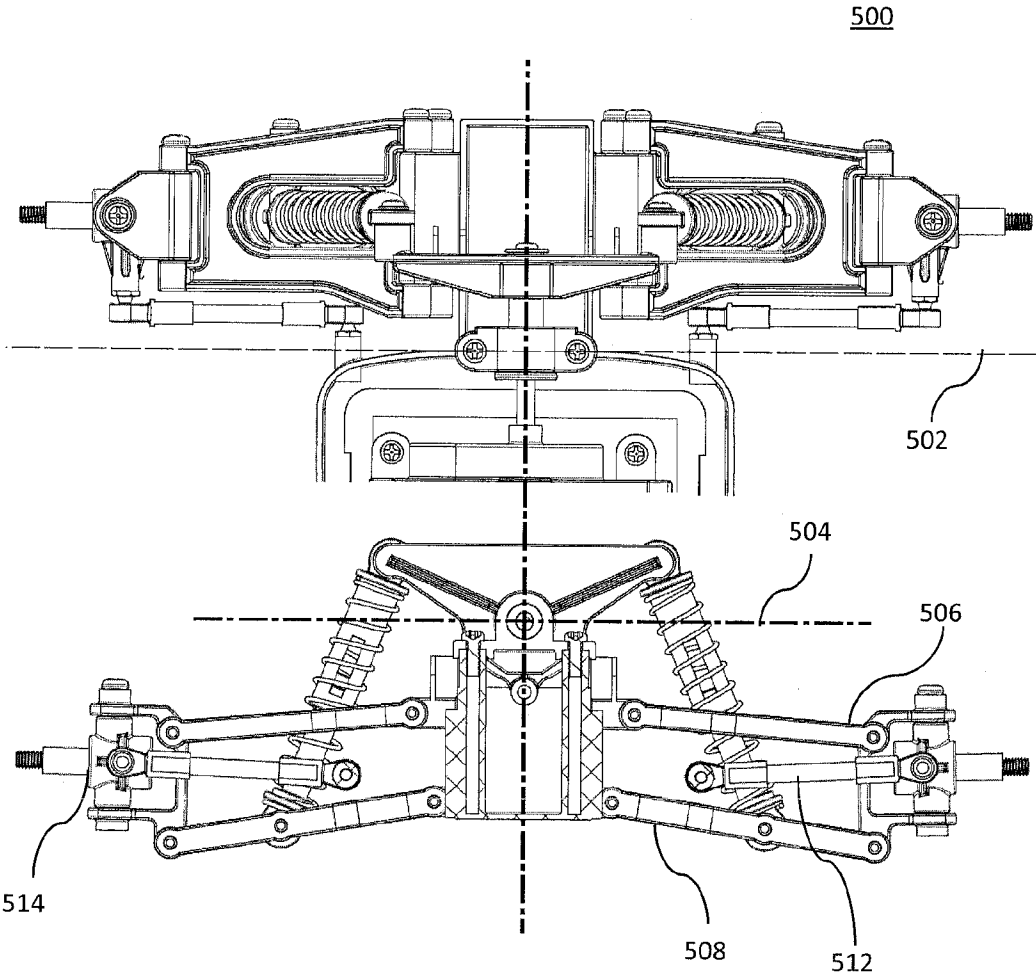


FIG. 5A

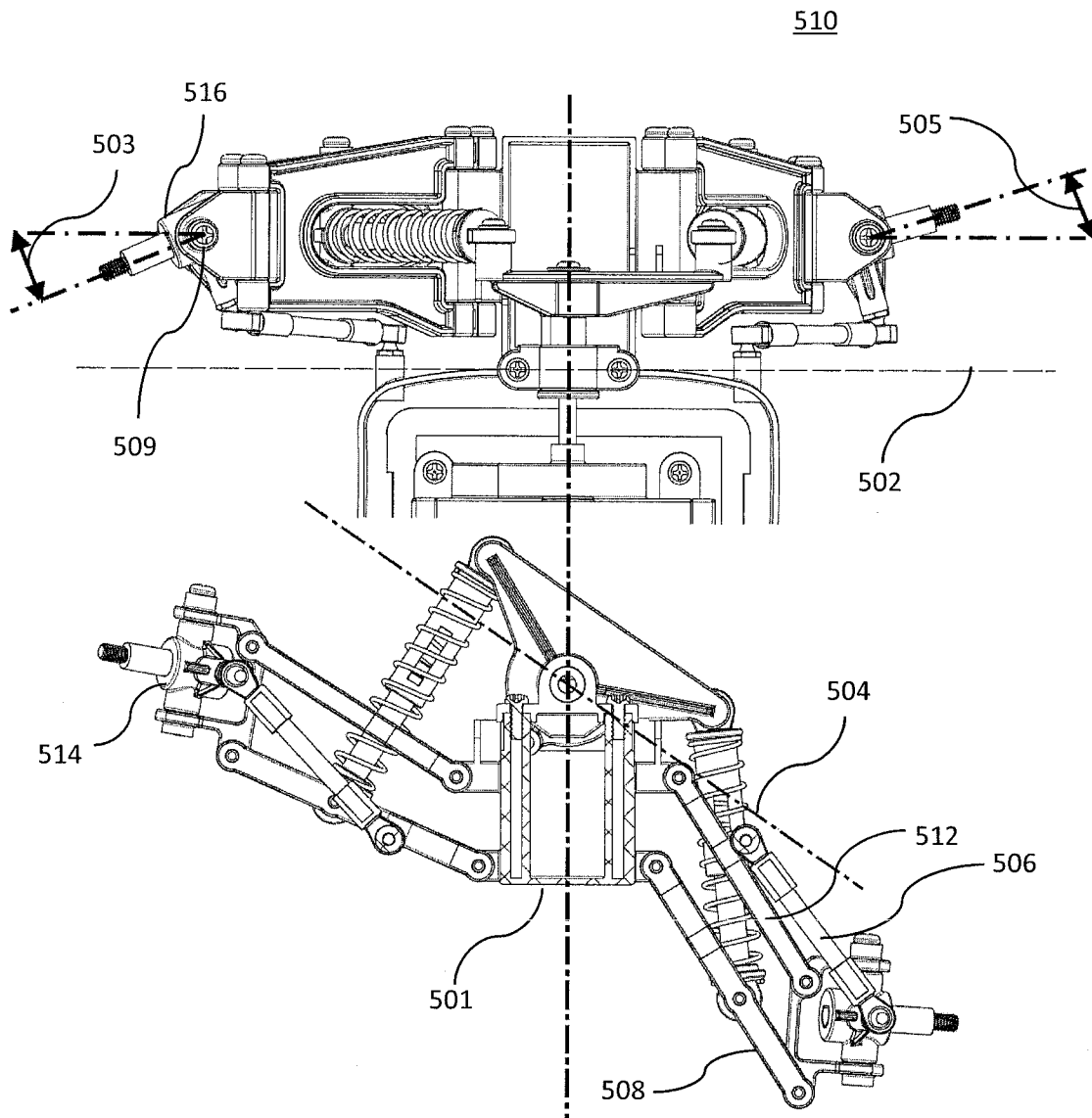


FIG. 5B

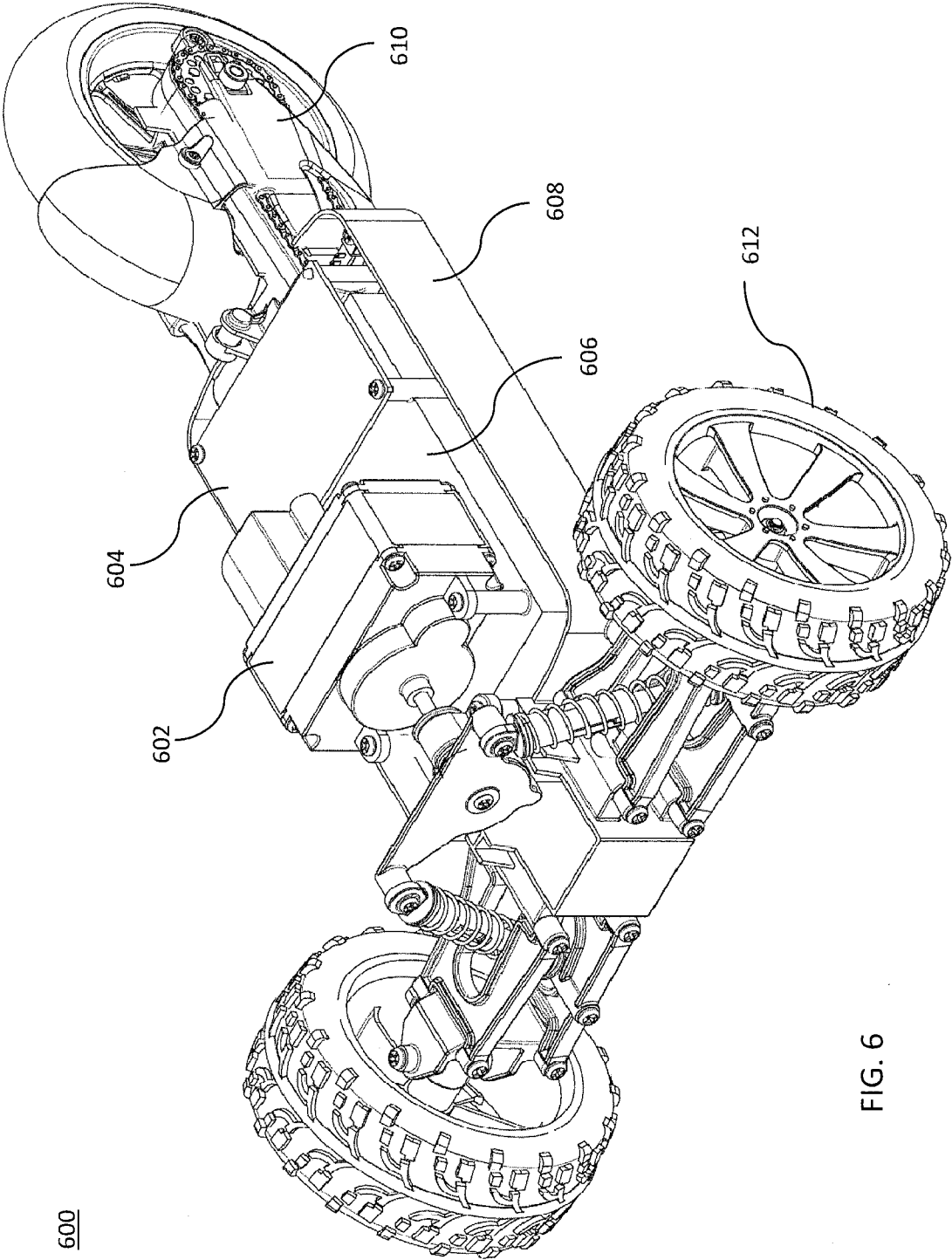


FIG. 6

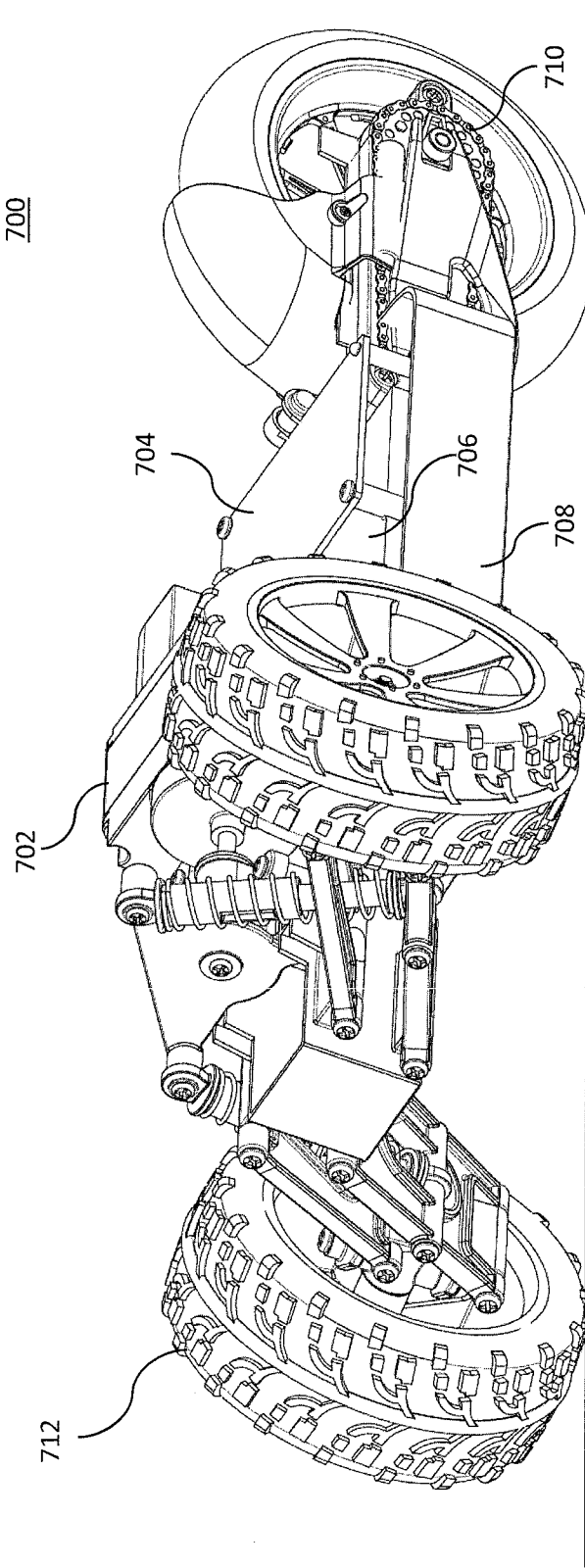


FIG. 7