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(54) **Title:** SWING WITH MOTION GENERATED BY MOVING FRAME

(57) **Abstract:** A baby swing for producing a back and forth swinging motion is disclosed. The baby swing can include an upper frame, a lower frame, a hub, and a drive mechanism. The upper frame can be pivotally coupled to the lower frame, such that the upper frame can pivot relative to the lower frame. The hub can be coupled to at least one of the upper frame and the lower frame. The drive mechanism can be disposed within the hub, and the drive mechanism can be configured to cause the upper frame to pivot relative to the lower frame.

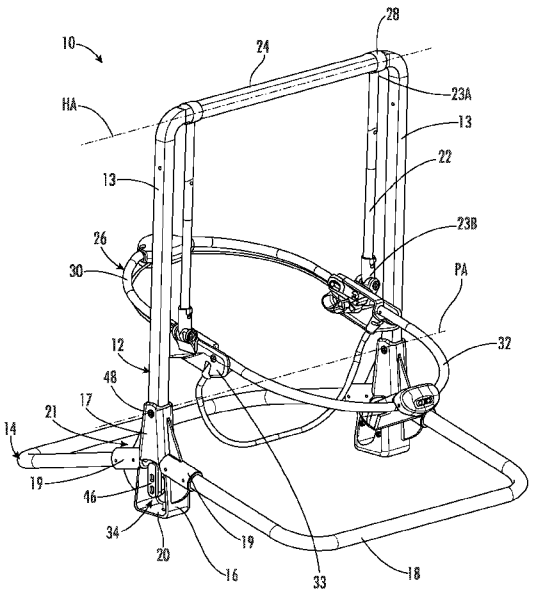

FIG. 1

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SWING WITH MOTION GENERATED BY MOVING FRAME

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 63/508,729, filed on June 16, 2023, and U.S. Provisional Patent Application No. 63/584,719, filed on September 22, 2023, which are incorporated by reference as if fully set forth.

TECHNICAL FIELD

[0002] The present disclosure is directed to a baby swing, and more particularly it is directed to a baby swing including frame swinging motion generation.

BACKGROUND OF THE INVENTION

[0003] Baby swings are utilized for rocking and swinging a baby in a back and forth motion to soothe and calm the baby within the swing. Electric baby swings, which produce the swinging motion using an electric actuator, are conventionally powered using small DC motors and gearboxes that are typically mounted on the upper frame, near the hinge pivot point of the swing. As such, conventional electric baby swings can be readily recognized by a slender lower frame and bulky upper frame, due to the need to contain the drive mechanism and electrical components near the upper hinge pivot point of the swing. Therefore, conventional electric baby swings have a bulky, top-heavy design, are often difficult to fold due to the large housings at the top of the frame, and generally have complicated wiring running from the lower to upper frame to power the drive mechanism.

[0004] As such, there is a need for a new and improved electric baby swing that minimizes or eliminates the aforementioned issues with previous electric baby swings.

SUMMARY OF THE INVENTION

[0005] According to one aspect, the present disclosure is directed to a baby swing. The baby swing can include an upper frame pivotally coupled to a lower frame, such that the upper frame can pivot relative to the lower frame. A hub can be coupled to at least one of the upper frame and the lower frame. A drive mechanism can be disposed within the hub, and the drive mechanism can be configured to cause the upper frame to pivot relative to the lower frame.

[0006] In an aspect, the hub is coupled to both the upper frame and the lower frame.

[0007] In an aspect, the hub is positioned adjacent an intersection of the upper frame and the lower frame.

[0008] In an aspect, the drive mechanism disposed within the hub is positioned below the intersection of the upper frame and the lower frame.

[0009] In an aspect, the drive mechanism disposed within the hub is positioned adjacent a supporting surface.

[0010] In an aspect, a seat can be pivotally coupled to the upper frame through at least one pendulum arm, such that the seat can pivot relative to the upper frame.

[0011] In an aspect, a frame pivot axis of the upper frame and lower frame is vertically offset from a hinge pivot axis of the seat and at least one pendulum arm.

[0012] In an aspect, the seat includes a first seat half and a second seat half each rotatably coupled to a seat hub, and the first and second seat halves can rotate relative to the seat hub into a folded configuration.

[0013] In an aspect, the lower frame includes at least one lower leg, and the at least one lower leg is rotatably coupled to the hub such that the at least one lower leg can rotate and fold into a folded configuration.

[0014] In an aspect, a resilient arm can extend between and be coupled to each of the upper frame and the drive mechanism, and the resilient arm can be configured to transfer induced motion from the drive mechanism to the upper frame.

[0015] In an aspect, the resilient arm converts rotary motion from the drive mechanism into oscillatory motion of the upper frame.

[0016] In an aspect, a first end of the resilient arm is coupled to a frame pivot point of the upper frame, and a second end of the resilient arm includes a slot that is configured to engage with the drive mechanism.

[0017] In an aspect, the drive mechanism includes a wheel coupled to a crank, and the slot of the resilient arm is configured to engage with the wheel as the wheel rotates with the crank about a rotation axis of the crank.

[0018] In an aspect, engagement between the crank, the wheel, and the slot of the resilient arm is configured to convert rotary motion of the crank into back and forth oscillatory motion of the resilient arm within the hub.

[0019] In an aspect, due to the first end of the resilient arm being coupled to the frame pivot point of the upper frame, the back and forth oscillatory motion of the resilient arm within the hub produces a back and forth oscillatory motion of the upper frame relative to the lower frame.

[0020] In an aspect, the lower frame remains stationary during pivoting of the upper frame relative to the lower frame.

[0021] In an aspect, the upper frame includes first and second vertically extending members with a connecting bar extending between and connecting the first and second vertically extending members; and two pendulum arms are coupled to hinges of the first and second vertically extending members, and the pendulum arms are coupled to a seat.

[0022] In an aspect, the upper frame includes first and second vertically extending members with hinges positioned at distal ends of the first and second vertically extending members; two pendulum arms are coupled to the hinges of the first and second vertically extending members, and the pendulum arms are coupled to a seat; and a connecting bar extends underneath the seat, and the connecting bar extends between and connects a first hub to a second hub.

[0023] In an aspect, the upper frame includes a single vertically extending members with a hinge positioned at a distal end of the single vertically extending member; and a single pendulum arm is coupled at a first end to the hinge and coupled at a second end to a seat.

[0024] In an aspect, a first side of the upper frame includes a forked end, and a second side of the upper frame includes a forked end; and a first pendulum arm extends between and is coupled to the forked ends of the first and second sides of the upper frame; and a second pendulum arm extends between and is coupled to the forked ends of the first and second sides of the upper frame, wherein the first and second pendulum arms extend beneath and support a seat.

[0025] In an aspect, the upper frame includes a single vertically extending members with a hinge positioned at a distal end of the single vertically extending member; and a seat is coupled directly to the hinge.

[0026] According to another aspect, the present disclosure is directed to a method of operating a baby swing to generate a swinging motion. The method can include providing a hub with an upper frame and a lower frame each coupled to the hub, such that the upper frame can pivot relative to the lower frame; providing a drive mechanism disposed within the hub, adjacent an intersection of the upper frame and the lower frame, and adjacent a supporting surface; providing a resilient arm that is positioned between and coupled to each of the upper frame and the drive mechanism; and activating the drive mechanism to cause the resilient arm and the upper frame to pivot relative to the lower frame, causing a seat coupled to the upper frame to swing in a back and forth motion.

[0027] In an aspect, the method can further include providing a wheel coupled to a crank of the drive mechanism, wherein activating the drive mechanism causes the crank to rotate about a rotation axis of the crank, which causes the wheel to revolve around the rotation axis of the crank.

[0028] In an aspect, the resilient arm includes a slot that is configured to engage with the wheel of the drive mechanism, such that during activation of the drive mechanism the resilient arm converts rotary motion of the crank of the drive mechanism into oscillatory motion of the upper frame.

[0029] In an aspect, the resilient arm is positioned and pivots within the hub in a same rotation direction as the upper frame.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] The foregoing Summary as well as the following Detailed Description will be best understood when read in conjunction with the appended drawings, which illustrate a preferred embodiment of the disclosure. In the drawings:

[0031] FIG. 1 is a perspective view of an exemplary embodiment of a baby swing according to the present disclosure.

[0032] FIG. 2A is a side view of the baby swing of FIG. 1 in an expanded configuration.

[0033] FIG. 2B is a side view of the baby swing of FIG. 1 in a collapsed or folded configuration.

[0034] FIG. 3 is a magnified detail view of a drive mechanism of the baby swing, as indicated by Detail View A in FIG. 2A.

[0035] FIG. 4 is a perspective view of the drive mechanism of FIG. 3, removed from a hub of the baby swing.

[0036] FIG. 5 is a perspective view of a second embodiment of the baby swing according to the present disclosure.

[0037] FIG. 6 is a perspective view of a third embodiment of the baby swing according to the present disclosure.

[0038] FIG. 7 is a perspective view of a fourth embodiment of the baby swing according to the present disclosure.

[0039] FIG. 8 is a perspective view of a fifth embodiment of the baby swing according to the present disclosure.

[0040] FIG. 9 is a perspective view of a sixth embodiment of the baby swing according to the present disclosure.

[0041] FIG. 10A is a perspective view of a seventh embodiment of the baby swing according to the present disclosure.

[0042] FIG. 10B is a side view of the seventh embodiment of the baby swing of FIG. 10A.

[0043] FIG.11A is a perspective view of an eighth embodiment of the baby swing according to the present disclosure.

[0044] FIG. 11B is a side view of the eighth embodiment of the baby swing of FIG. 11A.

[0045] FIG. 12 is a perspective view of a ninth embodiment of the baby swing according to the present disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0046] Certain terminology is used in the following description for convenience only and is not limiting. The words "front", "rear", "upper", and "lower" designate directions in the drawings to which reference is made. The words "inwardly" and "outwardly" refer to directions towards and away from parts referenced in the drawings. "Axially" refers to a direction along the axis of a shaft. A reference to a list of items that are cited as "at least one of a, b, or c" (where a, b, and c represent the items being listed) means any single one of the items a, b, or c, or combinations thereof are included. The terminology includes the words specifically noted above, derivatives thereof and words of similar import.

[0047] The present disclosure is directed to a baby swing that can produce a back and forth swinging or rocking motion. The baby swing assembly can include an upper frame and a lower frame structure. The upper frame can be pivotally coupled to the lower frame at a frame pivot point via a frame pivot axis that allows the upper frame to rock in a back and forth motion. A drive mechanism can be attached to the lower frame and/or a hub. The drive mechanism can include a crank and a wheel. A resilient member or arm with a slot can be configured to fit around the wheel, and the resilient member or arm can extend from the upper frame and can be connected to the wheel. A seat can be suspended from pendulum arms that are connected via a hinge pivot axis near the top of the upper frame. When the drive mechanism is operated or activated, the crank turns and moves the wheel 360 degrees around a rotation axis of the crank. Further, the wheel rotates within the slot, driving the resilient member or arm and the upper frame in a back and forth motion. As the upper frame moves in a back and forth motion, the seat suspended from the pendulum arms also moves in a back and forth motion, gaining energy and momentum each cycle of the crank and the wheel. The upper frame can move in unison with the suspended seat in this fashion until a desired swing amplitude is achieved.

[0048] FIG. 1 is a perspective view of an exemplary embodiment of a baby swing 10 according to the present disclosure. The baby swing 10 can include an upper frame 12, a lower frame 14, and a hub 16. The upper frame 12 can have a generally upside down U-shape, when viewing the baby swing 10 in a direction from front to back. The lower frame 14 can have a generally rectangular shape, when viewing the baby swing 10 in a direction from top down. More specifically, the lower frame 14 can include at least one lower leg 18. In the illustrated example, the lower frame 14 includes two lower legs 18. Each lower leg 18 includes a generally U-shape, when viewing the baby swing 10 from top down. Further, in some examples, each lower leg 18 can be constructed to be identical in shape and size.

[0049] The upper frame 12 and the lower frame 14 can each be coupled to the hub 16, such that the upper frame 12 can pivot relative to the lower frame 14. More specifically, the upper frame 12 can be coupled to a vertically extending portion 17 of the hub 16, with respect to the orientation illustrated in FIG. 1 (i.e., the operational orientation during use). Further the lower frame 14 can be coupled to generally fore and aft extending portions 19 of the hub 16. As illustrated, based on the shape of the hub 16, the generally fore and aft extending portions 19 of the hub 16 are not exactly horizontal, relative to a support surface, but rather point in a direction towards the supporting surface on which the baby swing 10 rests when in use. As such, the vertically extending portion 17 of the hub 16 and the generally fore and aft extending portions 19 of the hub 16 form an upside-down Y-shaped structure 21 of the hub 16. As such, the hub 16 can be generally positioned adjacent an intersection of the upper frame 12 and the lower frame 14.

[0050] A support 20 of the hub 16 is positioned at the bottom of the hub 16 below the upside-down Y-shaped structure 21 of the hub 16, such that the support 20 is positioned further from the upper frame 12 and closer to the lower frame 14. In some examples, the upside-down Y-shaped structure 21 and the support 20 of the hub 16 can be formed integral as a single component. In other examples, the upside-down Y-shaped structure 21 and the support 20 of the hub 16 can be coupled through known fastening techniques, such as, without limitation, fasteners, adhesives, welding, brazing, clamping, etc. Further, at least some of

the support 20 is positioned adjacent and in direct contact with the supporting surface utilized to stand and support the baby swing 10. The support 20 along with the lower legs 18 of the lower frame 14 are configured to provide standing or supporting surfaces for the baby swing 10 to keep the baby swing 10 in an upright position during use of the baby swing 10. In an exemplary aspect, the baby swing 10 can include two hubs 16, with one positioned on each lateral side of the baby swing 10, as illustrated in FIG. 1.

[0051] In the illustrated embodiment of FIGS. 1-3, the upper frame 12 and the lower frame 14 can each be constructed from tubes that are inserted in apertures or receiving channels of the hub 16, and a fastener is used to couple and secure the upper frame 12 and the lower frame 14 to the hub 16. Specifically, in the illustrated example, the upper frame 12 can be formed from a rectangular or square tube, while the lower legs 18 of the lower frame 14 can each be formed from circular tubes. It is to be understood that the upper frame 12 and the lower frame 14 can each be formed from a tube having any desired cross-sectional shape, and that the present disclosure is not limited to only rectangular, square, or circular tubes. Further, it is to be understood that the upper frame 12 and the lower frame 14 can be coupled to the hub 16 through known means that would be apparent to those skilled in the art. For example, the upper frame 12 and the lower frame 14 could be coupled to the hub 16 through fasteners, adhesives, welding, brazing, clamping, and a friction fit connection, among other options not specifically listed.

[0052] The baby swing 10 can further include at least one pendulum arm 22 coupled at a first end 23A to a top portion or connecting bar 24 of the upper frame 12, and coupled at a second end 23B to a seat 26 of the baby swing 10. In the illustrated example of FIG. 1, the baby swing 10 includes two pendulum arms 22, with one on each lateral side of the baby swing 10. In other examples, the baby swing 10 can include more or less than two pendulum arms 22. The at least one pendulum arm 22 is configured to provide structure to hang and support the seat 26 from the upper frame 12. In some examples, the at least one pendulum arm 22 can be a rigid bar, arm, or other similar member. In other examples, the at least one pendulum arm 22 can be a non-rigid bar or arm, such as a cord, rope, or chain, among other options not specifically listed. In the illustrated example, each of the

at least one pendulum arm 22 is coupled to the connecting bar 24 of the upper frame 12 adjacent a vertically extending member 13 of the upper frame 12, such that the at least one pendulum arm 22 is generally parallel with the vertically extending member 13 of the upper frame 12. The opposite end of the at least one pendulum arm 22 not coupled to the upper frame 12 is coupled to the seat 26, such that the seat 26 is hanging from the connecting bar 24 of the upper frame 12.

[0053] The seat 26 is pivotally coupled to the connecting bar 24 of the upper frame 12 through a hinge 28 of the at least one pendulum arm 22, with the hinge 28 being coupled to the connecting bar 24 of the upper frame 12. The hinge 28 of the at least one pendulum arm 22 allows the seat 26 to pivot back and forth relative to the upper frame 12. In other examples, the seat 26 can be rigidly coupled to the connecting bar 24 of the upper frame 12 through the at least one pendulum arm 22, such that the seat 26 cannot pivot relative to the upper frame 12. In such an example, the seat 26 would move and/or pivot in unison with the upper frame 12. Therefore, in some examples the seat 26 can pivot relative to the upper frame 12, and in other examples the seat 26 cannot pivot relative to the upper frame 12, depending on the desired configuration/movement of the seat 26.

[0054] The seat 26 can include a first seat half 30, a second seat half 32, and a seat hub 33. In the illustrated example shown in FIGS. 1, 2A, and 2B, the first seat half 30 and the second seat half 32 each include a generally U-shape, and each are constructed from circular tubes. Further, as illustrated, the seat 26 can include two seat hubs 33 positioned on opposite lateral sides of the seat 26. The first seat half 30 and the second seat half 32 can each be coupled to both of the seat hubs 33 of the seat 26. In addition, the first seat half 30 and the second seat half 32 can each be rotatably coupled to the seat hubs 33, such that the first seat half 30 and the second seat half 32 can rotate relative to the seat hubs 33 into a folded configuration, discussed further below. Although not illustrated, it is to be understood that a soft goods, baby car seat, or other baby carrier can be inserted into and/or supported by the seat 26. In turn, a baby can be laid into the soft goods, baby car seat, or other baby carrier to be rocked back and forth by the baby swing 10.

[0055] FIG. 2A is a side view of the baby swing 10 in an expanded configuration. FIG. 2B is a side view of the baby swing 10 in a collapsed or folded configuration. FIGS. 2A-2B will be discussed together below.

[0056] As discussed, the lower frame 14 can include at least one lower leg 18. In the illustrated example shown in FIGS. 1, 2A, and 2B, the lower frame 14 includes two lower legs 18. Each of the lower legs 18 are coupled to the hub 16, and each of the lower legs 18 are configured to aid in supporting the baby swing 10 in a standing, upright position when in use, as illustrated in FIGS. 1 and 2A. Further, each of the lower legs 18 can be rotatably coupled to the hub 16, such that each of the lower legs 18 can rotate upwards toward the upper frame 12 and fold into a folded configuration, as illustrated in FIG. 2B. When each of the lower legs 18 are folded into the folded configuration (FIG. 2B), each of the lower legs 18 are oriented generally parallel to the vertically extending members 13 of the upper frame 12. Folding the lower legs 18 allows for easier storing and transporting of the baby swing 10, compared to a baby swing that cannot be folded.

[0057] As discussed, the seat 26 can include the first seat half 30 and the second seat half 32, and the seat 26 is configured to support a soft goods, baby car seat, or other baby carrier, as illustrated in FIG. 2A. Further, each of the first seat half 30 and the second seat half 32 can be rotatably coupled to the seat hubs 33, such that the first seat half 30 and the second seat half 32 can rotate relative to the seat hubs 33 into a folded configuration, as illustrated in FIG. 2B. More specifically, each of the first seat half 30 and the second seat half 32 can rotate upwards toward the upper frame 12 and fold into the folded configuration. When each of the first seat half 30 and the second seat half 32 are folded into the folded configuration (FIG. 2B), each of the first seat half 30 and the second seat half 32 are oriented generally parallel to the vertically extending members 13 of the upper frame 12, and generally parallel to the lower legs 18 when the lower legs 18 are also folded into the folded configuration. Folding the first seat half 30 and the second seat half 32 of the seat 26 allows for easier storing and transporting of the baby swing 10, compared to a baby swing that cannot be folded.

[0058] Referring again to FIG. 1, the baby swing 10 can also include a drive mechanism 34 disposed within one or both of the hubs 16. More specifically, the

drive mechanism 34 can be disposed within an interior open space of the support 20 of the hub 16. As such, based on the shape and structure of the hub 16, the drive mechanism 34 can be positioned below the intersection point or location of the upper frame 12 and the lower frame 14. Further, as illustrated, with the drive mechanism 34 disposed within the hub 16, the drive mechanism 34 is positioned adjacent the supporting surface on which the baby swing 10 is supported during use. In other words, the drive mechanism 34 can be positioned adjacent the hub 16 and the lower frame 14 such that the drive mechanism 34 is positioned close to and/or adjacent the ground or other supporting surface on which the baby swing 10 is supported during use. Therefore, in the illustrated example, the drive mechanism 34 is positioned away from the connecting bar 24 of the upper frame 12, and the drive mechanism 34 is not directly coupled to the upper frame 12.

[0059] The drive mechanism 34 can be positioned adjacent the ground or supporting surface to aid in stabilizing the baby swing 10 as a result of more weight of the baby swing 10 typically being positioned close to the ground or supporting surface. Further, positioning the drive mechanism 34 adjacent the ground or supporting surface reduces the mass and weight at the connecting bar 24 of the upper frame 12 of the baby swing 10, compared to top-heavy conventional baby swings which typically have a drive mechanism coupled directly to or adjacent the top bar of the upper frame. In addition, the drive mechanism 34 being positioned adjacent the ground or supporting surface removes the large drive mechanism housing positioned adjacent the top bar or connecting bar of the upper frame found in conventional designs, which results in the top portion of the baby swing 10 being slender and easier to fold, transport, and store. Further, positioning the drive mechanism 34 adjacent the ground or supporting surface simplifies the overall design, compared to conventional baby swings, because no electrical wires or other electrical components need to be guided or positioned at or near the connecting bar 24 of the upper frame 12.

[0060] FIG. 3 is a magnified detail view of the drive mechanism 34 of the baby swing 10, as indicated by Detail View A in FIG. 2A. FIG. 4 is a perspective view of the drive mechanism 34 shown in FIG. 3, removed from the hub 16 of the baby swing 10. FIGS. 3-4 will be discussed together below.

[0061] The drive mechanism 34 is configured to cause the upper frame 12 to pivot and/or move relative to the lower frame 14. As illustrated in FIG. 4, the drive mechanism 34 can include a motor 36, a gearbox 38, a crank 40, and a wheel 42. The motor 36 can be an actuator or other similar device that converts electrical energy into rotational output of a shaft or output device. A battery (not shown) or other electrical connection can be coupled to the motor 36 to transfer electrical energy to the motor 36, as will be appreciated by those skilled in the art. The gearbox 38 is coupled to or otherwise engageable with the shaft or output device of the motor 36. The gearbox 38 is configured to receive rotational output or energy from the motor 36, and then the gearbox 38 increases or decreases the rotational output speed of the drive mechanism 34, depending on the specific configuration and requirements. The output of the gearbox 38 is coupled to the crank 40 along a rotation axis AA of the crank 40.

[0062] The crank 40 is positioned outside of a housing 44 in which the motor 36 and gearbox 38 are positioned within. The crank 40 is configured to rotate relative to the housing 44 along the rotation axis AA of the crank 40. In the illustrated example of FIGS 3-4, the crank 40 can have a flat stadium geometric shape, meaning the cross-sectional shape of the crank 40 is rectangular with semicircles at opposite ends of the crank 40. As such, the crank 40 can include a first semi-circular end 41A and a second semi-circular end 41B positioned at an opposite end of the crank 40 as the first semi-circular end 41A. An axis BB of the first semi-circular end 41A of the crank 40 is axially aligned with the rotation axis AA of the crank 40, such that the crank 40 rotates about the rotation axis AA and the axis BB of the first semi-circular end 41A.

[0063] The wheel 42 can be positioned at the second semi-circular end 41B of the crank 40, and the wheel 42 is axially aligned with an axis CC of the second semi-circular end 41B. In the illustrated example, the wheel 42 is fixed to the crank 40 such that the wheel 42 does not rotate relative to the body of the crank 40. Further, since the wheel 42 is axially offset from the rotation axis AA of the crank 40, the wheel 42 is configured to revolve 360 degrees around the rotation axis AA of the crank 40. In the illustrated example, the wheel 42 includes a circular cross-sectional shape. In other examples, the wheel 42 could include other

geometric cross-sectional shapes. The wheel 42 is positioned on an opposite side of the crank 40 as the housing 44, such that the wheel 42 is offset from the housing 44 in a direction axially along the rotation axis AA.

[0064] The baby swing 10 can further include a resilient arm 46 that extends between and is coupled to both the upper frame 12 and the drive mechanism 34. In some examples, the resilient arm 46 can be formed integral with the upper frame 12, such that the resilient arm 46 is an extension of the upper frame 12 that extends in a direction towards the lower frame 14. In other examples, the resilient arm 46 can be a separate component from the upper frame 12 that is coupled to an end of the upper frame 12, with the resilient arm 46 extending in a direction towards the lower frame 14. In either example, the resilient arm 46 is configured to be rigidly fixed to the upper frame 12, such that the resilient arm 46 pivots and/or rotates with the upper frame 12, discussed further below. In some examples, the resilient arm 46 can be constructed from a plastic or other elastically deformable polymeric material. Further, in some examples, the resilient arm 46 can be constructed from an elastically deformable metallic material.

[0065] The resilient arm 46 can be positioned entirely within the hub 16. The resilient arm 46 can be coupled at a first end 46A to a frame pivot point 48 of the upper frame 12, and the resilient arm 46 is coupled at a second end 46B to the wheel 42 of the drive mechanism 34. The frame pivot point 48 can be a pin, dowel, or other similar component that extends through and connects each of the hub 16, the upper frame 12, and the resilient arm 46. The frame pivot point 48 includes a frame pivot axis PA, and the frame pivot axis PA is the location and/or axis in which the upper frame 12 pivots relative to the hub 16 and the lower frame 14. As such, it is to be understood that the lower frame 14 remains stationary during pivoting of the upper frame 12 relative to the hub 16 and the lower frame 14. As illustrated in FIG. 1, the frame pivot axis PA of the upper frame 12 is vertically offset from a hinge pivot axis HA of the hinge 28 of the at least one pendulum arm 22. As such, in some examples, the upper frame 12 can pivot relative to the lower frame 14 about the frame pivot axis PA, while the seat 26 can pivot relative to the upper frame 12 about the hinge pivot axis HA.

[0066] Referring again to FIG. 3, the second end 46B of the resilient arm 46 includes a slot 50 that extends in a direction from the second end of the resilient arm 46 towards the first end 46A of the resilient arm 46. The slot 50 of the second end 46B of the resilient arm 46 is configured to engage with the drive mechanism 34. Specifically, the slot 50 is configured to engage with the wheel 42, such that the wheel 42 is coupled to and/or positioned within the slot 50 of the resilient arm 46. The slot 50 is configured to engage with the wheel 42, such that as the wheel 42 revolves around the rotation axis AA of the crank 40, the wheel 42 remains engaged with the slot 50 and the wheel 42 translates through the slot 50.

[0067] The crank 40 can be configured to rotate in either the clockwise direction or the counter-clockwise direction, depending on the desired configuration. The following discussion will focus on an exemplary aspect in which the crank 40 rotates in a clockwise direction and is starting the rotation at the 6 o'clock position, as illustrated in FIG. 3. When the wheel 42 is at the 6 o'clock position, the resilient arm 46 is in a straight vertical orientation, aligned with the upper frame 12, as illustrated in FIG. 3. When the wheel 42 rotates and reaches the 9 o'clock position, the resilient arm 46 pivots, rotates, or moves in a leftwards direction (based on the orientation illustrated in FIG. 3) towards the 9 o'clock position. In turn, the movement of the resilient arm 46 in a leftwards direction causes the coupled upper frame 12 (through the frame pivot point 48) to pivot, rotate, or move in a rightwards direction (based on the orientation illustrated in FIG. 3). When the wheel 42 is at the 12 o'clock position, the resilient arm 46 is again in a straight vertical orientation, aligned with the upper frame 12, and the resilient arm 46 has moved in a rightwards direction while the upper frame 12 has moved in a leftwards direction (based on the orientation illustrated in FIG. 3). When the wheel 42 rotates and reaches the 3 o'clock position, the resilient arm 46 pivots, rotates, or moves in a rightwards direction towards the 3 o'clock position, and the upper frame 12 pivots, rotates, or moves in a leftwards direction (based on the orientation illustrated in FIG. 3).

[0068] Therefore, the resilient arm 46 is configured to transfer induced motion from the drive mechanism 34 to the upper frame 12. More specifically, the resilient arm 46 is configured to convert rotary motion of the crank 40 of the drive

mechanism 34 into oscillatory (back and forth) motion of the upper frame 12. As such, engagement between the crank 40 and the wheel 42 of the drive mechanism 34, and the slot 50 of the resilient arm 46 is configured to convert rotary motion of the crank 40 into back and forth oscillatory motion of the resilient arm 46 within the hub 16. In turn, due to the first end of the resilient arm 46 being coupled to the frame pivot point 48 which is coupled to the upper frame 12, the back and forth oscillatory motion of the resilient arm 46 within the hub 16 produces a back and forth oscillatory motion of the upper frame 12 relative to the stationary lower frame 14. Additionally, the resilient arm 46 is configured to flex slightly during the back and forth oscillatory motion to aid in a smooth transition and swinging motion of the upper frame 12 relative to the lower frame 14.

[0069] The drive mechanism 34 can be activated and operated continuously to achieve the desired back and forth oscillatory motion of the upper frame 12. With the seat 26 being suspended from the pendulum arms 22 which are coupled to the upper frame 12, the seat 26 also moves in a back and forth oscillatory motion, gaining energy and momentum each cycle of the crank 40 and the wheel 42 of the drive mechanism 34. As discussed, in some examples, the upper frame 12 can move in unison with the suspended seat 26 in this fashion until a desired swing amplitude is achieved. The baby swing 10 can be utilized for rocking and swinging a baby in a back and forth motion to soothe and calm the baby within the baby swing 10.

[0070] In addition, the disclosed baby swing 10 has many advantages over conventional baby swings, as will be appreciated by persons having ordinary skill in the art. For example, the disclosed baby swing 10 reduces the mass and weight at the top of the baby swing 10 and places the weight near the ground or other supporting surface. The disclosed baby swing 10 removes the need for a large housing at the top of the baby swing, which allows the top of the baby swing to be more slender and easier to fold and stow. The disclosed baby swing 10 also does not require any wires, electronics, or drives in the upper frame 12, as is required by previous designs, which simplifies the overall cost and design of the baby swing 10. The aforementioned advantages are only a few listed advantages, but persons

having ordinary skill in the art will appreciate the many other advantages of the disclosed baby swing 10 compared to previous baby swings.

[0071] FIGS. 5-12 include views of other exemplary embodiments of the baby swing according to the present disclosure. It is to be understood that the disclosure regarding the baby swing 10 illustrated in FIGS. 1-4 applies to the embodiments of the baby swings illustrated in FIGS. 5-12, unless noted otherwise. As such, in an effort to avoid redundancy, only the differences between the baby swings illustrated in FIGS. 5-12 and the baby swing 10 illustrated in FIGS. 1-4 will be discussed in detail below.

[0072] FIG. 5 is a perspective view of a second embodiment of the baby swing 10A according to the present disclosure. The baby swing 10A of FIG. 5 is similar to the baby swing 10 of FIGS. 1-4, with the differences illustrated in the Figures and described herein. A first difference is that the connecting bar 24A of the baby swing 10A includes a curved shape instead of a straight shape, as is the case for the connecting bar 24 of the baby swing 10 of FIGS. 1-4. The curved shape of the connecting bar 24A of the baby swing 10A can provide more space to place and remove a child into the seat 26A. Further, the curved shape of the connecting bar 24A of the baby swing 10A can provide increased stability for the overall baby swing 10A. Another difference is that the pendulum arms 22A of the baby swing 10A can be coupled to the vertically extending members 13A of the upper frame 12A instead of the connecting bar 24A. In addition, the pendulum arms 22A can extend around the and connect to a bottom portion of the seat 26A for additional support. Otherwise, the operation of the baby swing 10A is substantially similar to the baby swing 10 of FIGS. 1-4.

[0073] FIG. 6 is a perspective view of a third embodiment of the baby swing 10B according to the present disclosure. The baby swing 10B of FIG. 6 is similar to the baby swing 10 of FIGS. 1-4, with the differences illustrated in the Figures and described herein. A first difference is that the pendulum arms 22B of the baby swing 10B are coupled to the vertically extending members 13B of the upper frame 12B, while the baby swing 10 of FIGS. 1-4 includes the pendulum arms 22 coupled to the connecting bar 24. Another difference is that the connecting bar 24B of the baby swing 10B is positioned beneath the seat 26B, while the baby swing 10 of

FIGS. 1-4 includes the connecting bar 24 positioned above the seat 26. Adjusting the connection and/or hinge location and the location of the connecting bar 24B provides an advantage of having more space above the seat 26B to place and remove a child into the seat 26B. A further advantage of the embodiment of FIG. 6 is that more mass and weight of the baby swing 10B is positioned closer to the ground or supporting surface, which improves the stability of the baby swing 10B. In addition, the pendulum arms 22B can extend around and connect to a bottom portion of the seat 26B for additional support. Otherwise, the operation of the baby swing 10B is substantially similar to the baby swing 10 of FIGS. 1-4.

[0074] FIG. 7 is a perspective view of a fourth embodiment of the baby swing 10C according to the present disclosure. The baby swing 10C of FIG. 7 is similar to the baby swing 10 of FIGS. 1-4, with the differences illustrated in the Figures and described herein. One difference is that the baby swing 10C includes only one vertically extending member 13C of the upper frame 12C, one hinge 28C, and one pendulum arm 22C. The removal of a second hub 16C, a second vertically extending member 13C of the upper frame 12C, and a second pendulum arm 22C simplifies the overall design, reduces the overall weight, and reduces the overall cost of the baby swing 10C due to their being fewer overall components. Otherwise, the operation of the baby swing 10C is substantially similar to the baby swing 10 of FIGS. 1-4. Specifically, the drive mechanism 34C within the hub 16C is configured to cause the upper frame 12C to pivot in an oscillatory back and forth motion, which in turn causes the seat 26C to oscillate in a back and forth motion. In addition, the pendulum arm 22C can connect to a bottom portion of the seat 26C for additional support. Otherwise, the operation of the baby swing 10D is substantially similar to the baby swing 10 of FIGS. 1-4

[0075] FIG. 8 is a perspective view of a fifth embodiment of the baby swing 10D according to the present disclosure. The baby swing 10D of FIG. 8 is similar to the baby swing 10 of FIGS. 1-4, with the differences illustrated in the Figures and described herein. One difference is that the baby swing 10D includes an upper frame 12D that forks into a Y-shaped upper frame 12D on each lateral side of the baby swing 10D. Further, the baby swing 10D includes two pendulum arms 22D on each lateral side of the baby swing 10D. The pendulum arms 22D are each

coupled to a forked end 12D' of the upper frame 12D at four hinges 28D. Each pendulum arm 22D oscillates about a respective hinge axis HA while the upper frame 12D oscillates about a single pivot axis PA. The baby swing 10D provides an alternative approach for supporting the seat 26D for oscillatory back and forth swinging motion. In addition, the pendulum arms 22D can extend around and connect to a bottom portion of the seat 26D for additional support. Otherwise, the operation of the baby swing 10D is substantially similar to the baby swing 10 of FIGS. 1-4.

[0076] FIG. 9 is a perspective view of a sixth embodiment of the baby swing 10E according to the present disclosure. The baby swing 10E of FIG. 9 is similar to the baby swing 10 of FIGS. 1-4, with the differences illustrated in the Figures and described herein. One difference is that the baby swing 10E includes two upper frames 12E and two pendulum arms 22E positioned on each lateral side of the baby swing 10E. Each pendulum arm 22E is coupled to an upper frame 12E at a hinge 28E. Each pendulum arm 22E oscillates about a respective hinge axis HA while each upper frame 12E oscillates about a respective pivot axis PA. The baby swing 10E provides an alternative approach for supporting the seat 26E for oscillatory back and forth swinging motion. In addition, the pendulum arms 22E can extend around and connect to a bottom portion of the seat 26E for additional support. In the illustrated embodiment, the base 14E contacts the ground and the hub 16E may contact the ground and includes the drive mechanism 34E, but the secondary hub 16E' is mounted to the base and does not contain a drive mechanism. Otherwise, the operation of the baby swing 10E is substantially similar to the baby swing 10 of FIGS. 1-4. In some embodiments, the secondary hub 16E' may be substantially similar to hub 16E and include a second drive mechanism (not shown).

[0077] FIG. 10A is a perspective view of a seventh embodiment of the baby swing 10F according to the present disclosure. FIG. 10B is a side view of the seventh embodiment of the baby swing 10F of FIG. 10A. FIGS. 10A-10B will be discussed together. The baby swing 10F of FIGS. 10A-10B is similar to the baby swing 10 of FIGS. 1-4, with the differences illustrated in the Figures and described herein. One difference is that the pendulum arms 22F extend underneath the seat

26F, for supporting the seat 26F from the underside, rather than the topside as is the case with the baby swing 10 of FIGS. 1-4. The pendulum arms 22F extend from the hinges 28F at an oblique angle relative to a horizontal plane, such as, for example, the ground, in forward and backward directions. The pendulum arms 22F oscillate about a single hinge axis HA as shown, or in other embodiments oscillate about two hinge axes HA (not shown) that are proximate to each other within the perimeter of the hinge 28F. Each upper frame 12F oscillates about a pivot axis PA. The baby swing 10F provides an alternative approach for supporting the seat 26F for oscillatory back and forth swinging motion. In addition, the connecting bar 24F is positioned beneath the seat 26F, and the connecting bar 24F is coupled to each of the hubs 16F. From the hubs 16F positioned on each lateral side of the baby swing 10F, the lower frame 14F includes legs or extensions that extend in both the forward and backward (fore and aft) directions, with respect to the orientation a baby would be positioned within the baby swing 10F. Each of the legs or extensions of the lower frame 14F terminate freely, without being coupled to any other component. The legs or extensions of the lower frame 14F add stability to the baby swing 10F. Otherwise, the operation of the baby swing 10F is substantially similar to the baby swing 10.

[0078] FIG.11A is a perspective view of an eighth embodiment of the baby swing 10G according to the present disclosure. FIG. 11B is a side view of the eighth embodiment of the baby swing 10G of FIG. 11A. FIGS. 11A-11B will be discussed together. The baby swing 10G of FIGS. 11A-11B is similar to the baby swing 10 of FIGS. 1-4, with the differences illustrated in the Figures and described herein. One difference is that the pendulum arms 22G extend underneath the seat 26G, for supporting the seat 26G from the underside, rather than the topside as is the case with the baby swing 10 of FIGS. 1-4. The pendulum arms 22G extend from the hinges 28G at an oblique angle relative to horizontal plane, such as, for example, the ground, in forward and backward directions. The pendulum arms 22G oscillate about a single hinge axis HA as shown, or in other embodiments oscillate about two hinge axes HA (not shown) that are proximate to each other within the perimeter of the hinge 28G. Each upper frame 12G oscillates about a pivot axis PA. The baby swing 10G provides an alternative approach for

supporting the seat 26G for oscillatory back and forth swinging motion. From the hubs 16G positioned on each lateral side of the baby swing 10G, the lower frame 14G includes legs or extensions that extend in both the forward and backward (fore and aft) directions, with respect to the orientation a baby would be positioned within the baby swing 10G. The back/aft legs or extensions of the lower frame 14G terminate freely, without being coupled to any other component. The forward/fore legs or extensions of the lower frame 14G are coupled to and connected by the connecting bar 24G, which is positioned beneath the seat 26G. In other words, the connecting bar 24G is coupled to a distal front end of the lower frame 14G, and the connecting bar 24G connects the forward extensions of the lower frame 4G, adding stability to the baby swing 10G. Otherwise, the operation of the baby swing 10G is substantially similar to the baby swing 10.

[0079] FIG. 12 is a perspective view of a ninth embodiment of the baby swing 10H according to the present disclosure. The baby swing 10H of FIG. 12 is similar to the baby swing 10 of FIGS. 1-4, with the differences illustrated in the Figures and described herein. One difference is that the baby swing 10H includes only one vertically extending member 13H of the upper frame 12H, and the lower frame 14H does not fully connect in a loop but rather includes freely extending ends. The removal of a second hub, a second vertically extending member 13H of the upper frame, and a portion of the lower frame simplifies the overall design, reduces the overall weight, and reduces the overall cost of the baby swing 10H due to their being fewer overall components. Otherwise, the operation of the baby swing 10H is substantially similar to the baby swing 10 of FIGS. 1-4. Specifically, the drive mechanism 34H within the hub 16H is configured to cause the upper frame 12H to oscillate about pivot axis PA in a back and forth motion, which in turn causes the seat 26C to oscillate about hinge axis HA in a back and forth motion via hinge 28H.

[0080] The above-described baby swing may be implemented in various configurations and operated with various methods, including:

1. A baby swing comprising: an upper frame pivotally coupled to a lower frame, such that the upper frame pivots relative to the lower frame; a hub coupled

to at least one of the upper frame and the lower frame; and a drive mechanism disposed within the hub, the drive mechanism being configured to drive the upper frame to pivot relative to the lower frame.

2. The baby swing of configuration 1, wherein the hub is coupled to both the upper frame and the lower frame.

3. The baby swing of configuration 2, wherein the hub is positioned adjacent an intersection of the upper frame and the lower frame.

4. The baby swing of configuration 3, wherein the drive mechanism disposed within the hub is positioned below the intersection of the upper frame and the lower frame.

5. The baby swing of configuration 1, wherein the lower frame further comprises a support to support the baby swing on a support surface, and the drive mechanism disposed within the hub is positioned adjacent the support.

6. The baby swing of configuration 1, further comprising a seat pivotally coupled to the upper frame through at least one pendulum arm, such that the seat pivots relative to the upper frame.

7. The baby swing of configuration 6, wherein the upper frame pivots about a frame pivot axis and the at least one pendulum arm pivots about a hinge pivot axis, the frame pivot axis being vertically offset from the hinge pivot axis.

8. The baby swing of configuration 6, wherein the seat includes a first seat half and a second seat half each rotatably coupled to a seat hub, and the first and second seat halves rotate relative to the seat hub into a folded configuration.

9. The baby swing of configuration 1, wherein the lower frame includes at least one lower leg, and the at least one lower leg is rotatably coupled to the hub such that the at least one lower leg rotates and folds into a folded configuration.

10. The baby swing of configuration 1, further comprising a resilient arm extending between and coupled to each of the upper frame and the drive mechanism, the resilient arm is configured to transfer induced motion from the drive mechanism to the upper frame.

11. The baby swing of configuration 10, wherein the resilient arm converts rotary motion of the drive mechanism into oscillatory motion of the upper frame.

12. The baby swing of configuration 10, wherein a first end of the resilient arm is coupled at a frame pivot point to the upper frame, and a second end of the resilient arm includes a slot that is configured to engage with the drive mechanism.

13. The baby swing of configuration 12, wherein the drive mechanism includes a wheel coupled to a crank, and the slot of the resilient arm is configured to engage with the wheel as the wheel rotates with the crank about a rotation axis of the crank.

14. The baby swing of configuration 13, wherein engagement between the crank, the wheel, and the slot of the resilient arm is configured to convert rotary motion of the crank into back and forth oscillatory motion of the resilient arm within the hub.

15. The baby swing of configuration 14, wherein due to the first end of the resilient arm being coupled at the frame pivot point to the upper frame, the back and forth oscillatory motion of the resilient arm within the hub produces a back and forth oscillatory motion of the upper frame relative to the lower frame.

16. The baby swing of configuration 1, wherein the lower frame remains stationary during pivoting of the upper frame relative to the lower frame.

17. The baby swing of configuration 1, wherein: the upper frame includes first and second vertically extending members with a connecting bar extending between and connecting the first and second vertically extending members; and two pendulum arms are coupled to hinges of the first and second vertically extending members, and the pendulum arms are coupled to a seat.

18. The baby swing of configuration 1, wherein: the upper frame includes first and second vertically extending members with hinges positioned at distal ends of the first and second vertically extending members; two pendulum arms are coupled to the hinges of the first and second vertically extending members, and the pendulum arms are coupled to a seat; and a connecting bar extends underneath the seat, and the connecting bar extends between and connects a first hub to a second hub.

19. The baby swing of configuration 1, wherein: the upper frame includes a single vertically extending members with a hinge positioned at a distal end of

the single vertically extending member; and a single pendulum arm is coupled at a first end to the hinge and coupled at a second end to a seat.

20. The baby swing of configuration 1, wherein: a first side of the upper frame includes a forked end, and a second side of the upper frame includes a forked end; and a first pendulum arm extends between and is coupled to the forked ends of the first and second sides of the upper frame; and a second pendulum arm extends between and is coupled to the forked ends of the first and second sides of the upper frame, wherein the first and second pendulum arms extend beneath and support a seat.

21. The baby swing of configuration 1, wherein: the upper frame includes a single vertically extending members with a hinge positioned at a distal end of the single vertically extending member; and a seat is coupled directly to the hinge.

22. A method of operating a baby swing to generate a swinging motion, the method comprising: providing a hub with an upper frame and a lower frame each coupled to the hub, such that the upper frame pivots relative to the lower frame; providing a drive mechanism disposed within the hub, adjacent an intersection of the upper frame and the lower frame, and adjacent a supporting surface; providing a resilient arm that is positioned between and coupled to each of the upper frame and the drive mechanism; and activating the drive mechanism to cause the resilient arm and the upper frame to pivot relative to the lower frame, causing a seat coupled to the upper frame to swing in a back and forth motion.

23. The method of configuration 22, further comprising providing a wheel coupled to a crank of the drive mechanism, wherein activating the drive mechanism causes the crank to rotate about a rotation axis of the crank, which causes the wheel to revolve around the rotation axis of the crank.

24. The method of configuration 23, wherein the resilient arm includes a slot that is configured to engage with the wheel of the drive mechanism, such that during activation of the drive mechanism the resilient arm converts rotary motion of the crank of the drive mechanism into oscillatory motion of the upper frame.

25. The method of configuration 22, wherein the resilient arm is positioned and pivots within the hub in a same rotation direction as the upper frame.

[0081] Having thus described the present embodiments in detail, it is to be appreciated and will be apparent to those skilled in the art that many physical changes, only a few of which are exemplified in the detailed description of the disclosure, could be made without altering the inventive concepts and principles embodied therein.

[0082] It is also to be appreciated that numerous embodiments incorporating only part of the preferred embodiment are possible which do not alter, with respect to those parts, the inventive concepts and principles embodied therein. The present embodiment and optional configurations are therefore to be considered in all respects as exemplary and/or illustrative and not restrictive, the scope of the disclosure being indicated by the appended claims rather than by the foregoing description, and all alternate embodiments and changes to this embodiment which come within the meaning and range of equivalency of said claims are therefore to be embraced therein.

[0083]

CLAIMS

What is claimed is:

1. A baby swing comprising:

an upper frame pivotally coupled to a lower frame, such that the upper frame pivots relative to the lower frame;

a hub coupled to at least one of the upper frame and the lower frame; and

a drive mechanism disposed within the hub, the drive mechanism being configured to drive the upper frame to pivot relative to the lower frame.

2. The baby swing of claim 1, wherein the hub is coupled to both the upper frame and the lower frame.

3. The baby swing of claim 2, wherein the hub is positioned adjacent an intersection of the upper frame and the lower frame.

4. The baby swing of claim 3, wherein the drive mechanism disposed within the hub is positioned below the intersection of the upper frame and the lower frame.

5. The baby swing of claim 1, wherein the lower frame further comprises a support to support the baby swing on a support surface, and the drive mechanism disposed within the hub is positioned adjacent the support.

6. The baby swing of claim 1, further comprising a seat pivotally coupled to the upper frame through at least one pendulum arm, such that the seat pivots relative to the upper frame.

7. The baby swing of claim 6, wherein the upper frame pivots about a frame pivot axis and the at least one pendulum arm pivots about a hinge pivot axis, the frame pivot axis being vertically offset from the hinge pivot axis.

8. The baby swing of claim 6, wherein the seat includes a first seat half and a second seat half each rotatably coupled to a seat hub, and the first and second seat halves rotate relative to the seat hub into a folded configuration.

9. The baby swing of claim 1, wherein the lower frame includes at least one lower leg, and the at least one lower leg is rotatably coupled to the hub such that the at least one lower leg rotates and folds into a folded configuration.

10. The baby swing of claim 1, further comprising a resilient arm extending between and coupled to each of the upper frame and the drive mechanism, the resilient arm is configured to transfer induced motion from the drive mechanism to the upper frame.

11. The baby swing of claim 10, wherein the resilient arm converts rotary motion of the drive mechanism into oscillatory motion of the upper frame.

12. The baby swing of claim 10, wherein a first end of the resilient arm is coupled at a frame pivot point to the upper frame, and a second end of the resilient arm includes a slot that is configured to engage with the drive mechanism.

13. The baby swing of claim 12, wherein the drive mechanism includes a wheel coupled to a crank, and the slot of the resilient arm is configured to engage with the wheel as the wheel rotates with the crank about a rotation axis of the crank.

14. The baby swing of claim 13, wherein engagement between the crank, the wheel, and the slot of the resilient arm is configured to convert rotary motion of the crank into back and forth oscillatory motion of the resilient arm within the hub.

15. The baby swing of claim 14, wherein due to the first end of the resilient arm being coupled at the frame pivot point to the upper frame, the back and forth

oscillatory motion of the resilient arm within the hub produces a back and forth oscillatory motion of the upper frame relative to the lower frame.

16. The baby swing of claim 1, wherein the lower frame remains stationary during pivoting of the upper frame relative to the lower frame.

17. The baby swing of claim 1, wherein:

the upper frame includes first and second vertically extending members with a connecting bar extending between and connecting the first and second vertically extending members; and

two pendulum arms are coupled to hinges of the first and second vertically extending members, and the pendulum arms are coupled to a seat.

18. The baby swing of claim 1, wherein:

the upper frame includes first and second vertically extending members with hinges positioned at distal ends of the first and second vertically extending members;

two pendulum arms are coupled to the hinges of the first and second vertically extending members, and the pendulum arms are coupled to a seat; and

a connecting bar extends underneath the seat, and the connecting bar extends between and connects a first hub to a second hub.

19. The baby swing of claim 1, wherein:

the upper frame includes a single vertically extending members with a hinge positioned at a distal end of the single vertically extending member; and

a single pendulum arm is coupled at a first end to the hinge and coupled at a second end to a seat.

20. The baby swing of claim 1, wherein:

a first side of the upper frame includes a forked end, and a second side of the upper frame includes a forked end; and

a first pendulum arm extends between and is coupled to the forked ends of the first and second sides of the upper frame; and

a second pendulum arm extends between and is coupled to the forked ends of the first and second sides of the upper frame, wherein the first and second pendulum arms extend beneath and support a seat.

21. The baby swing of claim 1, wherein:

the upper frame includes a single vertically extending members with a hinge positioned at a distal end of the single vertically extending member; and

a seat is coupled directly to the hinge.

22. A method of operating a baby swing to generate a swinging motion, the method comprising:

providing a hub with an upper frame and a lower frame each coupled to the hub, such that the upper frame pivots relative to the lower frame;

providing a drive mechanism disposed within the hub, adjacent an intersection of the upper frame and the lower frame, and adjacent a supporting surface;

providing a resilient arm that is positioned between and coupled to each of the upper frame and the drive mechanism; and

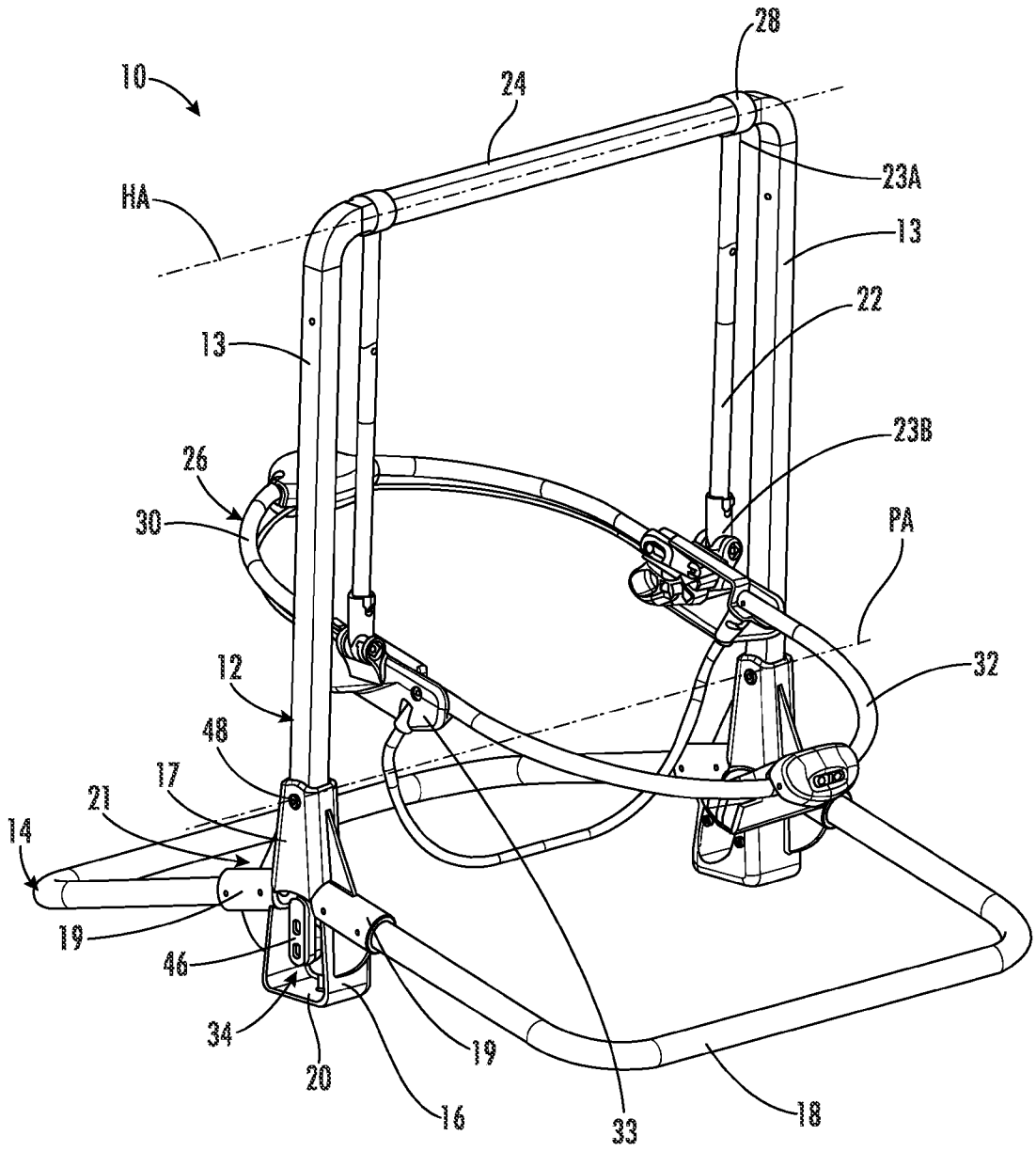
activating the drive mechanism to cause the resilient arm and the upper frame to pivot relative to the lower frame, causing a seat coupled to the upper frame to swing in a back and forth motion.

23. The method of claim 22, further comprising providing a wheel coupled to a crank of the drive mechanism, wherein activating the drive mechanism causes the crank to rotate about a rotation axis of the crank, which causes the wheel to revolve around the rotation axis of the crank.

24. The method of claim 23, wherein the resilient arm includes a slot that is configured to engage with the wheel of the drive mechanism, such that during

activation of the drive mechanism the resilient arm converts rotary motion of the crank of the drive mechanism into oscillatory motion of the upper frame.

25. The method of claim 22, wherein the resilient arm is positioned and pivots within the hub in a same rotation direction as the upper frame.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22
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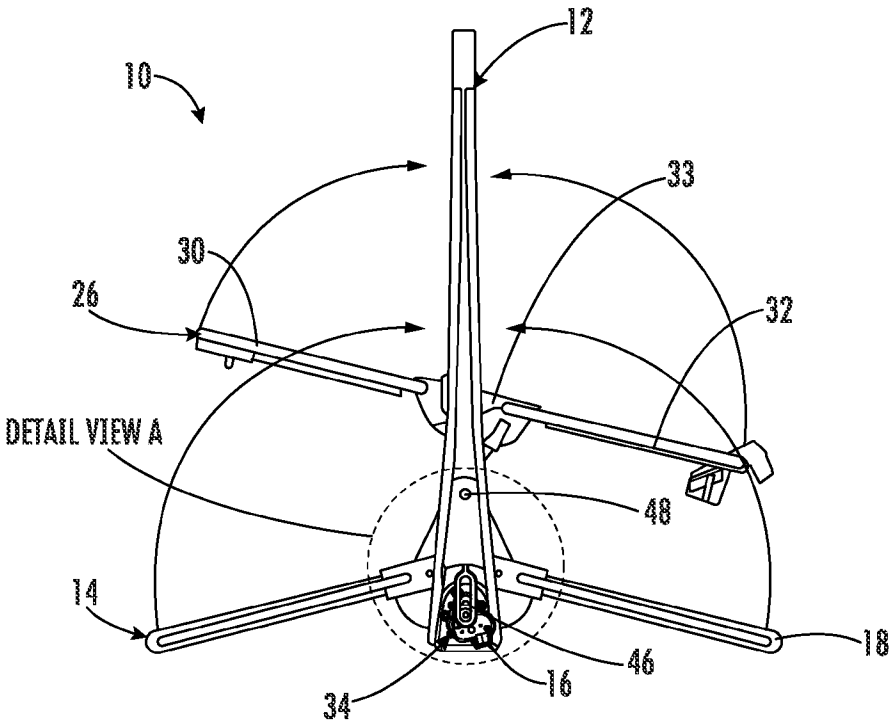
18

FIG. 1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DETAIL VIEW A
48
14
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34

FIG. 2A

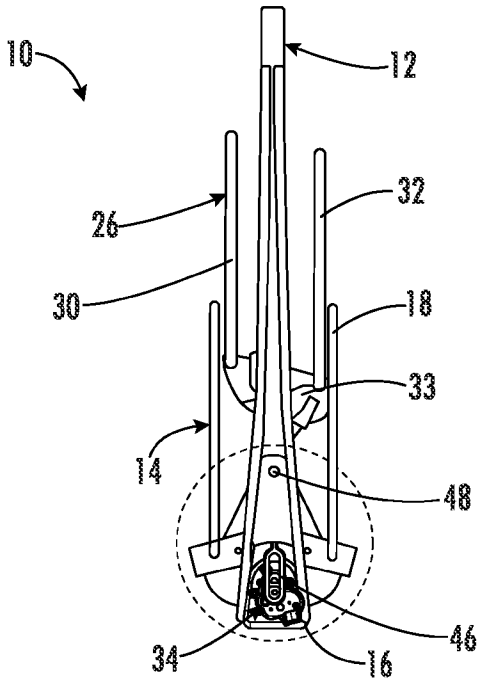
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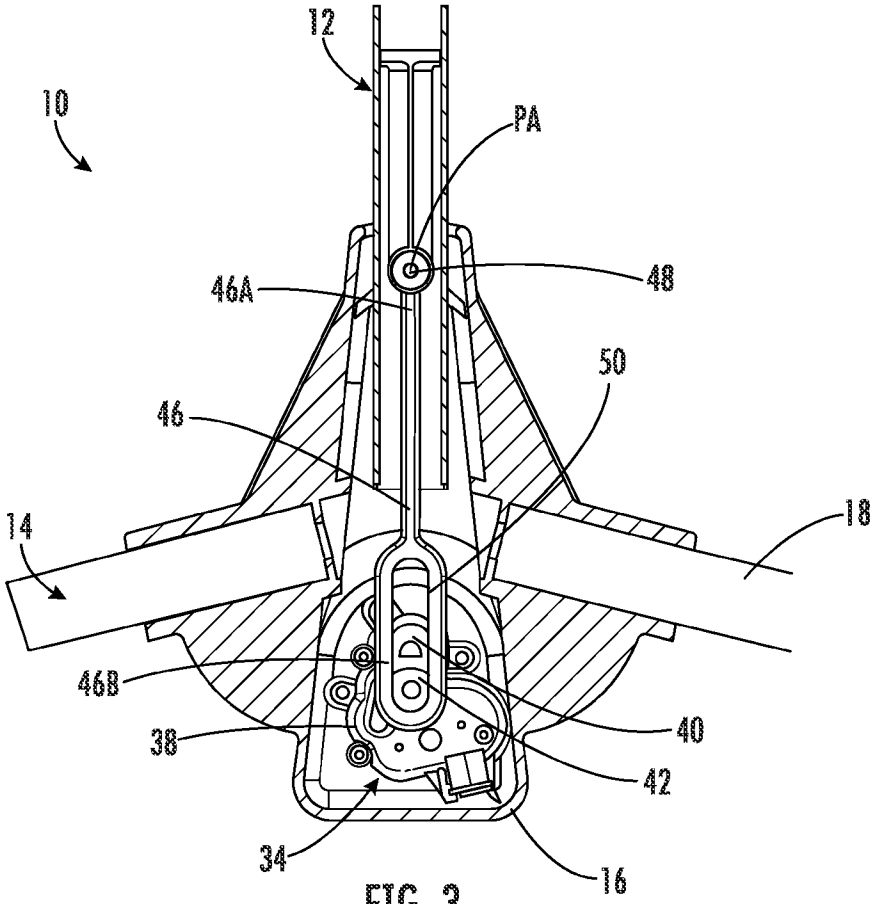
FIG. 2B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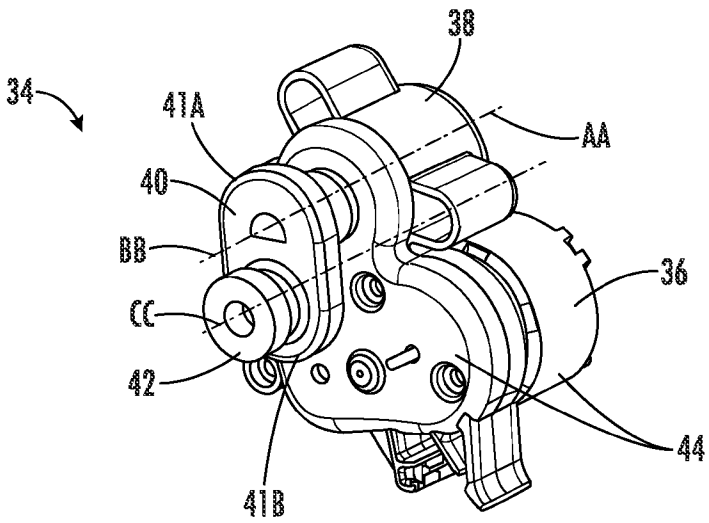
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44
41B

FIG. 4

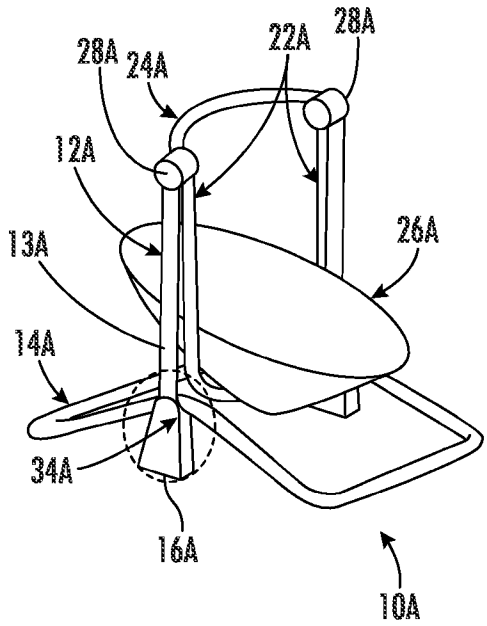

FIG. 5

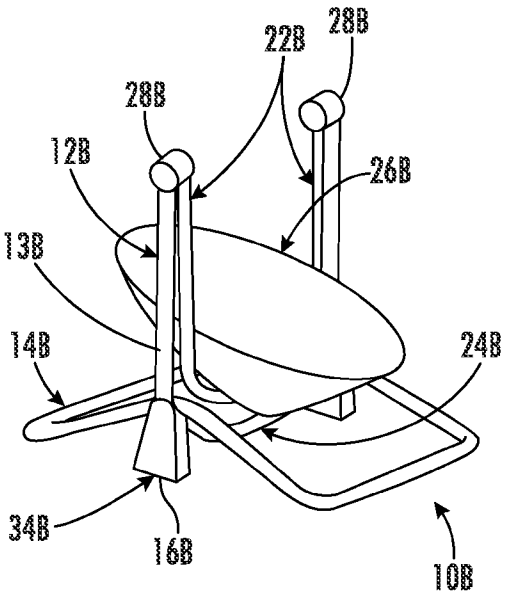

FIG. 6

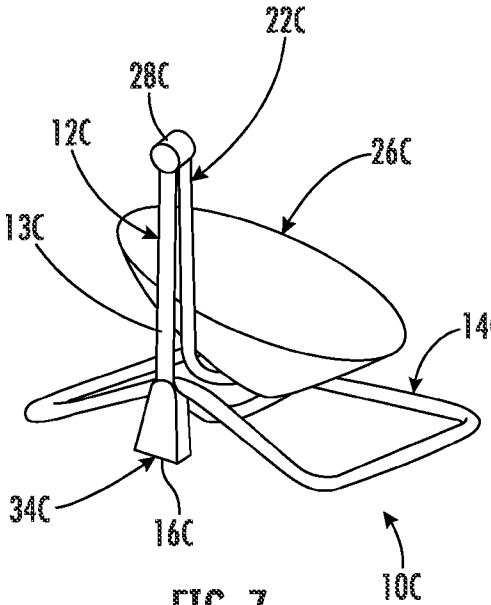

FIG. 7

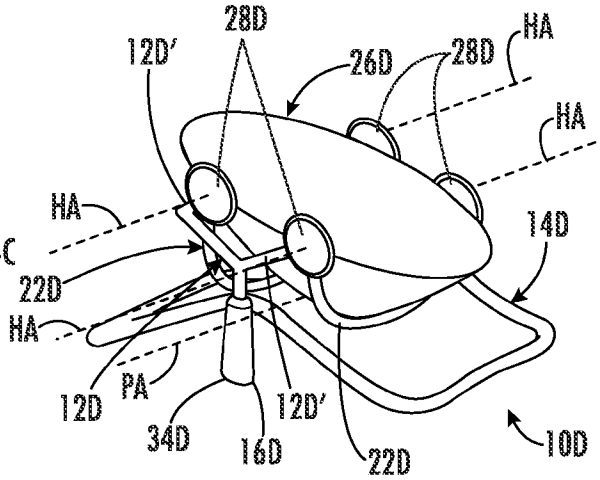

FIG. 8

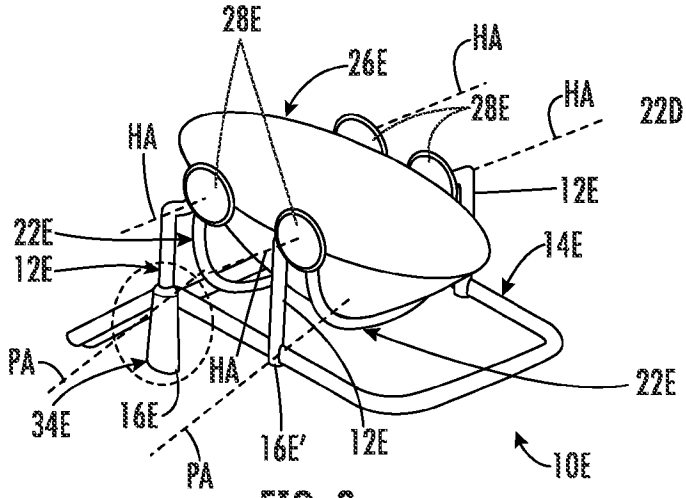

FIG. 9

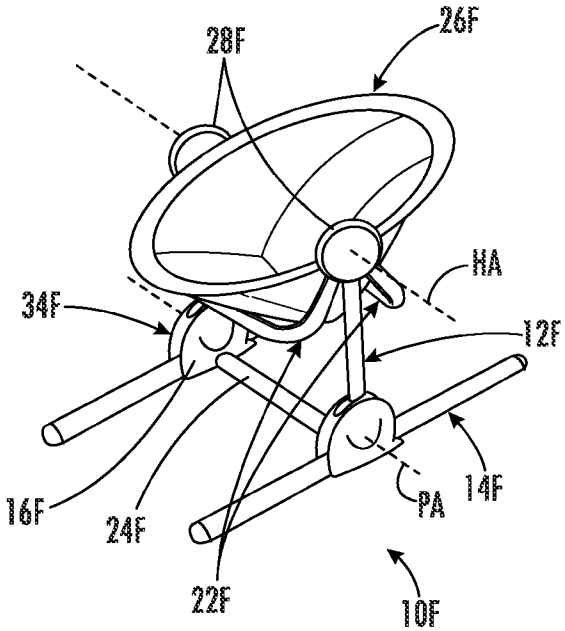

FIG. 10A

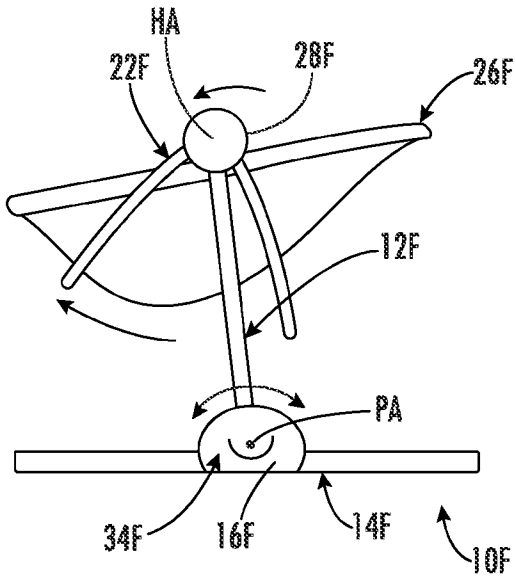

FIG. 10B

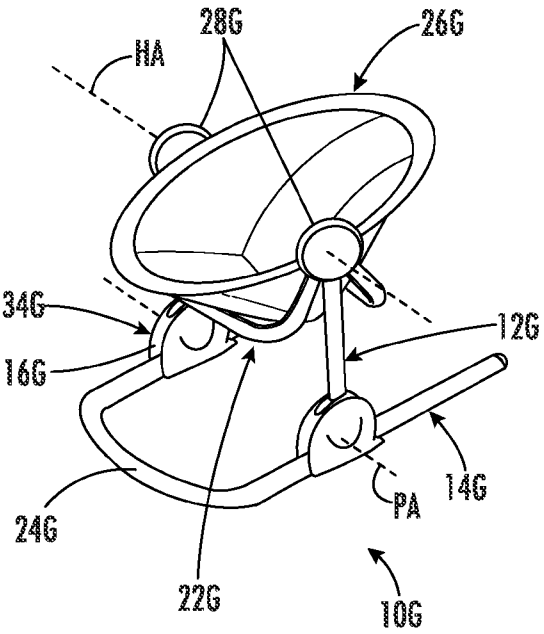

FIG. 11A

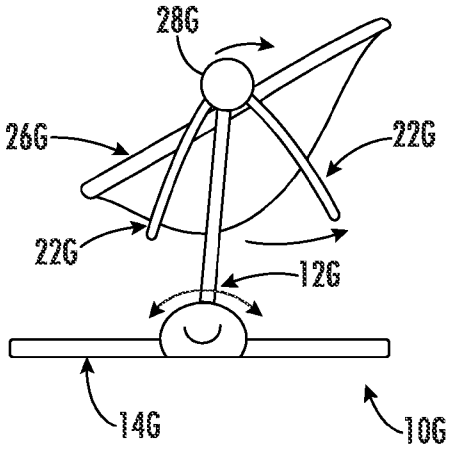

FIG. 11B

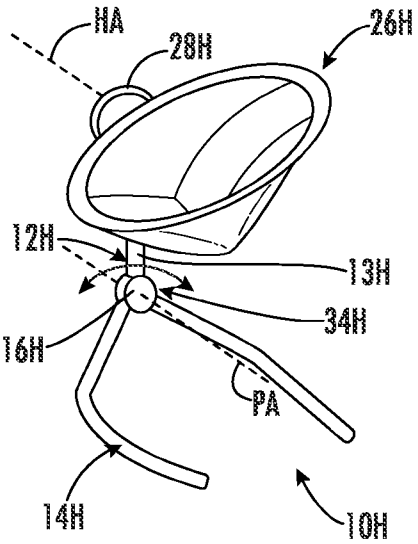

FIG. 12