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(54) **Remote-control toy motorcycle**

(57) A remote-control toy motorcycle is composed of a body (10, 50), a front wheel (15), a rear wheel (60), and a power output device (40). The rear wheel (60) includes a fastening shaft (62); a wheel rim set (61, 69) for inserting the fastening shaft (62) therethrough and for rotation driven by the power output device (40); a planetary gear set (70) having a gear wheel (71) and a plurality of planetary gears (73), the gear wheel (71) having an axial hole (710) located a center thereof for inserting the fastening shaft (62) therethrough, the planetary gears (73) engaging and circling the gear wheel (71); a unidirectional rotary member (68) inserted through the space between the fasten-

ing shaft (62) and the axial hole (710) for actuating unidirectional converse rotation of the gear wheel (71) that is forced by an external torque; a clutch set (80) connected with the planetary gears (73) for synchronic rotation and for expansion in high-speed rotation; and a flywheel set (90) having a main body (92) surrounding the clutch set (80) for rotation actuated by the expansion of the clutch set (80), the main body (92) having a plurality of cavities (93) for receiving a plurality of weights (95) whose number is identical to or smaller than that of the cavities (93).

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates generally to remote-control toy vehicles, and more particularly, to a remote-control toy motorcycle.

2. Description of the Related Art

[0002] There are a variety of conventional remote-control toy vehicles. Among them, the remote-control toy motorcycle concerns the present invention. As disclosed in each of U.S. Patent Nos. 4,342,175 and 5,368,516, a rudimentary conventional remote-control toy motorcycle includes a framework, a front wheel mounted to the front part of the framework, and a rear wheel mounted to the rear part of the framework. The front and rear wheels are provided for supporting the framework, wherein the former is capable of steering and the latter can be driven by a power drive device for rotation to drive the motorcycle to move forward. However, the steering mechanisms of the aforesaid patents are based on the gravity shift to usually require a larger turning radius while the front wheel is steered, such that their maneuverabilities are deficient.

[0003] Latter, the remote-control toy motorcycle has been being developed speedily. For example, U.S. Patent No. 5,709,583 disclosed a steering system for a radio-controlled wheeled vehicle toy, in which a servomotor instead of the rudimentary spring is used for controlling the turning of the front wheel. The U.S. Patent No. 5,820,439 disclosed a gyro stabilized remote controlled toy motorcycle, in which a motor and a clutch, instead of the servo motor, are further used for controlling the steering of the front wheel to greatly enhance dexterity of the maneuverability.

[0004] Although the way to control the above-mentioned remote-control toy motorcycle has been improved a lot, when the toy motorcycle runs on the special terrain, like rugged road surface or meadow, its maneuverability fails to reach stability and dexterity at the same time. Besides, while actually controlling the toy motorcycle, the user is usually skilled in linear acceleration, cornering and decelerating braking, and low-speed sliding. As the linear acceleration is concerned, while the rear wheel is accelerated up to 800 rpm (high speed), the clutch set located internally swings outward and expands due to the centrifugal effect and then contacts against the internal sidewall of the flywheel of the freewheel set, such that the freewheel set is driven for high-speed rotation to generate gyroscopic effect and then to enhance the stability of the moving motorbike. It is to be specially noted that when the user controls the motorbike to do the braking or decelerating sliding in the high-speed movement, theoretically, the clutch set is supposed to shrink immediately

and to disengage from the internal sidewall of the flywheel due to the reduction of the centrifugal effect because the rear wheel is decelerated down to low speed; however, in fact, the clutch set will fail to do so as soon as the rear wheel is decelerated or braked, such that the clutch set is actually still engaged with the freewheel set impermanently (within one second or so). For this reason, in the planetary gear set inside the toy motorbike, the planetary gears and the chain wheel instantly counterwork one another torsionally to result in abnormal vibration for the maneuverability to further affect the stability of the maneuverability. Even worse, the long operation may generate strain between the planetary gears and the chain wheel to further damage the gear teeth.

SUMMARY OF THE INVENTION

[0005] The primary objective of the present invention is to provide a remote-control toy motorcycle, whose maneuverability is stable and dexterous at the same time.

[0006] The foregoing objective of the present invention is attained by the remote-control toy motorcycle composed of a body, a front wheel, a rear wheel, and a power output device. The rear wheel includes a fastening shaft; a wheel rim set for inserting the fastening shaft therethrough and for rotation driven by the power output device; a planetary gear set having a gear wheel and a plurality of planetary gears, the gear wheel having an axial hole located a center thereof for inserting the fastening shaft therethrough, the planetary gears engaging and circling the gear wheel; a unidirectional rotary member inserted through the space between the fastening shaft and the axial hole for actuating unidirectional converse rotation of the gear wheel that is forced by an external torque; a clutch set connected with the planetary gears for synchronic rotation and for expansion in high-speed rotation; and a flywheel set having a flywheel surrounding the clutch set for rotation actuated by the expansion of the clutch set, the flywheel having a plurality of cavities for receiving a plurality of weights whose number is identical to or smaller than that of the cavities.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]

FIG. 1 is an exploded view of a preferred embodiment of the present invention.

FIG. 2 is a perspective view of a part of the preferred embodiment of the present invention.

FIG. 3 is similar to FIG. 2, viewed from another side. FIG. 4 is a top view of the preferred embodiment of the present invention.

FIG. 5 is a perspective view of a part of the preferred embodiment of the present invention.

FIG. 6 is an exploded view of the part of FIG. 5.

FIG. 7 is a sectional view taken from a line 7-7 indicated in FIG. 5.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0008] Referring to FIGS. 1-7, a remote-control toy motorcycle constructed according to a preferred embodiment of the present invention is composed of a front body 10, a rear body 50, and a power output device 40. The front body 10 includes a front frame 11. A seat 12 is mounted to a top end of the front frame 11 for a rider (not shown) to sit thereon. A front suspension 13 and a steering gear 14 are mounted to a front side of the front frame 11 and seat 12. A front wheel 15 is mounted below the front suspension 13. The rear body 50 is detachably connected with the front body 10 by that front frame 11 is engaged with the rear frame 51 by screws 18. A rear suspension 53 and a rear wheel 60 are mounted to a rear end of the rear frame 51. The power output device 40 includes a DC motor 41 or an engine (not shown) for driving a gear set 52 located beside the rear frame 51. The driving power generated by the DC motor 41 can be transmitted to a chain wheel 56 beside the rear wheel 60 via a rotary shaft 54 and a chain 55. The rear wheel 60 further includes a unidirectional rotary member 68, a planetary gear set 70, a clutch set 80, and a flywheel set 90.

[0009] The rear wheel 60 further includes a left wheel rim 61, a right wheel rim 69, a fastening shaft 62, a plurality of bearings 64, and a wheel body 65. The chain wheel 56 is mounted to an external side of the left wheel rim 61 and can be driven by a chain 55 for rotation. A decorative brake disk 691 is mounted to an external side of the right wheel rim 69. The fastening shaft 62 puts the left and right wheel rims 61 and 69 together by means of two fasteners 621 and two bearings 64. After the fastening shaft 62 is mounted between the left and right wheel rims 61 and 69, the fastening shaft 62 is not rotated along with the left and right wheel rims 61 and 69 while they are driven by the chain 55 for rotation. In other words, the fastening shaft 62 remains still after mounted to the left and right wheel rims 61 and 69.

[0010] The unidirectional rotary member 68 is a unidirectional bearing or a ratchet or other industrial parts for transferring torque along one single rotary direction and for idling along the other rotary direction. When the unidirectional rotary member 68 is a unidirectional bearing, it can be a roller bearing, a shore bearing, a mechanical frictional bearing, or a mechanical locking bearing.

[0011] The planetary gear set 70 includes a gear wheel 71, three planetary gears 73, and a triangular frame 75. The gear wheel 71 is received in a recessed portion 611 in the left wheel rim 61. The gear wheel 71 is a circular disk having internal annular teeth 711 formed at an underside thereof and an axial hole 710 formed at a center thereof for allowing the gear wheel 71 to be fixed to the fastening shaft 62. The three planetary gears 73 are mounted to an internal side of the triangular frame 75, which faces the gear wheel 71, and engaged with the internal annular teeth 711. The triangular frame 75 is fixed

to the left wheel rim 61 by three screws 751 and can be rotated along with the rotation of the left wheel rim 61. When the triangular frame 75 is rotated, the three planetary gears are driven to circle the gear wheel 71 that is not constantly rotatable.

[0012] It is to be noted that the unidirectional rotary member 68 is mounted between the external side of the fastening shaft 62 and the sidewall of the axial hole 710 for actuating the gear wheel 71 to run along one single rotary direction. Specifically, as soon as the gear wheel 71 bears the torsional resistance of the three planetary gears 73, the unidirectional rotary member 68 drives the gear wheel 71 to rotate along a rotary direction converse to that of the planetary gears 73 to immediately release inertial impulse.

[0013] The clutch set 80 includes a clutch holder 82, three separable pieces 84, and an annular springy member. The clutch holder 82 is sleeved onto one end of the fastening shaft 62, having a teeth portion 83 formed at a center thereof corresponding to the three planetary gears 73 for engaging the three planetary gears 73 and for rotation along with the same. The three separable members 84 are tightly annularly mounted to the clutch holder 82. The annular springy member 86 is a tension spring, surrounding the three separable members 84 for constricting and keeping the three separable pieces 84 tightly surrounding the clutch holder 82 while the centrifugal effect becomes weaker. When the clutch holder 82 is driven for rotation along with the three planetary gears 73, once the remote-control toy motorcycle runs at high speed, like 800 rpm and above, the three separable pieces 84 can overcome the constriction of the annular springy member 86 to expand outward due to the centrifugal effect.

[0014] The flywheel set 90 includes a bushing 91 having an annular chamber, a main body 92 having a central chamber, a plurality of weights 95, and a flywheel cover 97. The bushing 91 is mounted into the central chamber of the main body 92 for surrounding the three separable pieces 84, i.e. the three separable pieces 84 are located in the annular chamber of the bushing 91. The main body 92 has a plurality of cavities 93 recessed toward the left wheel rim 61 and annularly arranged at a predetermined interval for receiving a plurality of weights 95 whose number is equal to or fewer than that of the cavities 93. In practice, the number of the weights 95 depends on the user's option according to the road conditions. The flywheel cover 97 is screwed to an external side of the main body 92 for sealing the cavities 93 and preventing the weights 95 from falling off the cavities 93.

[0015] When the power of the DC motor 41 is transmitted via the planetary gear set 70 for high-speed rotation of 800 rpm and higher, the three separable members 84 expand outward due to the centrifugal effect to contact against an internal periphery of the bushing 91 and to drive the main body 92 of the flywheel set 90 for high-speed rotation at the same time. On the contrary, when the planetary set 70 decelerates down to low speed or

the user brakes, the three separable members 84 return to the bushing 91 and however, the main body 92 still keeps rotation alone. In other words, When the three separable members 84 returns to the bushing 91 due to the deceleration, the rotary speed of the flywheel set 90 is still higher than what the power output device 80 transmits to the rear wheel 60 to enable the flywheel set 90 to generate gyroscopic effect to stabilize the whole remote-control toy motorcycle. Especially when the remote-control toy motorcycle runs on the meadow or cross-country road, the gyroscopic effect for the stabilization becomes more noticeable.

[0016] However, the remote-control toy motorcycle usually has to immediately slow down the speed while turning, braking, or drifting at high speed, such that the separable members 84 should immediately return to the bushing 91 due to the weakening centrifugal effect to disengage from the bushing 91. As a matter of fact, the separable members 84 disengage from the bushing 91 because the annular springy member 86 fails to constrict the separable members 84 in real time. For this reason, the flywheel set 90 still keeps inertial rotation for a short time, about one second and less, and then continue to return to the clutch set 80 to force the three planetary gears 73, which have run in low speed or stop rotation, to be actuated by the teeth portion 83 for high-speed rotation. Even though the triangular frame 75 stops rotation via braking, a viscous torsion generated by the flywheel set 90 can still drive the three planetary gears 73 to impact the internal annular teeth 711. To prevent the teeth of the gear wheel 71 and three planetary gears 73 from breakage, the unidirectional rotary member 68 mounted to the axial hole 710 enables the gear wheel 71 to do immediate converse rotation against the torsional impact of the three planetary gears 73 to release the short inertial impact transferred forward from the flywheel set 90, further preventing the three planetary gears 73 and the gear wheel 71 from damage resulted from excessive engagement with each other and then effectively lessening the stagger of the toy motorcycle.

[0017] In addition, when the present invention is operated, the user has to pick a proper number of the weights 95 beforehand subject to the road condition, e.g. if the weights 95 are more, the maneuverability will be more stable but less dexterous, and then put them into the cavities 93. Therefore, the present invention can adapt the remote-control toy motorcycle to various terrains, like cross-country or common flat roads, to reach both of the maneuverable stability and dexterity because of the optional number of the weights 95.

[0018] Although the present invention has been described with respect to a specific preferred embodiment thereof, it is no way limited to the details of the illustrated structures but changes and modifications may be made within the scope of the appended claims.

Claims

1. A remote-control toy motorcycle having a body (10, 50), a front wheel (15) mounted to a front part of the body, a rear wheel (60) mounted to a rear part of the body, and a power output device (40), the rear wheel (60) comprising:
 - a fastening shaft (62);
 - a wheel rim set (61, 69) for inserting the fastening shaft (62) therethrough;
 - a wheel body (65) for receiving the wheel rim set (61, 69) and for rotation driven by the power output device (40);
 - a planetary gear set (70) having a gear wheel (71) and a plurality of planetary gears (73), the gear wheel (71) having an axial hole (710) formed at a center thereof and a plurality of annular teeth (711) formed at an underside thereof, the planetary gears (73) engaging the annular teeth (711);
 - a unidirectional rotary member (68) inserted into the axial hole (710) for providing the gear wheel with unidirectional rotation;
 - a clutch set (80) connected with the planetary gears (73) for expansion resulted from centrifugal effect; and
 - a flywheel set (90) surrounding the clutch set (80) for rotation driven by the expansion of the clutch set (80).
2. The remote-control toy motorcycle as defined in claim 1, wherein the unidirectional rotary member (68) is a unidirectional bearing.
3. The remote-control toy motorcycle as defined in claim 1, wherein the unidirectional rotary member (68) is a ratchet.
4. The remote-control toy motorcycle as defined in claim 1, wherein the fastening shaft (62) is inserted into the axial hole (710) and the unidirectional rotary member (68) is inserted between an external side of the fastening shaft (62) and a sidewall of the axial hole (710).
5. The remote-control toy motorcycle as defined in claim 1, wherein the unidirectional rotary member (68) is rotated in a direction converse to those of the planetary gears (73).
6. A remote-control toy motorcycle comprising a body (10, 50), a front wheel (15) mounted to a front part of the body, a rear wheel (60) mounted to a rear part of the body, and a power output device (40), the rear wheel (60) having a flywheel set (90) mounted therein for rotation driven by the power output device (40), the flywheel set (90) having a main body (92) and a

plurality of cavities (93) annularly arranged at a pre-determined interval, the cavities (93) being received with a plurality of weights (95), whose number is equal to or smaller than that of the cavities (93) and which are optionally equally received therein.

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7. The remote-control toy motorcycle as defined in claim 6, wherein the flywheel set (90) further comprises a flywheel cover (97) screwed to an external side of the main body (92) for sealing the cavities (93) and keeping the weights (95) in the cavities (93).
8. A remote-control toy motorcycle comprising a body (10, 50), a front wheel (15) mounted to a front part of the body, a rear wheel (60) mounted to a rear part of the body, and a power output device (40), the rear wheel (60) having a fastening shaft (62); a wheel rim set (61, 69) for inserting the fastening shaft (62) therethrough and for rotation driven by the power output device (40); a planetary gear set (70) having a gear wheel (71) and a plurality of planetary gears (73), the gear wheel (71) having an axial hole (710) formed at a center thereof, the planetary gears (73) engaging and circling the annular teeth (711); a unidirectional rotary member (68) inserted the space between the fastening shaft (62) and the axial hole (710) of the gear wheel (71) for actuating the gear wheel (71) for unidirectional rotation while the gear wheel (71) is forced by an external viscous torque; a clutch set (80) connected with the planetary gears (73) for synchronous rotation and for expansion resulted from centrifugal effect; and a flywheel set (90) having a main body (92) surrounding the clutch set (80) for high-speed rotation driven by the expansion of the clutch set (80), the main body (92) having a plurality of cavities (93) for receiving a plurality of weights (95), whose number is equal to or fewer than that of the cavities (93).

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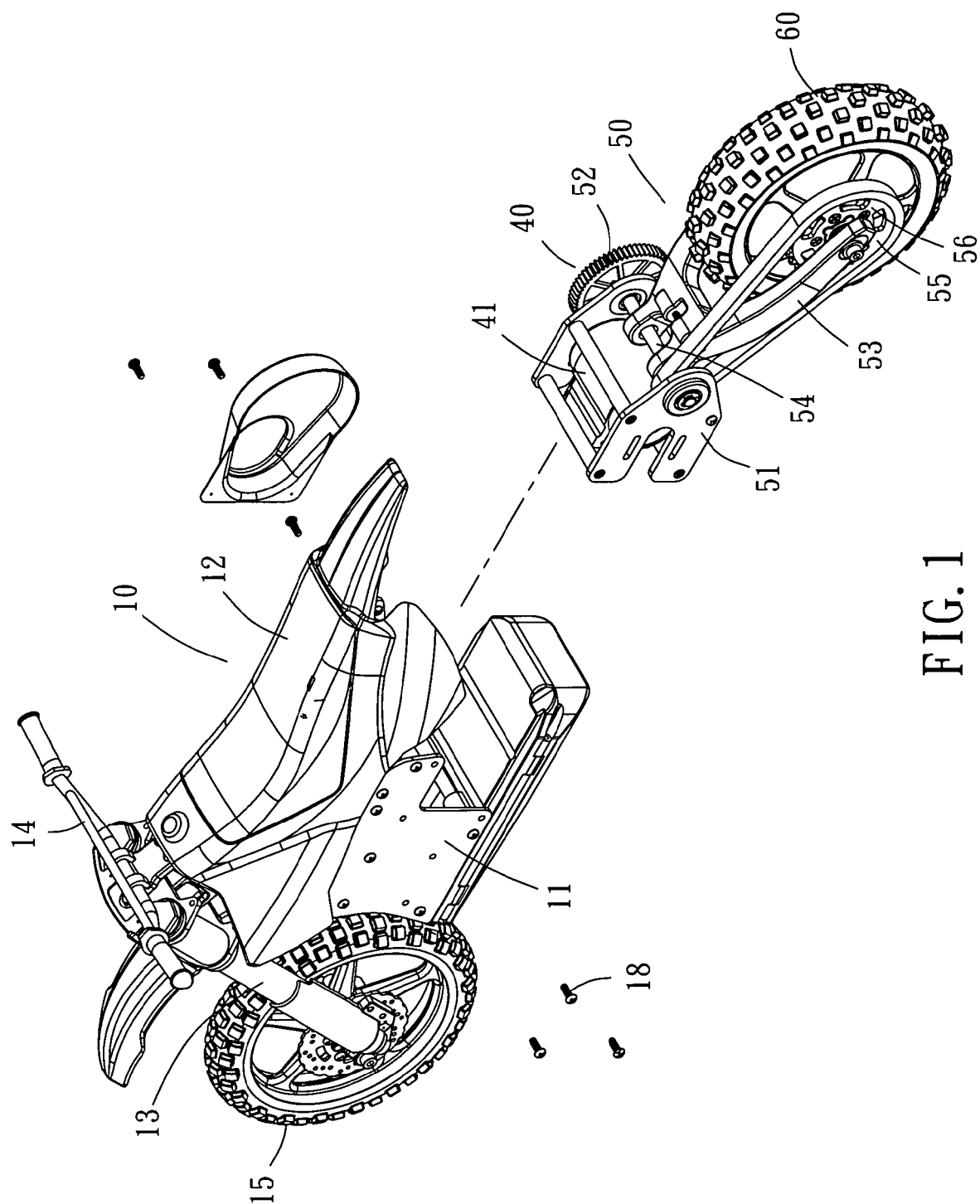


FIG. 1

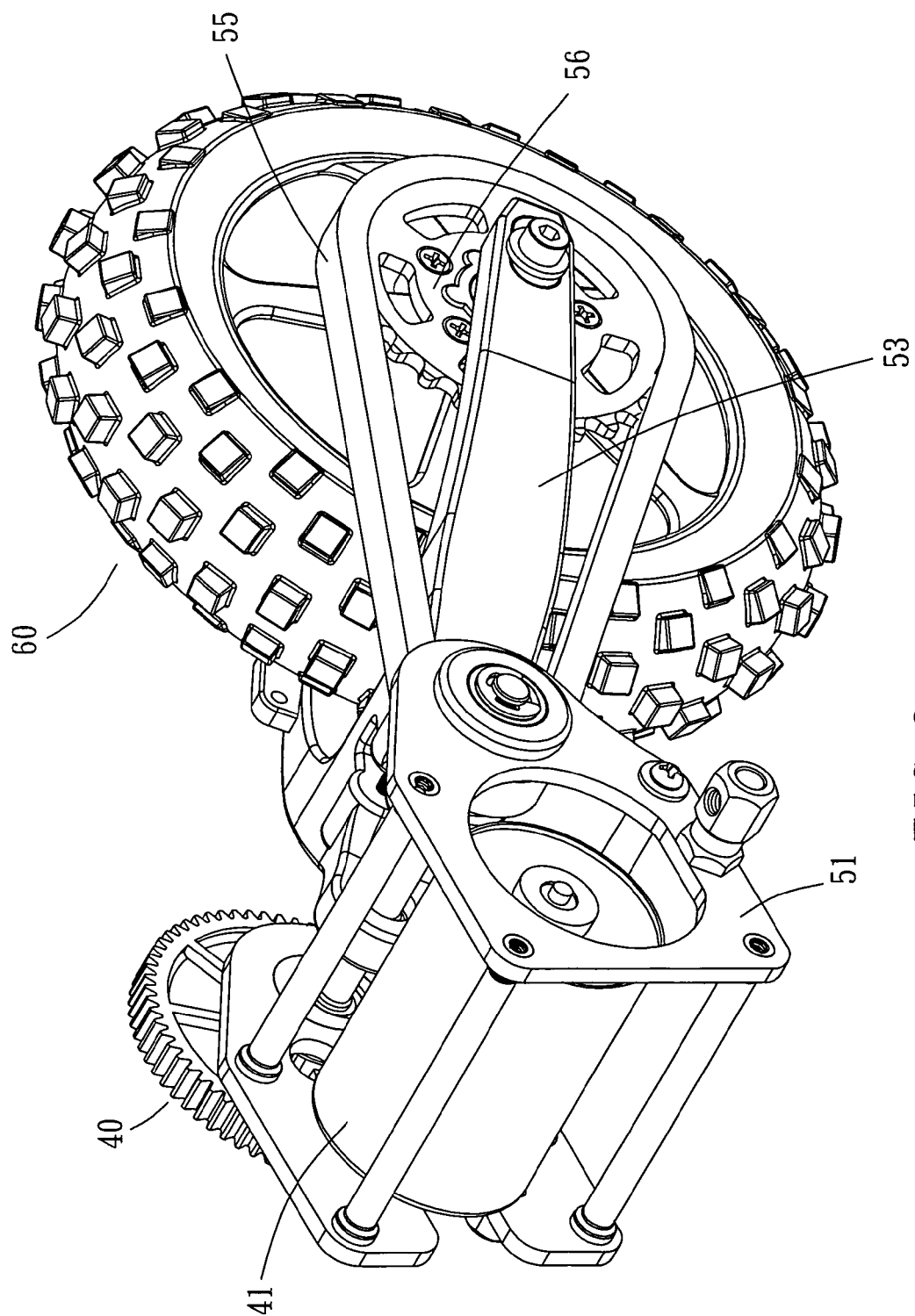


FIG. 2

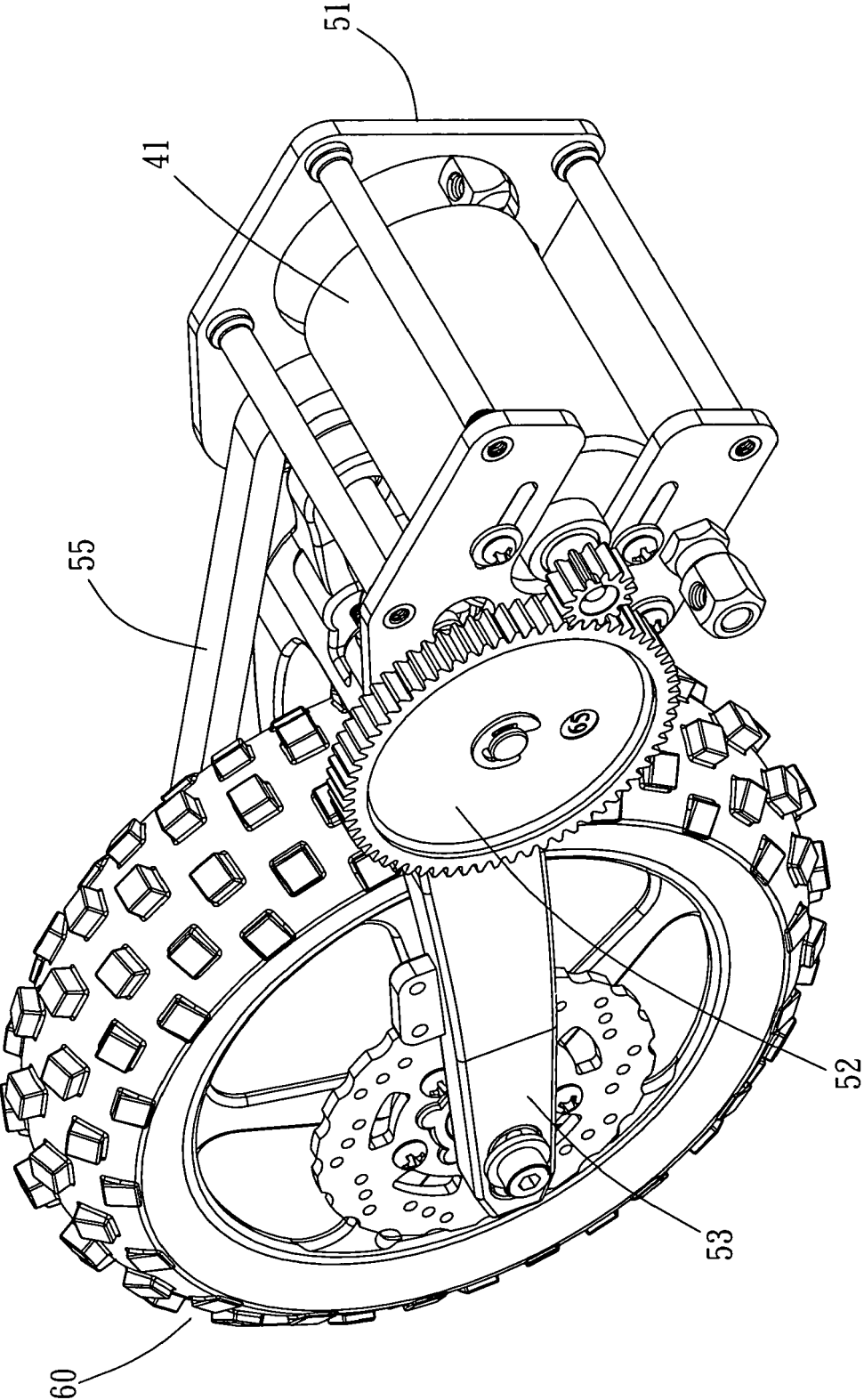


FIG. 3

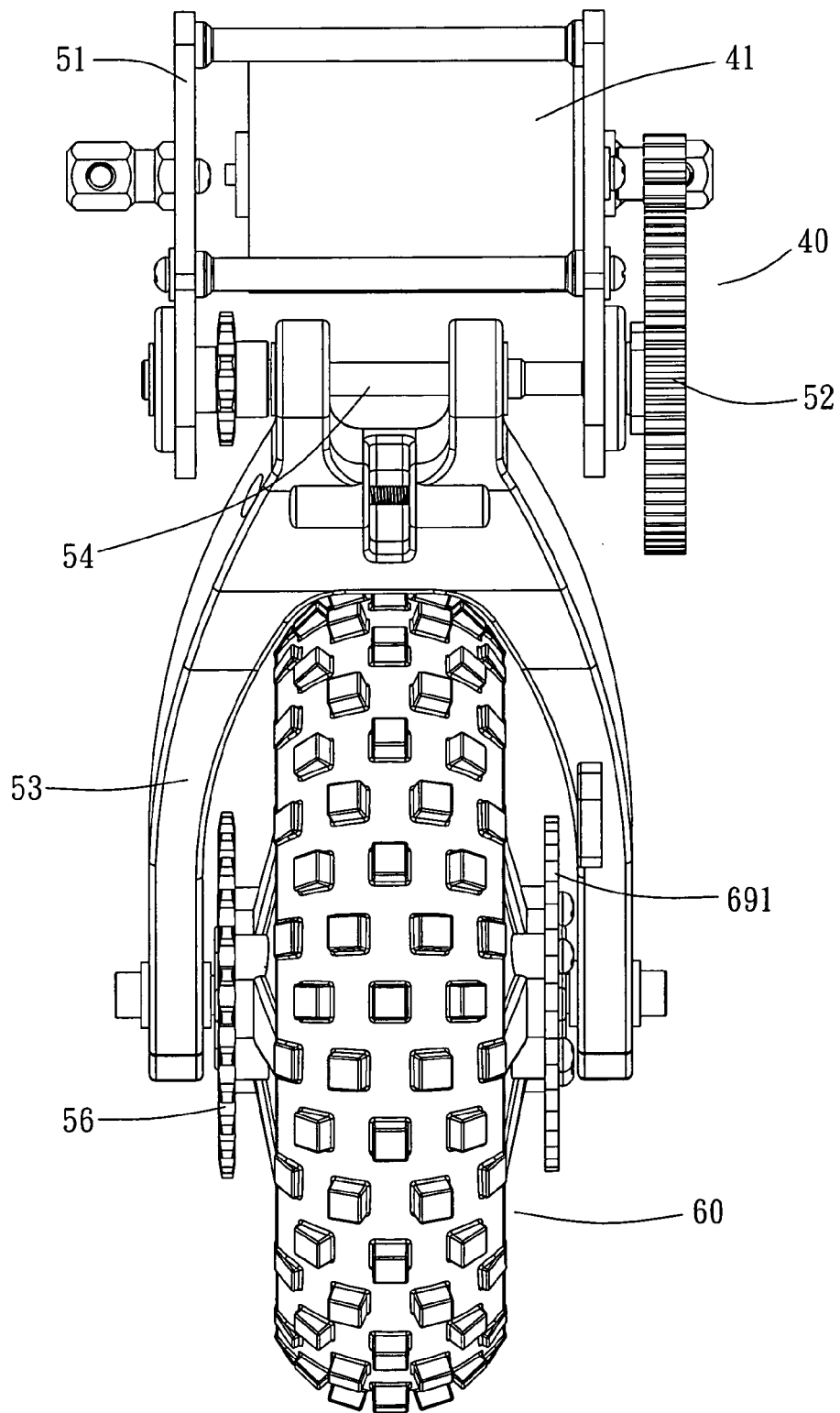


FIG. 4

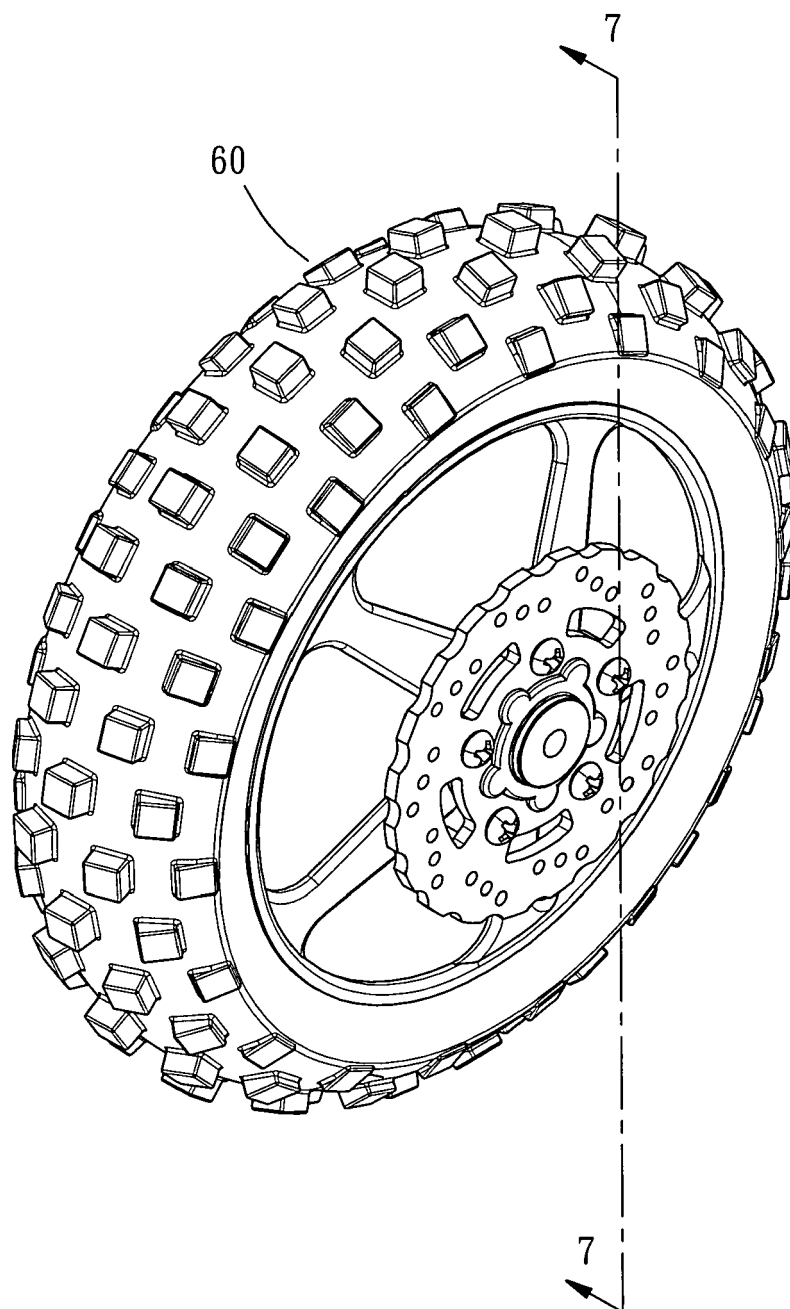


FIG. 5

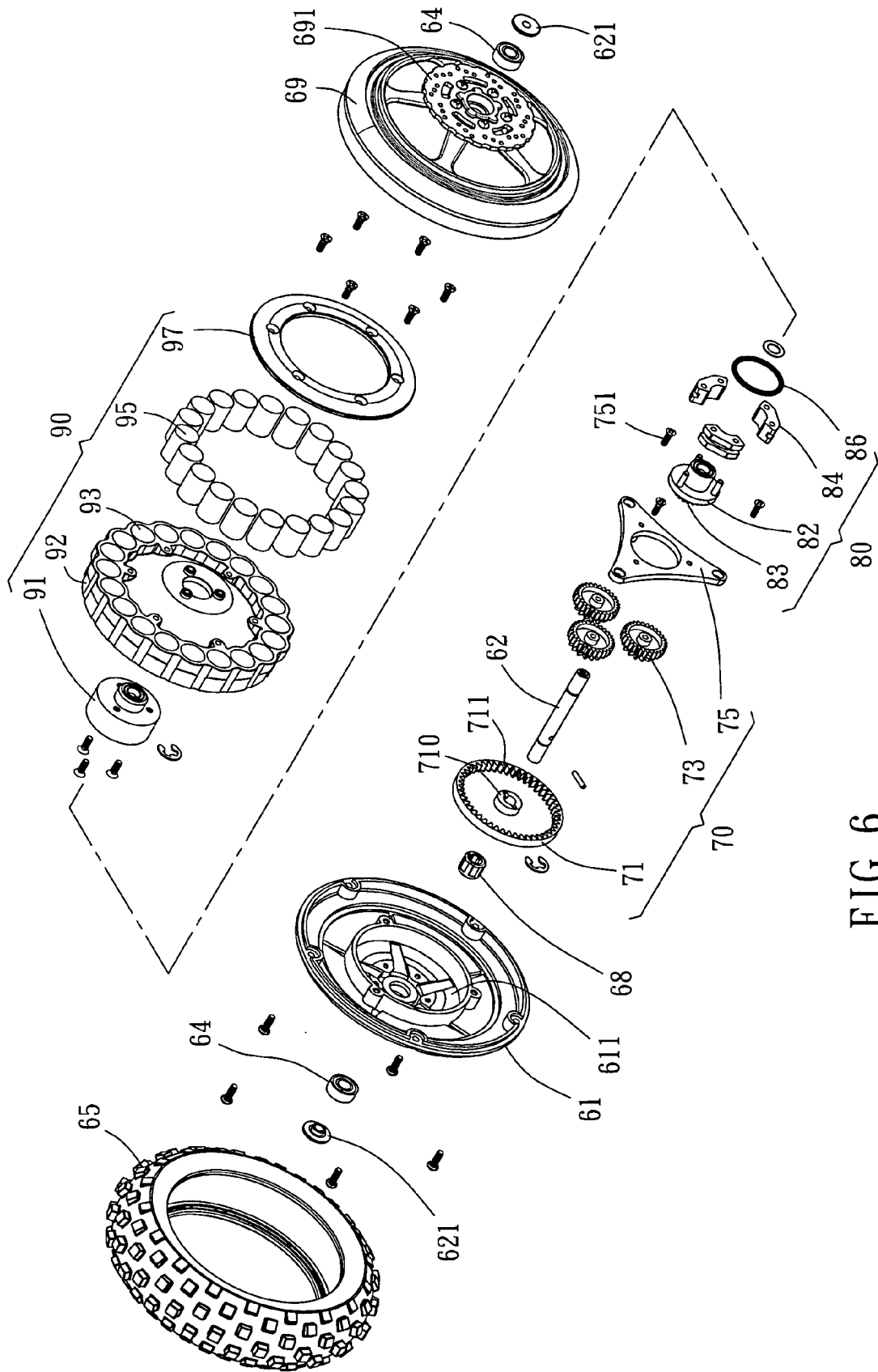


FIG. 6

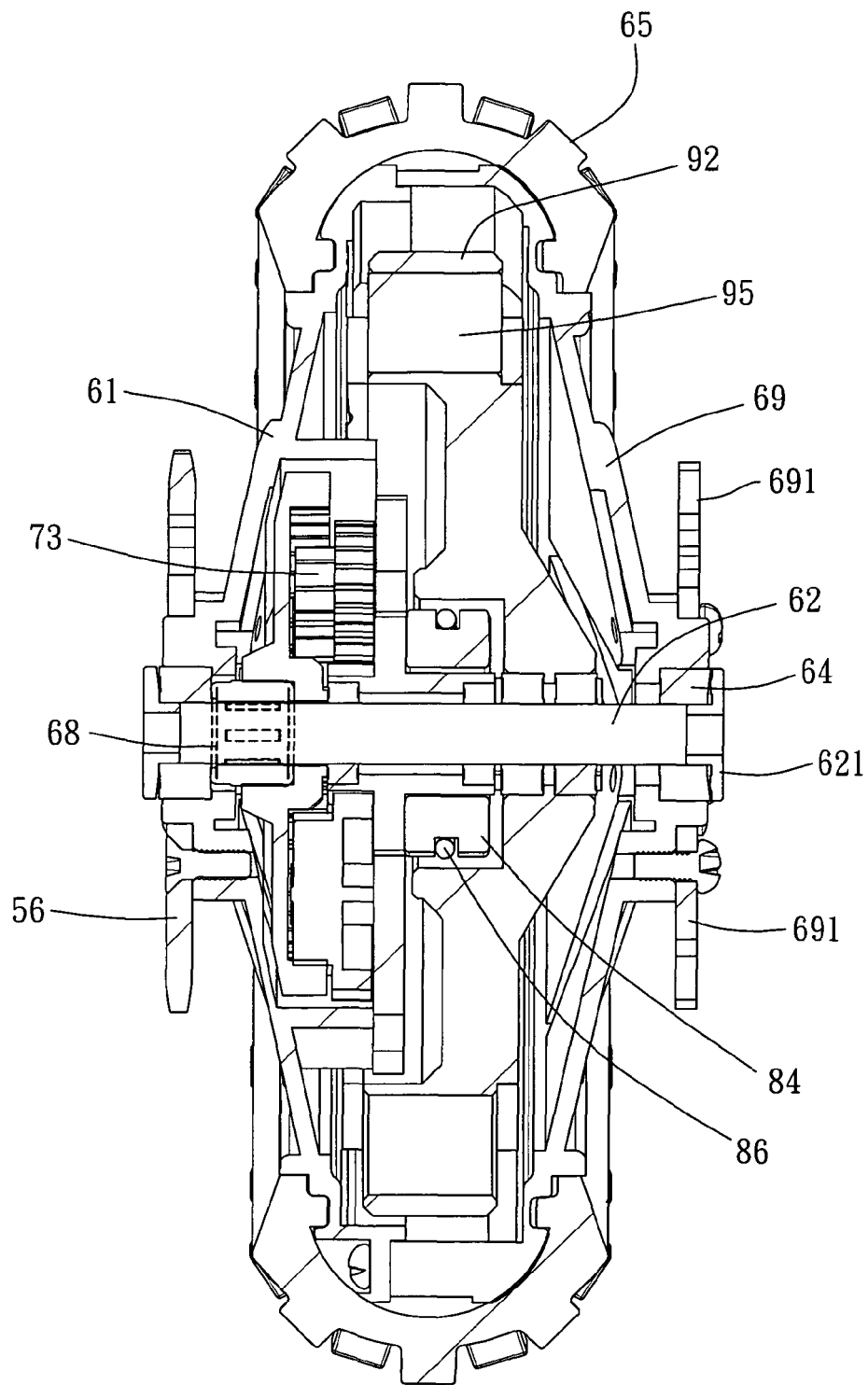


FIG. 7



EUROPEAN SEARCH REPORT

Application Number
EP 09 01 1156

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 December 2009	Examiner Lucas, Peter
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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