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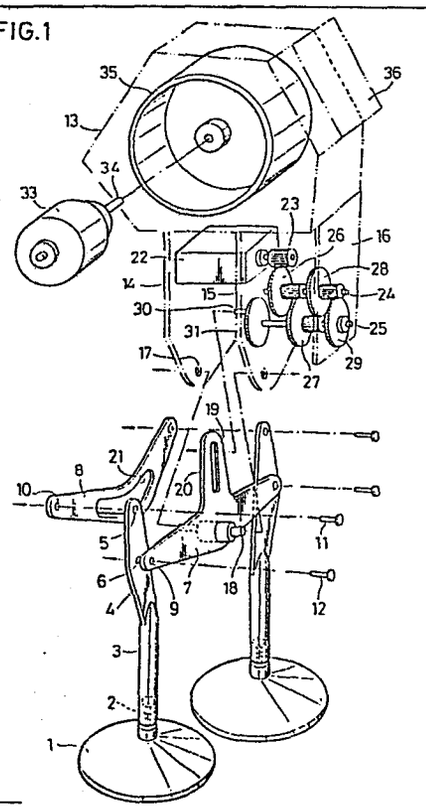
(54) Walking toy.

(57) A walking toy includes a pair of supporting feet; leg members respectively mounted pivotally on the pair of supporting feet; two cooperation members coupled in cooperative association with the leg members; a drive device mounted on a frame member formed in a torso section of the toy for swinging one of the cooperation members, which is swingingly coupled to the drive device; a flywheel mounted on the torso and having its rotation shaft substantially horizontal; and drive motors respectively for the drive device and the flywheel.

FIG.1



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SPECIFICATION

Title of the Invention

WALKING TOY

Background of the Invention

(Field of the Invention)

The present invention relates to a structure of a walking toy with two legs such as a toy robot which is provided with a flywheel in the torso thereof and the posture is retained stable by utilizing the gyroscopic precession of the flywheel while walking uprightly. Particularly, the present invention is directed to a walking toy which can walk uprightly and change its walking direction in a stable manner, by providing a motor exclusively used for obtaining the gyroscopic precession from the flywheel and another motor for driving the two leg members.

(Prior Art)

Conventional upright walking toys such as walking dolls have generally a single motor mounted in the torso thereof and a speed reduction mechanism coupled to the motor which constitutes a power device for walking toys. A crank shaft coupled to the power device is adapted to drive left and right leg members such that the leg members are alternately moved fore and aft by drive force from the power device, thereby enabling to make the toy walk.

The above conventional toy structure is however associated with some drawbacks that since the power device is accommodated within the torso of the toy and positioned above the two leg members substantially centrally of the torso, the center of gravity of the toy swings right and left as the toy walks, thereby degrading the upright stability of the toy. In order to

overcome such problems, auxiliary supporting members have been provided for the respective leg members so as to ensure the upright stability even while the toy stands on a single leg member. This method, however, disadvantageous in that the outer appearance of the toy is deteriorated, the movement of the toy is somewhat unnatural, and only the forward walking is possible without enabling a turn walking.

[Summary of the Invention]

The present invention has been made to eliminate the prior art problems. It is an object of the present invention to provide a walking toy which is stable while walking and can change its turning direction as desired.

According to the present invention, the walking toy comprises a pair of supporting feet; leg members respectively mounted pivotally on the pair of supporting feet; two cooperation means coupled in cooperative association with the leg members; a drive device mounted on a frame member formed in a torso section of the toy for swinging one of the cooperation means, which is swingingly coupled to the drive device; a flywheel mounted on the torso and having its rotation shaft substantially horizontal; and drive motors respectively for the drive device and the flywheel.

Other objects, features and advantages of the invention will become apparent from the following description and accompanying drawings.

[Brief Description of the Drawings]

Fig.1 is an exploded and perspective view of the main part of the walking toy according to an embodiment of the present invention; Fig.2 is a partially broken side view of the main

portion of the walking toy; Fig.3 is a partially broken front view of the walking toy; and Figs.4(a) to (d) are views for explaining the operation of walking of the toy.

[Embodiment]

Referring now to the accompanying drawings illustrating an embodiment of the present invention, numeral 1 represents a supporting foot of generally disk shape having a shaft member 2 extending upward from the middle of the disk portion of the supporting foot 1. A leg member 3 is rotatably mounted on the shaft member 2.

A pair of leg members 3 are fixed at upper ends thereof to respective plates 4, the plate being formed with two apertures 5 and 6 spaced from each other by a predetermined distance along the longitudinal direction of the plate 4. Two cooperation members 7 and 8 respectively formed with apertures 9 and 10 are coupled to the plates 4 by rivets 11 and 12 inserted into the apertures 6, 9 and 5, 10, respectively, such that the right and left leg members 3 can be moved maintaining parallel during up and down motion of the members while walking.

Numeral 13 represents a torso of a box shape of the toy. At the bottom of the torso 13, there is provided a frame member composed of a plurality of plates 14, 15 and 16 fixedly screwed to the torso 13. Through holes 17 are formed at the lower portion of the frame member, into which through holes 17 a shaft 18 mounted on the cooperation member 7 is inserted to thereby enable the pivotal movement of the cooperation member 7 relative to the frame member. The cooperation member 7 is integrally formed with an operation piece 20 having an elongated hole 19 and is

generally of an inverted T character shape. The other cooperation member 8 coupled at the opposite side of the plate 6 relative to the cooperation member 7 is formed with an aperture 21 through which the shaft 18 extends to the through hole 17 of the plate 14, thus the pivotal movement of the operation member 8 is not restricted by the rotation of the shaft 18.

Numeral 22 represents a drive motor for driving the operation member 7 to swing or pivot relative to the shaft 18. The drive motor 22 is fixedly screwed between the plates 14 and 15 with its output shaft provided with a pinion 23. The pinion 23 is coupled to a reduction device comprising reduction gears 26, 27, 28 and 29, each gear meshing with each other in this order and having a pinion gear except the gear 29 as shown in the figure. The pinion gear of the spur gear 28 rotatably supported by a shaft 24 meshes with the spur gear 29 fixed to a rotation shaft 25 supported between the plates 15 and 16. One end of the rotation shaft 25, on the output side of the reduction device, is provided with a cam member 30 formed on an eccentric member 31 eccentrically mounted relative to the rotation shaft 25. The cam member 30 of the eccentric member 31 is inserted into the elongated hole 20 of the operation piece 21 of the cooperation member 7.

A motor housing 32 is formed above the frame member in the torso, the longitudinal axis of the housing 32 of an elongated cylinder shape being substantially parallel with the longitudinal direction of the cooperation member 7. The rotation shaft 34 of the motor 33 is coupled to a flywheel 35.

Numeral 36 represents a receiver for a remote radio control

operation, the receiver 36 being powered by a not shown battery and constructed such that the motors 22 and 33 are independently controlled by not shown drive circuits.

The operation of the walking toy constructed as above will be described. Upon rotation of the motor 22, the reduction device comprising the reduction gear 26 meshing with the pinion 23 of the motor 22, reduction gears 27, 28 and 29 causes the rotation shaft 25 to rotate at a predetermined reduction rate. The cam member 30 of the eccentric member 31 connected to the rotation shaft 25 then rotates to thereby make the cooperation member 7 swing with the cam member 30 engaged with the elongated hole 19 of the operation piece 20. Therefore, by virtue of the swing movement of the cooperation member 7, the right and left leg members 3 are alternately moved up and down while remaining parallel with each other due to the provision of the other operation member 8. Upon rotation of the motor 33, the flywheel 35 rotates at a high speed to thereby obtain a gyroscopic effect with the direction of torque perpendicular to the longitudinal direction of the cooperation member 7. For example, as shown in Fig.4 (d) where the walking toy stands with its torso 13 slanted, even in such case the slant of the torso 23 is automatically corrected due to the torque generated from the gyroscopic effect. Thus, the walking toy can stand upright and in turn stand on a single foot as shown in Figs.4 (b) or 4(c). The walking toy standing on a single foot 1a with the other foot 1b apart from the floor, as shown in Fig.4 (b) for example, is then pivotable on the shaft 2 of the supporting foot 1a. In this condition, due to the torque of the gyroscopic effect acting upon the torso 13,

the torso 13 will be rotated in a certain horizontal direction. Next, during the rotation of the torso 13, the motor 22 is rendered to be rotated so as to change the slant direction of the cooperation member 7. As a result, the posture of the walking toy standing on the single foot 1a is changed from Fig.4(a) to Fig.4(c) with the help of the gyroscopic effect. Thus, in this case, the walking toy stands on the single foot 1b with the other foot 1a spaced apart from the floor while maintaining an upright posture of the torso 13. Then, it is possible to rotate the torso 13 in a certain horizontal direction about the shaft 2 of the supporting foot 1b. The above operation are repeated to effect the change of turning direction while standing on a single foot and the forward walking one foot after another. In particular, while maintaining the upright posture of the torso 13 by the gyroscopic effect generated by the rotation of the motor 33, the walking toy standing on the single foot contacting the floor can be turned about its foot. By changing the timings for the turning motion of the walking toy, a desired walking direction can be obtained.

As appreciated from the above description, the provision of the flywheel within the torso and the motor for exclusively driving the flywheel enables to obtain the gyroscopic effect caused by a high speed rotation of the flywheel and the stable upright posture of the toy walking on two feet. In addition, the provision of another drive motor for effecting the alternate raising of the feet enables to turn the walking direction of the torso with the help of the torque generated by the gyroscopic effect. Therefore, even with a high position of the center of

gravity of the walking toy, there is no fear of swinging the center of gravity while walking. Specifically, the gyroscopic effect gives automatic restoration of the stable upright posture and enables to stand on a single foot, thus always ensuring a stable walking. Furthermore, by controlling the timings for changing the turning direction, a desired walking direction can be obtained with a relatively natural walking posture.

While a preferred embodiment has been described, variations thereto will occur to those skilled in the art within the scope of the present inventive concepts which are delineated by the following claims.

What is claimed is:

1. A walking toy comprising; a pair of supporting feet; leg members respectively mounted pivotally on the pair of supporting feet; two cooperation means coupled in cooperative association with the leg members; a drive device mounted on a frame member formed in a torso section of the toy for swinging one of the cooperation means, which is swingingly coupled to the drive device; a flywheel mounted on the torso and having its rotation shaft substantially horizontal; and drive motors respectively for the drive device and the flywheel.

2. A walking toy according to claim 1, wherein said cooperation means are disposed substantially in parallel with the longitudinal direction of the rotation shaft of said flywheel.

3. A walking toy according to claim 1, wherein said drive device for swinging one of said cooperation means comprises an operation piece formed integrally with said one of cooperation means having an elongated hole; a cam member formed on an eccentric member mounted on an output shaft of a reduction device coupled to said drive motor; and wherein said cam member of said eccentric member is inserted for engagement with said elongated hole of said operation piece.

4. A walking toy according to claim 1, wherein said pair of supporting feet are of a disk shape and respectively formed centrally thereof with shaft members for pivotally coupling said supporting feet.

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FIG.1

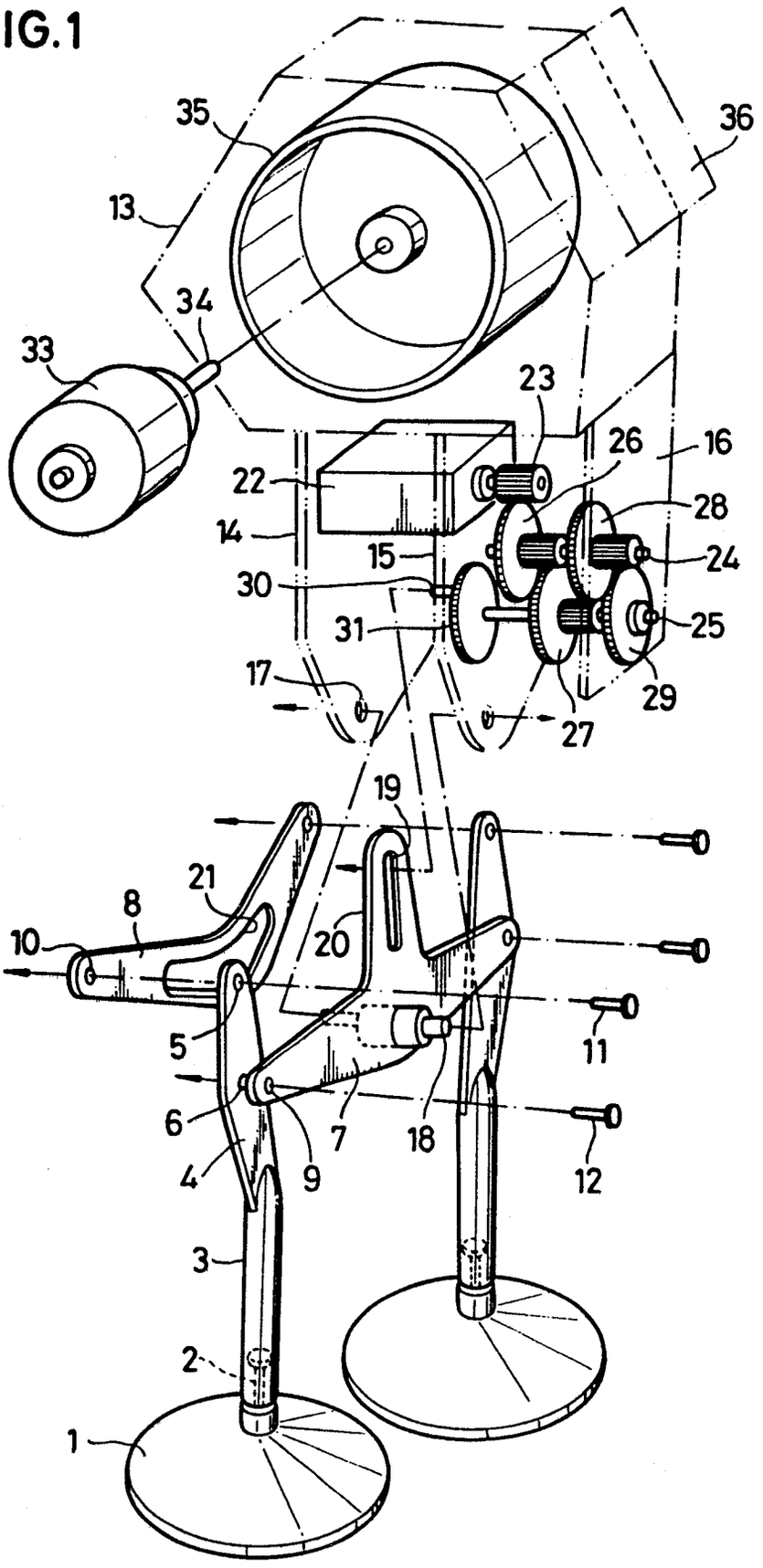

FIG. 2

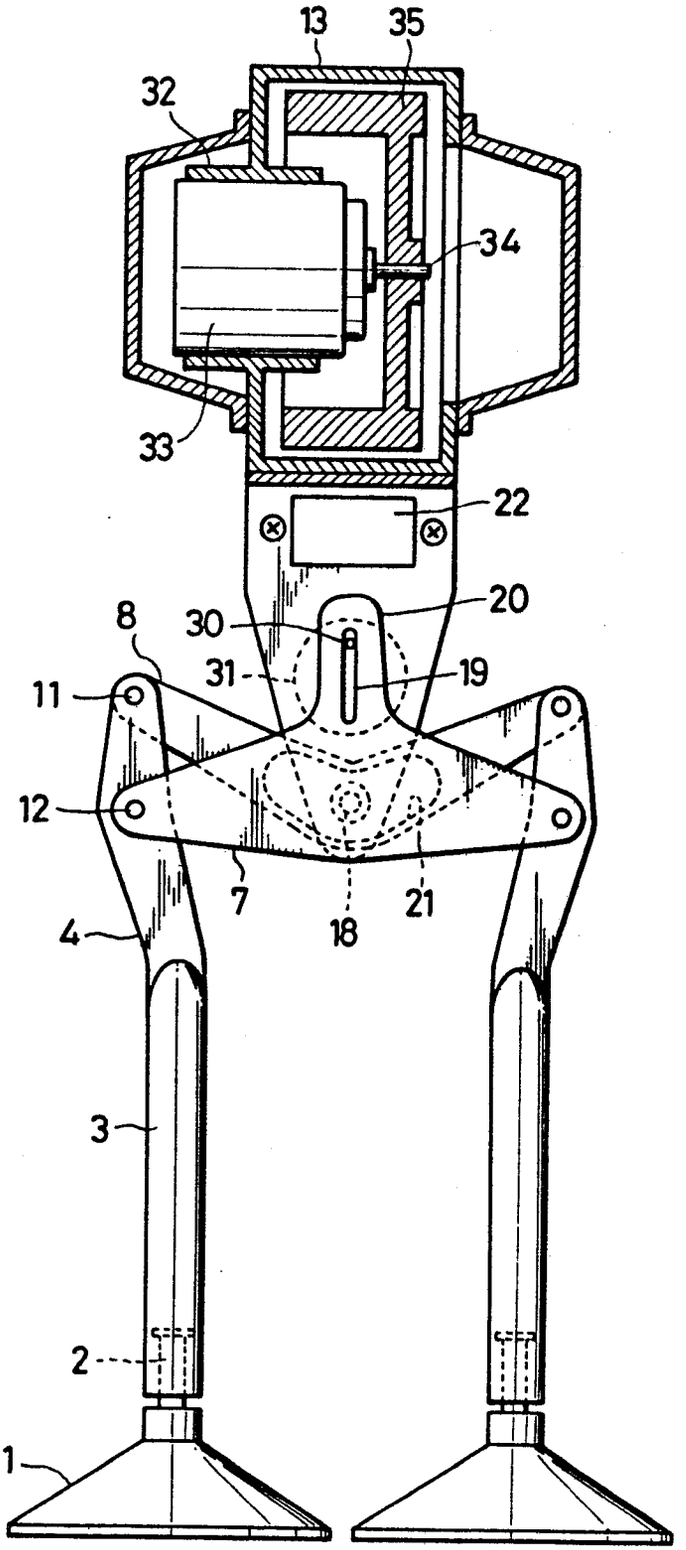

FIG.3

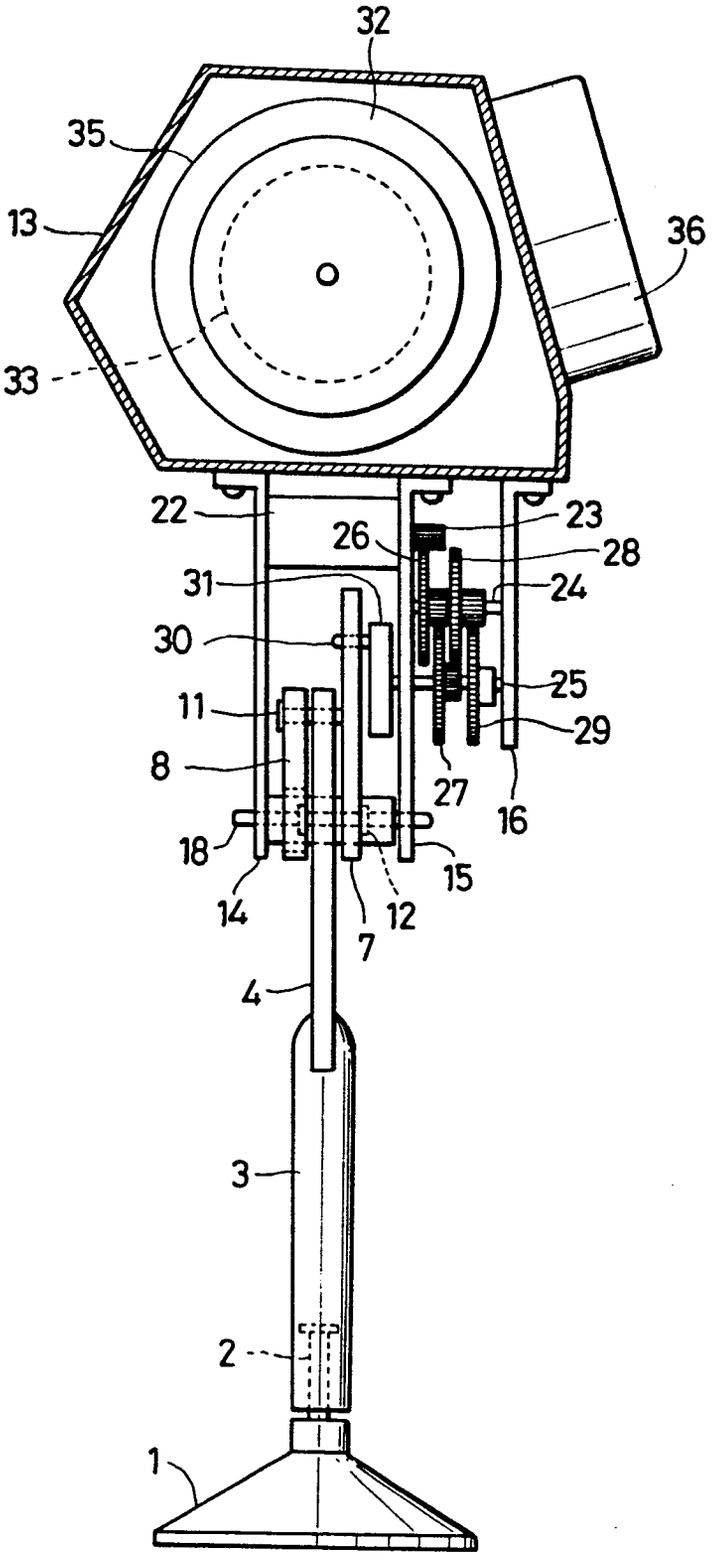

FIG.4