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(54) CHILD SEAT AND ROCKER

(57) A children's seat (66) and rocker apparatus includes a rocker base, a support assembly, and an elevational support and adjustment mechanism (80) operable between the rocker base and the support assembly to provide support and positional adjustment of the head end (54) of the support assembly. The support and adjustment mechanism (80) is detachable from the support assembly to allow the apparatus to be folded into a collapsed configuration for compact storage and transport.

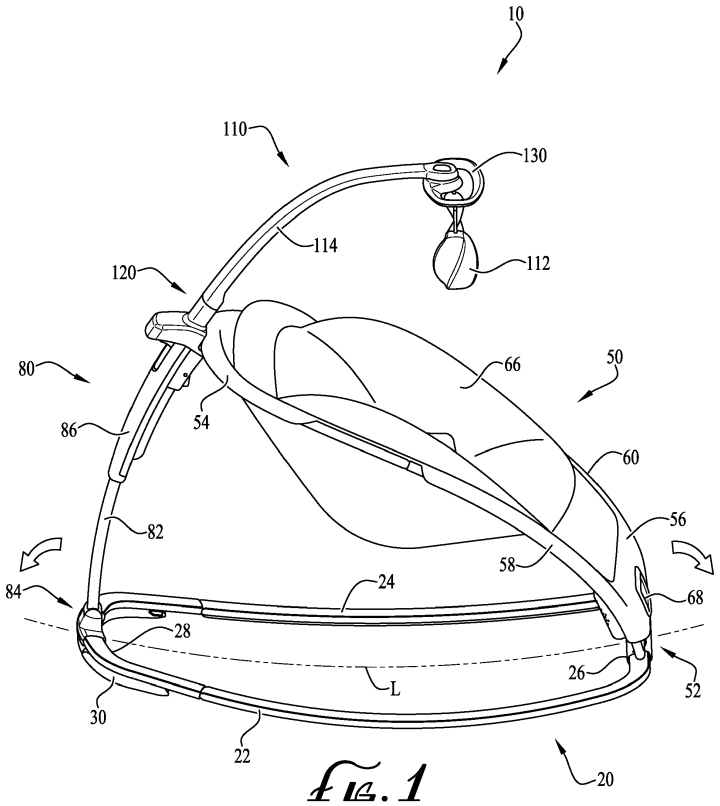

FIG. 1

EP 3 228 223 A1

Description

Cross-Reference to Related Applications

[0001] This application claims the benefit of U.S. Provisional Patent Application Serial No. 62/304,653 filed March 7, 2016 and U.S. Provisional Patent Application Serial No. 62/394,874 filed September 15, 2016, the entireties of which are hereby incorporated herein by reference for all purposes.

Technical Field

[0002] The present invention relates generally to the field of children's accessories, and more particularly to a child seat or support device having a rocker base and adjustable support frame.

Background

[0003] Support devices such as seats, rockers, bouncers, sleepers, bassinets, and the like are commonly used to hold infants and other small children during rest, play and entertainment. In many instances, parents and adult caregivers may prefer to move support devices from location to location during different daily activities, and to store the devices out of the way when not in use. Simplicity in assembly and use, ease of portability, adaptability to different modes of use, and compactness for storage and transport are commonly deemed desirable aspects of a child support device.

[0004] Continuing developments and improvements are sought in the field of children's accessories. It is to the provision of an improved child support device meeting these and other needs that the present invention is primarily directed.

Summary

[0005] In example embodiments, the present invention provides a seat and rocker apparatus suitable for supporting an infant or small child. In example forms, the seat and rocker provides ease of assembly and use by an adult caregiver, is lightweight and portable, adaptable to different modes of use, and collapses to a compact configuration for storage and transport.

[0006] In one aspect, the present invention relates to a seat and rocker apparatus including a rocker base having a first end and a second end, and at least one rocker element between the first and second ends; a support assembly comprising a head end, a foot end, and a seat, the foot end of the support assembly being pivotally coupled to the rocker base; and an elevational support and adjustment mechanism operable between the rocker base and the support assembly to provide support and positional adjustment of the head end of the support assembly.

[0007] In another aspect, the invention relates to a seat apparatus including a base frame for supporting the apparatus upon a support surface; a support assembly comprising a head end, a foot end, and a seat, the foot end of the support assembly being pivotally coupled to the base frame; and an elevational support and adjustment mechanism operable between the base frame and the support assembly to provide support and positional adjustment of the head end of the support assembly relative to the support surface. The elevational support and adjustment mechanism preferably includes a post having a lower end pivotally coupled to the base frame, and an upper end coupled to the head end of the support assembly.

[0008] In still another aspect, the invention relates to a seat apparatus including a base frame for supporting the apparatus on a support surface, the base frame defining a generally central lengthwise axis extending between front and back ends of the base frame. The seat apparatus preferably also includes a support assembly having a head end, a foot end, and a seat, the foot end of the support assembly being pivotally coupled to the front end of the base frame. The seat apparatus preferably also includes a support member extending between the back end of the base frame and the head end of the support assembly, a lower end of the support member being pivotally connected to the back end of the base frame along the lengthwise axis, and an upper end of the support member being detachably coupled to the head end of the support assembly.

[0009] These and other aspects, features and advantages of the invention will be understood with reference to the drawing figures and detailed description herein, and will be realized by means of the various elements and combinations particularly pointed out in the appended claims. It is to be understood that both the foregoing general description and the following brief description of the drawings and detailed description of example embodiments are explanatory of example embodiments of the invention, and are not restrictive of the invention, as claimed.

Brief Description of the Drawings

[0010]

Figure 1 is a perspective view of a seat and rocker apparatus according to an example embodiment of the present invention.

Figures 2A, 2B, 2C and 2D are side views of the seat and rocker apparatus of Figure 1, showing a sequence of assembly and folding of the apparatus.

Figures 3, 3A and 3B show additional details of a kickstand or brace component of the seat and rocker apparatus of Figure 1, according to an example embodiment.

Figures 4A and 4B are side views of the seat and rocker apparatus of Figure 1, showing a sequence of positional adjustment of the support frame.

Figures 5A, 5B and 5C are top and perspective views showing positional adjustment and removability of an entertainment feature component of the seat and rocker apparatus of Figure 1, according to an example embodiment.

Figures 6A, 6B and 6C show a sequence of partial disassembly of the seat frame for removal of soft goods, according to an example embodiment of the invention.

Detailed Description of Example Embodiments

[0011] The present invention may be understood more readily by reference to the following detailed description of example embodiments taken in connection with the accompanying drawing figures, which form a part of this disclosure. It is to be understood that this invention is not limited to the specific devices, methods, conditions or parameters described and/or shown herein, and that the terminology used herein is for the purpose of describing particular embodiments by way of example only and is not intended to be limiting of the claimed invention. Any and all patents and other publications identified in this specification are incorporated by reference as though fully set forth herein.

[0012] Also, as used in the specification including the appended claims, the singular forms "a," "an," and "the" include the plural, and reference to a particular numerical value includes at least that particular value, unless the context clearly dictates otherwise. Ranges may be expressed herein as from "about" or "approximately" one particular value and/or to "about" or "approximately" another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by use of the antecedent "about," it will be understood that the particular value forms another embodiment.

[0013] With reference now to the drawing figures, wherein like reference numbers represent corresponding parts throughout the several views, Figures 1 - 6 show a seat and rocker apparatus 10 according to an example embodiment of the invention. In example embodiments, the seat and rocker apparatus 10 generally comprises a base frame 20, a seat or child support assembly 50, an elevational support and adjustment mechanism 80, and an entertainment feature 110.

[0014] In the depicted example embodiment, the base frame 20 comprises first and second side members in the form of elongate, convexly curved, arcuate rockers 22, 24, extending generally parallel to a lengthwise axis L of the base frame 20; a front end segment 26 connecting first or forward ends of the rocker side members; and a back end segment 28 connecting second or rearward ends of the rocker side members. Thus configured, in the depicted example, the base frame 20 forms a generally rectangular or oval hoop assembly bounding an open central area, with rounded or radiused corner portions. In alternate embodiments, the base frame may comprise a solid panel, rocker side members joined by one or more intermediate members, and/or configurations of various other shapes and constructions. The arcuate configuration of the rockers 22, 24 allows the device to be rocked back and forth on a floor or other underlying support surface, as indicated by the directional arrows in Figure 1. The base frame 20 can be constructed of one or more members of metal, wood, plastic and/or other structural materials, for example comprising multiple elements attached together to form a substantially rigid assembly or as an integral unitary construction.

[0015] The base frame 20 optionally further comprises a kickstand or brace component 30, shown in greater detail in Figures 3, 3A and 3B. In the depicted embodiment, the brace component 30 is hingedly coupled to the back end 28 of the base frame 20, and is pivotally repositionable between a folded or retracted position (Figure 1) for allowing rocking of the device 10 on an underlying support surface, and an open or extended position (Figure 3, 3B) for preventing rocking of the device and maintaining the base frame in a stable fixed position relative to the support surface. In alternate embodiments, the brace component 30 can be coupled at or adjacent the front end 26 or elsewhere along the base frame. Figure 3A shows the brace component 30 in the extended position in solid lines, and in broken lines in an intermediate position and in the retracted position. In the depicted embodiment, the brace component 30 is a U-shaped component having a central cross-member portion connected by a hinge joint 32 to the front end 26 of the base frame 20, with first and second legs 34, 36 extending from opposite ends thereof. The legs 34, 36 preferably have a length generally corresponding to the offset height of the arc defined by the rockers 22, 24, such that in the extended position of the brace component 30 (as shown in Figure 3) the weight of the device (and a child supported therein, if present) is substantially evenly distributed between the legs of the brace component and portions of the base frame distal from the brace component, to maintain the device 10 in a substantially fixed and stable position. The brace component 30 optionally comprises a contact flange 40 projecting therefrom for allowing a user to grip and pull or push the brace component to position it as desired. Also optionally, a retention tab 42 may be provided along the underside of one or both rockers 22, 24, for releasable engagement of a receiver or cooperative contact portion of the brace component 30, to retain the brace component in its folded or retracted position and prevent it from inadvertently opening.

[0016] The seat or child support assembly 50 is preferably pivotally coupled to the front end 26 of the base frame 20, for example by a hinge assembly 52 connected

between the foot end of the child support assembly and the base frame. In the depicted example embodiment, the seat or child support assembly 50 comprises a seat frame having a head end 54, a foot end 56, and first and second sides 58, 60. The seat or child support assembly 50 further comprises a seat 66 configured for supporting a child in a seated or reclined position. In example embodiments, the seat comprises a sling constructed of fabric, mesh and/or other soft goods, optionally including padding for comfort and one or more straps for retaining the child in the seat. In example embodiments, the seat frame forms a generally elongated hoop having a rectangular, square, oval or otherwise shaped configuration defining an opening forming a seating area in which the seat 66 is positioned. The seat frame can be constructed of metal, wood, plastic and/or other structural materials, for example comprising multiple elements attached together to form a substantially rigid assembly or as an integral unitary construction. In particular embodiments, the seat frame is constructed of lightweight metal (for example aluminum) tubing.

[0017] The seat or child support assembly 50 optionally also includes one or more electronic features and controls. For example, an audio unit 68 can be provided, for example mounted at or near the foot end 56 or elsewhere on the child support assembly 50 or other portion of the device 10, for playing music or other sounds. Various other features may optionally be provided, for example a vibration transducer unit, automatic rocker, heater, lights, a control unit, wired or wireless connections to a remote control device, cell phone, computer or other electronic device(s), video display screen, and/or other electronic features and controls are optionally provided.

[0018] As shown in greater detail in Figures 6A, 6B and 6C, the seat or child support assembly 50 optionally allows for removal of the soft goods of the seat 66, for example for laundering or replacement. In example embodiments, the first and second sides 58, 60 of the seat frame include detachable coupling portions 70, 72, such as cooperative sleeve and ferrule tubing portions having snap-button (e.g., Valco™ button) or other detachable fasteners. In this manner, fastener elements of the seat 66 are disengaged, and portions of the seat frame are separated from one another, thereby allowing attachment sleeves of the seat to be removed from the seat frame. The process is reversed to replace the seat 66 back onto the seat frame as desired.

[0019] The elevational support and adjustment mechanism 80 is engaged between the base frame 20 and the child support assembly 50, preferably at or adjacent the head end 54 and generally opposite the hinge connection 52, to support the head end at an elevated position above the base frame and maintain the child support assembly at a desired angle of inclination relative to the floor or other support surface upon which the device 10 is placed. In example embodiments, the support mechanism 80 comprises a single post or spine 82, for example at least partially comprising a structural tube or bar, having a lower end pivotally attached by a hinge joint 84 to the base frame 20 at the back end 28 along a central lengthwise axis of the base frame, and having an upper end coupled to the center of the head end 54 of the child support assembly 50. In alternate embodiments, the support mechanism 80 may comprise two or more support members, a support panel, or be otherwise configured, for example in the form of a locking mechanism on or around the hinged connection 52. In example embodiments, the support mechanism 80 optionally includes one or more detachable coupling elements to enable the device 10 to be collapsed into a generally flat compact configuration for storage and/or transport; and/or positional adjustment means to allow adjustment of the height and/or angle of inclination of the child support assembly 50.

[0020] For example, as shown in greater detail in Figures 2A, 2B, 2C and 2D, the support mechanism 80 may include a detachable coupling 90 at its upper free end for releasable engagement with a cooperating connector element 92 at the head end 54 of the child support assembly 50. To collapse the device 10 into its compact configuration, the entertainment feature 110, if present, is removed as described in greater detail below (Figure 2A). The adult caregiver depresses a release actuator 94 of the detachable coupling 90, and pivots the child support assembly 50 forward, as indicated by the directional arrows in Figure 2B, thereby detaching the child support assembly from the support mechanism 80. The support mechanism 80 may be pivotally retracted to then allow the child support assembly 50 to be folded downward, pivoting about the hinge 52, onto the base frame 20, as shown in Figure 2C. Finally, the support mechanism 80 is folded downward, pivoting about hinged coupling 84, over the child support assembly 50 and the base frame 20, as shown in Figure 2D. In alternate embodiments, the seat support assembly 50 and the support mechanism 80 can detach entirely from one another and/or from the base frame 20, for compact storage and transport.

[0021] Figures 4A and 4B show additional detail of a positional adjustment portion of the support mechanism 80 to allow adjustment of the height and/or angle of inclination of the child support assembly 50. In example form, the positional adjustment mechanism comprises an upper sleeve 86 within which the lower post 82 is telescopingly or slidably received. The lower post 82 is extended relative to the upper sleeve 86 to raise the head end 54 of the child support assembly (Figure 4A), and the lower post is retracted back into the upper sleeve to lower the head end (Figure 4B). In example embodiments, the lower post 82 and the upper sleeve 86 have generally matching arcuate or curved profiles, allowing the lower post to slide smoothly into and out of the upper sleeve in telescoping fashion. A plurality of coupling points or adjustment positions can be provided, or a continuous positioning adjustment can permit adjustment to any position within a defined range. For example, Figure 4A shows the support mechanism 80 adjusted to an up-

per position, with the height of the head end 54 of the child support assembly at a higher elevation, and with a greater angle of inclination of the child support assembly; and Figure 4B shows the support mechanism adjusted to a lower position, with the height of the head end of the child support assembly at a lower elevation, and with a lesser angle of inclination of the child support assembly. In example embodiments, the positional adjustment mechanism may allow height adjustment of the head end of the child support assembly from about 6" to about 30" above the support surface and in particular embodiments from about 12" to about 20" above the support surface, and/or adjustment of the angle of inclination from about 15° to about 45° and in particular embodiments from about 22° to about 38°. To adjust the position of the child support assembly 50, an adult caregiver depresses an actuator 88 to release the adjustment mechanism, lifts or lowers the child support assembly to the desired position, and releases the actuator, as indicated by the directional arrows in Figure 4B. In example embodiments, the actuators for operation of the positional adjustment mechanism and detach and fold mechanisms are located out of reach of a child seated in the seat 66, to prevent inadvertent operation.

[0022] The device 10 optionally further comprises one or more entertainment features 110. In example embodiments, the entertainment feature 110 may take the form of a mobile or suspended toy 112, having a support mechanism configured to position the toy over the seat 66 during use of the device 10. In the depicted embodiment, a support arm or strut 114 having a proximal end configured for detachable and rotational coupling with a mounting hub 120 at the upper free end of the elevational support and adjustment mechanism 80 and or at the head end 54 of the child support assembly 50. As shown in Figures 2A and 5C, the proximal end of the support arm 114 includes a cylindrical mounting lug 122 with one or more retention fingers projecting therefrom, configured for cooperative engagement within a corresponding cylindrical receiver channel 124 in the mounting hub 120. As shown in Figure 5A, a suspension platform 130 is optionally rotationally mounted to the distal end of the support arm 114, from which one or more toys, for example in the form of stuffed animals 112', are suspended. Additionally, and as shown in Figure 5B, the support arm or strut 114 is rotational relative to the mounting hub 120, to allow the entertainment feature 110 to be rotated away from a position over the seat 66 to avoid interference while placing a child in the seat or removing the child from the seat.

[0023] In example modes of use, the seat and rocker apparatus is assembled by positioning the child support assembly 50 in a desired position relative to the base frame 20, for example by appropriate adjustment of the elevational support and adjustment mechanism 80 as described. A child may be positioned in the seat 66. The kickstand 30 is optionally extended to prevent rocking motion, or retracted to permit rocking motion. The entertainment feature 110 is optionally attached or removed, and/or repositioned as desired. The elevation and/or angle of inclination may be varied as desired by adjustment of the elevational support and adjustment mechanism 80 as described. After use, the child may be removed from the seat, and the seat and rocker apparatus folded into its collapsed configuration for compact storage and transport. Optionally, soft goods of the seat may be removed for cleaning, and replaced, as described.

[0024] While the seat and rocker device 10 has been described herein primarily with regard to child and infant applications, the invention may be adapted for adult applications as well. For example, a larger scale version may be structurally configured to support the weight of an adult, and the mobile / toy entertainment feature may be replaced with a reading light, a fan for air circulation, a sunshade, a mount for a mobile phone or computer, or the like. In example applications, such a device may be utilized, as indoor or outdoor furniture, a lounger, a beach chair, a camping chair, or for various other applications and modes of use.

[0025] While the invention has been described with reference to example embodiments, it will be understood by those skilled in the art that a variety of modifications, additions and deletions are within the scope of the invention, as defined by the following claims.

[0026] For the avoidance of doubt, the present application extends to the subject-matter described in the following numbered paragraphs (referred to as "Para" or "Paras"):

1. A seat and rocker apparatus comprising:

   a rocker base having a first end and a second end, and at least one rocker element between the first and second ends;
   a support assembly comprising a head end, a foot end, and a seat, the foot end of the support assembly being pivotally coupled to the rocker base; and
   an elevational support and adjustment mechanism operable between the rocker base and the support assembly to provide support and positional adjustment of the head end of the support assembly.

2. The seat and rocker apparatus of Para 1, wherein the rocker base comprises first and second rocker arms extending between the first and second ends of the rocker base.

3. The seat and rocker apparatus of Para 1 or 2, wherein the rocker base further comprises a brace pivotally coupled for repositioning between an extended position preventing rocking motion of the apparatus and a retracted position allowing rocking motion.

4. The seat and rocker apparatus of any preceding Para, wherein the elevational support and adjustment mechanism comprises first and second mem-

bers telescopingly extensible and retractable relative to one another.

5. The seat and rocker apparatus of any preceding Para, wherein the elevational support and adjustment mechanism comprises at least one post having a lower end pivotally coupled to the rocker base, and an upper end coupled to the head end of the support assembly.

6. The seat and rocker apparatus of Para 5, wherein the upper end of the elevational support and adjustment mechanism is detachably coupled to the head end of the support assembly.

7. The seat and rocker apparatus of Para 6, wherein detachment of the upper end of the elevational support and adjustment mechanism from the head end of the support assembly allows the apparatus to be collapsed into a generallyflat compact configuration.

8. The seat and rocker apparatus of any preceding Para, further comprising at least one entertainment feature positionable over the seat of the support assembly.

9. The seat and rocker apparatus of Para 8, wherein the at least one entertainment feature is rotational or removable away from a position over the seat of the support assembly.

10. A seat apparatus comprising:

a base frame for supporting the apparatus upon a support surface;

a support assembly comprising a head end, a foot end, and a seat, the foot end of the support assembly being pivotally coupled to the base frame; and

an elevational support and adjustment mechanism operable between the base frame and the support assembly to provide support and positional adjustment of the head end of the support assembly relative to the support surface, wherein the elevational support and adjustment mechanism comprises a post having a lower end pivotally coupled to the base frame, and an upper end coupled to the head end of the support assembly.

11. The seat apparatus of Para 10, wherein the upper end of the post is coupled to the head end of the support assembly by an extensible linkage comprising first and second members telescopingly extensible and retractable relative to one another.

12. The seat apparatus of Para 10 or 11, wherein the upper end of the elevational support and adjustment mechanism is detachably coupled to the head end of the support assembly.

13. The seat apparatus of Para 12, wherein detachment of the upper end of the elevational support and adjustment mechanism from the head end of the support assembly allows the apparatus to be collapsed into a generallyflat compact configuration.

14. The seat apparatus of any of Paras 10-13, wherein the base frame comprises at least one arcuate rocker allowing a rocking motion of the apparatus relative to the support surface.

15. The seat apparatus of Para 14, further comprising a brace selectively repositionable between an extended position preventing the rocking motion and a retracted position allowing the rocking motion.

16. The seat apparatus of any of Paras 10-15, further comprising at least one entertainment feature positionable over the seat of the support assembly.

17. The seat apparatus of Para 16, wherein the at least one entertainment feature is rotational or removable away from a position over the seat of the support assembly.

18. A seat apparatus comprising:

a base frame for supporting the apparatus on a support surface, the base frame defining a generally central lengthwise axis extending between front and back ends of the base frame;

a support assembly comprising a head end, a foot end, and a seat, the foot end of the support assembly being pivotally coupled to the front end of the base frame; and

a support member extending between the back end of the base frame and the head end of the support assembly, a lower end of the support member being pivotally connected to the back end of the base frame along the lengthwise axis, and an upper end of the support member being detachably coupled to the head end of the support assembly.

19. The seat apparatus of Para 18, wherein the base frame comprises at least one arcuate rocker allowing a rocking motion of the apparatus relative to the support surface.

20. The seat apparatus of Para 19, further comprising a brace selectively repositionable between an extended position preventing the rocking motion and a retracted position allowing the rocking motion.

21. The seat apparatus of any of Paras 18-20, further comprising at least one entertainment feature positionable over the seat of the support assembly.

22. The seat apparatus of Para 21, wherein the at least one entertainment feature is rotational or removable away from a position over the seat of the support assembly.

23. The seat apparatus of any of Paras 18-22, wherein the support member further comprises an extensible linkage comprising first and second members telescopingly extensible and retractable relative to one another.

24. The seat apparatus of any of Paras 18-23, wherein detachment of the upper end of the support member from the head end of the support assembly allows the apparatus to be collapsed into a generally flat

compact configuration.

Claims

1. A seat and rocker apparatus comprising:

   a rocker base having a first end and a second end, and at least one rocker element between the first and second ends;
   a support assembly comprising a head end, a foot end, and a seat, the foot end of the support assembly being pivotally coupled to the rocker base; and
   an elevational support and adjustment mechanism operable between the rocker base and the support assembly to provide support and positional adjustment of the head end of the support assembly.

2. The seat and rocker apparatus of claim 1, wherein the rocker base comprises first and second rocker arms extending between the first and second ends of the rocker base.

3. The seat and rocker apparatus of claim 1 or 2, wherein the rocker base further comprises a brace pivotally coupled for repositioning between an extended position preventing rocking motion of the apparatus and a retracted position allowing rocking motion.

4. The seat and rocker apparatus of any preceding claim, wherein the elevational support and adjustment mechanism comprises first and second members telescopingly extensible and retractable relative to one another.

5. The seat and rocker apparatus of any preceding claim, wherein the elevational support and adjustment mechanism comprises at least one post having a lower end pivotally coupled to the rocker base, and an upper end coupled to the head end of the support assembly.

6. The seat and rocker apparatus of claim 5, wherein the upper end of the elevational support and adjustment mechanism is detachably coupled to the head end of the support assembly.

7. The seat and rocker apparatus of claim 6, wherein detachment of the upper end of the elevational support and adjustment mechanism from the head end of the support assembly allows the apparatus to be collapsed into a generally flat compact configuration.

8. A seat apparatus comprising:

   a base frame for supporting the apparatus upon a support surface;
   a support assembly comprising a head end, a foot end, and a seat, the foot end of the support assembly being pivotally coupled to the base frame; and
   an elevational support and adjustment mechanism operable between the base frame and the support assembly to provide support and positional adjustment of the head end of the support assembly relative to the support surface, wherein the elevational support and adjustment mechanism comprises a post having a lower end pivotally coupled to the base frame, and an upper end coupled to the head end of the support assembly.

9. The seat apparatus of claim 8, wherein the upper end of the post is coupled to the head end of the support assembly by an extensible linkage comprising first and second members telescopingly extensible and retractable relative to one another.

10. The seat apparatus of claim 8 or 9, wherein the upper end of the elevational support and adjustment mechanism is detachably coupled to the head end of the support assembly.

11. The seat apparatus of claim 10, wherein detachment of the upper end of the elevational support and adjustment mechanism from the head end of the support assembly allows the apparatus to be collapsed into a generally flat compact configuration.

12. The seat apparatus of any of claims 8-11, wherein the base frame comprises at least one arcuate rocker allowing a rocking motion of the apparatus relative to the support surface.

13. The seat apparatus of claim 12, further comprising a brace selectively repositionable between an extended position preventing the rocking motion and a retracted position allowing the rocking motion.

14. The apparatus of any of preceding claim, further comprising at least one entertainment feature positionable over the seat of the support assembly.

15. The apparatus of claim 14, wherein the at least one entertainment feature is rotational or removable away from a position over the seat of the support assembly.

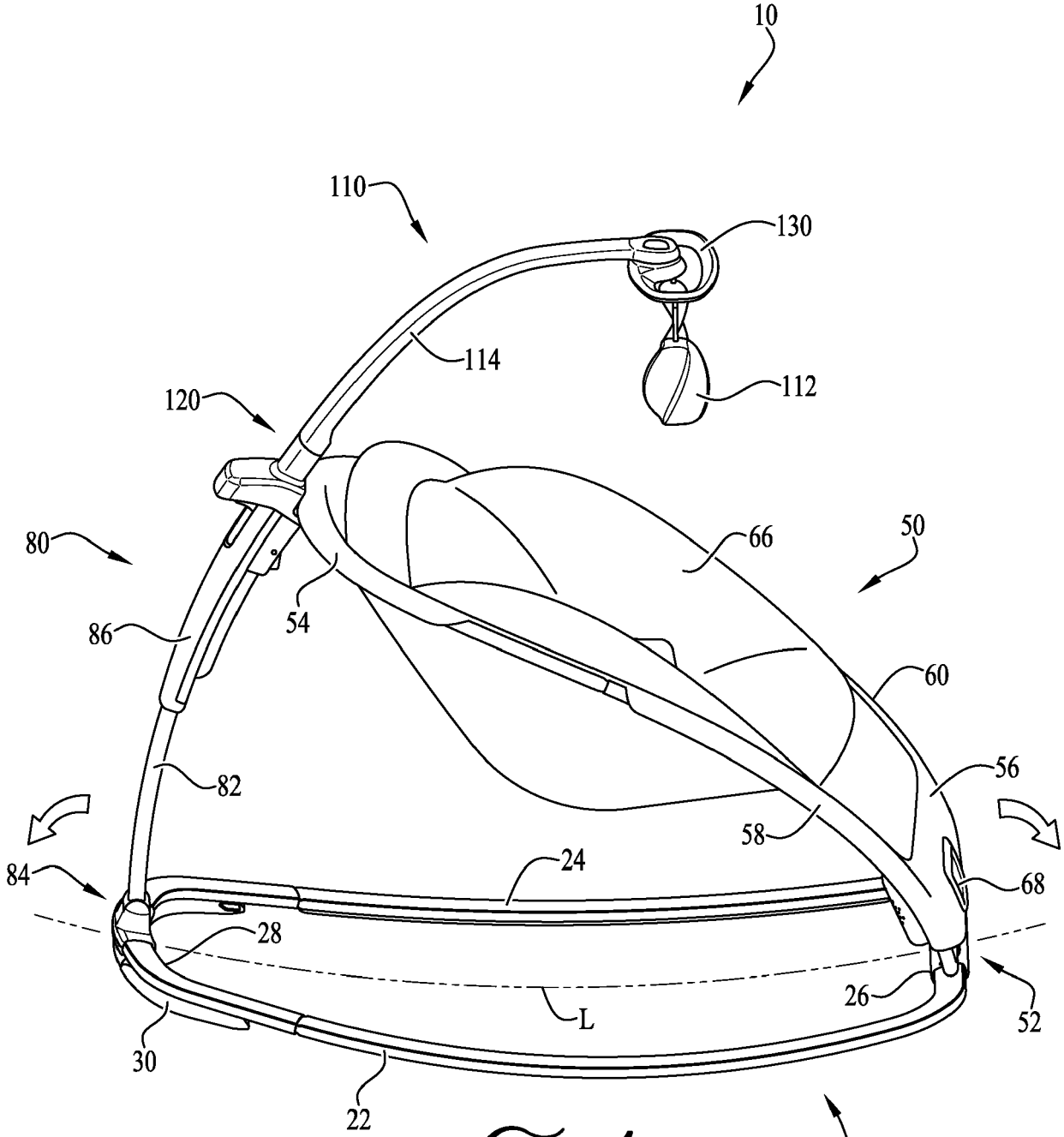
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Fig. 1

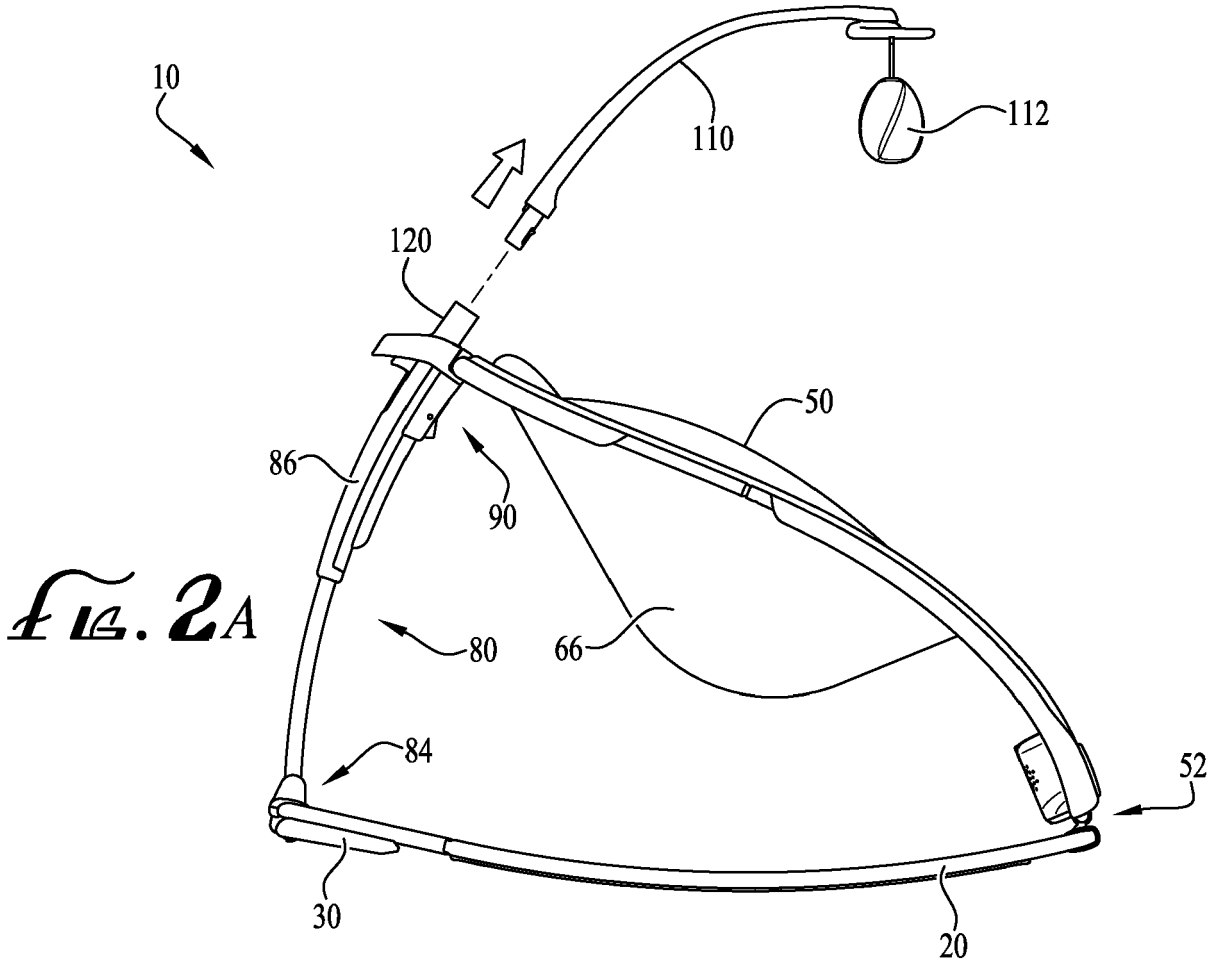
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FIG. 2A

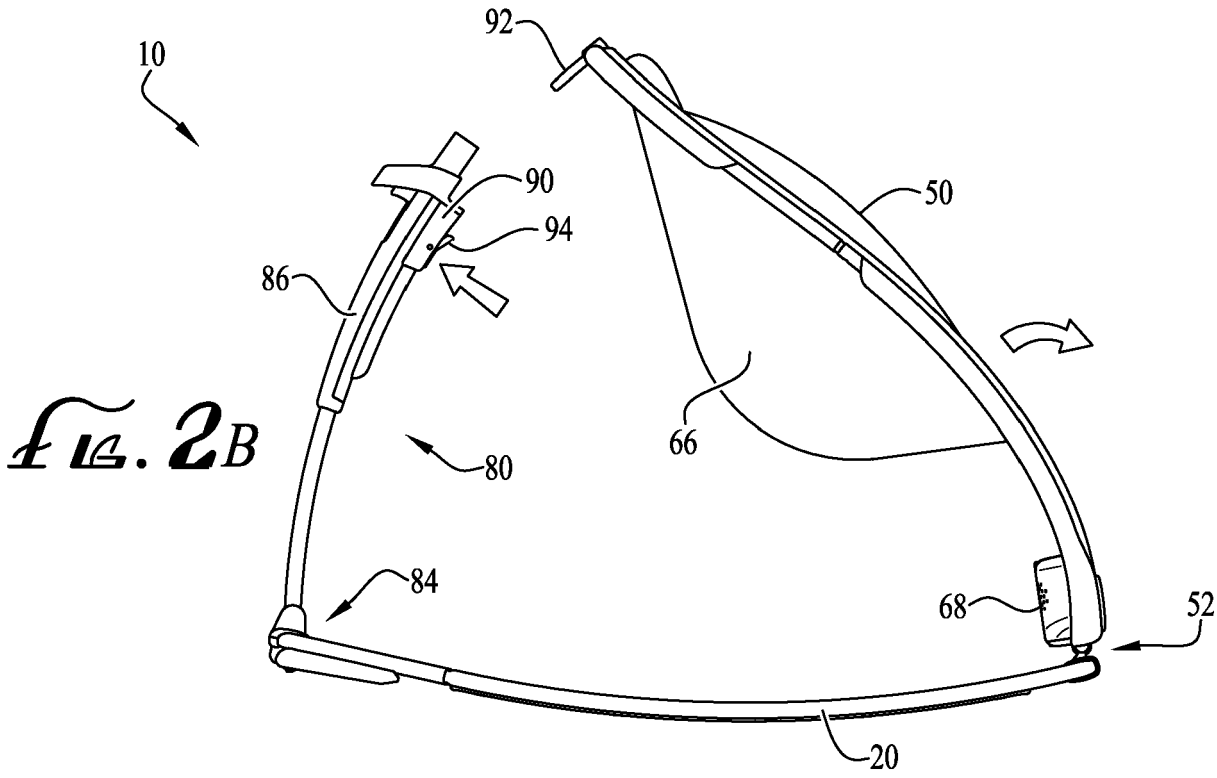
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FIG. 2B

FIG. 2C

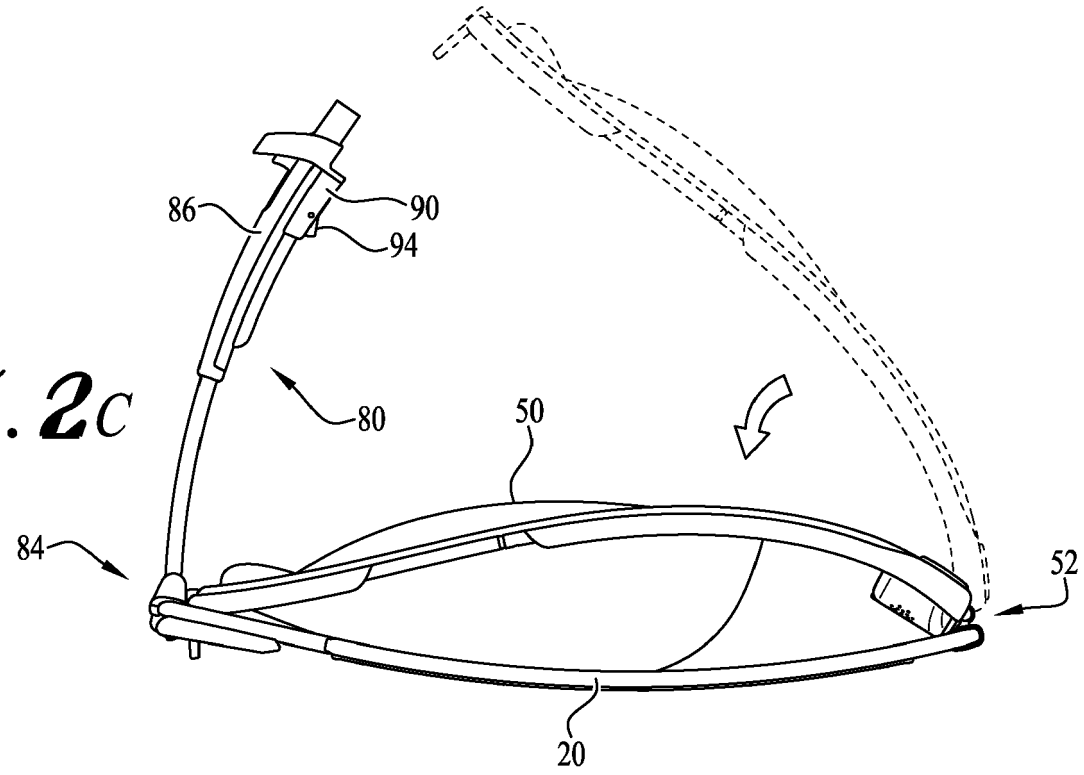
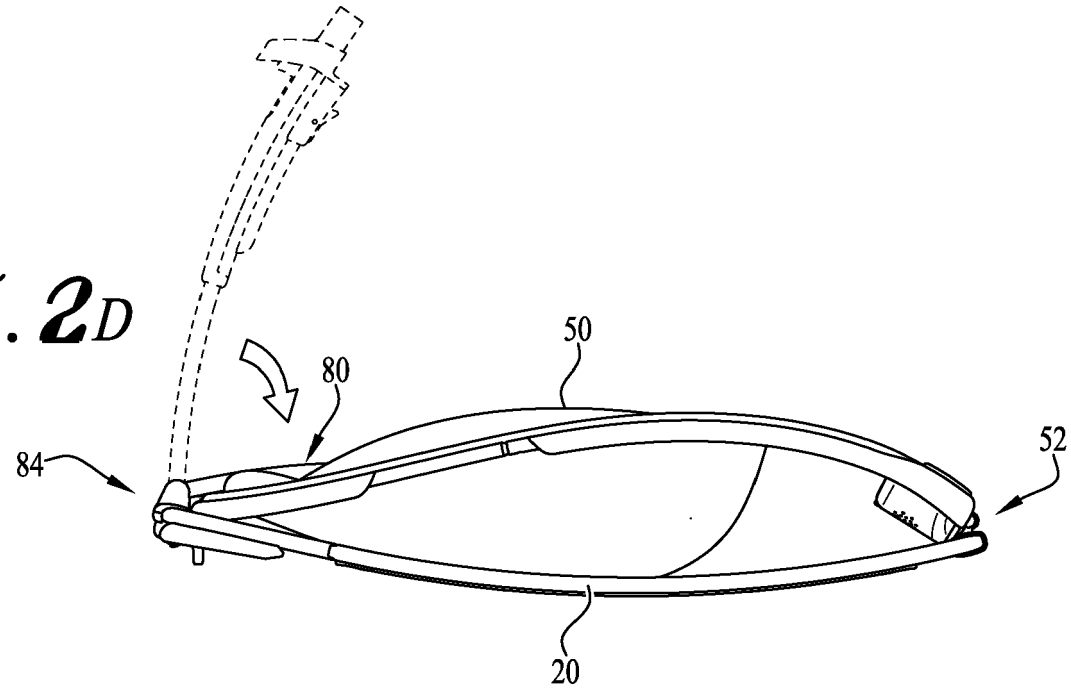


FIG. 2D



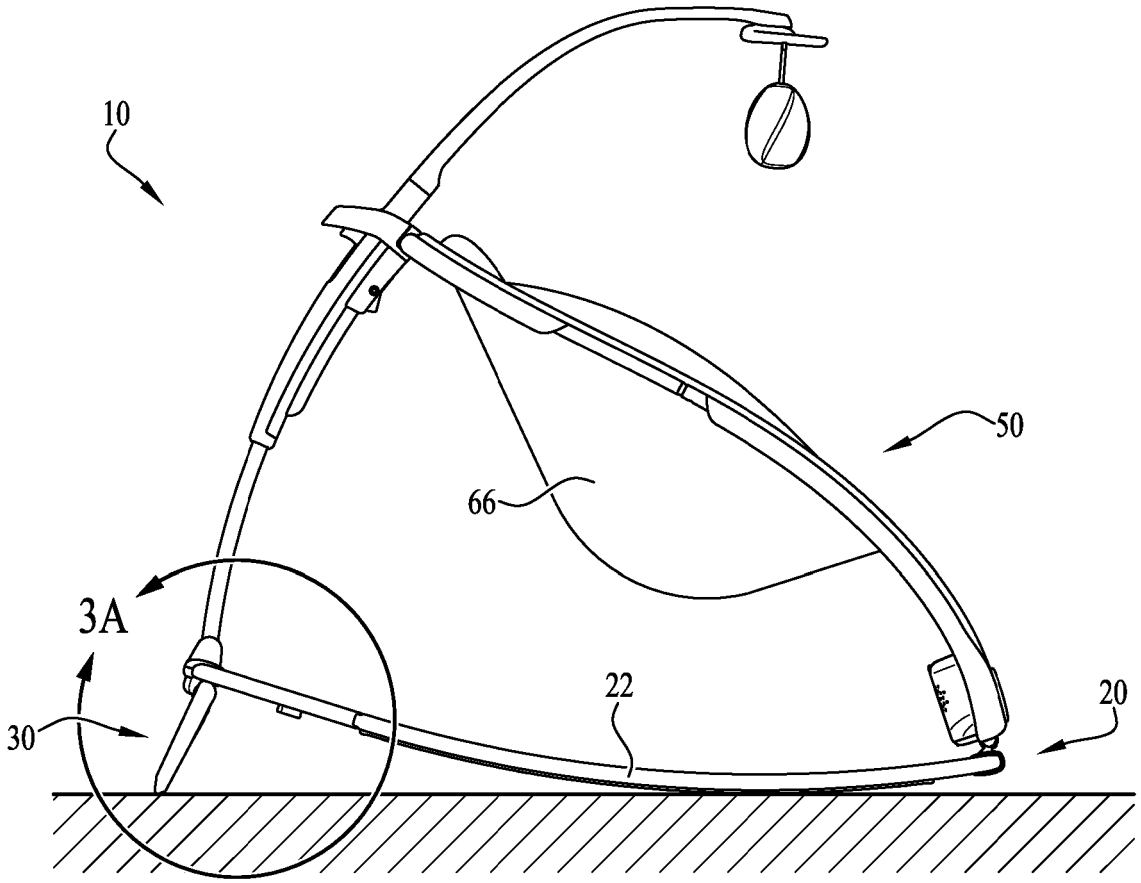


FIG. 3

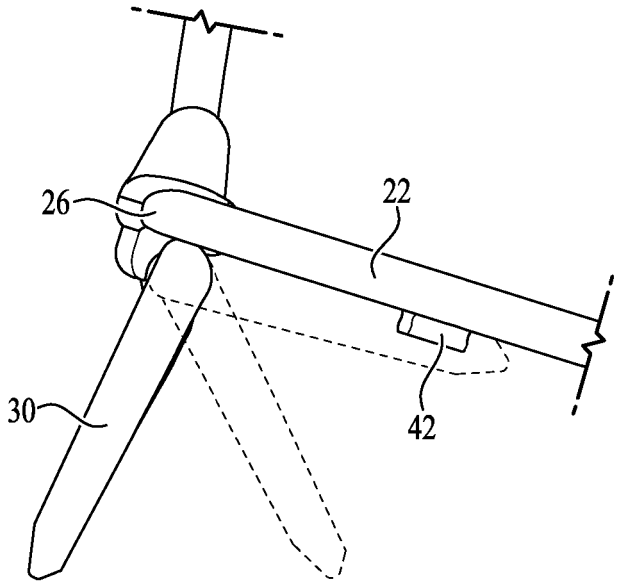


FIG. 3A

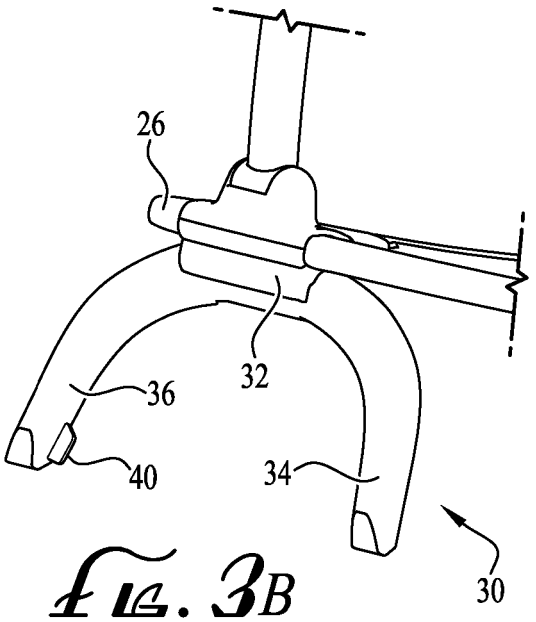


FIG. 3B

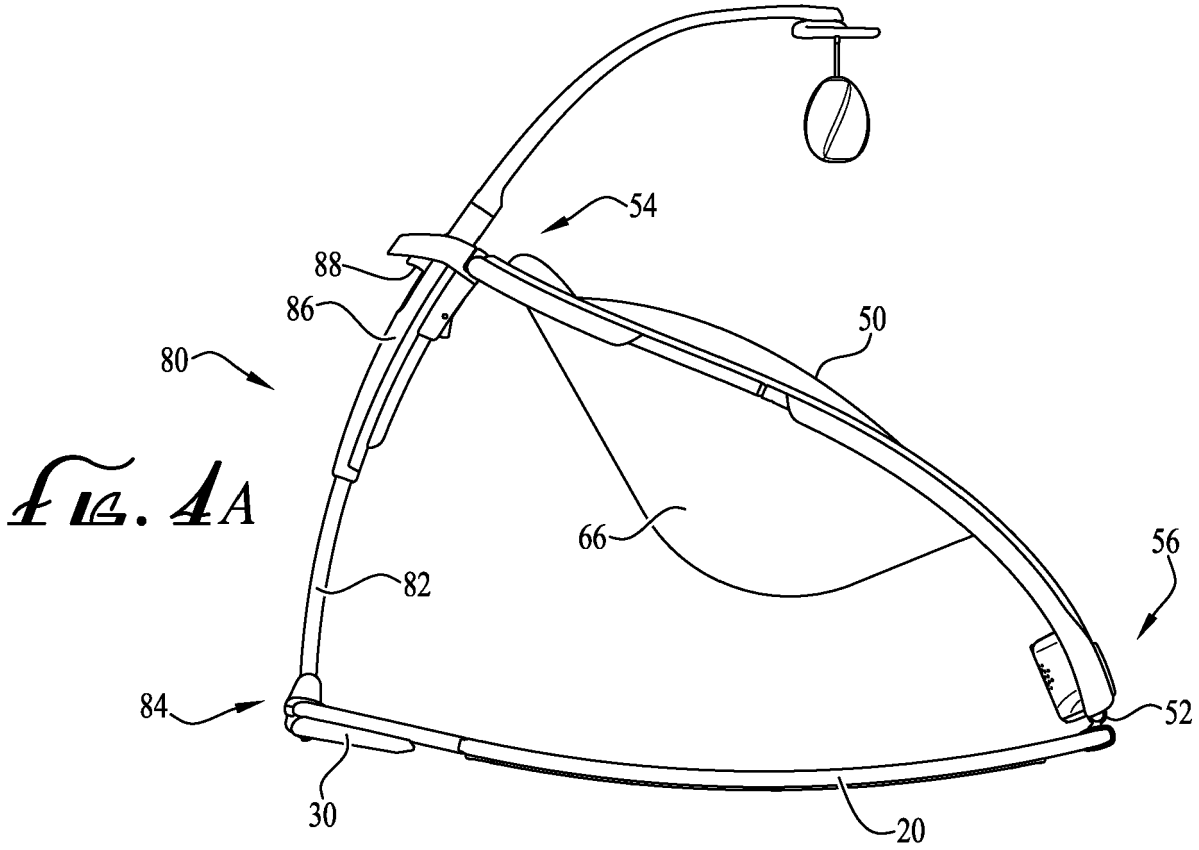


FIG. 4A

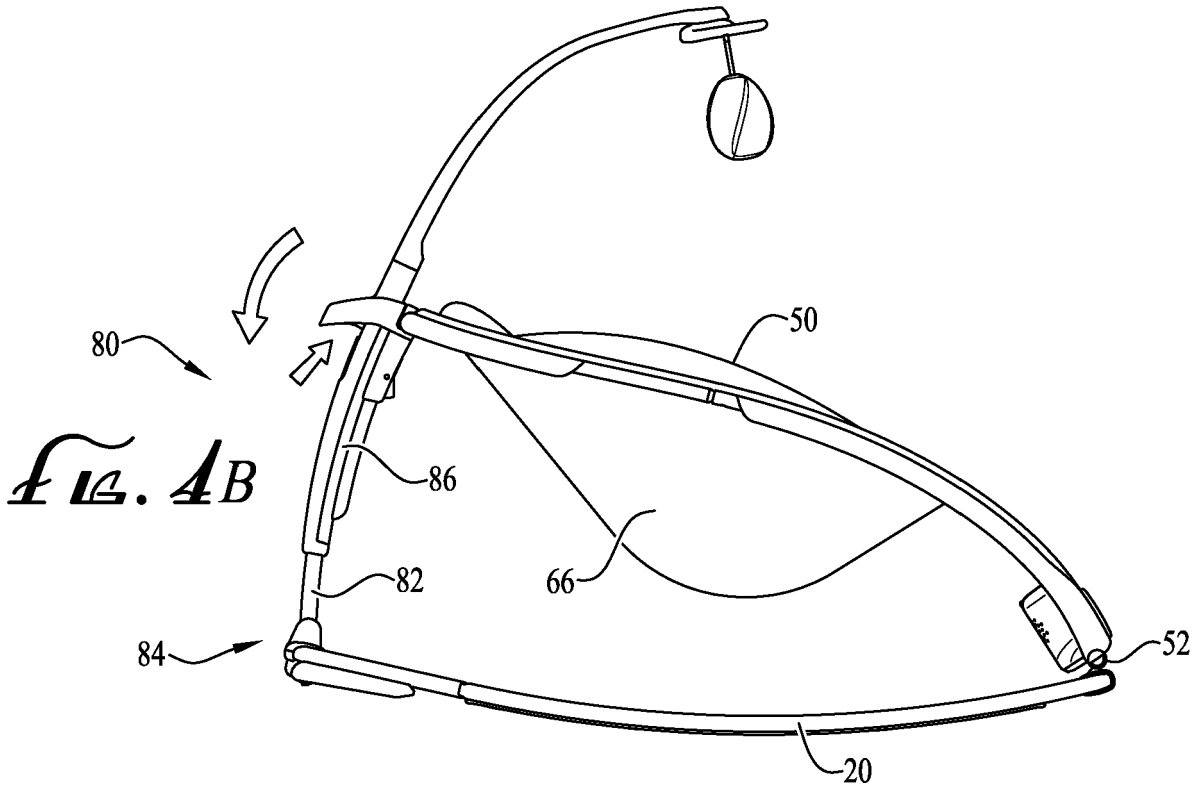


FIG. 4B

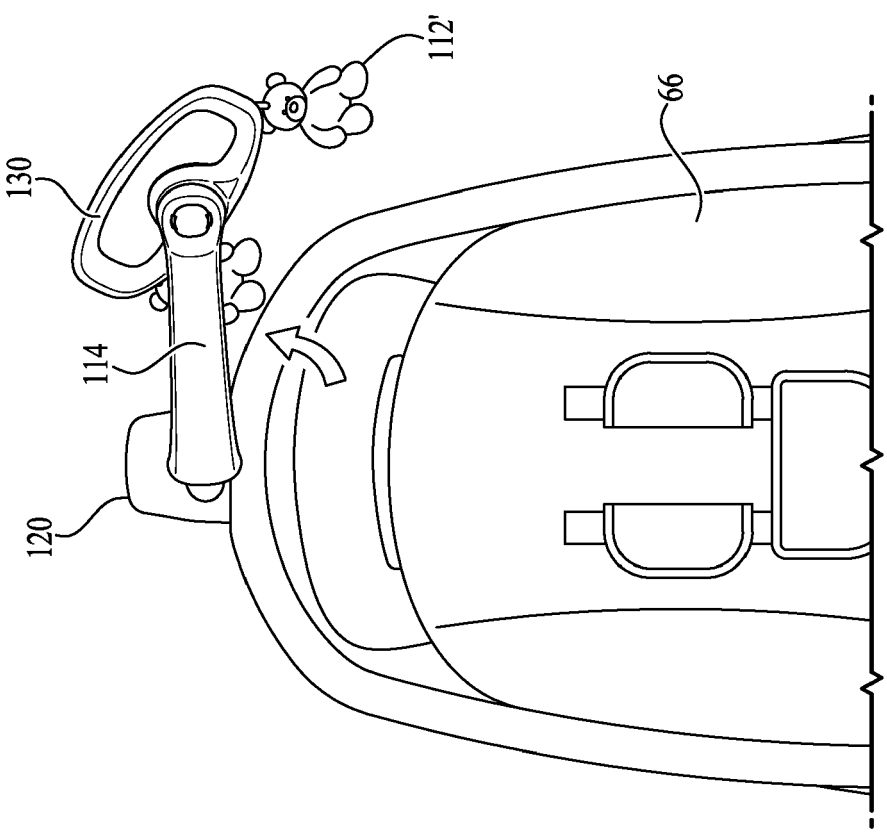


FIG. 5B

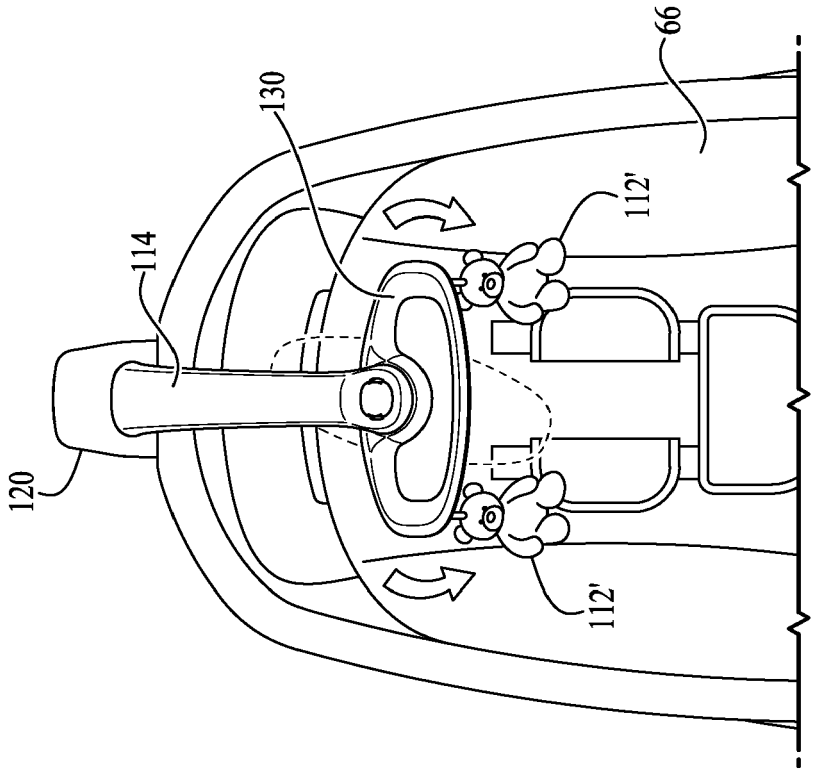


FIG. 5A

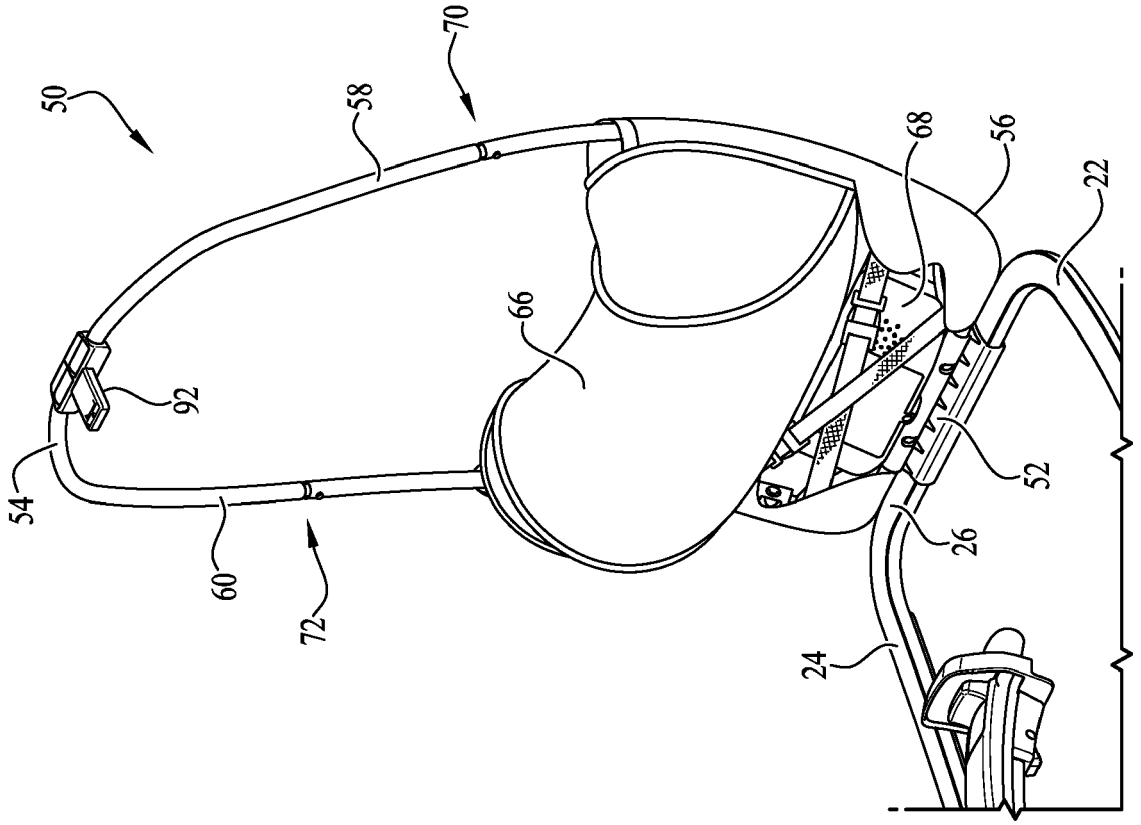


FIG. 6A

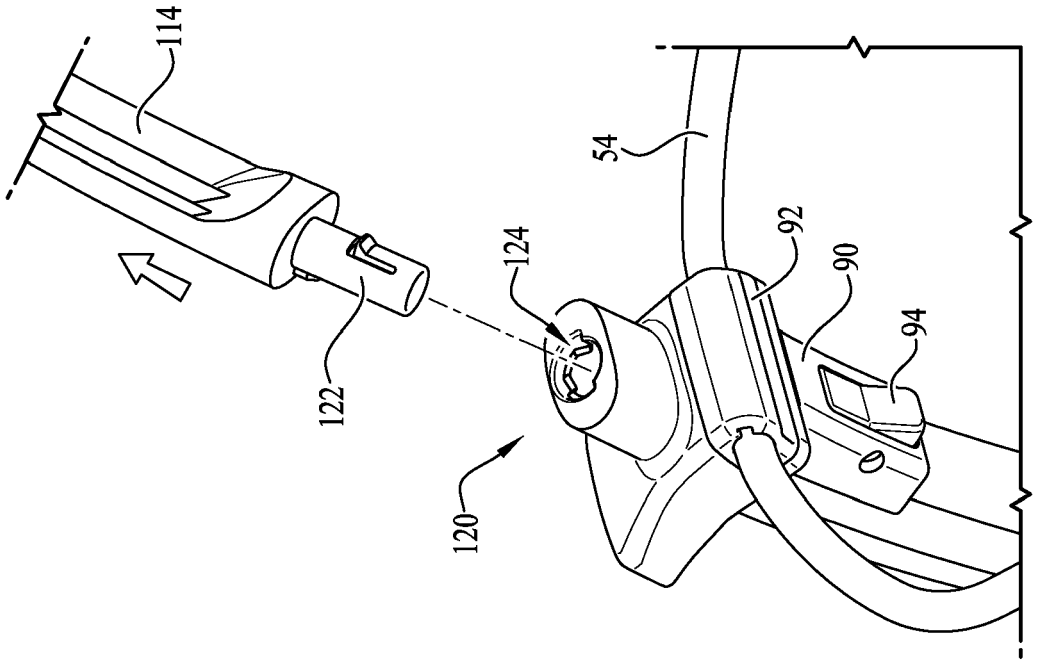


FIG. 5C

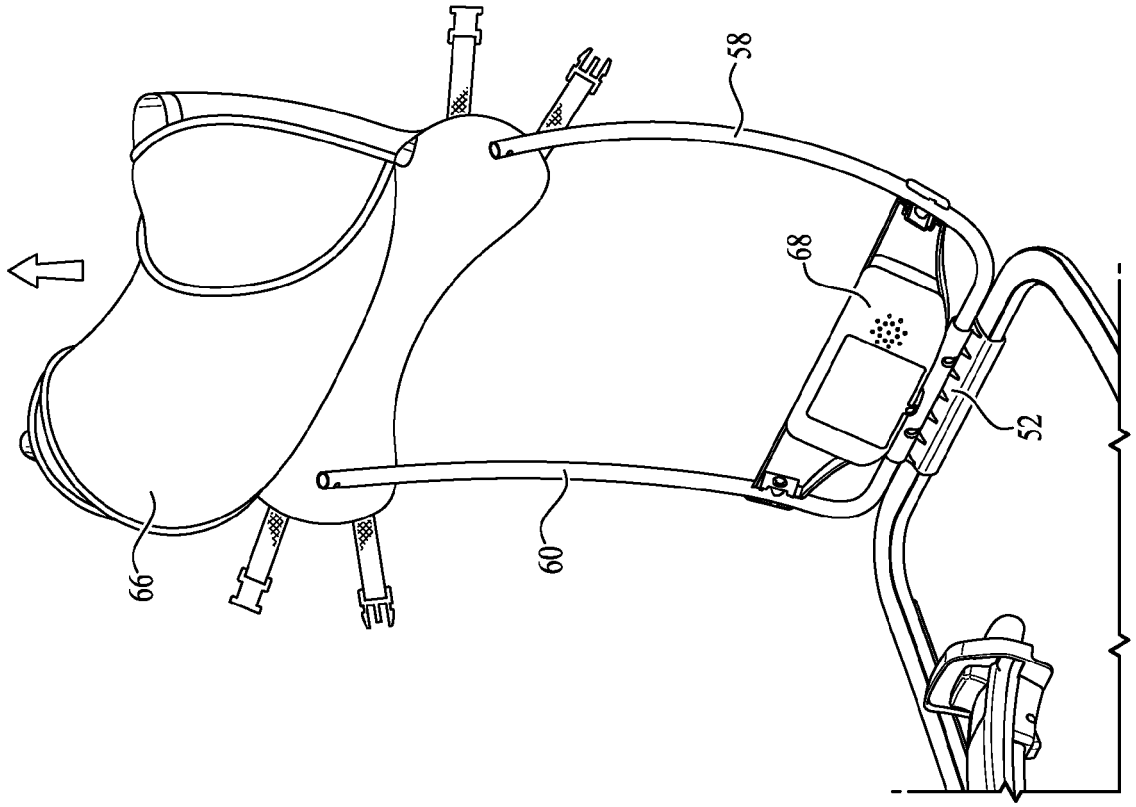


Fig. 6C

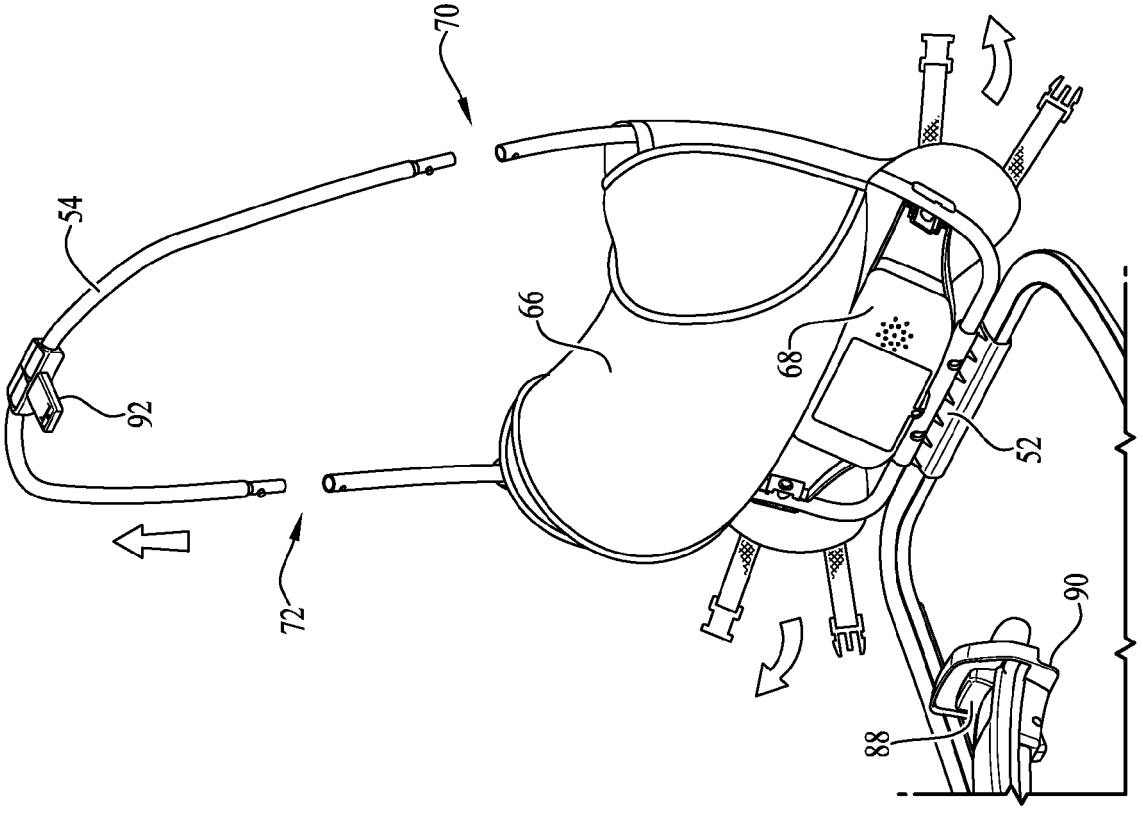


Fig. 6B

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EUROPEAN SEARCH REPORT

Application Number
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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A47D
A47C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 August 2017	Amghar, Norddin

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