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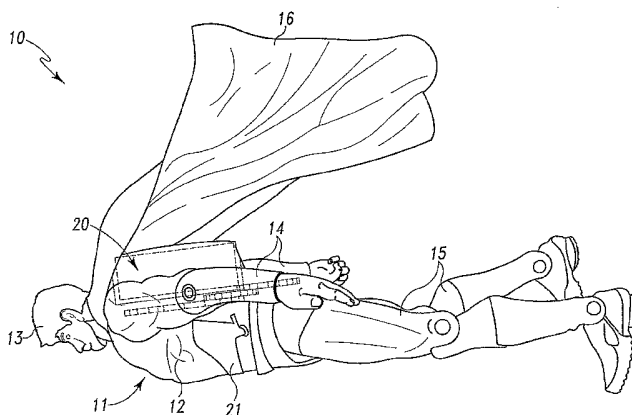
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(54) Title: TOY FIGURE WITH GYROSCOPIC ELEMENT



(57) Abstract: A toy having an internal gyroscopic element is disclosed, including ways of using the toy. A toy having a gyroscopic element is intended to provide an entertaining play experience by providing resistance to movement of the toy when it is used in, for example, a role playing situation. Movement of the gyroscopic element may manually be initiated by a person playing with the toy, and the duration and degree of movement of the gyroscopic element may be limited by natural forces.

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TOY FIGURE WITH GYROSCOPIC ELEMENTCross-reference to related applications

[0001] This application is based upon and claims priority under 35 U.S.C. § 119(e) to U.S. Provisional Patent Application Serial No. 60/688,040, filed June 6, 2005. U.S. Provisional Patent Application Serial No. 60/688,040 is incorporated herein by reference in its entirety for all purposes.

Background of the disclosure

[0002] Examples of gyroscopic elements and toys in which gyroscopic elements are used can be found in U.S. Patents and Patent Application Publications numbered: RE 30299; 3,650,067; 3,726,146; 4,463,515; 5,353,655; 5,683,284; 5,823,845; 5,957,745; 6,030,272; 6,346,025; 6,612,895; 6,676,476; and US2002/0102906. The disclosures of the aforementioned patents and patent application publications are incorporated herein by reference in their entirety for all purposes.

Summary

[0003] The present disclosure relates generally to handheld toys having included gyroscopic devices. An object of a toy with a gyroscopic element may be for a person to initiate rotation of the gyroscopic element and then play with the toy, with the gyroscopic element imparting a novel play experience to the toy. In some methods of play with the disclosed toy, a gyroscopic element in a toy may provide motion-related feedback and stability control. The toys of the present disclosure will be understood more readily after consideration of the drawings and the detailed description.

Brief Description of the Drawings

[0004] Figure 1 is a side view of a toy figure according to the present disclosure.

[0005] Figure 2 is side view of a gyroscopic element according to the present disclosure.

[0006] Figure 3 is an exploded view of an exemplary gyroscopic element according to the present disclosure.

Detailed Description

[0007] The present disclosure relates to a toy figure utilizing a toy body and a gyroscopic element. The components of a toy figure according to the present disclosure are shown in Figures 1-3.

[0008] Shown generally at 10 in Figure 1, a toy figure includes a toy body 11 having a torso 12, head 13, arms 14, legs 15 and decorative accoutrement 16. Various aspects of the illustrated embodiment of the toy figure are based on an adventure story in which a superhero overcomes various challenges. Accordingly, the characteristics of the toy figure resemble a known superhero figure or other similar toy figure. However, other embodiments according to the present disclosure may be based on one or more other themes, plots, or back stories, or no particular theme. For example, the toy figure may take another humanoid shape, or it may take the form of a vehicle, a unique and novel toy shape, or any other desired configuration. As well, the toy figure may be made of any suitable material, including plastic, wood, metal, etc., or any combination of appropriate materials. In the disclosed embodiment, the body of the toy figure is constructed predominantly of a plastic material with some portions being constructed of rubber or metal.

[0009] As shown in Figure 1, a torso 12 of a toy figure 10 may typically house a gyroscopic element 20 in an internal space. Torso 12 may be constructed of multiple torso portions that may be mated together in any appropriate manner. For example, magnetic attachment, pin joints, Velcro, snaps, or any other appropriate attachment device may be used. In the disclosed embodiment, front and back halves of the torso include male and female mating portions held in fixed arrangement with adhesive. A portion of gyroscopic element 20, for example, a handle 21 or other manual acceleration device, may protrude from the inner space of the torso to allow a user to activate the gyroscopic element during play activity.

[0010] Gyroscopic element 20 may embody the principle of conservation of angular momentum and may use that principle to impart novel entertainment value to a toy figure. A gyroscope essentially embodies a spinning wheel mounted on an axle. Typically, as seen in Figures 2 and 3, a gyroscopic element 20 may include a rotor 23 configured to rotate freely about an axis of rotation. For example, upon receiving a rotational force, rotor 23 may rotate around a spin axis 50. The rotor of the gyroscopic element may be constructed of any suitable material, though in the disclosed embodiment the rotor is constructed of a metal. In addition, the rotor may be configured as a singular piece of material, or the rotor may be configured as multiple portions 24 of material making up a singular rotor body. Although it is possible to construct a rotor of multiple independently-moving portions of material, for the rotor to work to its best effect it may be preferable that the multiple elements be configured to move as a unitary body.

[0011] A gyroscopic element 20 may be housed within a torso 12 of a toy figure 10 such that rotor 23 may undergo uninhibited rotation about spin axis 50. Torque generated by

spinning rotor 23 may cause the gyroscopic element to resist changes in an orientation of its axis of rotation and may likewise cause a toy figure containing the gyroscopic element to resist changes in its positioning. In an illustrated embodiment, gyroscopic element 20 may be housed in a toy figure used in a flying adventure game, with the spin axis 50 of the gyroscopic element aligned perpendicular to a long axis 60 of the toy figure. In a different construction, spin axis 50 may be aligned parallel to the long axis of the toy. When used in a flying adventure game, a toy figure containing such a rotating gyroscopic element may give feedback to a user such that the user encounters resistance when attempting to turn the toy figure in an arcuate path, or when causing the toy figure to ascend or descend, or when making any other movement with the toy figure that alters the orientation of the spin axis. Such feedback may also be present when the gyroscopic element is present in a land-based toy, or a water-based toy or toys used in many other play situations.

[0012] A gyroscopic element 20 housed in a toy figure 10 may be activated through any appropriate means. In the illustrated embodiment, gyroscopic element 20 may be activated by an integral pull cord 22 attached to a handle 21 which, when manipulated by a toy user, causes the rotor to accelerate upon its spin axis. After fully accelerating the rotor, the pull cord may release from the rotor and be held by the toy user. Alternatively, the pull cord may be held within the toy body on a spindle, or may automatically retract into the toy body until further use. In an illustrated embodiment, the pull cord retracts into the torso of the toy figure after the rotor is accelerated by manual manipulation of the pull cord and handle.

[0013] Rotational motion of the rotor of the gyroscopic element may be transmitted from the pull cord and handle to the rotor via a gear assembly 30 including a system of gears,

seen in partial side view in Figure 2 and in exploded view in Figure 3. The rotor may be attached to the gear assembly with a rotor bracket 25. The gear assembly may include first 35, second 36 and third 37 gears housed in a gear assembly shell including gear assembly shell portions 31A and 31B. As noted above, a manual acceleration device for the gear assembly may be configured as a pull cord 22 with one end of the cord mounted to a handle 21 and the other end of the cord attached to, and wrapped around, a spool 32. The pull cord may be guided from its point of insertion in the torso to the spool by one or more cord guides 26, if necessary.

[0014] The gear assembly may serve to couple the manual acceleration device to the rotor for inducing rotation in the rotor. To initiate rotation of the rotor 23 of gyroscopic element 20, a user may grasp the handle 21 attached to pull cord 22 and draw the pull cord away from the body 11 of the toy figure, whether that body has a humanoid shape or some other shape. Drawing the cord out of or away from the body of the toy figure may cause the cord 22 to unwind from the spool 32. Since the cord may be, preferentially, attached to the spool by one of its ends, unwinding the cord may cause the spool 32 to rotate on its axis in a first direction. For repeated winding and unwinding of the spool, it may be useful to include a resistive device in the gear assembly, such that the resistive device provides a counter-rotational force on the spool 32 when it is initially rotated. A counter-rotational force may be provided by, for example, a spring 33 attached to one portion of the spool. In the illustrated embodiment, a spring 33 is attached to an inner surface of the spool 32 at one of its ends and to one portion of the gear assembly shell 31B, or another relatively immovable structure, at its other end. When the pull cord is pulled to initiate movement of the rotor 23, the spool may impart a force upon the spring 33, causing it to become partially uncoiled (in the illustrated embodiment; in other embodiments, the spring may initially be stretched

longitudinally and then return to its original configuration). When a pulling force is no longer applied to the pull cord, the spring may recoil, causing the spool 32 to rotate in a direction counter to its initial rotation and to rewind the pull cord 22. In this manner, the pull cord may repeatedly be pulled and rewound, allowing a user to impart progressively increasing rotational speeds to the rotor 23.

[0015] As noted above, a force applied to the pull cord will induce rotation of the spool 32 and, eventually, the rotor 23 of the gyroscopic element. Transfer of rotational motion may proceed from the spool to the rotor via an assembly of gears 35-37. In the illustrated embodiment, three intermeshed gears form the operative connection between the spool 32 and the rotor 23. In a first interaction step, rotation of the spool 32 may induce rotation of a first, power gear 35 that is operatively coupled to the spool. The power gear 35 may be permanently coupled to the spool 32 or it may be coupled to the spool in a nonpermanent manner. In another embodiment, the spool and the power gear may be configured as a single part. In the illustrated embodiment, the power gear 35 sits on an upper surface of the spool 32 and is rotationally coupled to the spool via a pair of tabs on the gear that insert into slots 34 on an upper surface of the spool. The power gear 35 may further interact with other gears in a gear assembly, or it may interact directly with the rotor. However, in an illustrated embodiment the power gear operates on the rotor through an interaction with a number of other gears.

[0016] The power gear, as shown, may interact with a second, transfer gear 36. The transfer gear 36 may include two “layers” of gear teeth on different, parallel planes. The two layers of a given gear may or may not have the same number of gear teeth, depending on design considerations. A lower set of gear teeth may interact with the power gear 35, while

an upper set of gear teeth may interact with a next gear in the assembly, a drive gear 37. Drive gear 37 may also have gear teeth on two parallel planes. The lower set of gear teeth may interact with the transfer gear 36 to receive the rotational force that was initiated at the spool 32 and passed through the power gear 35. The upper set of teeth may, in turn, transfer that rotational force to the rotor 23. The rotor may include a pinion gear 38 on its lower surface, with the pinion gear 38 configured to receive the rotational force from the drive gear 37. As the gear assembly may be housed within a gear assembly shell, it may be necessary to provide a way for the rotational force of the gears to be passed through the gear assembly shell to the rotor. In the illustrated embodiment, a shell slot 39 is provided in the gear assembly shell; a portion of drive gear 37 projects out of the shell slot to engage the pinion gear 38 of the rotor, which sits near enough the shell slot to engage the drive gear.

[0017] Of note, although the words “upper” and “lower” have been used to denote the different layers of gear teeth on a given gear, the gear assembly need not be arranged in a series of horizontal planes. It is within the skill of one in the art to mount the gears in predominantly vertical planes, or to have some gears in vertical planes and some in horizontal planes, etc. Also, although the mechanical interaction is shown as involving tooth-to-tooth gear interactions, it is also possible that the mechanical interaction could be a frictional interaction between smooth-surfaced gears. Of course, appropriate materials would have to be utilized to allow rotational force to be passed between the gears in the absence of an arrangement using gear teeth to pass the force.

[0018] As noted above, it is possible to repeatedly apply force to the pull cord 22 to progressively increase the speed of the rotor 23. Such a repeated application of force to the rotor 23, without the rotor reversing direction during the rewinding of the manual

acceleration device, may be achieved through the use of a clutch device. For example, it may be possible to provide for unidirectional acceleration (i.e. acceleration of the rotor consistently in one direction with repeated applications of a pulling force on the pull cord) with use of a ratchet-and-teeth assembly. The spool of the disclosure could have spring-loaded teeth that engage an inner surface of the power gear in one direction but then retract to allow the spool to rewind the pull cord. In an illustrated embodiment, the clutch effect is implemented by seating the drive gear 37 in a float slot 40 within the gear assembly.

[0019] In the illustrated embodiment, the power gear 35 and the transfer gear 36 each rotate about their individual axes, which are centered on axles mounted into a lower half 31B of the gear assembly shell. Each of the power and transfer gears is relatively fixedly mounted to the gear assembly shell 31B. However, in the illustrated embodiment, the drive gear is mounted on an axle that is configured to slide within a roughly oval float slot 40; as such, the position of the drive gear 37 is variable in the gear assembly. The float slot may be oriented substantially perpendicular to the axis of rotation of the rotor such that the drive gear 37 may move near to the pinion gear 38 of the rotor 23 or it may move away from the pinion gear 38 of the rotor 23. As illustrated, the drive gear 37 moves near to, and engages with, the pinion gear 38 of the rotor when an accelerating force is applied to the power gear 35 (i.e. when the pull cord is pulled to accelerate the rotor). The drive gear 37 moves toward the pinion gear 38 because of the force applied to the drive gear 37 by the transfer gear 36. When the pull cord is being rewound (i.e. there is no accelerating force being applied) the gears of the gear assembly 30 move in a reverse direction due to the resistive effect of the spring 33 attached to the spool 32. The transfer gear 36 thus applies a reverse rotational force to the drive gear 37, causing the drive gear 37 to move away from an engaging interaction with the pinion gear 38 of the rotor.

[0020] In addition to being accelerated by a pull cord-type device, gyroscopic element 20 may also be mounted such that rotor 23 partially protrudes from torso 12. In such a configuration, rotational motion may be imparted to rotor 23 by frictional contact with a given surface. Such a surface may be a table, a floor, a user's hand, or any other suitable surface for imparting rotational motion on the rotor. Alternatively, gyroscopic element 20 may be activated through the use of mechanical levers or other means. For example, in one embodiment different portions, for example, legs, of the toy figure may be spaced apart in an outward position before the toy figure is used. A second position of the legs may be an inward position. Movement of the legs from an outward position to an inward position may, through appropriate coupling, impart rotation to a rotor 23 of the gyroscopic element 20. Such coupling may occur through mechanical linkages, or magnetic interactions, or other suitable coupling force. Other means of imparting rotational motion to gyroscopic element 20 are possible, including rack and pinion linkages, etc.

[0021] For play with the described toy figure, a user may initially grasp the handle 21 of a provided pull cord 22. The user may extend the pull cord 22 away from the body of the toy figure a single time to initiate rotation of the rotor 23 of gyroscopic element. A single pull of the pull cord may be enough to impart a desired play effect to the toy figure, but a user may initiate multiple cord pulls to increase the rotational speed of the rotor and the gyroscopic effect. Once desired rotation is initiated, the user may grasp the toy figure in one of his or her hands and move the toy figure about in space. Such movement by the user may encounter a degree of resistance on the part of the toy figure, as the gyroscopic element imparts some measure of inertia to the toy figure. The encountered resistance by the toy figure may cause the toy figure to provide an enhanced play experience to the toy user.

[0022] It is believed that the disclosure set forth above encompasses multiple distinct inventions with independent utility. While each of these inventions has been disclosed in its preferred form, the specific embodiments thereof as disclosed and illustrated herein are not to be considered in a limiting sense as numerous variations are possible. The subject matter of the inventions includes all novel and non-obvious combinations and subcombinations of the various elements, features, functions and/or properties disclosed herein. Similarly, where any claim recites “a” or “a first” element or the equivalent thereof, such claim should be understood to include incorporation of one or more such elements, neither requiring nor excluding two or more such elements.

[0023] Inventions embodied in various combinations and subcombinations of features, functions, elements, and/or properties may be claimed through presentation of new claims in a related application. Such new claims, whether they are directed to a different invention or directed to the same invention, whether different, broader, narrower or equal in scope to the original claims, are also regarded as included within the subject matter of the inventions of the present disclosure.

WE CLAIM:

1. A toy figure (10) comprising:
a housing (11), wherein the housing defines an outer surface and an inner space; and
a rotor (23) supported for rotation within the inner space of the housing; and
a manually operable accelerating device (22) drivingly coupled to the rotor.
2. The toy figure of claim 1, wherein the housing embodies a humanoid figure.
3. The toy figure of claim 1, wherein the manually operated accelerating device (22) is capable of movement in a first and a second direction.
4. The toy figure of claim 3, further comprising a spring (33) in operative communication with the accelerating device (22), the spring (33) applying a countering force on the accelerating device (22) when the accelerating device (22) is moved in a first direction.
5. The toy figure of claim 4 wherein the accelerating device (22) comprises a pull cord.
6. The toy figure of claim 1, further comprising a gear assembly (30) comprising a plurality of intermeshed gears, the gear assembly (30) transferring rotational force to the rotor (23) in response to manual manipulation of the gear assembly (30).
7. The toy figure of claim 6, wherein the gear assembly (30) is configured intermittently to be drivingly coupled to the rotor (23).

8. The toy figure of claim 6 wherein at least one of the plurality of gears includes a site for direct interaction with the accelerating device (22).
9. The toy figure of claim 8 wherein the gear assembly (30) comprises at least three gears drivingly coupling the accelerating device (22) to the rotor (23).
10. The toy figure of claim 9 wherein the gear assembly (30) includes three gears.
11. The toy figure of claim 10, wherein the gear assembly (30) includes a powered gear (35) rotatingly driven by the acceleration device (22), a drive gear (37) adapted to rotate the rotor (23) when rotated, and a transfer gear (36) drivingly coupling the powered gear (35) and the drive gear (37).
12. The toy figure of claim 11 wherein the rotor (23) includes an integral pinion gear (38) configured to engage the drive gear (37).
13. The toy figure of claim 1, further comprising a gear assembly (30) coupling the acceleration device (22) to the rotor (23), where the gear assembly (30) comprises a plurality of gears and a clutch means for reversible engagement of the rotor (23).
14. The toy figure of claim 13, wherein the pull cord device (22) initiates rotation of the plurality of gears and further wherein the gear assembly (30) mechanically engages the rotor (23).

15. The toy figure of claim 14 wherein the gear assembly (30) includes at least three gears.
16. The toy figure of claim 14 wherein the mechanical interaction is a gear-to-gear interaction.
17. The toy figure of claim 16, further comprising an axle supporting the rotor (23) for rotation and a pinion gear (38) mounted on the axle and further wherein the axle is coaxial with an axis of rotation (50) of the rotor.
18. The toy figure of claim 13 wherein the rotor (23) comprises a plurality of rotor disks (24) adapted to co-rotate.
19. A toy figure (10), comprising:
 - a housing (11), wherein the housing defines an outer surface and an inner space; and
 - a rotor (23) supported for rotation within the inner space of the housing; and
 - a manually operable accelerating device (22) drivingly coupled to the rotor (23); and
 - clutch means for drivingly coupling the manually operable accelerating device (22) to the rotor (23).

20. A toy figure, comprising:
- a housing (11) having a substantially humanoid form; and
 - a gyroscopic element (20) supported within an inner space of the housing, the gyroscopic element (20) comprising:
 - a rotor (23); and
 - a manually-activated acceleration device (22); and
 - a gear assembly (30) including a plurality of gears drivingly coupling the acceleration device (22) to the rotor (23), wherein manual activation of the acceleration device (22) produces rotation of the rotor (23), and rotation of the rotor (23) produces resistance to manual movement of the toy figure (10).

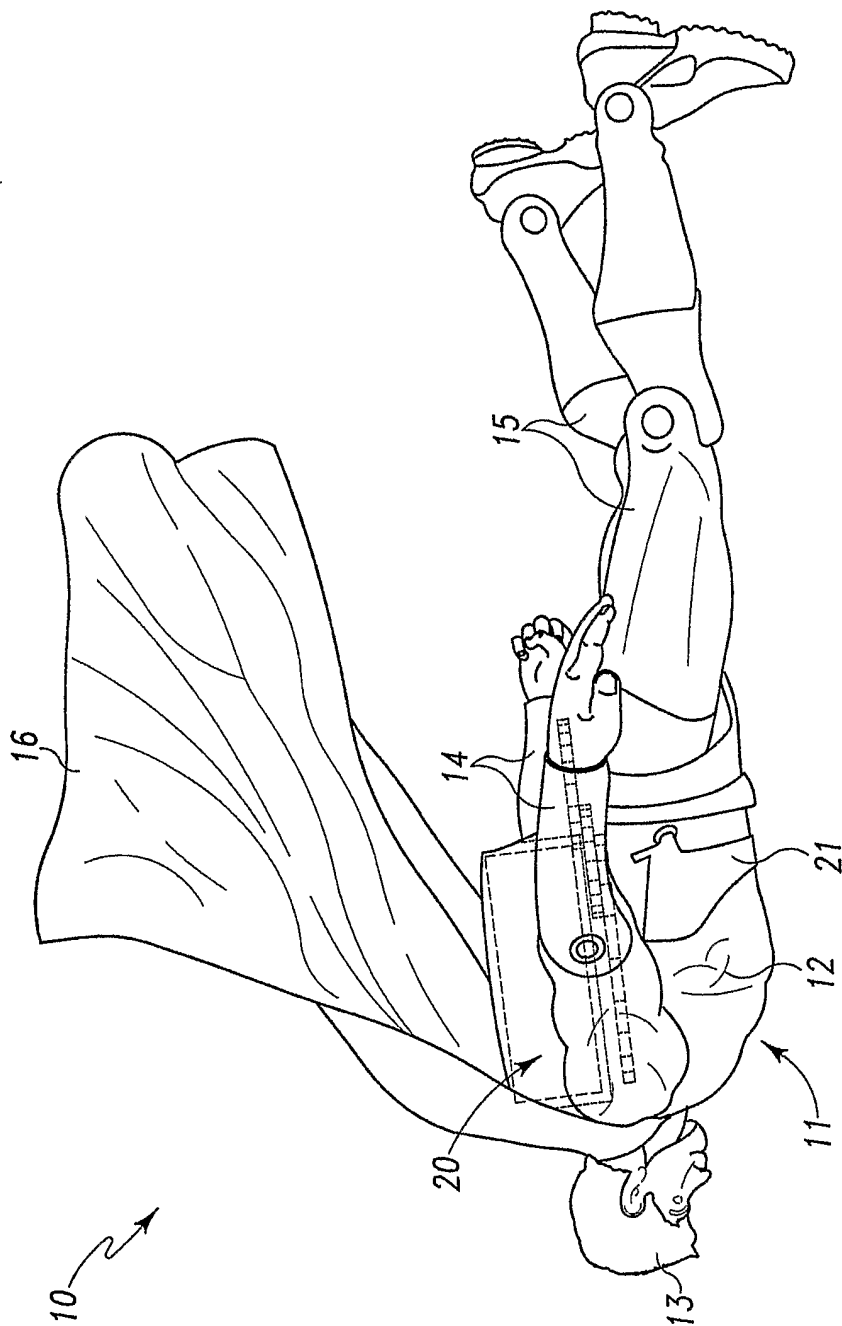


Fig. 1

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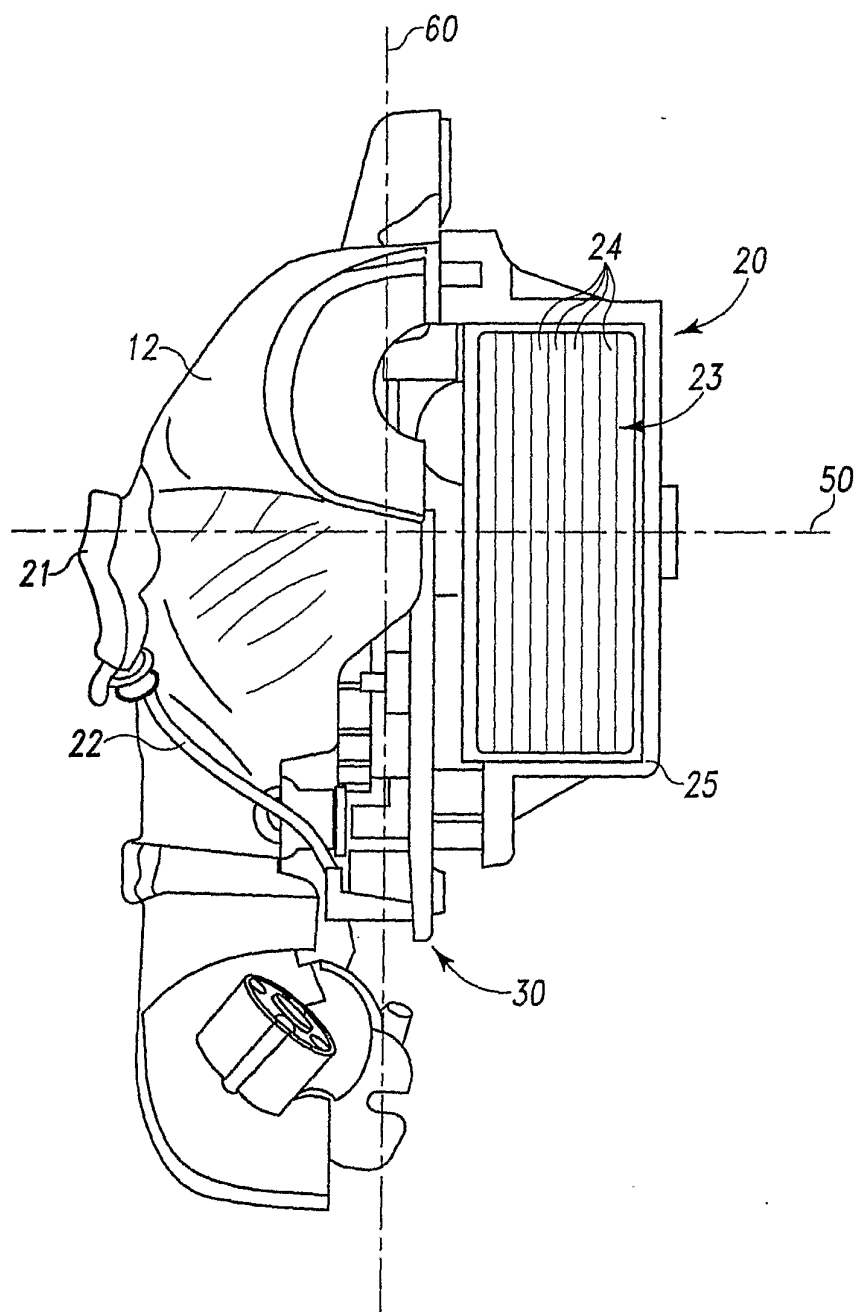


Fig. 2

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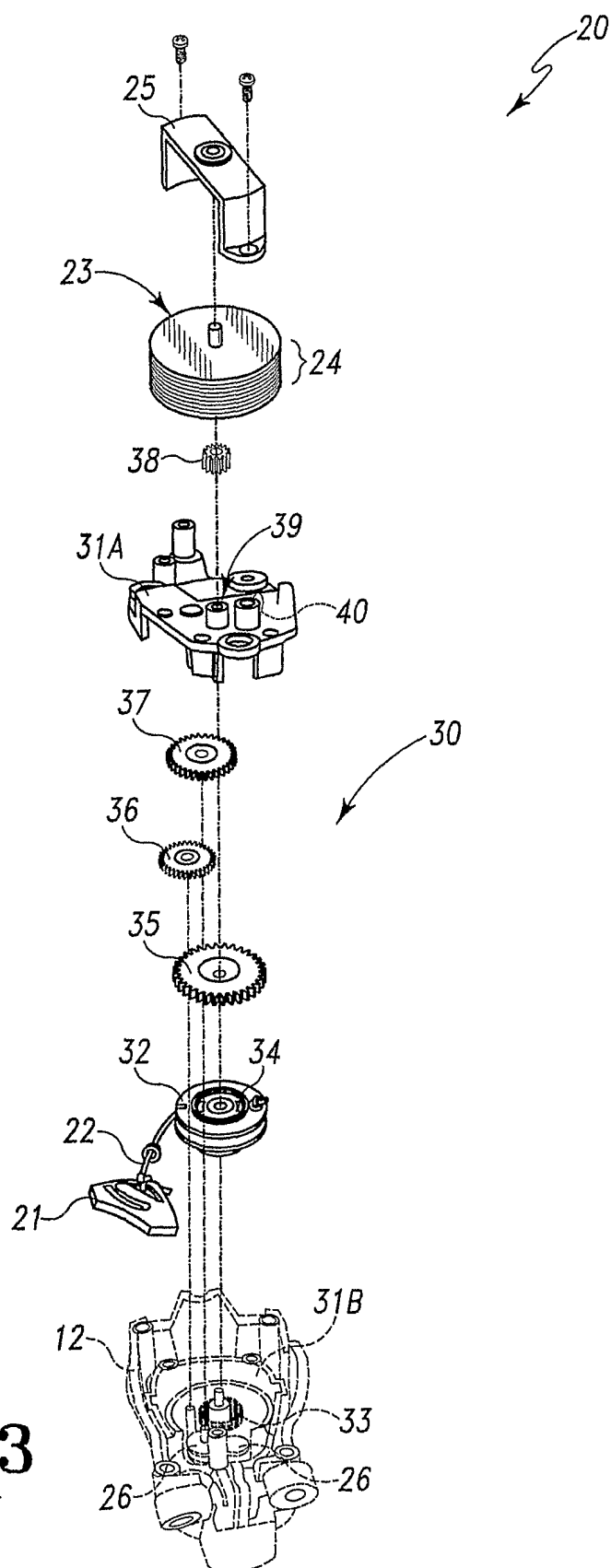


Fig. 3