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(54) **Title**: SIMULATED WALKING TOY

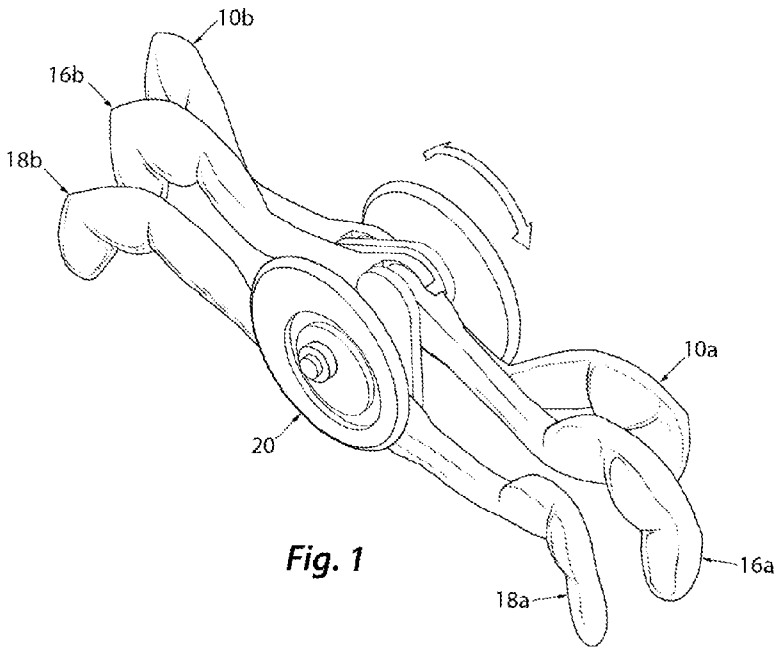


Fig. 1

(57) **Abstract**: A toy simulating a walking or crawling creature comprising, a drive wheel assembly with at least a drive wheel, and a plurality of shafts that are eccentrically configured with respect to the main rotational axis of the drive wheel. A plurality of limbs are loosely coupled to said drive wheel through the plurality of shafts. The joint end of a limb is loosely coupled to a shaft so the limb can freely pivot around the shaft. A pair of left and right limbs coupled to a shaft further comprise at least a rotation stop that reciprocally restrain the rotational movement of the paired limbs. The terminal tip ends of limbs extend outward and downward to make contact with a surface continuously or temporarily through a rotation cycle of the drive wheel assembly. The limbs slide linearly and reciprocally on a surface as the drive wheel assembly is rotated. A frictional member is optionally coupled to the drive wheel assembly to provide frictional engagement with the surface to prevent skidding and ensure traction as the walking creature is propelled across a surface. The limbs, due to being positioned in an eccentric relation and partially staggered, simulate a natural walking or crawling movement of a multi-limbed creature when actuated by rotating the drive wheel assembly.

SIMULATED WALKING TOY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority to U.S. Provisional Patent Application No. 61/852,060, filed March 15, 2013, entitled Rolling Cam Walking Animal or Creature, the disclosure of which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] This invention relates generally to walking toys and particularly to an apparatus for simulating the crawling or walking movements of multi-limbed creatures.

BACKGROUND OF THE INVENTION

[0003] Crawling or walking toys are generally known and well established in the art. Toys designed to imitate the movement of multi-limbed creatures, especially those with four or more limbs, however, have struggled to provide a realistic and natural simulation of their walk cycles. While there are many examples of two-legged toys that achieve their desired effects with comparatively simple mechanisms, an operative mechanism that imparts realistic and natural limb action in toys with four or more limbs, such as crustaceans, insects, and arthropods, is lacking. Existing mechanisms apply overly complicated designs, or require separate driving force to actuate each individual limb. This is due in part to the increased complexity of motion involved in creatures with four or more limbs, where the relative actions of the additional limbs are staggered.

[0004] In a continuing effort to meet this need, practitioners in the toy arts have provided a wide variety of operative mechanisms which are directed towards walking or crawling toys having multiple limbs. Accordingly, it is a general object of the present invention to provide a simpler and improved mechanism to actuate a greater plurality of limbs. It is a more particular object of the present invention to provide a mechanism that actuates a plurality of limbs in a synchronized, oscillated, and partially staggered movement that imparts a realistic sense of crawling or walking motion. Such said mechanism may be manufactured, assembled and incorporated into various walking or crawling toys without undue complexity or expense.

SUMMARY OF THE INVENTION

[0005] In accordance with the present invention, there is provided a drive wheel assembly that transfers the rotational force of a drive wheel into synchronized, staggered, linear movement of multiple limbs. Said drive wheel assembly comprises at least a drive wheel and a plurality of shafts configured in an offset and eccentric relation with respect to the main rotational axis of such drive wheel. The joint end of a first limb is coupled to one of these shafts and can freely pivot around said shaft. In a preferred embodiment, a second limb is coupled to the same shaft in the same mechanism but in a mirrored or opposite direction. A plurality of limbs can be paired and coupled to the drive wheel assembly in the same mechanism to one or more eccentrically configured shafts.

[0006] The drive wheel assembly allows the separate pairs of limbs coupled at different eccentrically configured shafts that are offset at different angles to move in a synchronized and partially staggered fashion. It will be seen that as an eccentric shaft is moving towards the highest point in its elliptical operative cycle, it imparts the simulation that the pair of limbs coupled to said shaft are contracting. Conversely, as said shaft is moving towards the lowest point in the elliptical cycle, it imparts the simulation that such limbs are extending.

[0007] Each limb may further comprise a rotation stop that reciprocally restrains the rotational range of the paired joint ends to impart limitations when joints extend and contract with respect to a body. The rotation stops also ensure that limbs retain their respective orientations when lifted off and then placed backed on to a surface. The tip ends of the limbs extend outwardly and downwardly to make contact with a surface such as a floor or tabletop. The tip ends slide linearly, back and forth on a surface as the limbs are actuated when the drive wheel assembly rolls on a surface. Some of the tip ends may continuously or periodically lift off a surface as the drive wheel assembly rolls on a surface. As the drive wheel assembly rolls on a surface, the limbs cycle through a movement sequence which presents a realistic and natural crawling or walking motion of a multi-limbed creature. Limbs, due to being joined at multiple shafts that are offset at different angles and eccentric to the main rotational axis, simulate contraction and extension of limbs. The present invention actuates multi-limb movements without the need for interior power to propel each limb separately.

[0008] The walking toy disclosed herein is a drive wheel assembly adapted to be propelled along a surface, such as on a floor or tabletop, by pulling or pushing manually. It will be understood by those skilled in the art that, alternative motive power for the propulsion can be provided via other means, such as an electric or battery-powered motor, or a spring-loaded drive mechanism.

[0009] As a user continues to propel the walking toy across a surface, at the completion of each operative cycle, the limb positions will return to their initial positions in the new cycle. The cycles repeat as a user continues pulling or pushing toy 1 across a surface. A frictional element is optionally coupled to the drive wheel assembly to provide frictional engagement with the surface to prevent skidding as the walking creature is propelled across a smooth surface, such as glass or tile. Rough surfaces, such as carpets, sandy beaches, and gravel pavements are operable due to the flexibility in the joint ends being freely and pivotally coupled to shafts.

[0010] It will be understood that while the walking toy disclosed here is preferably configured in the shape of a crab. The present invention is not limited to any particular six-legged creature. Accordingly, a variety of multi-limbed creatures with more than four limbs may be operated using the present mechanism without departing from the spirit and scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The features of the present invention, which are believed to be novel, are set forth with particularity in the appended claims. The invention, together with further objects and advantages thereof, may best be understood by reference to the following description taken in conjunction with the accompanying drawings, in the several figures of which like reference numerals identify like elements. For the purpose of illustrating the invention, there is shown in the drawings a preferred embodiment of the invention. It should be understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown.

[0012] In the drawings:

[0013] Fig. 1 is an orthographic view of the drive wheel assembly of the present invention with six limbs attached and the arrow showing the rotational directions of the drive wheel assembly;

[0014] Fig. 2a is a front view of the drive wheel assembly with six limbs attached at a point in an operative cycle as the present invention rolls on a surface;

[0015] Fig. 2b is a top view of the drive wheel assembly with six limbs attached as shown in Fig. 2a;

[0016] Fig. 3a is a front view of the drive wheel assembly with six limbs at a different point in an operative cycle as the present invention rolls on a surface;

[0017] Fig. 3b is a top view of the drive wheel assembly with six limbs attached of Fig. 3a;

[0018] Fig. 4 is an exploded orthographic view of a preferred embodiment of the present invention in a crab shape;

[0019] Fig. 5a is an orthographic view of the crab shape embodiment of the present invention as shown in Fig. 4;

[0020] Fig. 5b is a top view of the crab shape embodiment of the present invention as shown in Fig. 5a;

[0021] Fig. 5c is a front view of the crab shape embodiment of the present invention as shown in Fig. 5a;

[0022] Fig. 5d is a back view of the crab shape embodiment of the present invention as shown in Fig. 5a;

[0023] Fig. 6a is a top view of the drive wheel assembly and to a pair of eyes;

[0024] Fig. 6b is an orthographic view of the drive wheel assembly and a pair of eyes operatively coupled to an optional eye movement tracking groove embedded into a drive wheel;

[0025] Fig. 6c is a side view of the drive wheel assembly and a pair of eyes as shown in Fig. 6a;

[0026] Fig. 6d is a front view of the drive wheel assembly and a pair of eyes showing an optional eye movement tracking groove of the present invention;

[0027] Fig. 7a is a partial front view of two joint ends of a pair of limbs that form a linkage joint in an extended position;

[0028] Fig. 7b is a partial front view of two joint ends of a pair of limbs that form a linkage joint in a contracted position;

DESCRIPTION OF PREFERRED EMBODIMENTS

[0029] Certain terminology is used in the following description for convenience only and is not limiting. The words, “up,” “down,” “right,” “left,” “front,” and “back” designate orientation in

the drawings to which reference is made. The terminology includes the words above specifically mentioned, derivatives of, and words of similar import.

[0030] The toy can be shaped to resemble or represent any multi-limbed creature, real or imaginary. For examples, such toy can be shaped to resemble crustaceans, spiders, insects, robots, or aliens. In the accompanying drawings, a six-limbed creature is shown as one of the various illustrative embodiments of this invention. With the operative mechanism of the present invention set forth below in greater detail, it is within the spirit and scope of the present invention to provide a drive wheel assembly that simulates the crawling or walking movement of any creature with four or more limbs.

[0031] Fig. 1 sets forth an orthographic view of a drive wheel assembly 20 of the present invention with six limbs attached. A back left limb 10a is coupled to drive wheel assembly 20 with a corresponding back right limb 10b. Similarly, a middle left limb 16a is coupled to drive wheel assembly 20 with a corresponding middle right limb 16b. A front left limb 18a is coupled to drive wheel assembly 20 with a corresponding front right limb 18b. In accordance with the present invention, drive wheel assembly 20 is reciprocally rotatable in either linear direction as indicated by the arrow in Fig. 1. Limbs simulating appendages, arms, legs, or antenna of a creature are coupled to drive wheel assembly 20 in an off-center eccentric relation with respect to the main rotational axis of the drive wheels. Said limbs are reciprocally movable in either linear direction upon rotating said drive wheel assembly.

[0032] By the mechanism as explained below in greater detail and as illustrated in Figs. 2a, 2b, 3a and 3b, the force required for moving the various limbs is provided by rotating drive wheel assembly 20, and thereby actuating the limbs that are coupled to said drive wheel assembly 20 through a plurality of shafts. As further shown in Figs. 2a, 2b, 3a and 3b, tip ends of said limbs extend outwardly and downwardly to engage a surface. In a preferred embodiment as shown in Figs. 2a and 3a, said tip ends slide back and forth horizontally to said drive wheel assembly 20.

[0033] Fig. 2a is a front view of drive wheel assembly 20 coupled with six limbs at a point in an operative cycle where front limbs 18a and 18b are approaching their extreme right positions. Fig. 3a shows a front view of drive wheel assembly 20 with six limbs attached at a different point in an operative cycle, when front limbs 18a and 18b are near their respective extreme left

positions. The transition to Fig. 3a from Fig. 2a can be achieved by rotating the drive wheels 180 radial degrees clockwisely or counter-clockwisely, i.e. in either right or left linear direction. Fig. 2b is a top view of Fig. 2a; and Fig. 3b is a top view of Fig. 3a. As seen in these figures, when drive wheel assembly 20 is rotated 180 radial degrees, front limbs 18a and 18b are shifted from their near extreme right positions linearly to their near extreme left positions. Conversely, back limbs 10a and 10b are shifted from their near extreme left positions to their extreme right positions. The limbs are partially staggered with respect to each other and remain partially staggered. The broken lines in Figs. 2a and 3a indicate the position of joint ends, limbs, shafts, and links hidden from the front view.

[0034] Referring to Fig. 3a, it shows that limbs 10a, 10b, 16a, 16b, 18a and 18b extend outwardly from drive wheel assembly 20 and downwardly to contact a surface. It is preferable that each terminal tip end of said limbs contacts a surface, so that it simulates a natural and realistic sense of limbs gripping the surface when a creature is crawling or walking. It will be understood that said tip ends can either continuously or temporarily stay in contact with a surface throughout a rotation cycle.

[0035] Referring to Fig. 3a, limbs 10a, 16a, and 18a differ in contour and size, but are identical to limbs 18b, 16b, and 10b, respectively. It is preferable to mirror said limbs to impart a realistic and aesthetically pleasing crawling motion of a crab. It will be understood that said limbs can be freely interchangeable with one another without sacrificing the function. Said limbs can also be made with the same contour or size.

[0036] Referring to Fig. 4, each limb has a joint end that pivotally couples the limb to drive wheel assembly 20. Each limb further has a terminal tip end extends outwardly and downwardly. Back left limb 10a, right back limb 10b, middle left limb 16a, middle right limb 16b, front left limb 18a, and front right limb 18b are freely, pivotally coupled to drive wheel assembly 20 through joint ends 15a, 15b, 17a, 17b, 19a, and 19b, respectively.

[0037] As illustrated in in Figs. 2a and 3a, during an operative cycle, joint ends 15a, 15b, 17a, 17b, 19a and 19b oscillate simultaneously. In an operative cycle, said pairs of joint ends as coupled via their respective shafts alternate their positions leftwardly, rightwardly, upwardly, and downwardly with respect to each other. Right limbs are partially staggered at the initiation of the

cycle and remain partially staggered throughout the cycle. In a mirrored symmetry, left limbs are also partially staggered at the initiation of the cycle and remain partially staggered throughout the cycle. The synchronized, oscillated, and partially staggered movement of multiple limbs imparts a realistic and natural sense of crawling or walking motion of a multi-limbed creature, such as a crab shape embodiment of the present invention as shown in Figs. 5a-5d.

[0038] As described in greater detail below and illustrated in the drawings, drive wheel assembly 20 comprises a front drive wheel 27a and a back drive wheel 27b mounted in space with relation to each other. Said drive wheel assembly 20 further comprises links 22 and 23, and shafts 24, 25 and 26. In a preferred embodiment as shown in Fig. 4, a first shaft 26 is coupled off-center to a front drive wheel 27a, and a second shaft 24 is coupled off-center to a back drive wheel 27b. Via the connections of links 22 and 23, respectively, said shafts 26 and 24 are coupled to a third shaft 25. Referring to a preferred embodiment, said shaft 25 is off-center to the common rotational axis of drive wheels 27a and 27b. Drive wheels 27a and 27b rotate coaxially and simultaneously actuate rotations of eccentrically configured shafts 24, 25, and 26.

[0039] In a preferred embodiment, said shafts 24, 25, and 26 and links 22 and 23 are shown as housed between drive wheels 27a and 27b. It will be understood that said shafts and links can also be coupled exterior to, or the outfacing side, of either drive wheel 27a or 27b.

[0040] In a preferred embodiment, shafts 24, 25, and 26 are configured eccentrically with respect to the main rotational axis of drive wheels 27a and 27b. As drive wheel assembly 20 is rotated clockwisely or counter-clockwisely, it actuates shafts 24, 25 and 26 to oscillate in height and position with respect to each other. Because said shafts are eccentric to the common rotational axis, their operative cycles are elliptical and out of phase. It will be understood that said shafts can also be configured concentrically or in phase with respect to each other, although the effect is less desirable in simulating crawling or walking motions of creatures with more than four limbs.

[0041] It is shown in a preferred embodiment that drive wheel assembly 20 comprises of a pair of drive wheels 27a and 27b for added rotational stability. It will be understood that it is functionally sufficient to have a single drive wheel with said shafts configured and coupled to the drive wheel eccentrically with respect to the rotational axis of the drive wheel. It is feasible to

add or remove any number of drive wheels, shafts, links, or limbs to drive wheel assembly 20. It will be understood that the present invention may comprise more than two drive wheels, three shafts, two links, and six limbs.

[0042] Figs. 6a-6d set forth the top, orthographic, side, and front views of drive wheel assembly 20, respectively, with limbs removed and showing a pair of eyes shown in their configuration in relation to drive wheel 27a. In a preferred embodiment, as shown in Figs. 6a and 6c, shafts 24, 25 and 26 are cylindrical and of the same diameter and thickness. While an optimal operative mechanism for coupling a pair of joint ends to drive wheel assembly 20 and actuating said joint ends is achieved through cylindrical shafts, it will be understood that said shafts can be of other shapes, such as cubic or spherical. Said shafts can be of different size or thickness as well.

[0043] Referring to Fig. 6d, shafts 24, 25, and 26 are spaced at equal distance radially from the main rotational axis of drive wheels 27a and 27b. In a preferred embodiment, as shown in Figs. 2a and 3a, shafts 24, 25, and 26 are configured to form approximately an equal lateral triangle, i.e. with three 60-degree inner angles. It will be understood that, when viewed from the front of drive wheel 27a, said three shafts can be configured to form any various triangle. When viewed from the side, said shafts can be positioned at any horizontal or vertical distance with respect to each other, or to either drive wheel. It will be further understood that said shafts can be configured at the same vertical height.

[0044] Referring to Fig. 1, six limbs as coupled to drive wheel assembly 20 are constructed and arranged for reciprocal movement upon rotation of drive wheel assembly 20 to impart natural and realistic crawling or walking motions of a multi-limbed creature. Referring to Figs. 2a and 3a, drive wheel assembly 20 has at least three axles, namely, shafts 24, 25, and 26, which are off-center to the main rotational axis formed by 29a or 29b. As drive wheel assembly 20 is propelled to rotate across a surface, the rotational force is operatively coupled to the oscillation of shafts 24, 25, and 26. The movement of the limbs is actuated by the joint ends, which are pivotally coupled to shafts 24, 25 and 26. Said joint ends transition from their contracted positions to extended positions in an operative cycle of drive wheel assembly 20.

[0045] For example, as shaft 24 reaches its highest vertical point with respect to a surface in an operative cycle, joint ends 15a and 15b coupled to shaft 24 also reach their highest and most

contracted positions. As drive wheel assembly 20 continues to rotate, shaft 24 gradually descends, and either leftwardly or rightwardly, to the lowest point in an operative cycle, causing joint ends 15a and 15b to transition into their lowest and fully extended positions.

[0046] In accordance with the anticipated operation of the present invention crab toy 1, a user may push, pull, or lift up toy 1 by inserting fingers in recessed pocket handle 59. Other alternative drive mechanisms such as an electric or battery operative motor, or a spring-loaded drive mechanism may be incorporated to the present invention to act as a propelling force for said drive wheels. As drive wheel assembly 20 rolls along a surface, shafts 24, 25 and 26, in their respective offset and eccentric positions, actuate the limbs coupled thereon by extending and contracting each pair of joint ends. In a preferred embodiment, as shown in Figs. 2a and 3a, for example, the movements of paired limbs 10a/10b, 16a/16b and 18a/18b are one third of cycle out of phase from each other, or spaced 120 radial degrees apart from each other. The effect simulates multiple limbs extending and contracting in relation to a body when a multi-limbed creature walks or crawls along a surface.

[0047] As back limb 10a pivots upwardly into a contracted position, back limb 10b also pivots upwardly in a mirrored fashion. Simultaneously, front limbs18a and 18b pivot downwardly into their extended positions. Middle limbs 16a and 16b are in the midpoint positions in the operative cycle. When drive wheel assembly 20 rotates along a surface, actuated limbs 10a, 10b, 16a, 16b, 18a, 18b move linearly and reciprocally. Such particular motion may be described as a continuous series of full contractions and extensions of joint ends of each pair of limbs, with the outer tips engaging the ground and sliding between their left and right extremity positions. As each operative cycle continues, each limb repeatedly moves upwardly or downwardly, and leftwardly or rightwardly.

[0048] Fig. 6d sets forth a front view of drive wheel assembly 20 with an optional tracking groove 21a and a centrally located axle 29a. Drive wheel 27b may further comprise axle 29b centrally located on said drive wheel. Although not shown in the figures, back drive wheel 27b may also optionally have a tracking groove.

[0049] Fig. 6a sets forth a top view of drive wheel assembly 20, which shows that drive wheels 27a and 27b may further comprise channels 28a and 28b, respectively, to optionally house

surface gripping o-rings. The advantage of providing a frictional element to drive wheels is to prevent the drive wheels from skidding on a slippery surface when said drive wheels are being pushed or pulled, and to ensure proper traction when propelled along a surface.

[0050] Fig. 4 is an exploded view of a walking toy constructed in accordance with the present invention and is generally referenced by numeral 1. Toy 1 is configured to resemble a crab and includes a drive wheel assembly 20, a top shell unit 50, eyes 44 and 48, limbs 10a, 10b, 16a, 16b, 18a and 18b, and a front attachment unit 30. Drive wheel assembly 20 is operatively coupled to each of limbs 10a, 10b, 16a, 16b, 18a, and 18b in the manner illustrated by the broken lines. Drive wheel assembly 20 simultaneously actuates the linear movement of six limbs, imparting the crawling or walking actions of a multi-limbed creature as embodied in toy 1.

[0051] As demonstrated in Figs. 2a and 3a, joint ends 15a and 15b of limbs 10a and 10b are pivotally coupled to shaft 24. Joint ends 17a and 17b of limbs 16a and 16b are pivotally coupled to shaft 25. Joint ends 19a and 19b of limbs 18a and 18b are pivotally coupled to shaft 26. Each said joint end can freely pivot with respect to drive wheel assembly 20. The rim of joint end is preferably coated with anti-friction element to allow easy rotation of said joint end when paired and coupled to said drive wheels.

[0052] As better seen in Figs. 7a and 7b, each shows a pair of engaged joint ends forming a linkage joint. Fig. 7a is a partial front view of a linkage joint formed by a pair of joint ends engaged in fully extended positions. The broken lines represent said joint ends shifting to their contracted positions. Fig.7b is a partial front view of said linkage joint in contracted positions. The broken lines represent said joint ends shifting to their fully extended positions. Referring to the figures, each said joint end comprises a rotation stop. As shown in Fig. 4, joint end 15b of back right limb 10b comprises a rotation stop 11b, a lower lip 12b, a C-opening 13b, and an upper lip 14b. Joint end 15a of left back limb 10a comprises the same features, namely, a lower lip 12a, a C-opening 13a, and an upper lip 14a. Joint end 15a also has a rotation stop 11a (shown in broken lines in Fig. 4) similarly located adjacent to C-opening 13a. The rotation stops on the joint ends of two paired limbs reciprocally restrain the rotational angles of said limbs to simulate the realistic limitations of joints when contracting and extending, and to prevent the limbs from collapsing together when toy 1 is lifted off a surface.

[0053] Referring to Fig. 7a, when a pair of joint ends is in its fully extended position, upper lip 14a is pressed downwardly against rotation stop 11b. At the same time, upper lip 14b is pressed downwardly against rotation stop 11a. Conversely, referring to Fig. 7b, when a pair of joint ends is in its fully contracted position, lower lip 12a is pressed upwardly against rotation stop 11b. At the same time, lower lip 12b is pressed upwardly against rotation stop 11a.

[0054] Referring to a preferred embodiment, it is desirable to have a rotation stop on each joint end in order to achieve efficient production and assembly by eliminating the need to differentiate between left from right joint end. It is functionally sufficient, however, to have only one rotation stop per pair of joint ends. As aforementioned, an advantage of having rotation stops on joint ends is to keep limbs 10a and 10b within limited rotational range with respect to each other. The rotation stops also ensure that limbs retain their respective orientations when lifted off and then placed backed on to a surface. For example, when lifted off a surface, said rotation stops prevent said limbs from collapsing downwardly completely. It is also permissible to have no rotation stop on joint ends, although the effect is less desirable.

[0055] Limbs 10a, 10b, 16a, 16b, 18a and 18b each terminates at a tip end, which extends outwardly and downwardly to contact a surface. In a preferred embodiment, the terminal tip ends are frictionless so limbs can slide across a surface back and forth as drive wheel assembly 20 is rotated clockwisely or counter-clockwisely. It will be understood that not all tip ends need to be in continuous contact with a surface throughout an operative cycle of said toy 1. Some can stay afloat or temporarily lift off a surface during an operative cycle.

[0056] Referring to Fig. 4, a preferred embodiment of the present invention is in the configuration of a crab. Preferably, toy 1 comprises a drive wheel assembly 20, coupled to three limbs on each lateral side 10a, 16a, 18a and 10b, 16b, 18b, a front claw attachment unit 30, and a top shell unit 50 with a pair of eyes 44 and 48. Referring to Fig. 4, drive wheel assembly 20 is housed inside the cavity under top shell unit 50 and behind front attachment unit 30.

[0057] Said front claw attachment 30 comprises a right alignment bar 31, left alignment bar 32; fastener 33; bottom left half circle 34; bottom right half circle 35; right claw 36; left claw 37; receiving slot 38. Top shell 50 has a cavity as housing of drive wheel assembly 20. Said top shell 50 unit comprises a right front attachment alignment slot 51, left front attachment

alignment slot 52, back shell wheel bracket 53, back shell axle port 54, top right half circle 55, top left half circle 56, front body wheel bracket 57, front shell axle port 58, and recessed pocket handle 59.

[0058] Referring to Fig. 4, drive wheel assembly 20 by means as set forth below in greater detail is rotatably housed beneath top shell 50 cavity and coupled behind front attachment unit 30. Axle 29a on drive wheel assembly 20 is slidably received in slot 38 of front attachment unit 30. Front body wheel bracket 57 of top shell unit 50 is further slidably received in slot 38. Axle 29a is rotatably snapped into front between Front body wheel bracket 57 with front shell axle port 58. Fastener 33 further secures axle 29a to front attachment unit. It will be understood that other means for fastening can be substituted to secure such front attachment unit to drive wheel assembly 20. Similarly, although not shown in the figures, back shell wheel bracket 53 is coupled to back axle 29b. Back axle 29b snaps into back shell axle port 54. The broken lines in Fig. 4 represent the coupling of top shell unit 50 to drive wheel assembly 20.

[0059] Referring to Fig. 5c, right claw 36 and left claw 37 extend downwardly and make contact with the surface, thus serving as an additional stabilizer for drive wheel assembly 20 when toy 1 is propelled across a surface. Because top shell unit 50 is attached to drive wheel assembly 20 via coupling axle ports 58 and 54 to axles 29a and 29b, respectively, it tilts downwardly on either side. By coupling front attachment unit 30 to top shell 50, it allows claws 36 and 37 to further serve as restraints to the tilting movement of said top shell so that it does not impinge on the limbs on either side when toy 1 is propelled across a surface.

[0060] Top shell unit 50 is further coupled to front attachment 30 by means as set forth below in greater detail. Right attachment alignment slot 51 of top shell 50 mates with right alignment bar 31 of front attachment unit 30. Left front attachment alignment slot 52 mates with left alight bar 32 on front attachment unit 30. It will be understood that other means for coupling can be substituted to secure such front claw attachment unit 30 to top shell unit 50.

[0061] Figs. 6a-6d show the different views of drive wheel assembly 20 with a pair of tracking levers and eyes attached. Referring to the figures, the rotational power provided in the above-described walking cycle is operatively coupled to right tracking pin 42 and left tracking pin 46 for actuating a pair of tracking levers 41 and 45 simultaneously. In a preferred embodiment,

tracking levers 41 and 45 are connected to said tracking pins 42 and 46 on one end and to a pair of eyes 44 and 48 on the other end. Referring to Fig. 4, right eye 44 is coupled to the other end of right tracking lever 41 through peg 43; left eye 48 is coupled in a similar fashion to tracking lever 45 through peg 47. It is understood that a single, or a plurality of tracking pin or tracking lever, may be adopted via the same mechanism. It is further understood that components other than eyes, for example, limbs, antennae, tails, or signage, may be coupled to said tracking lever via the same mechanism.

[0062] Although only front drive wheel 27a is shown to have a tracking groove, it will be understood that back drive wheel 27b optionally can also have a tracking groove for driving a single or a plurality of components, such as a limb, tail, or signage, using the same mechanism.

[0063] Particular embodiments of the invention have been shown and described. It will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects. Therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of the invention.

CLAIMS

Having thus described one form of the invention in some detail, what is claimed is:

1. A drive wheel assembly comprising:

a first and second drive wheels;

said first drive wheel is operatively coupled to a first shaft;

said second drive wheel is operatively coupled to a second shaft;

a third shaft is operatively coupled to said first and second shafts; and

at least a limb operatively coupled to each said shaft.

2. The drive wheel assembly of claim 1, wherein said first drive wheel is rotatable with said second drive wheel along a common rotational axis.

3. The drive wheel assembly of claim 2, wherein each said shaft is eccentric to said rotational axis.

4. The drive wheel assembly of claim 3, wherein said first, second, and third shafts are offset at different angles from said rotational axis.

5. The drive wheel assembly of claim 4, wherein a first pair of limbs is operatively coupled to said first shaft.

6. The drive wheel assembly of claim 5, wherein a second pair of limbs is operatively coupled to said second shaft.

7. The drive wheel assembly of claim 6, wherein a third pair of limbs is operatively coupled to said third shaft.

8. The drive wheel assembly of claim 7, each said pair of limbs further comprises a rotation stop.

9. The drive wheel assembly of claim 8 further comprises a first tracking groove integrated to said first drive wheel.

10. The drive wheel assembly of claim 9 further comprises a second tracking groove integrated to said second drive wheel.

11. A drive wheel assembly comprising:

a drive wheel;

a plurality of shafts;

a plurality of limbs;

said drive wheel is operatively coupled to said shafts; and

each said limb is operatively coupled to at least one of said shafts.

12. The drive wheel assembly of claim 11, wherein said shafts are coupled eccentrically to said drive wheel.

13. The drive wheel assembly of claim 12, wherein at least two said limbs are coupled to each said shaft.

14. The drive wheel assembly of claim 13, wherein said two limbs further comprise at least a rotation stop.

15. The drive wheel assembly of claim 14 further comprises a tracking groove integrated to said drive wheel.

16. A walking toy device comprising:

a driving wheel,

a plurality of shafts; and

a plurality of limbs paired in horizontally opposed directions.

17. The walking toy device of claim 16, further comprises a link.

18. The walking toy device of claim 17, further comprises a tracking groove.

19. The walking toy device of claim 18, further comprises a rotation stop.

20. The walking toy device of claim 19, further comprises a stabilizer.

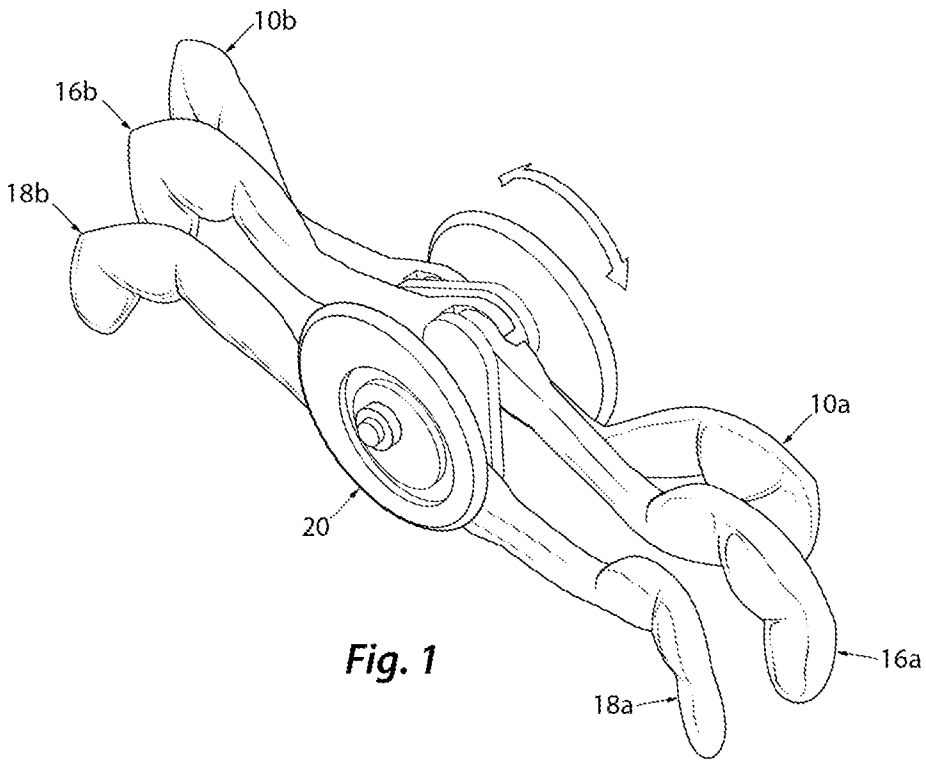
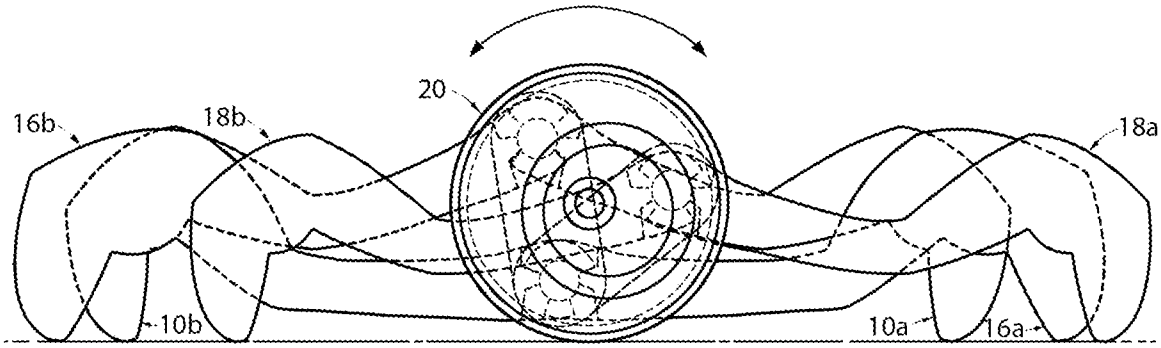


Fig. 1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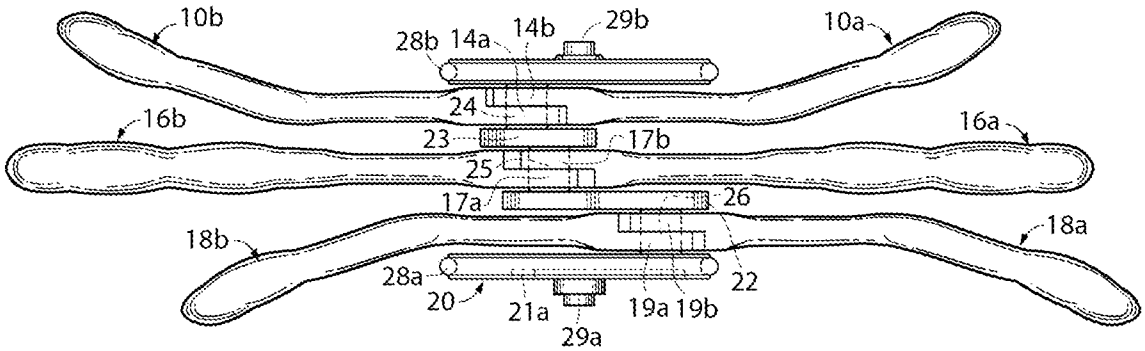
18b
18a
10b
10a
16a

Fig. 2a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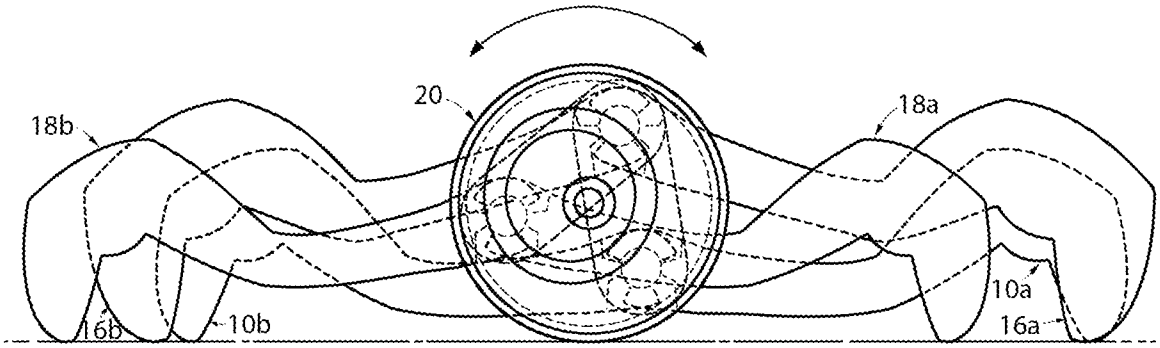
22
20
21a
19a
19b
29a

Fig. 2b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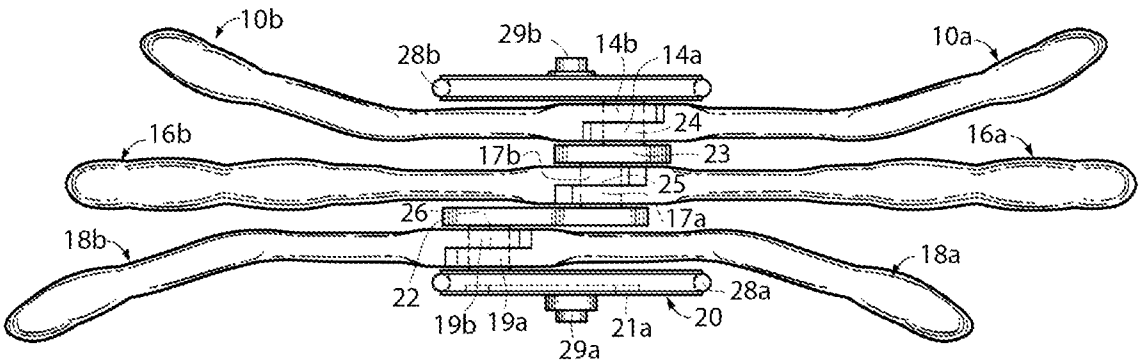
18b
18a
10a
16b
10b
16a

Fig. 3a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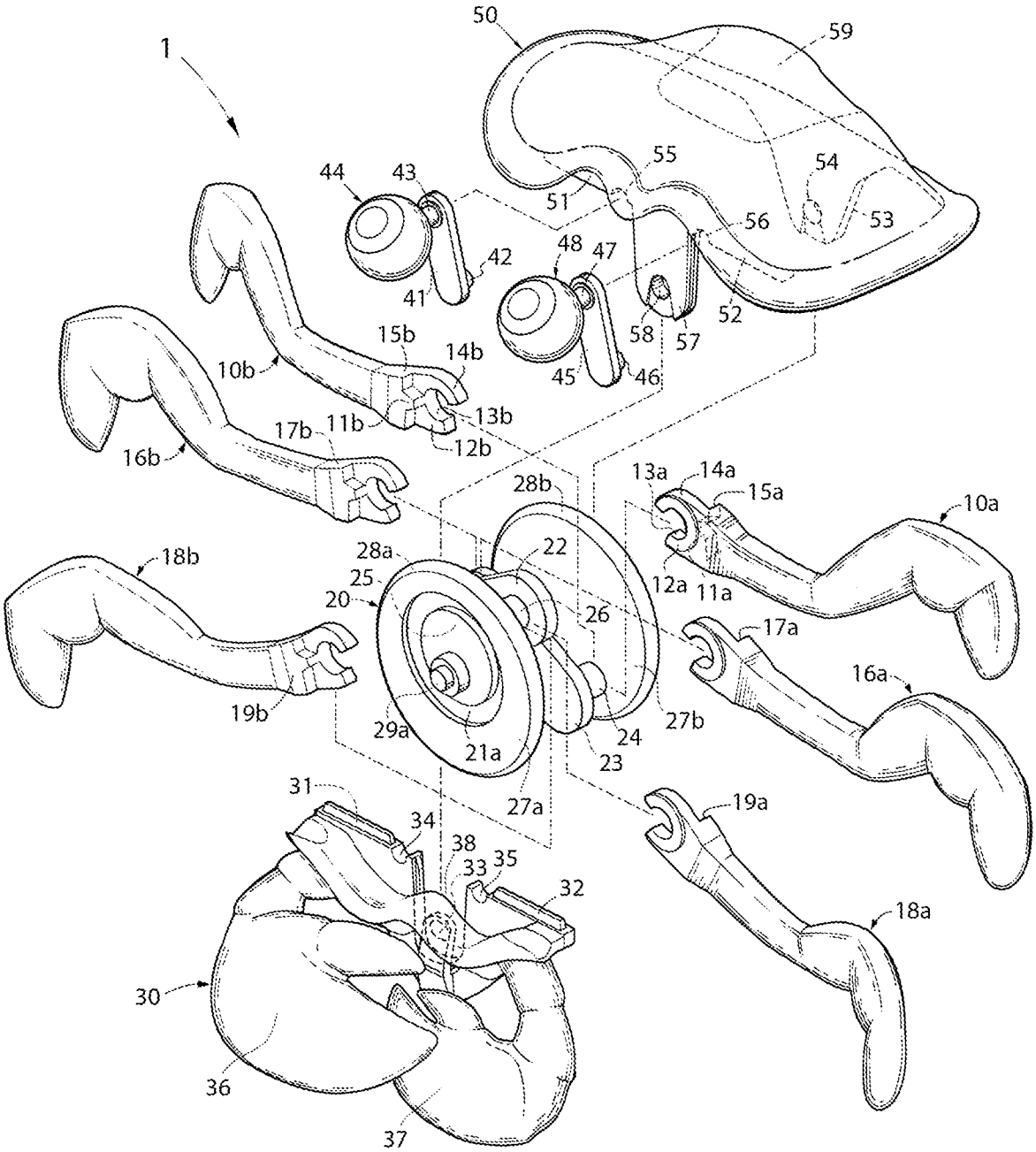
28a
19b
19a
21a
20
29a

Fig. 3b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28b
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18b
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Fig. 4

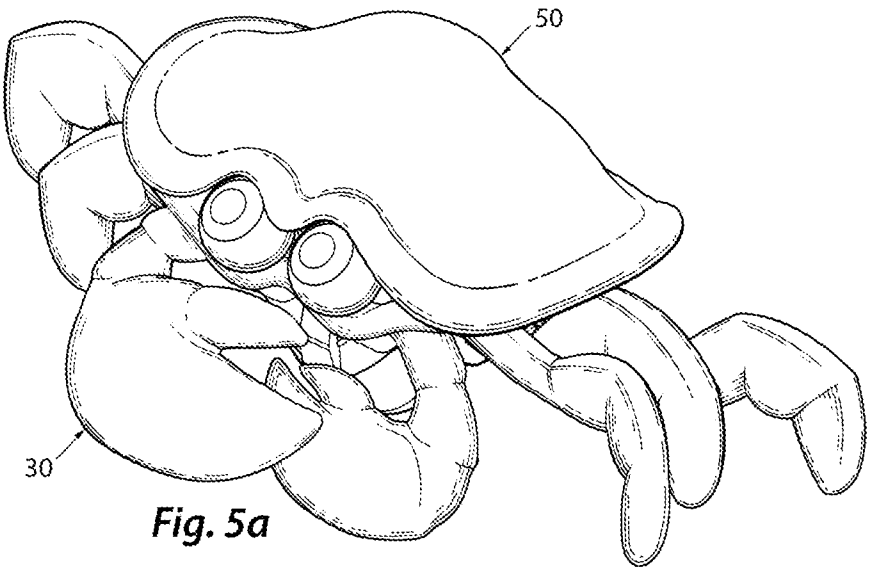

Fig. 5a

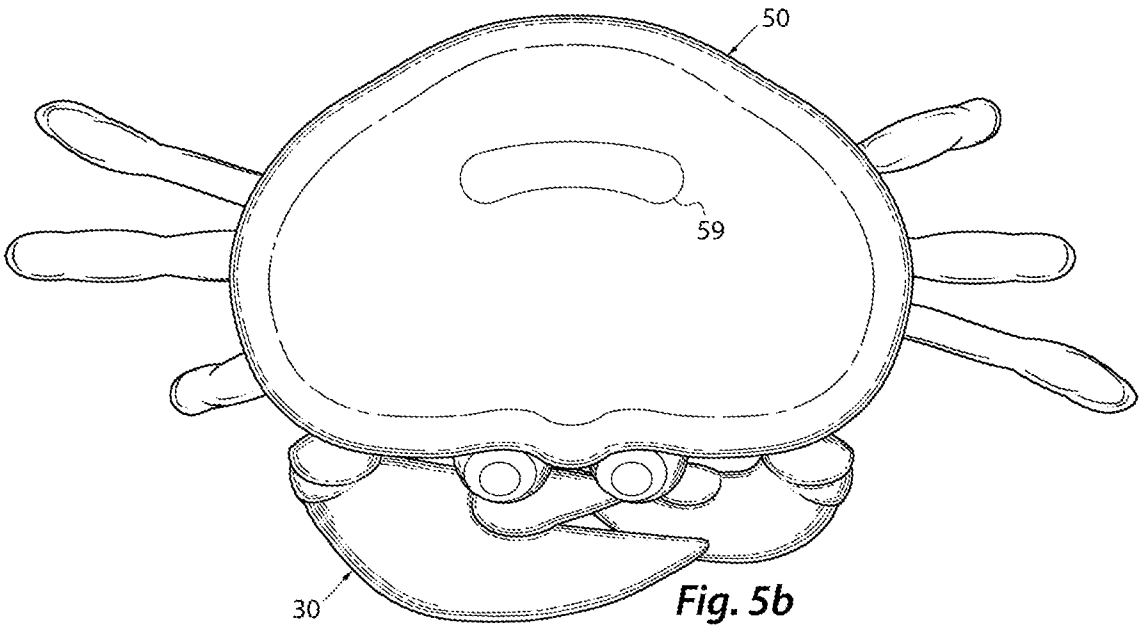

Fig. 5b

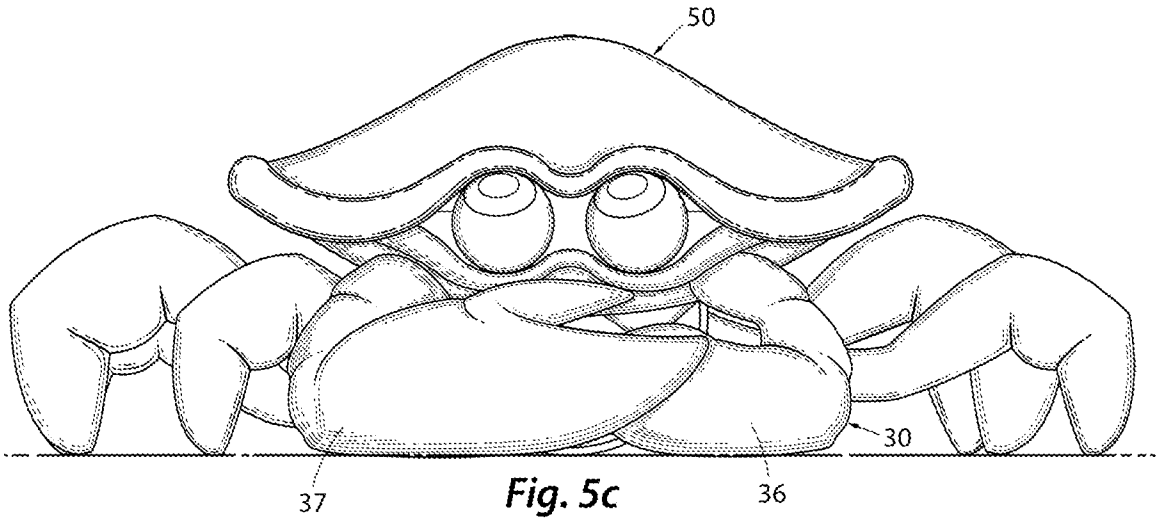

Fig. 5c

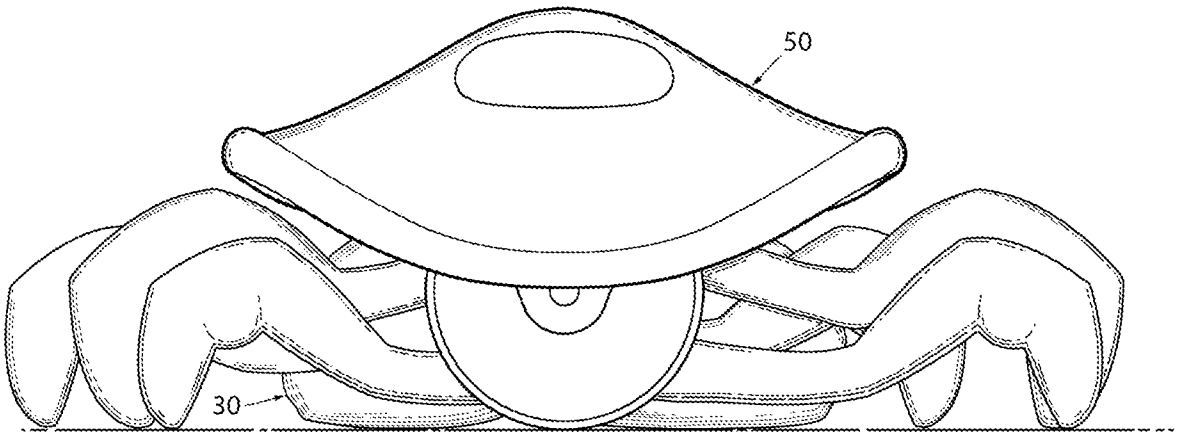

Fig. 5d

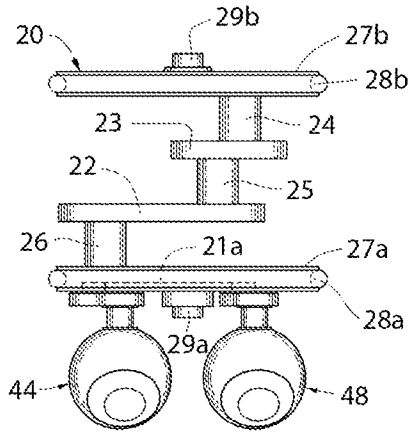

Fig. 6a

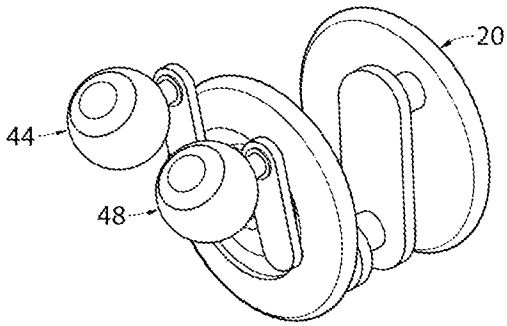

Fig. 6b

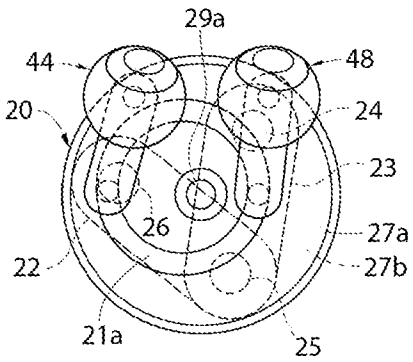

Fig. 6d

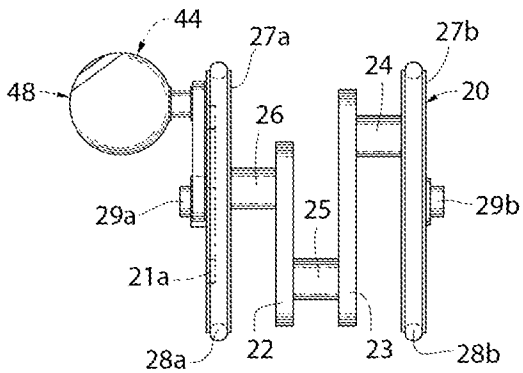

Fig. 6c